TECHNICAL BULLETIN

DIAGNOSTIC PROGRAMS

FOR

AUTOMATIC

TELEPHONE

CENTRAL OFFICE

AN/TTC-38(V)

HEADQUARTERS, DEPARTMENT OF THE ARMY

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REPORTING OF ERRORS

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INTRODUCTION AND DESCRIPTION

Purpose and Scope. *a.* The diagnostic programs for Automatic Telephone Central Office AN/TTC-38(V) are essentially off-line functional fault detection programs. A particular order of program unit usage is a typical expectation in any diagnostic program package; however, each diagnostic program for the AN/TTC-38(V) is considered a separate entity and therefore, the program units can be executed in any order.

b. The diagnostic package contains two basic types of tests. One uses manual execution of instructions and control of the logic for detection purposes and the other depends upon program control and analysis of the resultant data flow. Detailed test/programs exercise instruction sequences and data flow to isolate failures to the functional level defined by each test. The level of function fault detection varies with the detectability of unique failure characteristics for the different units.

c. The introduction of various manual instruction and display activities from the Maintenance Control Panel establishes the basic "sanity" of the communication system, provides for the keying-in of a basic loader program, and confirms the capability of input operation and the continuation to storage and retrieval of data for error-free performance.

d. To assist in fault isolation, data flow diagrams have been provided, where possible, to show a pictorial order of program execution, the possible program halts to be encountered, and the particular problems signified by the program halt. The program halts designated on the flow diagrams represent points in the diagnostic program where technical assistance personnel must make a decision.

EXHIBIT A

MAINTENANCE CONTROL PANEL DIAGNOSTIC PROGRAM

Section I. GENERAL

There are two individual sections of the Maintenance Control Panel diagnostic program: manual and programmed tests. The two test sections are independent and therefore provide verification of the logic, associated with the Maintenance Control Panel, from different vantage points.

Both the manual and the programmed diagnostic programs are generally redundant in their ability to check the Maintenance Control Panel controls and indicators. Therefore, the programmed test for this purpose would normally be used since it is quicker. However, if problems exist, whereby the program cannot be loaded into memory, the manual diagnostic program can be used.

Section II. MANUAL DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED FOR INITIAL CONDITIONING

1. Set the MEMORY guarded switch to the UNPROTECTED position.
2. Set the PARITY ERROR HALT toggle switch to OFF.
3. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
4. Set the ADV-RPT toggle switch to ADV.
5. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
6. Set the RUN/ONE INSTR toggle switch to RUN.
7. Set the system status panel CONTROL TRANSFER guarded switch to DISABLE and observe that:
   a. PROCESSOR STATUS OFF-LINE Indicator is illuminated.
   b. ACTIVE indicator is illuminated.
   c. PRGM HALT indicator is illuminated.
8. Press the NORMAL HALT pushbutton switch and observe that:
   a. PRGM HALT indicator extinguishes.
   b. PRCS HALT indicator illuminates.
   c. ACTIVE indicator extinguishes.
9. Press and hold the LAMP TEST pushbutton switch.
10. Observe that all Maintenance Control Panel indicators, except the other PRCS IDENT indicator, illuminate.
11. Release the LAMP TEST pushbutton switch and observe that all indicators illuminated in step 10 above are extinguished.

THE FOLLOWING PROCEDURES TEST THE CLOCK
OPERATE CONTROL FUNCTIONS

12 Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the CLOCK OPERATE CONTROL to SINGLE PULSE.
13. Set the ADV-RPT toggle switch to RPT and observe that either the P1, P2, or P3 indicator lamp is illuminated.
14. Press the INITIATE pushbutton switch and observe that the same indicator lamp observed in step 13 above is still illuminated.
15. Set the ADV-RPT toggle switch to ADV.
16. Press the INITIATE pushbutton switch and observe that the next higher numbered indicator lamp illuminates. For example, if the P3 indicator lamp was illuminated in step 14 above, the P1 indicator lamp should now illuminate.

17. Set the ADV-RPT toggle switch to RPT.
18. Press the INITIATE pushbutton switch and observe that the same indicator lamp Illuminated in step 16 above remains illuminated.
19. Set the ADV-RPT toggle switch to ADV.
20. Press the INITIATE pushbutton switch and observe that the next higher numbered indicator lamp illuminates.
21. Set the ADV-RPT toggle switch to RPT.
22. Press the INITIATE pushbutton switch and observe that the same indicator lamp illuminated in step 20 above remains illuminated.
23. Set the CLOCK OPERATE CONTROL rotary switch to CONT and observe that the P1, P2, and P3 indicator lamps extinguish.
24. Set the ADV-RPT toggle switch to ADV.

THE FOLLOWING PROCEDURES TEST THE MEMORY STORE AND DISPLAY FUNCTIONS

25. Set the REGISTER SELECT rotary switch to MEM.
26. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
27. Set the ASR toggle switches to 010000.
28. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays the contents of memory address 10000. If the memory was cleared before performing this step, the BUS INDICATOR will display all 0's.
29. Set the REGISTER SELECT rotary switch to EOA and observe that the BUS INDICATOR displays a reading of 00010000.

NOTE

This is the effective operand address which was entered into memory in steps 27 and 28 above.

30. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to MEM.
31. Set the WSR toggle switches to all 7's.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.
33. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 7's.

NOTE

This is the new contents of memory address 010000.

THE FOLLOWING PROCEDURES TEST THE SEQUENTIAL STORE FUNCTIONS

35. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
36. Set the WSR and the ASR toggle switches to all o's.
37. Set the RUN//ONE INSTR toggle switch to RUN.
38. Press the INITIATE pushbutton switch.
39. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
40. Observe that the BUS INDICATOR displays a reading of 77777777.
41. Set the WSR toggle switches to all 7's.
42. Press and hold the COORDINATE pushbutton switch and then press the INITIATE pushbutton switch.
43. Observe that the PRCS HALT indicator extinguishes and the ACTIVE indicator illuminates.

NOTE

The above procedures causes 77777777 to be stored in all memory addresses from the address set in step 36 above (memory page 0, address 0).

44. Press the NORMAL HALT pushbutton switch and observe that:
    a. PRCS HALT indicator illuminates.
    b. ACTIVE indicator extinguishes.
    c. BUS INDICATOR displays a reading of 77777777.
45. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
46. Set the ASR toggle switches to 051000.
47. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
48. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 7's.

NOTE

Contents of memory page 0, location 11000.

49. Set the ASR toggle switches to 15000.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.

NOTE

Contents of memory page 1, location 11000.

51. Set the ASR toggle switches to 251000.
52. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.

NOTE

Contents of memory page 2, location 11000.

THE FOLLOWING PROCEDURES TEST THE WORD
SWITCH REGISTER FUNCTIONS

53. Set the WSR toggle switches to 01234567.
54. Set the ASR toggle switches to 037774.
55. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 01234567.
56. Set the OPERATIONAL CONTROL rotary switch to STORE.
57. Set the WSR toggle switches to all 0's.
58. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000000.
59. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
60. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 0's.

THE FOLLOWING PROCEDURES TEST THE
REGISTER SELECTION FUNCTION

61. Set the OPERATIONAL CONTROL rotary switch to STORE.
62. Set the WSR toggle switches to all 7's.
63. Set the REGISTER SELECT rotary switch, in sequence, to each position listed on the attached Table X. Press the INITIATE pushbutton switch after each setting and observe that the BUS INDICATOR displays the numerical value listed.

Table X

REGISTER SELECT rotary switch	*BUS INDICATOR reading*
SBR	00177777
LSR	01000077
OAR	03707777
IAR	03707777
MO	xxxxxxxx
MEM	77777777
PEX	00377777
PC	00077777
EOA	00077777
A	77777777
B	77777777
Q	7777777
IR	77777777
CPS	3777020x (NOTE)
CPD	77770200
BR	00000770
SHC	00000000
RTC	17777777
SC1	00000X00
SC2	xxxxxxxx

NOTE

DATA WORD and INSTR WORD indicators illuminate. WSR bit 21 should equal 0. Observe and record the indications of WSR bits 22 and 23 for later checks outlined in Section V.

THE FOLLOWING PROCEDURES TEST THE REGISTER CLEARING FUNCTIONS

64. Set the REGISTER SELECT rotary switch to PEX.
65. Press the CLEAR pushbutton switch and observe that:
    a. DATA WORD indicator extinguishes.
    b. INSTR WORD indicator extinguishes.
    c. BUS INDICATOR displays a reading of 00000000.
65.1. Set the WSR and ASR toggle switches to all 0's.
66. Set the REGISTER SELECT rotary switch, in sequence, to each position listed on the attached Table XX and observe that the BUS INDICATOR displays the numerical value listed.

Table XX

REGISTER SELECT rotary switch	*BUS INDICATOR reading*
SBR	00000000
LSR	00000000
OAR	00100000
IAR	00100000
MO	77777777
MEM	00000000
PEX	00000000
PC	00000000
EOA	00000000
A	00000000
B	00000000
Q	00000000
IR	00000000
CPS	0010000X (NOTE)
CPD	40000000
BR	00000000
SHC	00000000
RTC	00000000
SC1	00000000
SC2	00000000

NOTE

WSR bit 21 should equal 0. Observe and record the indications of WSR bits 22 and 23 for later checks outlined in Section V.

THE FOLLOWING PROCEDURES TEST THE CONTROL PANEL
INSTRUCTIONS FUNCTIONS

67. Press the CLEAR pushbutton switch.
68. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR.
69. Set the WSR toggle switches to 12200001. This number represents an instruction (ADDC 1) which added 1 to the content of the accumulator (A register).
70. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 0's.
71. Set the REGISTER SELECT rotary switch to IR and observe that the BUS INDICATOR displays a reading of 12200001.
72. Set the REGISTER SELECT rotary switch to position A and observe that the BUS INDICATOR displays a reading of 00000001.
73. Set the RUN/ONE INSTR toggle switch to RUN.
74. Press the INITIATE pushbutton switch and observe that the PRCS HALT indicator extinguishes and the ACTIVE indicator illuminates.
75. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the ACTIVE indicator extinguishes.
76. Observe that the BUS INDICATOR displays any number except 00000001.

NOTE

While the ACTIVE Indicator was illuminated, the processor repeatedly executed the ADDC 1 instruction; the number one was added to the accumulator many times. The number displayed in step 76 above is the sum of this repetitive addition process. If a BUS INDICATOR reading of 00000001 is displayed, repeat the procedure at least once to verify that there is a malfunction.

THE FOLLOWING PROCEDURES TEST THE ONE-
INSTRUCTION FUNCTION

77. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
78. Set the WSR toggle switches to all 7's.
79. Set the OPERATIONAL CONTROL rotary switch to STORE.
80. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.
81. Set the REGISTER SELECT rotary switch to PEX.
82. Set the WSR toggle switches to 00050000.
83. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00050000.
84. Set the REGISTER SELECT rotary switch to MEM.
85. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL.
86. Set the WSR toggle switches to 55037774.
87. Set the ASR toggle switches to 00050000.
88. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 55037774.
89. Set the WSR toggle switches to all 0's.
90. Set the REGISTER SELECT rotary switch to position A and the OPERATIONAL CONTROL to CMPT.
91. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.

THE FOLLOWING PROCEDURES TEST THE FUNCTION
CODE AND ADDRESS SWITCH REGISTER FUNCTION

92. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INST.
93. Set the WSR toggle switches to 55037756.
94. Set the function code to 77.
95. Set the ASR toggle switches to 377777.

96. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77377777.
97. Set the function code to 00.
98. Set the ASR toggle switches to 00000.
99. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 0's.

THE FOLLOWING PROCEDURES TEST THE REAL TIME CLOCK FUNCTION

100. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
101. Set the WSR toggle switches to 00044777 (memory page 0, location 044777).
102. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00044777.
103. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
104. Set the WSR toggle switch to the settings shown in *a* through *d* below, in sequence, and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the indicated instruction word.
    a. 00160000.
    b. 55230707.
    c. 60144777.
    d. 22045000.
105. Verify that the REAL TIME CLOCK guarded switch is in the DISABLE position.
106. Set the REGISTER SELECT rotary switch to RTC and observe that the BUS INDICATOR displays all 0's.
107. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
108. Set the WSR toggle switches to 00045000.
109. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00045000.
110. Set the OPERATIONAL CONTROL rotary switch to CMPT.
111. Set the RUN/ONE INSTR toggle switch to RUN.
112. Press the INITIATE pushbutton switch and observe that the PRGM HALT indicator extinguishes and the ACTIVE indicator illuminates.
113. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the ACTIVE indicator extinguishes.
114. Set the REGISTER SELECT rotary switch to RTC and observe that the BUS INDICATOR displays all 0's.
115. Set the REAL TIME CLOCK guarded switch to the ENABLE position.
116. Press the INITIATE pushbutton switch and observe that the PRCS HALT indicator extinguishes and the ACTIVE indicator illuminates.
117. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the ACTIVE indicator extinguishes.
118. Observe that the BUS INDICATOR does not display 00000000.

THE FOLLOWING PROCEDURES TEST THE READ PUSHBUTTON SWITCH FUNCTION

119. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
120. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
121. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00045000.
122. Set the OPERATIONAL CONTROL rotary switch to CMPT.

123. Set the RUN/ONE INSTR toggle switch to RUN.
124. Press the INITIATE pushbutton switch and observe that the ACTIVE indicator illuminates.
125. Press the READ and NORMAL HALT pushbutton switches, in turn, and observe that the BUS INDICATOR displays a reading of 00045002.
126. Set the REGISTER SELECT rotary switch to CPS and observe that bit 12 of the BUS INDICATOR display equals 1.

THE FOLLOWING PROCEDURES TEST THE IMMEDIATE HALT SWITCH FUNCTION

127. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
128. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
129. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00045000.
130. Set the OPERATIONAL CONTROL rotary switch to CMPT.
131. Set the RUN/ONE INSTR toggle switch to RUN.
132. Press the INITIATE pushbutton switch and then the IMMED HALT pushbutton switch and observe that the PRCS HALT indicator is illuminated.
133. Set the REGISTER SELECT rotary switch to SC1 and observe that the BUS INDICATOR displays some 1's from bits 00 through 18.
134. Set the REGISTER SELECT rotary switch to SC2 and observe that the BUS INDICATOR displays some 1's from bits 00 through 18.

THE FOLLOWING PROCEDURES TEST THE MEMORY PROTECTION FUNCTION

135. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator is illuminated.
136. Press the CLEAR pushbutton switch.
137. Set the MEMORY guarded switch to the PROTECTED position.
138. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
139. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
140. Set the ASR toggle switches to 160000.

NOTE

Memory page 1, location 20000.

141. Set the REGISTER SELECT rotary switch to MEM.
142. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00030707.
143. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
144. Press the INITIATE pushbutton switch and observe that the US INDICATOR displays a reading of 00045000.
145. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
146. Set the WSR toggle switches to 60137756.
147. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 60137756.
148. Set the OPERATIONAL CONTROL rotary switch to STORE AND THE REGISTER SELECT to PEX.
149. Set the WSR toggle switches to 00045000.
150. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00045000.
151. Set the OPERATIONAL CONTROL rotary switch to CMPT.
152. Set the RUN/ONE INSTR toggle switch to RUN.
153. Press the INITIATE pushbutton switch and observe that the PRGM HALT and ACTIVE indicators illuminate.

154. Press the NORMAL HALT pushbutton switch and observe:
    a. PRCS HALT indicator illuminates.
    b. PRGM HALT and ACTIVE indicators extinguish.
155. Set the REGISTER SELECT rotary switch to CPS and observe that BUS INDICATOR bit 07 equals 1.
156. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
157. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
158. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00030707.

Section III. PROGRAMMED TAPE DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES WRITE ALL 1's INTO
MEMORY EXCEPT FOR LOCATION 15000

1. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
2. Set the MEMORY guarded switch to the UNPROTECTED position.
3. Set the RUN/ONE INSTR toggle switch to RUN.
4. Set the WSR toggle switches to all 7's.
5. Press and hold the COORDINATE pushbutton switch.
6. Press the INITIATE pushbutton switch and then simultaneously release both the INITIATE and COORDINATE pushbutton switches.
7. Observe that the ACTIVE indicator illuminates and the PRCS HALT indicator is extinguished.
8. Press the NORMAL HALT pushbutton switch and observe that:
    a. ACTIVE Indicator extinguishes.
    b. PRCS HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 77777777.
9. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
10. Set the ASR toggle switches to 15000.
11. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
12. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.
13. Set the WDR toggle switches to 01234567.
14. Set the OPERATIONAL CONTROL rotary switch to STORE.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 01234567.
16. Set the REGISTER SELECT rotary switch to PEX.
17. Set the WSR toggle switches to 00000400.
18. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000400.
19. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
20. Set the WSR toggle switches to the instruction word settings shown in Table XXX, in sequence, and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the indicated instruction word.

Table XXX

Instruction word	*Address location*
01202404	00000400
00000400	00000401
05200377	00000402
24000405	00000403
22000400	00000404
70100001	00000405
70000001	00000406
01202400	00000407
00000400	00000410
02200400	00000411
24000407	00000412
01202404	00000413
00000400	00000414
34000020	00000415
35000010	00000416
72000001	00000417
74000003	00000420
22000407	00000421
62500475	00000422
72100001	00000423
74100235	00000424
22000406	00000425
00000500	00000426

21. Set the REGISTER SELECT rotary switch to PEX and observe that the BUS INDICATOR displays a reading of 00000427.
22. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator is illuminated.
23. Set the OPERATIONAL CONTROL rotary switch to STORE.
24. Set the WSR toggle switches to 00000400.
25. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000400.
26. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
27. Set the WSR toggle switches to 51137754.
28. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays the instruction word readings indicated on Table XXX in step 20 above.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE OFF-LINE DIAGNOSTIC LEADER PROGRAM INTO MEMORY

29. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
30. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
31. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
32. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic loader tape moves.
33. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
34. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
35. Observe that the BUS INDICATOR displays a reading of 00000427.
36. Set the WSR toggle switches to 00000400.

37. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000400.
38. Set the OPERATIONAL CONTROL rotary switch to CMPT.
39. Set the RUN/ONE INSTR toggle switch to RUN.
40. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tape starts to load into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000427.
41. Rewind the diagnostic loader tape by setting the system status panel TAPE READ REWIND toggle switch to ON.

THE FOLLOWING PROCEDURES LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

42. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
42.1. Set the PARITY ERROR toggle switch to OFF.
42.2. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
42.3. Set the ADV-RPT toggle switch to ADV.
43. Set the system status panel CONTROL TRANSFER toggle switch to the DISABLE position.
44. Load the Bootstrap Diagnostic Program (SM-D-751714) and Maintenance Control Panel Diagnostic Program (SM-D-751718) tape reel on the paper tape reader.

NOTE

The two segment Bootstrap Diagnostic Program must be loaded into memory prior to loading in the one segment Maintenance Control Panel Diagnostic Program.

45. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
47. Set the OPERATIONAL CONTROL rotary switch to STORE.
48. Set the WSR toggle switches to 00000500.
49. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000500.
50. Set the OPERATIONAL CONTROL rotary switch to CMPT.
51. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tapes move.
52. Press the INITIATE pushbutton switch and observe that:
    a. Diagnostic program tapes start to load into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
53. Press the INITIATE pushbutton switch for a total of three (3) times and verify that the same indications obtained in step 52 above are observed.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING ADDRESS INTO MEMORY

54. Press the NORMAL HALT and the CLEAR pushbutton switches.
55. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
56. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
57. Set the ASR toggle switches to 00011314.
58. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00042000.
59. Set the OPERATIONAL CONTROL rotary switch to STORE.
60. Set the WSR toggle switches to 00047000.
61. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00047000.

62. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates and the PRGM HALT indicator extinguishes.
63. Press the CLEAR pushbutton switch and observe that the BUS INDICATOR displays all 0's.
64. Set the REGISTER SELECT rotary switch to PEX.
65. Set the WSR toggle switches to 00010000.
66. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010000.
67. Set the system status panel LOCAL PRINTER toggle switch to ON.
68. Press the system status panel RESET pushbutton switch.
69. Set the WSR toggle switches to all 0's.

THE FOLLOWING PROCEDURES ARE USED TO TEST A PROGRAM HALT

70. Set the OPERATIONAL CONTROL rotary switch to CMPT.
71. Set the RUN/ONE INSTR toggle switch to RUN.
72. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. PRCS HALT indicator extinguishes.
    c. ACTIVE Indicator is illuminated.
    d. BUS INDICATOR displays a reading of 00010014.
    e. MCP TEST message is generated on the page printer.

THE FOLLOWING PROCEDURES ARE USED TO TEST THE STORE SEQUENTIAL MODE

73. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010055.
74. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010214.

NOTE

If the BUS INDICATOR displays address 00010070, It indicates an error while reading all 1's from memory. If the BUS INDICATOR displays address 00010205, it indicates an error occurred reading location 15000 for 01234567. Memory Location 11313 will have the address at which the all 1's test failed.

THE FOLLOWING PROCEDURES ARE USED TO TEST THE WORD SWITCH REGISTER

75. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010232.
76. Set the WSR toggle switches to all 7's.
77. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010254.
78. Set the WSR toggle switches to all 0's.
79. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010272.
80. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010300.
81. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010316.

THE FOLLOWING PROCEDURES ARE USED TO TEST THE CONTROL PANEL INSTRUCTION FUNCTION

82. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
83. Press the NORMAL HALT pushbutton switch and observe:
    a. PRCS HALT indicator Illuminates.
    b. PRGM HALT indicator extinguishes.

84. Set the WSR toggle switches to 55037774.
85. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR.
86. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010317.
87. Set the OPERATIONAL CONTROL rotary switch to CMPT.
88. Set the RUN/ONE INSTR toggle switch to RUN.
89. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. ACTIVE indicator illuminates.
    c. BUS INDICATOR displays a reading of 00010324.
90. Set the WSR toggle switches to all 0's.

THE FOLLOWING PROCEDURES TEST THE REGISTER SELECT SWITCH FUNCTION

91. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. DATA WORD indicator illuminates.
    c. BUS INDICATOR displays a reading of 00010375.
92. Set the REGISTER SELECT rotary switch, in sequence, to each position listed in Table IX below and observe that the BUS INDICATOR displays the numerical value listed.

Table IX

REGISTER SELECT rotary switch	*BUS INDICATOR readings*
SBR	00037764
LSR	67405067
OAR	03607766
IAR	03607765
MO	00010375
MEM	00000000
PEX	00010375
PC	00010375
EOA	00010375
A	37750377
B	00000000
Q	37751377
IR	00010375
CPS	3x340x0x (NOTE)
CPD	37630200
BR	00000770
SHC	00000000
RTC	17737762
SC1	20000000
SC2	00000000

NOTE
CPS bit 21 should equal 1.

93. Set the REGISTER SELECT rotary switch to PEX.

THE FOLLOWING PROCEDURES ARE USED TO TEST THE CLEAR FUNCTION

94. Press the INITIATE pushbutton switch and observe that:
    a. ACTIVE indicator illuminates.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 00010532.
95. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
96. Press the CLEAR pushbutton switch.
97. Set the REGISTER SELECT rotary switch, in sequence, to each position listed in Table XV below and observe that the BUS INDICATOR displays the numeric value listed.

Table XV

REGISTER SELECT rotary switch	*BUS INDICATOR readings*
SER	00000000
LSR	00000000
OAR	00100000
IAR	00100000
MO	77777777
MEM	00000000
PEX	00000000
PC	00000000
EOA	00000000
A	00000000
B	00000000
Q	00000000
IR	00000000
CPS	0010000x (NOTE)
CPD	40000000
BR	00000000
SHC	00000000
RTC	00000000
SC1	00000000
SC2	00000000

NOTE

CPS bit 21 should equal 1.

THE FOLLOWING PROCEDURES ARE USED TO RESTORE THE PEX REGISTER

98. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
99. Set the WSR toggle switches to 00010532.
100. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00010532.
101. Set the OPERATIONAL CONTROL rotary switch to CMPT.
102. Press the INITIATE pushbutton switch and observe that:
    a. ACTIVE indicator illuminates.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 00010714.

THE FOLLOWING PROCEDURES TEST THE ONE INSTRUMENT ON FUNCTION

103. Press the NORMAL HALT pushbutton switch and observe that:
    a. PRCS HALT indicator illuminates.
    b. PRGM HALT and ACTIVE indicators extinguish.
104. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
105. Press the INITIATE pushbutton switch and observe:
    a. PRGM HALT Indicator illuminates.
    b. PRCS HALT indicator extinguishes.
    c. BUS INDICATOR displays a reading of 00C715.
106. Set the RUN/ONE INSTR toggle switch to RUN.
107. Press the INITIATE pushbutton switch and observe that:
    a. ACTIVE Indicator illuminates.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 00011020.

THE FOLLOWING PROCEDURES TEST THE READ PUSHBUTTON SWITCH FUNCTION AND THE MEMORY PROTECT FUNCTION FOR BOTH PAGE 1 AND 2

108. Set the MEMORY guarded switch to the PROTECTED position.

109. Press the INITIATE pushbutton switch and then immediately the READ pushbutton switch.
110. Observe that the PRGM HALT indicator illuminates and the BUS INDICATOR displays a reading of 00011121.

THE FOLLOWING PROCEDURES TEST THE FUNCTION CODE AND THE ADDRESS SWITCH REGISTER

111. Set the MEMORY guarded switch to the UNPROTECTED position.
112. Set the function code to 77.
113. Set the ASR toggle switches to 377777.
114. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00011133.
115. Set the function code and the ASR toggle switches to all 0's.
116. Press the INITIATE pushbutton switch and observe:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00011200.

THE FOLLOWING PROCEDURES TEST THE REAL TIME CLOCK ENABLE SWITCH

117. Set the REAL TIME CLOCK guarded switch to the ENABLE position.
118. Press the INITIATE pushbutton switch and observe:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00011225.

THE FOLLOWING PROCEDURES TEST THE NORMAL HALT FUNCTION

119. Press the INITIATE and then the NORMAL HALT pushbutton switches and observe that the PRGM HALT. indicator extinguishes and then illuminates, and the ACTIVE indicator illuminates and then extinguishes.
120. Set the OPERATIONAL CONTROL rotary switch to STORE.
121. Set the WSR toggle switches to 00011236.
122. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00011236.
123. Set the WSR toggle switches to all 0s.
124. Set the OPERATIONAL CONTROL to CMPT.
125. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00011256.
    c. END OF MP TEST message is generated on the page printer.
126. Set the MEMORY guarded switch to the PROTECTED position.

Section IV. REPEATING THE PROGRAM SECTION OF THE DIAGNOSTIC PROGRAM

1. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
2. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
3. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
4. Set the ASR toggle switches to 20000.
5. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00020000.
6. Set the WSR toggle switches to all 7's.
7. Set the OPERATIONAL CONTROL rotary switch to STORE.
8. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 77777777.
9. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
10. Set the ASR toggle switches to 160000.

11. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 22222222.
12. Set the OPERATIONAL CONTROL to STORE.
13. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 7's.
14. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
15. Set the ASR toggle switches to 260000.
16. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 33333333.
17. Set the OPERATIONAL CONTROL rotary switch to STORE.
18. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 7's.
19. Proceed to step 54, Section III.

Section V. MAINTENANCE CONTROL PANEL BIT VERIFICATION

1. If the other Maintenance Control Panel ACTIVE indicator is illuminated, its CPS bit 23 equals 1 and bit 23 of the Maintenance Control Panel under test must equal zero. If the other Maintenance Control Panel ACTIVE indicator is extinguished, then bit 23 of the Maintenance Control Panel under test must equal 1.
2. If the other Maintenance Control Panel and processor are ON LINE and operating properly, i.e., no control transfer malfunctions are occurring, its CPS bit 08 equals zero and bit 23 of the Maintenance Control Panel under test must equal zero.
3. If the other processor is OFF-LINE, display the CPS register and determine the value of CPS bits 08 and 23. For a valid test, the indicated bit values must agree with those defined in the following table.

MCP under test	*Other MCP*
Bit 22 = 0	Bit 08 = 0
Bit 22 = 1	Bit 08 = 1
Bit 23 = 1	Bit 23 = 0
Bit 23 = 0	Bit 23 = 1

Section VI. PROGRAMMED AND MANUAL TEST ERROR PRINTOUTS

Printout	Test description	Error vector XX =	Error	Logic associated with failure
MP01-XX ERROR STORE SEQUENTIAL LOC XXXXX PGE YY	Function: Store Sequential. Logic tested: CPH counter. OPS counter. Initial conditions: All memory locations checked preloaded to 77777777. Correct answer: All memory locations contain 77777777. Except page 0 address 1500 which contains 01234567.	01	Where XXXXX is any location in memory and YY is page number, (except where XXXXX is 15000 when YY is OQ) Content not equal 77777777	CPH, OPS, COMPW
		02	Where XXXXX is 15000 and YY is 00. Content not equal 01234567.	OPS1, OPS2, SIP, MEM, STARTC STRW

Printout	Test description	Error vector XX =	Error	Logic associated with failure
MP02-XX	Function: WSR toggle switch Logic tested: OPS counter. CPS counter. WSR toggle switch SET INPUTS. Initial conditions: WRS toggle switch - 77777777. Correct answer: Location 037774 contains 77777777.	01	Wrong answer.	TROWSR WSR 00-WSR 2
MP03-XX	Function: WSR toggle switch Logic tested: OPS counter. CPH counter. Word switch register Reset inputs. Initial conditions: WSR toggle switch = 00000000. Location 037774 contains 77777777. Correct answer: Location 037774 contains 00000000.	01	Wrong answer.	TROWSR WSROO-3
MP05-XX	Function REGISTER SELECT rotary switch register set states. Logic tested: CPH counter. OPS counter. Register selection Register display Initial conditions: None Correct answer: All actual register bits set.	01 02 03 04 05 06 07 10 11 12 13	(SBR) incorrect (LSC) incorrect (OAR) incorrect (IAR) incorrect (2000 (200000) incorrect (Q) incorrect (CP) incorrect (CPD) incorrect (BR) incorrect (RTC) incorrect (A) incorrect	DISH, CPB00IND-CPB23IND SEL SBR SEL LSR SEL OAR SEL IAR SEL MEM SEL Q SEL CPS SEL CPD SEL BR SEL RTC SEL A CLRSW
MP06-XX	Function: CLEAR pushbutton switch. Register clear states. Logic tested: OPS counter. CPH counter. Register selection. Register display Initial conditions: Registers contained values listed.	01 02 03 04 05 06 07 10 11 12	(A) incorrect (Q) incorrect (SBR) incorrect (LSR) incorrect (OAR) incorrect (IAR) incorrect (CPS) incorrect (CPD) incorrect (BR) incorrect (RTC) incorrect	

Printout	Test description	Error vector XX =	Error	Logic associated with failure
	Correct answer: All actual stages cleared. (With the exception of CPD00 and CPS08.)			
MP07-XX	Function: ONE INSTR. CLA instruction Logic tested: CPH counter. OPS counter. Initial conditions: (A) =00000007. Processor halted PEX = 010714. Correct answer: (A) = 77777777. PEX = 010715.	01	(A) ≠ 7777T77 or PEX ≠ 010715.	COMPW ONI
MP08-XX	Instruction: MEMORY guarded switch STR. Logic tested: Memory unprotected. Initial conditions: (160000) = 77777777. (260000) = 77777777. CPS07 = 0. Correct answer: (160000) = 22222222. CPS07 = 0. (260000) = 33333333. CPS07 = 0.	01 02 03 04	Incorrect data in (160000). CPS07 was set. Incorrect data in (260000). CPS07 was set.	Write lockout.
MP09-XX	Function MEMORY guarded switch. Logic tested: Memory protect. Read Pushbutton switch. Initial conditions: (160000) = 12222222. (260000) = 33333333. CPS07 = 0. CPS12 = 0. MEMORY guarded switch set to PROTECTED. Correct answer: (16000) = 22222222. (260000) = 33333333. CPS07 = 1. CPS12 = 1.	01 02 03 04	CPS12 was not set. Data in (160000) was changed. CPS07 was not set. Data in (260000) was changed.	Memory lockout.

Printout	Test description	Error vector XX =	Error	Logic associated with failure
XP10-XX	Function: Function Code and Address Switch Register. Logic Tested: Function code and ASR toggle switches and register. Initial conditions: Function code set to 77. Address switch resister set to 377777. Correct answer: (37756) = 77377777.	01	Wrong answer.	TROFCSW TROASR FC00-FC05 ASR07-ASR23
MP10-XX	Function: Function Code and Address Switch Register. Logic tested: Function code and ASR toggle switches and registers. Initial conditions: Function Code set to 00. Address Switch Register set to 000000. (37756) = 77377777. Correct answer: (37756) = 00000000.	02	Wrong answer.	TROFCSW TROASR FC00-FC05 ASR07-ASR23
MP10-XX	Function: Read only nature of Function Code and Address Switch Register. Logic Tested: Write addressing and control; address switch register and function code register gates. Initial conditions: Function code set to 00. Address Switch Register set to 000000. (A) = 77777777. Correct answer: (37756 = 00000000. ***Note:*** **the program attempts to write ones into the register.**	03	Logical 1's read from register.	TROFCSW TROASR FC00-FC06 ASR07-ASR23
MP11-XX	Function: REAL TIME CLOCK guarded switch DISABLE. Logic tested: Real time clock control. Initial conditions: REAL TIME CLOCK guarded switch set to DISABLE.	01	Wrong answer.	DRTCSW STPCLK

Printout	Test description	Error vector XX =	Error	Logic associated with failure
	Correct answer: RTC = 00000000.			
MP11-XX	Function: REAL TIME CLOCK guarded switch ENABLE. Logic tested: Real time clock control. Initial conditions: REAL TIME CLOCK switch set to ENABLE. Correct answer: RTC = 0000000.	02	Wrong answer.	DRTCSW AIRTC

EXHIBIT B

CENTRAL PROCESSOR DIAGNOSTIC PROGRAM

Section I. GENERAL

A total of 112 individual test procedures make up the Central Processor diagnostic program. Failure indications for a particular test occur as maintenance error printouts on the local page printer and Section IX contains a listing of the individual maintenance printouts.

Each test in the Central Processor diagnostic program has a number assigned to it which is stored in the OAR register. The particular test number and the equivalent name for each test are also included in the diagnostic procedure. The logic data flow diagram, provided as an aid in running the diagnostic program, consists of three more segments: detailed tests, an interrupt processor routine, and a control subroutine. The detailed tests were designed to report failures in mechanization- level functions. The interrupt processor routine was designed to report any hangups, halt or other unexpected error detectable by the interrupts and the control subroutine processes the user-assigned operating modes of the program.

To fully utilize the Central Processor diagnostic program, the reader must have a clear understanding of how the diagnostic program interrogates the WSR toggle switch settings (program options) and where the program halts are embedded in the program. The program halts designated on the logic data flow diagram represent points in the program where the user must decide on two different actions by either pressing the INITIATE pushbutton switch or by pressing the NORMAL HALT and then, in turn, the INITIATE pushbutton switch.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO CONVERT THE
OPERATIONAL PRELOADER PROGRAM TO THE OFF-LINE
DIAGNOSTIC PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
3. Set the WSR toggle switches to 00277750.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
6. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
7. Set the WSR toggle switches to 55137754.
8. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified in the o-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions must be loaded into memory before proceeding. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 42 below.

Preloader Instruction Chart

Address	*Instruction*
00277750	01077751
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	02200040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62501776 (62500476)
00277773	72100001
00277774	74100107 (74100235)
00277775	22077756
00277776	00000000

9. Set the MEMORY guarded switch to the UNPROTECTED position.
10. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
11. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.
22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 55137754.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the correct address.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the correct instruction number.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 62500476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
33. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 741000235.
38. Set the OPERATIONAL CONTROL rotary switch to STORE.
39. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE OFF-LINE
DIAGNOSTIC LOADER PROGRAM INTO MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the loader tape moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
49. Set the WSR toggle switches to 00277750.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.

52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tape strip loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
55. Set the PARITY ERROR HALT toggle switch to OFF.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.
58. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
59. Set the MEMORY guarded switch to the UNPROTECTED position.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.
61. Set the printer motor control bypass toggle switch to BYPASS.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

62. Load the Central Processor Diagnostic Program tape (SM-D-751715) on the paper tape reader.
63. Set he paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
64. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tape moves.
65. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
66. Set the OPERATIONAL CONTROL rotary switch to STORE.
67. Set the WSR toggle switches to 00000500.
68. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000500.
69. Set the OPERATIONAL CONTROL rotary switch to CMPT.
70. Press the INITIATE pushbutton switch and observe that:
    a. Diagnostic program tape loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
71. Set the REAL TIME CLOCK guarded switch to the ENABLE position.
72. St the CONTROL TRANSFER toggle switch to ENABLE.
73. Set the PARITY ERROR HALT toggle switch to ON.
74. Rewind the diagnostic program tape by setting the system status panel TAPE READER REWIND toggle switch to ON.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING ADDRESS INTO THE PROGRAM COUNTER

75. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
76. Press the CLEAR pushbutton switch.
77. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
78. Set the OPERATIONAL CONTROL rotary switch to STORE.
79. Set the WSR toggle switches to 00010000.
80. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00010000.
81. Set the system status panel RESET SELECT LOCAL PRINTER toggle switch to ON.
82. Press the system status panel RESET pushbutton switch several times.
83. Set the RUN/ONE INSTR toggle switch to RUN.
84. Set the WSR toggle switches to all 0's.

THE FOLLOWING PROCEDURES ARE USED TO EXECUTE THE DIAGNOSTIC PROGRAM

85. Set the OPERATIONAL CONTROL rotary switch to CMPT.
86. Press the INITIATE pushbutton switch and observe that:
    a. CP TEST message is generated on the page printer.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 000100017.
87. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00120244.
88. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00020276.
    c. END OF CP message is generated on the page printer.

NOTE

If the program halts at any other BUS INDICATOR reading or any maintenance error printouts occur before the END OF CP message is generated, troubleshoot the Central Processor Unit in accordance with standard procedures established a the operating site.

Section III. UNSCHEDULED PROCESSOR INTERRUPTS

1. If an unscheduled Interrupt occurs, the following error message is generated on the local page printer:
   CP VVVV WW XXX AT LOC YYYYYYPGZZ, where,
   CP = Central Processor
   VVVV = Tet name
   WW = Vector Number
   XXX = one of the following interrupts listed below or a group of interrupts that occurred.

Interrupt	*Description*	*CPS*
DPE.....	Data Parity Error	01
TTY	Teletype	04
IPE	Instruction Parity Error	05
ILI.....	Illegal Instruction	06
WLV	Write Lockout Violation	07
PRH	Program Halt	09
TMO	Time Out Condition	10
RIO	Remote TTY	16
UND	Undetermined	...

   YYYYYY = address at which the interrupt occurred.
   PGZZ = page number when the interrupt occurred.

2. If an unscheduled interrupt occurs with the inhibit printout option selected (WSRO1 = 1), the program will halt at address 21077. The address at which interrupt occurred will be stored in the accumulator.
3. Set the REGISTER SELECT rotary switch to position A and record the BUS INDICATOR reading. This is the exact address at which the Interrupt occurred.
4. Set the REGISTER SELECT rotary switch to OAR and record the BUS INDICATOR reading. Refer to Section IV, to determine the exact test number that was being executed a the time of interrupt.

5. Set the REGISTER SELECT rotary switch to CPS.
6. Set the WSR toggle switches to all 0's.
7. Set the OPERATIONAL CONTROL rotary switch to STORE.
8. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays all 0's, except for bit 08.

Section IV. TEST NUMBERS AND EQUIVALENT NAME

Test no.	*Test name*	*Test no.*	*Test name*	*Test no.*	*Test name*
1	KD01	47	KB04	115	KF22
2	KD02	50	KB05	116	KF23
3	KD03	51	KB06	117	KF24
4	KD04	52	KB07	120	KF25
5	KD05	53	KB08	121	KF26
6	KD06	54	KB09	122	KF27
7	KD07	55	KB10	123	KJ01
10	KD08	56	KB11	124	KJ02
11	KD09	57	KB12	125	KJ03
12	KD10	60	KB13	126	KJ04
13	KD11	61	KB14	127	KJ05
14	KD12	62	KB15	130	KJ06
15	KD13	63	KB16	131	KJ07
16	KD14	64	KB17	132	KJ08
17	KA01	65	KB18	133	KJ09
20	KA02	66	KB19	134	EX01
21	KA03	67	KF00	135	EX02
22	KA04	70	KF01	136	EX03
23	KA05	71	KF02	137	EX04
24	KA06	72	KF03	140	EX05
25	KA07	73	KF04	141	EX06
26	KA08	74	KF05	142	EX07
27	KA09	75	KF06	143	EX08
30	KA10	76	KF07	144	EX09
31	KA11	77	KF08	145	EX10
32	KA12	100	KF09	146	EX11
33	KA13	101	KF10	147	EX12
34	KA14	102	KF11	150	EX13
35	KA15	103	KF12	151	EX14
36	KA16	104	KF13	152	EX15
37	KA17	105	KF14	153	EX16
40	KA18	106	KF15	154	EX17
41	KA19	107	KF16	155	EX18
42	KA20	110	KF17	156	EX19
43	KA21	111	KF18	157	EX20
44	KB01	112	KF19	160	EX21
45	KB02	113	KF20		
46	KB03	114	KF21		

Section V. PROGRAM OPTIONS

Option 1 = WSR00 set:

This option is the controlling option bit for the diagnostic program. If WSR00 is set, there must also be another WSR bit selected from WSR01 through WSR06.

Option 2 = WSR01 set:

This option inhibits the local page printer. It is to be always used in conjunction with option 3 below.

Option 3 = WSR02 set:

This option halts the program when an error is detected within a test. The error vector is stored in the IAR register and can be determined by setting the REGISTER SELECT rotary switch to the IAR position. The error vector number will be displayed on BUS INDICATOR bits 18 to 23. The OAR register contains the particular test number that was being executed when the error was detected. If the REGISTER

SELECT rotary switch is set to PEX, the BUS INDICATOR will display the address of the halt plus 1.

There are several choices at this point for program operation:

a. The program can be continued by pressing the INITIATE pushbutton switch.

b. The test can be repeated by pressing the NORMAL HALT pushbutton switch and then the INITIATE pushbutton switch. If the error does not occur, the program will continue in its normal sequence; if the error (text missing) will halt as before.

c. The loop test option (2) below) can be selected to loop this test continuously and aid in isolating the error. Option 3 can remain in effect during the loop test but it is subject to the procedures used in testing as to whether it is left in effect when option 4 is selected.

Option 4 = WSR03 set:

The selection of this option will loop the selected test until the option bit is reset. This option is normally used when an error is found in a particular test and is only selected after it has been determined that there is an error.

Option 5 = WSR04 set:

This option is used when a subunit of the program is to be looped.

Option 6 = WSR05 set:

This option halts the diagnostic program at the end of each test. The test number will be stored in the OAR register. There are several options available at this point:

a. To continue the program to the next test, press the NORMAL HALT and then the INITIATE pushbutton switches. This directs the program to continue to the next test in the program.

b. The test just completed can be repeated in two ways:

(1) Select option 4 above and press the INITIATE pushbutton switch.

(2) Press the INITIATE pushbutton switch and the program will repeat the same test and will halt at the same place. This is useful in determining if the sequence of tests is being executed in the proper order.

Option 7 = WSR06 set:

This option allows the diagnostic program to be looped continuously until WSR bit 06 is reset.

NOTE

A summary of the various options is given in the chart below.

WSR toggle switch	*Description*
00	Enables options 01 through 06.
01	Inhibits printout on local page inter.
02	Halt on error.
03	Loop on individual test.
04	Loop on a group of tests for a particular set of logic. For example the entire KD counter
05	portion of the test.
06	Halt at end of each test.
	Loop on complete Central Processor diagnostics.

Section VI. TROUBLESHOOTING A HARD FAULT

The TEST DESCRIPTION column for the error message located in Section IX describes the failing instruction that should be executed as a control panel instruction from the Maintenance Control Panel. The acronym listed in the LOGIC ASSOCIATED WITH FAILURE column can be used to index into TM 11-5805-628-34-7 which contains the fan-out for each signal within the Central Processor.

THE FOLLOWING PROCEDURES EXECUTE THE FAILING INSTRUCTION
AS A CONTROL PANEL INSTRUCTION

1. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR.
2. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
3. Set the WSR toggle switches to the particular instruction listed in the TEST DESCRIPTION column.
4. Set the RUN/ONE INSTR toggle switch to RUN.

5. Press the INITIATE pushbutton switch and observe that the ACTIVE indicator illuminates.
6. When the diagnostic program halts, select the desired program option and set the WSR toggle switches accordingly.

Section VII. TROUBLESHOOTING A TRANSIENT FAULT

1. Load the off-line diagnostic preloader program and the off-line diagnostic loader tapes as outlined in Section II above.
2. Set the WSR toggle switches to 70100000.
3. Set the REGISTER SELECT rotary switch to PEX.
4. Press the INITIATE pushbutton switch and wait r the transient fault to cause the PRGM HALT indicator to illuminate.
5. Record the reading displayed on the BUS INDICATOR.
6. Set the WSR toggle switches to 74000000.
7. Press the INITIATE pushbutton switch and wait for the transient fault to cause the PRGM HALT indicator to illuminates.
8. Record the reading displayed on the BUS INDICATOR. If the BUS INDICATOR reading does not agree with the reading recorded in step 5 above, repeat the procedure until a consistent halt address can be obtained.
9. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR.
10. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
11. Set the WSR toggle switches to the particular instruction listed in the TEST DESCRIPTION column.
12. Press the INITIATE pushbutton switch and observe that the ACTIVE indicator illuminates.

Section VIII. OPERATIONAL HALT TABLE

Location	Symbolic Address	Test
01006		WSR option selection
010676	KDER01	KD01 Error halt
010730	KDER02	KD02
011003	KDER03	KD03
011053	KDER04	KD04
011112	KDER05	KD05
011204	KDER06	KD06
011253	KDER07	KD07
011321	KDER08	KD08
011367	KDER09	KD09
011435	KDER10	KD10
011504	KDER11	KD11
011546	KDER12	KD12
011632	KDER13	KD13
011724	KDER14	KD14
011770	KAER01	KA01
012027	KAER02	KA02
012066	KAER03	KA03
012163	KAER04	KA04
012222	KAER05	KA05
012261	KAER06	KA06
012360	KAER07	KA07
012421	KAER08	KA08
012462	KAER09	KA09
012531	KAER10	KA10
012566	KAER11	KA11
012623	KAER12	KA12
012671	KAER13	KA13
012747	KAER14	KA14
013024	KAER15	KA15
013064	KAER16	KA16
013127	KAER17	KA17
013164	KAER18	KA18
013232	KAER19	KA19
013263	KAER20	KA20
013351	KAER21	KA21
013430	KBER01	KB01
013473	KBER02	KB02
013535	KBER03	KB03
013571	KBER04	KB04
013655	KBER05	KB05
013711	KBER06	KB06
013755	KBER07	KB07
014046	KBER08	KB08
014155	KBER09	KB09
014223	KBER10	KB10
014257	KBER11	KB11
014357	KBER12	KB12
014414	KBER13	KB13
014514	KBER14	KB14
014551	KBER15	KB15
014606	KBER16	KB16
014677	KBER17	KB17
014734	KBER18	KB18
015021	KBER19	KB19
015131	KFER00	KF00
015166	KFER01	KF01
015215	KFER02	KF02
015266	KFER03	KF03
015321	KFER04	KF04
015355	KFER05	KF05
015410	KFER06	KF06
015444	KFER07	KF07
015477	KFER08	KF08
015533	KFER09	KF09
015566	KFER10	KF10
015622	KFER11	KF11
015655	KFER12	KF12
015711	KFER13	KF13
015744	KFER14	KF14
016000	KFER15	KF15
016034	KFER16	KF16
016070	KFER17	KF17
016124	KFER18	KF18
016160	KFER19	KF19
016214	KFER20	KF20
016250	KFER21	KF21
016304	KFER22	KF22
016340	KFER23	KF23
016374	KFER24	KF24
016430	KFER25	KF25
016464	KFER26	KF26
016521	KFER27	KF27
016617	KJER01	KJ01
016720	KFER02	KJ02
016762	KJER03	KJ03
017050	KJER04	KJ04
017100	KJER05	KJ05
017131	KJER06	KJ06
017157	KJER07	KJ07
017255	KJER08	KJ08
017315	KJHLT9	KJ09
017334	EXER01	EX01-01
017347	EXER02	EX01-02
017365	EXER03	EX02-01
017400	EXER04	EX02-02
017416	EXER05	EX03-01
017431	EXER06	EX03-02
017447	EXER07	EX04-01
017462	EXER08	EX04-02
017506	EXER09	EX05-01
017531	EXER10	EX06-01
017604	EXER11	EX07-01
017631	EXER12	EX08-01
017656	EXER13	EX09-01
017703	EXER14	EX10-01
017710	EXER15	EX11-01
017755	EXER16	EX12-01
020002	EXER17	EX13-01
020027	EXER18	EX14-01
020054	EXER19	EX15-01
020101	EXER20	EX16-01
020126	EXER21	EX17-01
020153	EXER22	EX18-01
020202	EXER23	EX19-01
020226	EXER24	EX20-01
020263	EXER25	EX21-01
020275		End of CP Test
020677	OPTHLT	Select WSR options
021076	INTHLT	Interrupt halt
021264	ICLOB	Too many interrupts

Operational Halt Table - Continued

Location	Symbolic Address	Test
01006		WSR option selection
010676	KDER01	KD01 Error halt
010730	KDER02	KD02
011003	KDER03	KD03
011053	KDER04	KD04
011112	KDER05	KD05
011204	KDER06	KD06
011253	KDER07	KD07
011321	KDER08	KD08
011367	KDER09	KD09
011435	KDER10	KD10
011504	KDER11	KD11
011546	KDER12	KD12
011632	KDER13	KD13
011724	KDER14	KD14
011770	KAER01	KA01
012027	KAER02	KA02
012066	KAER03	KA03
012163	KAER04	KA04
012222	KAER05	KA05
012261	KAER06	KA06
012360	KAER07	KA07
012421	KAER08	KA08
012462	KAER09	KA09
012531	KAER10	KA10
012566	KAER11	KA11
012623	KAER12	KA12
012671	KAER13	KA13
012747	KAER14	KA14
013024	KAER15	KA15
013064	KAER16	KA16
013127	KAER17	KA17
013164	KAER18	KA18
013232	KAER19	KA19
013263	KAER20	KA20
013351	KAER21	KA21
013430	KBER01	KB01
013473	KBER02	KB02
013535	KBER03	KB03
013571	KBER04	KB04
013655	KBER05	KB05
013711	KBER06	KB06
013755	KBER07	KB07
014046	KBER08	KB08
014155	KBER09	KB09
014223	KBER10	KB10
014257	KBER11	KB11
014357	KBER12	KB12
014414	KBER13	KB13
014514	KBER14	KB14
014551	KBER15	KB15
014606	KBER16	KB16
014677	KBER17	KB17
014734	KBER18	KB18
015021	KBER19	KB19
015131	KFER00	KF00
015166	KFER01	KF01
015215	KFER02	KF02
015266	KFER03	KF03
015321	KFER04	KF04
015355	KFER05	KF05
015410	KFER06	KF06
015444	KFER07	KF07
015477	KFER08	KF08
015533	KFER09	KF09
015566	KFER10	KF10
015622	KFER11	KF11
015655	KFER12	KF12
015711	KFER13	KF13
015744	KFER14	KF14
016000	KFER15	KF15
016034	KFER16	KF16
016070	KFER17	KF17
016124	KFER18	KF18
016160	KFER19	KF19
016214	KFER20	KF20
016250	KFER21	KF21
016304	KFER22	KF22
016340	KFER23	KF23
016374	KFER24	KF24
016430	KFER25	KF25
016464	KFER26	KF26
016521	KFER27	KF27
016617	KJER01	KJ01
016720	KFER02	KJ02
016762	KJER03	KJ03
017050	KJER04	KJ04
017100	KJER05	KJ05
017131	KJER06	KJ06
017157	KJER07	KJ07
017255	KJER08	KJ08
017315	KJHLT9	KJ09
017334	EXER01	EX01-01
017347	EXER02	EX01-02
017365	EXER03	EX02-01
017400	EXER04	EX02-02
017416	EXER05	EX03-01
017431	EXER06	EX03-02
017447	EXER07	EX04-01
017462	EXER08	EX04-02
017506	EXER09	EX05-01
017531	EXER10	EX06-01
017604	EXER11	EX07-01
017631	EXER12	EX08-01
017656	EXER13	EX09-01
017703	EXER14	EX10-01
017710	EXER15	EX11-01
017755	EXER16	EX12-01
020002	EXER17	EX13-03
020027	EXER18	EX14-01
020054	EXER19	EX15-01
020101	EXER20	EX16-01
020126	EXER21	EX17-01
020153	EXER22	EX18-01
020202	EXER23	EX19-01
020226	EXER24	EX20-01
020263	EXER25	EX21-01
020275		End of CP Test
020677	OPTHLT	Select WSR options
021076	INTHLT	Interrupt halt
021264	ICLOB	Too many interrupts

Section IX. MAINTENANCE ERROR PRINTOUTS

a. KA Counter Tests.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKA 01-XX	instruction: RLL0 (35000000) Logic tested: Arithmetic unit A and Q Registers, KA sequence counter, Address Register decoder network AR (F) = 00. Initial conditions: (A) = -52341234. (KAOP1) (Q) = -52341234. Correct answer: (A) = -52341234 stored in ACCSAV. (Q) = -52341234 stored in INORGSAV.	01 02	(A) ≠ -52341234	A Reg. inputs AMG- AZG-	ACC and ORG are unaffected since KA counter should skip from KAM 1 to KAM 4. Invalid enabling signals may be present at A Register clock gates. Check that KA sequence counter skips from KAM 1 to . KAM 4. If not, check that AR(F) = 00 is properly decoded.
		02	(Q) ≠ -52341234.	QRG INPUTS QMG- QZG-	Invalid enabling signals may be present at Q Register input gates. Check that KA sequence counter does not enter KAM 3.
		03	AR DECODER BIT(S) PICK UP	AR(F) = 00.	Perform = RLL0 Test that AR(F) 00 is decoded, also ACC and QRG are unaffected since KA counter should skip from KAM 1 to KAM 4. This is the sum of above error vectors indicating that both have occurred.
CPKA02-XX	Instruction: RLL 1 (35000001). Logic tested: Arithmetic Unit A and Q Registers, KA sequence counter, shift register and shift counter decoder SHC = 77_8. Initial conditions: (A) = -77777777. (KAOP2) (Q) = -77777777. Correct answer: (A) = -77777777 contained (KAOP2). in ACCSAV/(Q) = -77777777 stored in QRGSAV.	01	(CA) ≠ -77777777.	SLA- INPUT gates to A Register.	A Register input gates receiving SLA signals fail to transfer all ONE's. Check that KA sequence counter enters state KAM 3 to generate $\overline{SLA}$. Check that shift counter decoder generates SHC = 77.
		02	(Q) ≠ -77777777.	SLQ INPUT gates to Q Register.	Q Register input gates receiving SLQ signals fail to transfer all ONE's. Check that KA sequence counter enters state KAM 3 to generate SLQ.
		03			This is the sum of above error vectors indicating that both have occurred.
CPKA03-XX	Instruction: RLL 1 (35000001). Logic tested: Arithmetic Unit A and Q Registers, KA sequence counter.	01	(A) ≠ 00000000.	SLA- input gates to A Register.	A Register input gates receiving SLA signals fail to transfer all ZERO's.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	shift register and shift counter decoder SHC = 77_8. Initial conditions: = 0 (A) = 00000000/. (Q) = 00000000. Correct answer: (A) = 00000000 contained in ACCSAV/. (Q) = 00000000 contained in QRGSAV.				Check that KA sequence counter enters state KAM 3 to general $\overline{\text{SLA}}$.
		02	(Q) ≠ 00000000.	SLQ input gates to Q Register.	SLQ input gates receiving SLQ signals fail to transfer all ZERO's. Check that KA sequence counter enters state KAM 3 to generate SLQ.
		03			This is the sum of the above error vectors indicating that both have occurred.
CPKA04-XX	Instruction: RLL 1 (35000001). Logic tested: Arithmetic Unit Q and A Register, KA sequence counter and Processor gate flip-flops AMG, AZG, QMG, QZG.	01	A00 = 0	SAT00 AZG	A Register bit 00 fails in switch from ZERO to ONE on RLL instruction. Check A00 clock and shift left input gates.
	Initial Conditions (A) = 25252525. (KAOP3) (Q) = 25252525. Correct answer: (A) = -52525252. (KAOP4) (Q) = -52525252. Actual A Register answer contained in location KAW.	02	A Register bits through 22 fail to transfer proper ONE's/ ZERO's combination on RLL instruction.	SLA shift gates for bits A01 through A22 of A Register. Also all clock gates (AMG) for bits A01 through A22.	Display actual answer contained in KAW; then check affected gate(s).
		04	A23 = 1	SAMG SH23	A Register bit 23 fails to switch from ONE to ZERO on RLL instruction. Check A23 clock and shift-left input gates.
		03, 05 06 and 07			These are sums of above error vectors indicating that more than one have occurred.
		10	Q00 = 0 Q Register bit 00 fails to switch from ZERO to ONE on RLL instruction.	SQT00 QZG	Q Register bit 00 fails to switch from ZERO to ONE on RLL instruction. Check Q00 clock and shift left input gates.
		20	Q Register bits 01 through 22 fail to transfer ONE's/ ZERO's combination RLL instruction.	SLQ shift gates fir bits Q01 through Q22 of Q Register. Also all clock gates (QMG) for bits Q01 through Q22.	Display actual answer contained in KAW; then check affected gate(s).

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
		40	Q23 = 1	SQ23 SQMG.	Q Register bit 23 fails to switch from ONE to ZERO on RLL instruction. Check Q23 clock and shift-left gates.
		10-17, 20-27, 30-37, 40-47, 50-57, 60-67 and 70-77			These are sums of above error vectors indicating that more than one have occurred. For example, error vectors of 04, 10, and 20 are summed and a printout of 34_8 results.
CPKA05-XX Arithmetic Unit A and Q Registers, KA sequence counter, shift register, and shift counter decoder SHC = 77_8	Instructions: RLL 1 (37000001). Logic tested: None Initial conditions: (A) = -77777777. (KAOP2) (Q) = -77777777. Correct answer: (A) = -77777777 stand in ACCSAV/ (Q) = -77777777 stored in QRGSAV.	01	(A) ≠ -77777777.	SRA input gates to A Register.	A Register input gates receiving SRA inputs fail to transfer all ONE's. Check that KA sequence counter enters state KAM 3 to generate SRA. Check also that shift counter decoder generates SHC = 77.
		02		SRQ input gates to Q Register.	Q Register input gates receiving SRQ signals fail to transfer all ONE's. Check that KA sequence counter enters state KAM to generate SRQ.
		03			This is the sum of above error vectors indicating that both have occurred.
CPKA06-XX	Instruction: RRL 1 (37000001). Logic tested: Arithmetic Unit A and Q Registers KA sequence counter, shift counter and shift counter decoder SHC = 77. Initial conditions: (A) = 00000000. (Q) = 00000000. Correct answer: (A) = 00000000 contained in ACCSAV/. (Q) = 00000000 contained in QRGSAV.	01	(A) ≠00000000.	A00-23 shift right input gates.	A Register shift right input gates fail to transfer all ZERO's. Check that KA sequence counter enters state KAM 3 to generate SRA. Check also that shift counter decoder generates SHC = 77.
		02	(Q) ≠ 00000000.	Q00-23 shift right input gates	Q Register shift right input gates fail to transfer all ZERO's. Check that KA sequence counter enter state KAM 3 to generate SRQ.
		03			This is the sum of the above error vectors indicating that both have occurred.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKA07-XX	Instructions: ARL 1 (37000001). Logic tested: Arithmetic Unit A Register, KA sequence counter and Processor gate flip-flops AMG, AZG. Initial conditions: (A) = -52525252. (KAOP4) (Q) = -52525252. Correct answer: (A) = 25252525. (KAOP3) (Q) = 25252525. Actual A Register answer contained in KAW.	01	A00 = 1.	SAT00 AZG.	A Register bit 00 fails to switch from ONE to ZERO on RRL instruction. Check A00 clock and shift right input gates.
		02	A01 = 0.	SAT01 AMG.	A Register bit 01 fails to switch from ZERO to ONE on RRL instruction. Check A01 clock and shift right input gates.
		04	A Register bits 02 through 23 fail to transfer proper ONE's/ZERO's. combination on RRL instruction.	SRA shift gates for bits 02 through 23 of A Register. Also all clock gates to (AMG) for bits A02 through A23.	Display actual answer contained in KAW; then check affected gate(s).
		03, 05, 06 and 07			These are sums of the above error vectors indicating that more than one have occurred.
		10	Q00 = 1	SQT00 SQZG	Check Q00 clock and shift-right input gates.
		20	Q01 = 0	SQT01 SQMG	Check Q01 clock and shift-right input gates.
		40	Q Register bits 02 through 23 fail to transfer proper ONE's/ZERO's combination.	QRG INPUTS SQMG SRQ shift gates for bits 02 through 23 of Q Register. Also all clock gates (QMG) for bits Q02 through Q23.	Display actual answer, then check affected gates.
		10-17, 20-27, 30-37, 40-47, 50-57, 60-67, 70-77			These are sums of the above error vectors indicating that more than one have occurred. For example, error vectors of 04, 10, and 20 are summed and an error vector of 34_8 results.
CPKA08-XX	Instructions: NRM SHCSAV (41010464).	01	Shift count not written into memory	A01, NRM/NRL MEMORY WRITE	Display contents of SHCSAV after NRM execution, then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Logic tested: Arithmetic Unit A Register, KA Sequence counter. Shift counter and memory write logic. Initial conditions: (A) = 20000000. (KAOP7). Correct answer: 00000000. Actual answer contained in SHCSAV.	77	Shift count incorrectly written into memory.	SHC→B BYG Shift counter logic.	Display contents of SHCSAV following NRM execution; then check associated logic.
CPKA09-XX	Instruction: NRM SHCSAV (41010464). Logic tested: Arithmetic Unit A Register, KA sequence counter, shift counter. Initial conditions: (A) = 10000000. (KAPO10). Correct answer: 00000001. Actual answer contained in SHCSAV.	01	NRM decode or timing error, shift count not written into memory or SHC23 = 0.	SBYG-SHC. ADDER BIT23→CPB SHC23→CPB23.	Display contents of SHCSAV following NRM execution, then check associated logic.
		77	Shift counter logic failure, shift countered picked up bits or shift counter decoder failed.	A01 + 26_8 SHC → CPB 18-22.	Display contents of SHCSAV following NRM executing; then check associated logic.
CPKA10-XX	Instruction: NRM SHCSAV (41010464). Logic tested: Arithmetic Unit A Register, KA sequence counter shift counter. Initial conditions: (A) = 00040000. (KAOP11). Correct answer: 00000010. Actual answer contained in SHCSAV.	01	Bit dropped during shift operation. A02 output BAD; or instruction does not terminate when number is normalized.	SLA- SAMG- A02	Display contents of SHCSAV following NRM execution, then check associated logic.
		02	NRM instruction terminates prior to required number of shifts.	A02 + 26	Display contents of SHCSAV following NRM execution, then check associated logic.
		77	Shift counter carry network failure.	SHC_{28} → CPB_{20} SHC → SHC ADDER Carries bits 23-23.	Perform NRM SHCSAV test third set NRM logic levels, SHC adder carry levels and SHC inputs to adder.
CPKA11-XX	Instruction: NRM SHCSAV (41010464). Logic tested: Arithmetic Unit A Register, KA sequence counter, shift counter, shift counter decoded. Initial conditions: (A) = 00000000. Correct answer: 00000027. Actual answer contained in SHCSAV.	01	Shift counter decoder fails, shift counter does not count.	A02 + 26 A01-	Display contents of SHCSAV; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
		77	Shift counter carry network problem.	SHC → CPB	Display contents of SHCSAV; then check associated logic.
CPKA12-XX	Instruction: NRL SHCSAV (42010464). Logic tested: Arithmetic Unit A and Q Registers KA sequence counter, shift counter, shift counter decoder. Initial conditions: (A) = 000000000. (Q) = 000000000. Correct answer: 00000056. Actual answer contained in SHCSAV.	01	Shift counter decoder failure or shift count not written into memory.	A01- A02 + 55	Display contents of SHCSAV; then check associated logic.
		77	Shift counter carry network error.	SHC → CPB and SHC → SHC carry network	Display contents of SHCSAV; then check associated logic.
CPKA13-XX	Instruction: NRL SHCSAV (42010464). Logic tested: Arithmetic Unit A and Q Registers, KA sequence counter shift counter and shift counter decoder. Initial conditions: (A) = 00000000. (Q) = 00020000. (KAOP12) Correct answer: 00000040. Actual answer contained in SHCSAV.	01	NRL instruction failed to shift Q Register causing shift counter to count out at 55_8.	SQMG-	If SHCSAV contains 00000056, check SQMG gates and SLQ gates.
		02	Instruction failed to normalize correct number of places, QRG → ACC shifts logic or shift counter decoder failed.	A02 + 55 SLQ- SQ23-	Perform: NRL SHCSAV last set of NRL logic levels shift counter adder carries (19, 20). Display contents of SHCSAV. contains 00000056 and (Q) ≠ 20000000 check associated logic.
		77	Shift counter carry network failure.	SHC → SHC Carry network.	Display contents of SHCSAV. If SHCSAV contains value other than 00000056 check associated logic.
CPKA14-XX	Instruction: RLS 6 (34000006). Logic tested: Arithmetic Unit A and Q Registers, KA sequence counter, shift counter and shift counter decoder SHC = 77. Initial conditions: (A) = 01470707 (A5) (Q) = -36307070 (AG) Correct answer: -47070701 (A14ANS). Actual answer contained in ACCSAV.	01	Q Register changes contents during RLS instruction execution.	QRG GATES	Display contents of QRGSAV; then check associated logic.
		02	A00 to A23 transfer logic fail.	A00 → A23	Display contents of ACCSAV; then check associated logic.
		04	A01 to A00 transfer gates fail.	A01 → A00	Display contents of ACCSAV; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
		10	KAM3 unique RLS functions fail.	AZG, AMG shift counter logic.	Display content of ACCSAV; then check associated logic.
		03, 05 06, 07/ 10_8 through 17_8			These are sums of the above error vectors indicating that more than one have occurred. For example error vectors of 04 and 10 are summed and an error vector of 14_8 results.
CPKA15-XX	Instructions: RRS 6 (36000006). Logic tested: Arithmetic Unit A and Q Registers KA sequence counter shift counter shift counter and shift counter decoder SHC = 77. Initial conditions: (A) = 36307070. (A6). (A) = 01470707. (A7) Correct answer: -70763070 (A15ANS). Actual answer contained in ACCSAV.	01	Q Register changes content during RRS execution.	QRG GATES	Display content of QRGSAV; then check associated logic.
		02	A23 to A00 transfer logic fails.	A23 → A00.	Display content of ACCSAV; then check associated logic.
		04	A00 to A01 transfer gates fail.	A00 → A01.	Display content of ACCSAV; then check associated logic.
		10	KAM 3 unique RRS functions fail.	AZG, AMG SRA SHC logic.	Display content of ACCSAV; then check associated logic.
		03, 05, 06, 07, 10 through 17_8			These are sums of the above error vectors indicating that more than one have occurred. For example, error vectors 04 and 10 are summed and an error vector of 14_8 results.
CPKA16-XX	Instruction: RLQ 9 (40000009). Logic tested: Arithmetic Unit Q Register KA sequence counter, shift counter, shift counter decoder SHC = 77_8 Initial conditions: (Q) = -41234567 (A16). Correct answer: 34567412 (A16ANS).	01	Q00 = 1	Q01 → Q00	Display contents of Q Register to determine actual answer; then check associated logic.
		02	Q23 = 1	Q00 → Q23	Display contents of Q Register to determine actual answer; then check associated logic.
		04	Bits 02 through 23 of Q Register fail to transfer proper ONEs/ZEROs combination.	QMG, QZG SLG shift counter logic.	Display content of Q Register to determine actual answer; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
		06, 07			vectors indicating that more one have occurred.
CPKA17-XX	Instruction: SRS 15 (32000015). Logic tested: Arithmetic Unit A Register, K4 sequence counter shift counter, shift counter decoder SHC = 77. Initial conditions: (A) = -52345676 Correct answer: (A) = -40000123. Actual answer contained in ACCSAV.	01	A00 = 0.	GRD 102 0 → A01	Display contents of ACCSAV; then check associated logic.
		02	A23 = 0.	A22 → A23	Display content of ACCSAV; then check associated logic.
		04	Content of A02 through A22 incorrect.	AZG AMG SRA Shift counter logic.	Display content of ACCSAV, then check associated logic.
		03, 05, 06, 07			These are sums of above vectors indicating that more than one have occurred.
CPKA18-XX	Instruction: SRL 23 (33000023). Logic tested: Arithmetic Unit A and Q Registers, KA sequence counter shift counter and shift counter decoder. Initial conditions: -57654321 +0 (AN18) (A18) (A) = -57654321 (A18N). (Q) = 00000000. Correct answer: (Q) = -57654321. (A) = 00000000. Actual answers stored in ACCSAV and QRGSAV.	01	A00	GRD102 0 → A01	Display contents of ACCSAV; then check associated logic.
		02	Q00 = 1	A00 → Q00	Display content of QAGSAV; then check associated logic.
		04	Content of A23 does not transfer to Q01.	A23 → Q01	Display contents of ACCSAV and QRGSAV; then check associated logic.
		10	Q01 = 1	SRA SRQ SAC logic.	Display content of QRGSAV, then check associated logic.
		03, 05 06, 07/ $10\text{-}17_8$			These are sums of the above error vectors, indicating that more than one have occurred.
CPKA19-XX	Instruction: SLS0 (30000000). Logic tested: Arithmetic Unit A Register, OA Flip-Flop, KA Sequence counter.	01	(OA) = 1	0 → OA	Display content of SC1 Register and observe status of bit 17. If overflow flip-flop is set, check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	(A) = 00000000. Correct answer: (A) = 00000000/ overflow flip-flop OA is reset.				
CPKA20-XX	Instruction: SLS2 (30000002). Logic tested: Arithmetic Unit A Register, KA Sequence counter shift counter. Initial conditions: (A) = -77777777 (MONES). Correct answer: (A) = -77777774. (ANS20) Actual answer contained in ACCSAV.	01	A Register contains wrong value.	SLS AMG 0 → A23	Display content of ACCSAV; then check associated logic.
		02	(OA) = 0	A01 → 0VF	Display content of SC1 Register and observe status of bit 17; then check associated logic.
CPKA21-XX	Instruction: SLL 24 (31000024). Logic tested: Arithmetic Unit A and Q Registers, KA Sequence counter, shift counter, shift counter decoder (SHC = 7). Initial conditions: (A) = 00000000 (A18). (Q) = -77654321. (A18NL). Correct answer: (A) = -77530642. (ANS18) (A) = -40000000. Actual answers contained in ACCSAV and QRGSAV.	01	A and Q Register contain incorrect values.	QRG gating and shift counter logic.	Perform SLL 24 verify SLL decode, and SLL Functions. Display content of QRGSAV; then check associated logic.
		02	OA = 0	A01 → 0A	Display content of SC1 Register and observe status of bit 17; then check associated logic.
		04	A23 = 1	Q01 → A23	Display content of QRGSAV and ACCSAV; then check associated logic.
		03, 05 06 and 07			These are sums of above error vector indicating that more than one have occurred.
		10	A00 = 0	Q00 → A00	Display content of ACCSAV; then check associated logic.
		20	(A) incorrect.	Shift counter logic on A Register shift left gating.	Display content of ACCSAV; then check associated logic.

Maintenance Error Printouts - Continued.

b. KB Counter Tests.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKB01-XX	Instruction: KB0P01 570 10220. Logic tested: Central processor A Register, A + B carry network and KB counter logic. Initial conditions: (A) = -00000077 (KB0P05). (B) = -00007777 (KB0P01). Correct answer: (A) = 00007777. stored in ACCSAV.	01	A00 = 1.	SAZG	KBM1 CAM: 1 AZG failed. Display content of bit 00 from ACCSAV, then check associated logic.
		02	(A) = 0.	AMG A0S1 KBM2	KBMZ CAM: 1 AMG, 1A0S1 failed. A + B carry failed to occur or did not load into A Register.
		03	(A) = 00010076.	KBM1 SAMG	(AMG at KBM1 time failed; AMG at KBM2 time is at ONE level.)
		04	(A) = 00000077.	A0S1 SAMG KBM1 or KBM2	SAMG in both KBM1 time and KBM2 time appears to have failed.
		77	(A) ≠ 00007777.	Add network or data inputs to A Register.	Adder failure or timing function failure; see other error vectors.
CPKB02-XX	Instruction: CSM KB0P02 (50010221). Logic tested: Central processor A + B Registers; KB counter logic. Initial conditions: (A) = 00007777, CSM (KB0P02) = 37770000. Correct answer: (A) = 37770000 (KB0P03). Actual answer stored in ACCSAV.	01	A00 = 0.	1 => A00, AZG	Display content of A00 from ACCSAV, then check associated logic.
		02	(A) = -37777777.	AMG, KBM1	A Register should be cleared of 00007777 at KBM1 time.
		77	A ≠ -3777.	*Adder inputs* A = 0, B = 1 A = 0, B = 0 *Bits* 01-11 12-23	Display content of ACCSAV, then check associated logic.
CPKB03-XX	Instruction: CLS KB0P05 (56010224). Logic tested: Central processor A and B Registers; A + B carry network; KB counter logic. Initial conditions: (A) = -00000700 (KB0P04). CLS (KB0P05) = -00000077. Correct answer: (A) = 00000077. Actual answer stored in ACCSAV.	01	A00 = 1.	SAZG SBZG SAT00	Display content of A00 from ACCSAV, then check associated logic.
		02	(A) = 00000777.	AMG, KB counter.	A Register should be cleared at KBM1 time.
		77	(A) ≠ 00000077.	*Adder inputs* A = 0, B = 0 A = 0, B = 1 *Bits* 1-17 18-23	A + B carry network failure display contents of ACCSAV, then check associated logic.
CPKB04-XX	Instruction: CLS KB0P07 (56010226). Logic tested: Central processor A, B Registers; A + B carry network; KB counter logic. Initial conditions: (A) = 00700000 (KB0P06). CLS (KB0P07) = 37000000. Correct answer: (A) = -37000000.	01	A00 = 0.	SAT 00 SBT00	Sign bit of A Register did not change. Display content of A00 from ACCSAV, then check associated logic.
		77	(A) ≠ 37000000.	*Adder inputs* A = 0, B = 1 A = 0, B = 0	A + B carry network failure. Display content of ACCSAV, then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Actual answer stored in ACCSAV.			*Bits* 1-5 6-23	
CPKB05-XX	Instruction: LGN MZERO (04010502). Logic tested: Central processor A, B Registers; A + B carry network; KB counter logic. Initial conditions: (A) = 00000007 (KB0P09), LGN (MZERO) = -00000000. Correct answer: (A) = +37777777. (PONES) Actual answer stored in ACCSAV.	01 02 03 04 05 05 77	The sign of the A Register is incorrect This is the same problem as ERROR KB03-01. A00 = 1. (A) = 00000000. (A) = 00000006. (A) = 00077777. (A) = 37700000. A ≠ 37777777.	AZG B_0 => B_0 B_0 => A_0 SAZG- SAT00 SBZG- SBT00- COMP- AMG BNG BYG A + B carry network or B complement gate.	Sign of A Register did not change. Display content of A00 from ACCSAV, then check associated logic. LGN-KBM1: B- => B failure LGN - KBM1: 1 AMG failure. A Register failed to clear at KBM1 time. The BNG level is inoperative. causing bits 1-8 of the B Register not to complement at KBM1 time. The BYG level is inoperative, causing bits 9-23 of the B Register not to complement at KBM1 time. ONE or more bits of A Register are incorrect.
CPKB06-XX	Instructions: LBN PONES (04010503) Logic tested: Central processor A, B Registers; A + B carry network; KB counter logic. Initial conditions: (A) = 37777777 (PONES) Correct answer: (A) = -00000000 (MZEROS). Actual answer stored in ACCSAV.	01 77	A00 = 0. A ≠ -00000000.	B_{00} => B_{00} AZG/B00 => B00 KB counter, B complement B → A transfer	A bit or bits of the A Register are in error. Display content of ACCSAV to determine failure area.
CPKB07-XX	Instruction: ADDC 7777 (12207777). Logic tested: Central processor A, B Registers; A + B carry network; KB counter logic. Initial conditions: (A) = 37770000. (KB0P02), ADDC 7777. Correct answer: (A) = 37777777 (PONES) Actual answer stored in ACCSAV.	01 02 77	(A) = 37760001. A = 00000001. A ≠ 37777777.	A00 X B00 AS • OF- gate, KBM counter. *Adder inputs* A = 1, B = 0 A = 0, B = 1 *Bits* 1-11 12-23	Display contents of ACCSAV, then check associated logic. Display content of ACCSAV, then check associated logic. Display contents of ACCSAV to determine failure areas, then check associated logic.
CPKB08-XX	Instruction: ADD PONES (12010503). Logic tested: Central processor A, B	01	A = -37777776.	A00 X B00	A failure in the exclusive OR circuit of the processor (A) + (B) carry network could

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Registers: (A) + (B) carry network; KB counter logic. Initial conditions: (A) = -37777777 (MONES), ADD + 37777777. (PONES). Correct answer: (A) = -00000000. (MZEROS). Actual answer stored in ACCSAV.				yield this incorrect answer.
		02	(A) = -37777777.	SAS-, KB counter	ADD KBM1 A00 X B00: IAS failed.
		03	(A) = +00000000.	AS • OF- SAZG	A double failure in the AS • OF -circuit allows the KB counter to sequence through its remaining states.
		04	(A) = -37700000.	BNG	Add • KBM1 • A00 X B00 1 BNG failed.
		05	(A) = -00077777.	BYG	ADD • KBM1 • A00 X B00: 1 BYG failed.
		77	(A) ≠ -00000000.	Processor (A) + (B) carry network/KB counter.	Processor (A) + (B) carry network failure; or B-complement gate failure; or timing function failure. See other error vectors.
CPKB09-XX	Instruction: ADDC 7777 (12207777). Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = -00003777. (KB0P15). (B) = +00007777. Correct answer: (A) = +00004000. Actual answer contained in ACCSAV.	01	(A) = +00000000.	ASOF- COMP-	KB counter fails to increment from KBMB to KBM4
		02	(A) = -37774000.	TROACPB TRIBCPB SAMG A0S1	KBM3 or KBM5 functions failed.
		03	(A) = 37704000.	SBNG	KBM4 function failure.
		04	(A) = +00010000.	SBYG	Failure of BYG at KBM3 time.
		05	(A) = +00000001.	COMP-	KBM4 function failure.
		06	(A) = +00074001	SBYG	Failure of the BYG level at KBM4 time.
		07	(A) = -00004000.	SAT00	Failure in logic setting of bit bit A00 at KBM5 time.
		77	(A) ≠ +00004000	KBM counter, processor (A) + (B) carry network.	B Register complement gate failure; adder failure or timing function failure.
CPKP10-XX	Instruction: ADD PONES (12010503). Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = 37777777 (PONES). (B) = 37777777 (PONES). Correct answer: (A) = +37777776 (KB0P19). Actual answer stored in ACCSAV.	01	A ≠ +37777776.	*Adder inputs* A = 1, B = 1 *Bits* A11	Adder failure or timing function failure. Check other error vectors.
	Instruction: Add KB0P40 (12010267). Initial conditions: (A) = 25252525 (KB0P40) (B) = 25252525 (KB0P40). Correct answer: (A) = 12525252. Actual answer stored in ACCSAV.	02		*Adder inputs* (A) ≠ 12525252 A = 1, B = 1 A = 0, B = 0 *Bits* Odd Even	Adder failure or timing function failure. Check other error vectors.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Instruction: ADD KB0P41 (12010270). Logic tested: None. Initial conditions: (A) = 12525252 (KB0P41). (B) = 12525252 (KB0P41). Correct answer: (A) = 25252524 (KB0P43). Actual answer stored in ACCSAV.	04	(A) ≠25252524.	*Adder inputs* A = 1, B =1 A = 0, B = 0 *Bits* Even Odd	Adder failure or timing function failure. Check other error vectors.
		03, 05, 06, 07			These represent the sum of above error vectors indicating that more than one have occurred.
CPKB11-XX	Instruction: ADD KB0P01 (12010220). Logic tested:	01	A00 = 1.	A00 X B00 SAT 00 SAZG	Sign bit failure. Check other error vectors.
	Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = +00000000. (B) = -00007777 (KB0P01). Correct answer: (A) = -00007777 (KB0P01). Actual answer stored in ACCSAV.	77	(A) ≠ -00007777.	B Register complement gates or adder.	(A) + (B) carry network failure; or B-Register complement failure; or timing function failure. See other error vectors.
CPKB12-XX	Instruction: ADM KB0P12 (13010233). Logic tested:	01 02	(A) = -37700000. A = -00077774.	SBZG- A00	Sign bit fails to change. ADM • KBM1 • A00 failure.
	Central processor A, B Register; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = -00077776 (KB0P20). (B) = -37777776 (KB0P12). Correct answer: (A) = +37700000 (KB0P10).	03	(A) = 37700001	COMP-	ADM • KBM1 • A00 B- => B transfer level failure.
		04	(A) = -00000000.	SBNG	ADM • KBM1 • A00: 1 BNG failure.
		05	(A) = 37600003.	SBYG	ADM • KBM1 • A00: 1 BYG failure.
		06	(A) = 00077777.	SAS-	ADM • KBM1 • A00: 1 AS failure.
		77	(A) ≠ 37700000.	*Adder inputs* A = 0, B = 0 A = 1, B = 0 A = 0, B = 1 *Bits* 1-8 9-22 23	Adder failure or B register complement gate failure; or timing function failure. See other error vectors.
CPKB13-XX	Instruction: ADMC 1 132 00001. Logic tested:	01	(A) = +37767777.	A00	ADM - KBM1 - A00 failure.
	Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = 37770000 (KB0P02). Actual answer stored in ACCSAV.	77	A ≠ 37770001.	*Adder inputs* A = 1, B = 0 A = 0, B = 0 A = 0, B = 1 *Bits* 1-11 12-22 23	Adder failure or timing function failure. See other error vectors.
CPKB14-XX	Instructions: SUB KB0P13 (16010234).	01	(A) = -36700000.	$A_0 + B_0$	SUB • KBM1 • (A00 X B00) - failure.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = -37000000. Correct answer: (A) = 00700000. Actual answer stored in ACCSAV.	02	(A) = -00700000.	SBT00- SBZG	B00 => B00 failure during KBM1 or 1 BZG failure.
		03	(A) = +00777777.	COMP- SBYG-	B- => B transfer level failure during KBM1 or 1 BYG failure.
		04	(A) = -37000000.	SBNG-	1 BNG failure during KBM1.
		05	(A) = -37077777.	SAS-	IAS failure during KBM1 time.
		06	(A) = +00000001.	SBNG-	1 BNG failure during KBM3 time.
		07	A ≠ +00700000.	*Adder inputs* A = 0, B = 1 A = 0, B = 0 A = 0, B = 1 *Bits* A11 1-8 9-23	Adder failure; or B Register complement gate failure; or timing function failure. See other error vectors.
CPKB15-XX	Instruction: SUBC 6 16200006. Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = +00000001. Correct answer: (A) = -00000005 (KB0P30). Actual answer stored in ACCSAV.	01	(A) = +00000005.	SBT00-	B00 => B00 failure during KBM1.
		77	(A) ≠ -00000005.	(A) + (B) carry network	Adder failure or timing function failure. See other error vectors.
CPKB16-XX	Instruction: KB0P31 (16010256). Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = +00007777. Correct answer: +20007777. (KB0P32). Actual answer stored in ACCSAV.	01	(A) = +17770001.	A00 X B00	SUB • KBM1 • (A00 X B00) - failure during KBM1 time.
		77	(A) ≠ +20007777.	*Adder inputs* A = 0, B = 1 A = 0, B = 0 A = 1, B = 0 *Bits* 1 2-11 12-23	Adder failure or timing function failure. See other error vectors.
CPKB17-XX	Instruction: SBMC 7 15 2 00007. Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = +00000006. Correct answer: (A) = -00000001 (KB0P34). Actual answer stored in ACCSAV.	01	(A) = +00000001.	SBZG- SBT00-	1 BZG, 1 B00 failure during KBM1 time.
		02	(A) = -37777771.	COMP-	B- => B transfer level failure during KBM1 time.
		03	(A) = 37700001	SBNG-	SBM • KBM1 • A00: 1BNG failure.
		04	(A) = -00077763.	SBYG-	SBM • KBM1 • A00: 1 BYG failure.
		05	(A) = +37777776.	SAS-	SBM • KBM1 • A00: 1 AS failure.
		77	(A) ≠ -00000001	(A) + (B) carry network	Adder failure or timing function failure. See other error vectors.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKB18-XX	Instruction: SBMC 7 (152 00007). Logic tested: Central processor A, B Registers; (A) + (B) carry network; KB counter logic. Initial conditions: (A) = -00000006. Actual answer stored in ACCSAV.	01	(A) = -00000001.	A00	SBM • KBM1 • A00 - failure during KBM1 time.
		77	(A) ≠ -00000015.	*Adder inputs* A = 0, B = 0 A = 1, B = 1 A = 0, B = 1 *Bits* 1-20 21, 22 23	Failure in CPKB18 not already tested. Adder failure or timing function failure. Check other error vectors.
CPKB19-XX	Instruction: Case 1: ADD KB0P41 (12010270). Case 2: ADD KB0P42 (12010271). Case 3: ADD PONES (12010503). Logic tested: Central Processor A, B Registers; (A) + (B) carry network; OA logic. Initial conditions: Case 1: (A) = +25252525 (KB0P40). Case 2: (A) = +12525252 (KB0P41). Case 3: (A) = +00000001. Correct answer: Case 1: (A) = +37777777. (PONES). Case 2: (A) = +00000000. Case 3: (A) = +00000000.	01	OA = 1 (Case 1)	OA and AS logic.	The OA flip-flop should not set since the values added cannot produce an overflow condition.
		02	(A) ≠ +37777777 (Case 1).	(A) + (B) carry network (Case 1).	Adder network failure. Display content of ACCSAV; then check associated logic.
		04	OA = 1 (Case 2)	OA and AS logic.	The OA flip-flop should not set since the values added cannot produce an overflow condition.
	Instruction:	10	(A) 00000000.	(A) + (B) carry network (Case 2).	Adder network failure. Display content of ACCSAV2, then check associated logic.
	Logic tested:	10	OA = 0 (Case 3).	AS • OF	OA flip-flop fails to set when adding 37777777 plus 1.
	Initial conditions: Correct answer:	03, 05, 06, 07, 11-17, and 21-27			These values represent sums of the preceding error vectors indicating that more than one have occurred.

Maintenance Error Printouts - Continued.

c. PEX Tests.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPEX01-XX	Instruction: STR PEX (60037754). Logic tested: Central Processor page register and page register central logic. Initial conditions: CLA E0AX1/STR PEX, A = (E0AX1) = EXS01. Correct answer: PEX = EXS01.	01	PEX fails to transfer (PEX ≠ EXS01).	E0AX SE0AX1A- RE0AX2A	This test stores the address of EXS01 in the PEX with E0AX = 01.
		02	E0AX01 ≠ 1	SE0AX1A- RE0AX2A	The E0AX register should have the page 1 bit set.
CPEX02-XX	Instruction: STR PEX (60037754). Logic tested: Central processor page register and page register control logic. Initial conditions: CLA (E0AX2/STRPEX, A = (E0AX2) = EXS02. Correct answer: PEX = EXS02.	01	Program counter fails to transfer address (PEX ≠ EXS02)	SE0AX2A- RE0AX1A	This test stores the address of EXS02 in PEX with E0AX = 2.
		02	E0AX ≠ 2	SE0AX2A- RE0AX1A	The E0AX register should contain the page 2 value.
CPEX03-XX	Instruction: STR PEX (60037754). Logic tested: Central processor page register and page register control logic. Initial conditions: CLAE0AX3/STR PEX, A = (E0AX3) = EXS03). Correct answer: PEX = EXS03.	01	Program counter fails to transfer to proper address (PEX ≠ EXS03).	SE0AX1A- SE0AX2A	This test stores address of EXS03 in PEX and verifies E0AX contents.
		02	E0AX1, E0AX2 to ≠ 1, 1	SE0AX1A- SE0AX2A-	The E0AX bits are tested for the page 3 value.
CPEX04-XX	Instruction: STR PEX (60037754). Logic tested: Central processor page register and page register control logic. Initial conditions: PEX = 00017443 CLAE0AX4/STR PEX. Correct answer: PEX = EXS04 A = (E0AX4) = EXS04.	01	Program counter fails to transfer to proper address (PEX ≠ EXS04).	RE0AX1A RE0AX2A	Test verifies operation of PEX register.
		02	E0AX1, E0AX2, ≠ 0, 0	RE0AX1A RE0AX2A	Test verities E0AX bits can be reset.
CEPX05-XX	Instruction: STR * PG1, 60120307, CLA * PG1, 55120307. Logic tested: Central Processor page control and indirect addressing logic. Initial conditions: Content of location specified by PG2 00010000 (P1LOC). Correct answer:	01	Contents of PG1 (00150000) are not correct.	E0AX SE0AX1B RE0AX2B.	Test is to verify the indirect addressing function and paging.
CPEX06-XX	Instruction: STR * PG2, (60120311). CLA * PG2, (55120311).	01	Contents of PG2 (00240500) are correct.	Indirect addressing E0AX SE0AX2B. RE0AX1B.	Test verifies indirect addressing and page access.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Central processor page control and indirect addressing logic. Initial conditions: Contents of location specified by PG2 = 00000500 (02LOC). Correct answer:				
CPEX07-XX	Instruction: TSA * PG00 (26120315). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (PG00) - TRU EX07R (22017572). Correct answer: PCS = EX07R (00017572).	01	PCS ≠ 00017572	RE0AX1C RE0AX2C	Test of indirect transfer from within page 0.
CPEX08-XX	Instruction: TSA * PG1S (26120317). Logic tested Central processor page control and index/indirect logic. Initial conditions: (PG1S) specifies page 1, location 00015000. Correct answer: PCS = 00017617.	01	PCS ≠ 00017617	E0AX, Indirect transfer RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 1.
CPEX09-XX	Instruction: TSA * PG2S (26120320). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (PG2S) specifies page 2, location 000050000. Correct answer: PCS = 00017644.	01	PCS ≠ 00017644	RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 2.
CPEX10-XX	Instruction: TSA * PG1T (26120321). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (PG1T) specifies page 1, location 00015001. Correct answer: PCS = 00155002 (TRU EX10R).	01	PCS ≠ 00155002	RE0AX1C PE0AX2C	Test of indirect transfer from page 0 to page 1.
CPEX11-XX	Instruction: TSA * PG12T (26120322). Logic tested: Central processor page control and g register logic. Initial conditions: (PG12T) specifies page 1, location 00015003. Correct answer: PCS = 00155005.	01	PCS ≠ 00155005	RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 1 to page 2.
CPEX12-XX	Instruction: TSA * PG21T (26120323). Logic tested: Central processor page control and index/indirect logic.	01	PCS ≠ 00245005	RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 2 to page 1.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	(PG21T) specifies page 2, location 00005003. Correct answer: PCS = 00245005.				
CPEX13-XX	Instruction: TSA * PG22T (26120324). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (PG22T) specifies page 2, location 00005001. Correct answer: PCS = 002450002.	01	PCS ≠ 00245002	RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 2 to page 2.
CPEX14-XX	Instruction: TRU * PG1SA (22120314). TSA * (pg. 1) 5007(26155007). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (PG1SA) specifies page 1 location 00015006. [5007 (page 1)] = TRU EX14R. Correct answer: PCS = 00155007.	01	PCS ≠ 00155007	RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 1 to page 0.
CPEX16-XX	Instruction: TRP * P2P (21120335). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (A) = 77777777 (MONES) Correct answer: (A) = 00000000	01	Transfer occurred	KCIND- KCISUM KCISUMA TRPT- XTRPT SE0AX1E, SE0AX2E RE0AX1E, RE0AX2E RE0AXST1, RE0AXST2	The TRP* instruction tests the restore functions of E0AX => E0AXST => E0AX. The transfer should not occur.
CEPX15-XX	Instruction: TRU * PG2SA (22120313). TSA * (Pg. 2) 5007 (26245007). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (PG2SA) specifies page 2, location 00005006. [5007 (page 2)] = TRU EX15R. Correct answer: PCS = 00245007.	01	PCS ≠ 00245007	RE0AX1C RE0AX2C	Test of indirect transfer from page 0 to page 2 to page 0.
CPEX17-XX	Instruction: TRN * PIP (23120333). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (A) = 00000000. Correct answer: (A) = 00000000.	01	Transfer occurred	$E0AX_{1,2}$ => $E0AXST_{1,2}$ => $E0AX_{1,2}$ SE0AX1E, SE0AX2E RE0AX1E, RE0AX2E SE0AX22, RE0AXST1, RE0AXST2	Transfer should not occur since sign bit (A00) is positive.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPEX18-XX	Instruction: TRZ * P1P2 (24120334) Logic tested: Central processor page control and index/indirect logic. Initial conditions: (A) = 77777777. Correct answer: (A) = 00000000.	01	Transfer occurred	E0AX E0AXST KCINB-	The transfer should not occur since A register contains all ones.
CPEX19-XX	Instruction: TRY * P2P0A (25120336) Logic tested: Central processor page control and index/indirect logic. Initial conditions: OA = 0. Correct answer: OA = 0, no transfer.	01	OA = 1	E0AX E0AXST KCINC-	The transfer should not occur, since the OA (overflow A register) flip-flop should be reset.
CPEX20-XX	Instruction: TRU * P2PTRU (22120337) Logic tested: Central processor page control and index/indirect logic. Initial conditions: (P2PTRU) specifies page 2 location 00005015. [5015 (page 2)] = CLA PEX. Correct answer: (A) = 00245015.	01	PEX not correct (A) ≠ 00245015	E0AX, RE0AX1C, RE0AX2C SE0AX1C, SE0AX2C	Test verifies indirect transfer from page 0 to page 2.
CPEX21-XX	Instruction: HLT * P1PHLT (00120341). Logic tested: Central processor page control and index/indirect logic. Initial conditions: (P1PHLT) specifies page 1, location 00015014. [5014 (page 2)] = CLA PEX. Correct answer: (A) = 00155014.	01	Indirect transfer failed (A) ≠ 00155014	E0AX E0AXST E0AX SE0AX1C, SE0AX2C RE0AX1C, $E0AXST_{1,2}$ => $BREQ_{78}$ $E0AXST_{1,2}$ => $E0AX_{1,2}$	The test verifies the HLT* instructions transfer to page 1.

Maintenance Error Printouts - Continued.

d. KD Counter Lists.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKD01-XX	Instruction: TSA AA 260 AA. Logic tested: AR to PC gating. PC to PCS transfer. BR gating. Initial conditions: BR = 00. AR = AA. Correct answer: PCS (Loc 000004) = DER 11. PC = AA.	01 02 03	PC ≠ AA PCS ≠ DER 11	AR to PC gating. PC + 1 PCS transfer.	TSA failed to transfer AR to PC. PC + 1 save failed to execute properly. Combination of error vectors 01 and 02.
CPKD02-XX	Instruction: TSA BB 260 BB. Logic tested: KD counter. AR to PC gating. PC to PCS transfer. BR gating. Initial conditions: BR 77 AR = BB Correct answer: PCS = (LOC 000774) = DER 21 PC = BB.	01 02 03	PC ≠ BB PCS ≠ DER 21 PC ≠ AA and PCS ≠ DER 21	AR to PC gating.	TSA failed to transfer AR to PC. PC + 1 save failed to execute properly. TSA decode failed.
CPKD03-XX	Instruction: TSA CC 260 CC. Logic tested: KD counter PC + 1 to PCS transfer. BR gating. AR to PC gating. BYG, BZG, BNG. Initial conditions: BR = 0 PCS = 77777777. Correct answer: PCS = KDKHB PC = CC	01 02 03	EOA ≠ PCS EOA PCS and PCS0-8 not cleared	PC to B gating EOA = PCS BYG BR gating. BZG BNG	Intermediate check determined EOA not correct for PCS location. Upper nine bits of PCS not cleared by TSA at (KDM 3 time). TSA decode failed.
CPKD04-XX	Instruction: STQ TLOC 620 TLOC. Logic tested: STQ decode and operation. Initial conditions: Q = -77777777 Correct answer: TLOC = 77777777	01 02 03 04	TLOC ≠ 77777777 TLOC 00 ≠ 0 TLOC 09-23 ≠ 77777 	Q to B gating. BZG BYG or bit transfer. BNG or bit transfer.	Possible Q to B or memory write cycle failure. Q0 to B0 gating failed. If bits 9-23 = 0 check BYG. If bits 9-23 ≠ 0 QRG or BREG bit(s). Bits 1-8 = 0 BNG. Bits 1-8 ≠ 0 QRG or BRG bit(s) failed.
CPKD06-XX	Instruction: EX TLOC540 TLOC. Logic tested: A to B transfer B to A transfer Initial conditions: A = 73777777 TLOC = 25252525 Correct answer: TLOC = 77777777 A = 25252525	01 02 03 04	A REG = 0 A01-23 ≠ 25252525 A00 ≠ 0 TLOC = 00000000	Memory access or B to A transfer. AMG CPB to A or B to CPB AZG. A to B transfer or write memory.	Bit or bit(s) of ACC failed, on B to A transfer. Sign is positive bit - failed in A01-23. Perform B to A transfer. Sign bit failed. Other bits may also be in error. No transfer direct from ACC to B register at KDM1.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKD05-XX	Instruction: LDQ MONES 520 MONES	01	Q ≠ 77777777	B to Q transfer.	LDQ decode failed.
	Logic tested: B to Q transfer	02	Q 00 ≠ 1		QZG or B00 to Q 00 bit failed.
	Initial conditions: Q = 0	03	Q01-023 ≠ 37777777 nor all zeros.	QMG or bit transfer.	QRG in error; if Q(1-23) = 0
	Correct answer: Q = -77777777				QMG failure; if Q(1-23) ≠ 0 Q stage failure.
	Instruction:	05	TLOC 00 ≠ 1	BZG	B register sign bit failed to set KDM1 derived logic.
	Logic tested:	06	TLOC 09-23 ≠ 77777	BYG	Bits (B_9 - B_{23}) failed KDM1 derived logic.
	Initial conditions:	07	TLOC 01-08 ≠ 377	BNG	Bits (B_0 - B_8) failed KDM1 derived logic.
	Correct answer:				
CPKD07-XX	Instruction: SMK TLOC 470 TLOC	01	TLOC 00 ≠ 1	MSK 00 SBZG	Sign bit dropped.
	Logic tested: MSK (A-Q) and B to memory	02	Bits 9-23 ≠ 77777	MSG (01-15) SBYG	Bit(s) 9-23 dropped, could be MSK inputs or transfer levels.
		03			Combination of error sectors 01 and 02.
	Initial conditions: TLOC = 0 (Q Reg), (A Reg) = KDPAT3 = 77777777.	04	$Bits_{1-8}$ ≠ 377	MSK_{1-8} SBNG	Bit(s) 1-8 dropped, could be MSK inputs or transfer logic.
	Correct answer: TLOC = (KDPAT3) = 77777777.				
		05			Combination of error vectors 01 and 04.
		06			Combination of error vectors 02 and 04.
		07			Combination of error vectors 01, 02 and 04.
CPKD08-XX	Instructions: SMK TLOC 470 TLOC.	01	TLOC 00 ≠ 0	MSK 00 SBZG	Sign bit picked up or transfer logic.
	Logic tested: MSK and B to memory.	02	TLOC 09-23 ≠ 00000	MASK SBYG	Bit(s) 9-23 picked up or transfer logic.
		03			Combination of error vectors 01 and 02.
	Initial conditions: ACC = 77777777 KDPAT3 = 77777777 TLOC = 00000000 Q = 00000000	04	TLOC 1-8 ≠ 000	SBNG MASK	Bit(s) 1-8 picked up or transfer logic.
	Correct answer: TLOC = 00000000				
		05			Combination of error vectors 01 and 04.
		06			Combination of error vectors 02 and 04.
		07			Combination of error vectors 01, 02 and 04.
CPKD09-XX	Instructions: SMK TLOC 470 TLOC.	01	TLOC 00 = 1	MSK SBZG write	MASK inputs open or SMK transfer logic.
	Logic tested: MSK (A - Q) B => memory.	02	TLOC 09-23 ≠ 77777	MSK SBYG write	MASK inputs open or SMK transfer logic.
	Initial conditions: (QRG) (ACC) = 77777777. (TLOC) = 77777777.	04	TLOC 01-08 ≠ 377	Write SBNG MSK	MASK inputs open or SMK transfer logic.
	Correct answer: (KDPAT3) = 77777777.				

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKD01-XX	Instruction: LMK TLOCK 270 TLOC. Logic tested: MSK B to A transfer. Initial conditions: (TLOC) (QRG) = 77777777. (ACC) Correct answer: (ACC) = 00000000.	01	A00 ≠ 0	SAZG SBZG MSK00	Stuck on - should not change sign bit MSK = 0.
		02	A09-23 ≠ 00000	SAMG SBYG MSK (9-23)	Stuck on or MASK inputs to B bad, MASK occurs when it should not.
		03			Combination of error vectors 01 and 02.
		04	A01 = 08 ≠ 000		Stuck on or MASK input to B bad. MASK occurs when it should not.
		05			Combination of error vectors 01 and 04.
		06			Combination of error vectors 02 and 04.
		07			Combination of error vectors 01, 02 and 04.
CPKD11-XX	Instruction: LMK TLOC 270 TLOC. Logic tested: MSK (B • Q) B to A transfer Initial conditions: A = 00000000. Q = 00000000. TLOC - 77777777. Correct answer: KDPAT3 = 77777777.	01	$A_0 \neq 1$	SAZG SBZG MSK00	B • Q inputs to B failed to MASK.
		02	A00-23 ≠ 77777	SAMG SBYG MSK (9-23)	B • Q inputs to B failed to MASK
		03			Combination of error vectors 01 and 02.
		04	A01-08 ≠ 377		B • Q inputs to B failed to MASK.
		05			Combination of error vectors 01 and 04.
		06			Combination of error vectors 02 and 04.
		07			Combination of error vectors 01, 02 and 04.
CPKD12-XX	Instruction: CLLC 77777. 512 77777. Logic tested: KD counter 0 => A Reg Load QRG from B. Initial conditions: A = 77777777 (KDPAT3). Correct answer: (ACC) = 00000000. (QRG) = 00077777.	01	A00 ≠ 0	AZG	Test that ACC sign is cleared on literal operation (G = 2).
		02	A01-23 ≠ 00000000	AMG	Test that all is cleared on literal operation (G = 2).
		03	Q00 ≠ 0	B to Q transfer and control, QZG.	B to Q transfer levels KDM4 failed.
		04	Q01-23 ≠ 00077777		0 to QSN failed.
CPKD13-XX	Instruction: CLL TLOC3 510 TLOC3. Logic tested: B to A transfer B to Q transfer EOA + 1 to AR gating. Initial conditions: (TLOC3) = 25252525 (TLOC4) = 65252525	01	A01-23 ≠ 25252525	AMG, KDM1, B to A transfer and control.	KDM1 • AMG failed.
		02	A00 ≠ 0	AZG and B0 to A0 transfer	KDM1 • AZG failed.
		03	Q00 ≠ 1	QZG, B to Q transfer, EOA +1 => AR.	KDM4 • QZG failed.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Correct answer: (ACC) = 25252525 (QRG) = 65252525	04	Q01-23 = 00000000	AMG, B to Q transfer and control.	KDM1• QMG failed.
		05	Q01-23 ≠ 25252525	QMG B to Q transfer	B to Q KDM4 failed.
CPKD14-XX	Instruction: STL TLOC 610 TLOC.	01	TLOC = 0	A => B and write	STL • KDM1 transfer failed.
	Logic tested: A to B transfer Q to B transfer AR + 1 to EOA and write	02	$TLOC_0$ = 0 TLOC 00 ≠ 1	BZG A to B transfer and control.	Sign bit failed A to B at KDM1.
		03	TLOC09-23 ≠ 77777	BYG A to B transfer and control.	Bits (9-23) BYG failed A to B at KDM1.
	Initial conditions: LOC _____ = (MONES) (A) = 77777777 LOC _____ = (KDPAT1) (Q) = 25252525	04	TLOC01-08 ≠ 377	BNG A => B transfer and control.	Bits (1-8) BNG failed A to B at KDM1.
	Correct answer: A and (TLOC) = 77777777 Q and (TLOC + 1) = 25252525	05	TLOC + = 0	Q to B transfer, AR + 1 => EOA, write, KD counter sequencing.	Transfer level at KDM4.
		06	TLOC + 1 ≠ 25252525	BYG, BNG, BZG, BREG write.	B gates failed at KDM4.

Maintenance Error Printouts - Continued.

d. KJ Counter Lists.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKJ01-XX	Instruction: LXA * 7, 1 (70 4 00007) Logic tested: Indirect addressing, KJ counter, LXA mechanization Initial conditions: BR = 0 LOC 0 = 00000077 LOC 7 = 37000005 (KJ0P01) Correct answer: LOC 0 = 00000005	01	LOC 000007 = 00000005		EOA was unchanged from initial value (n) derived from indirect operation.
		02	LOC 00000 = 00000106	INI- INR- DEX-	Indexing occurred instead of indirect.
		03	LOC 00000 = 00000007	INR	Indirect failed.
		04	LOC 00000 = 00007700	INR- DEX-	Indexing and indirect both occurred.
		05	LOC 00000 = + 00000000	TRDARCPB TRICPB BYG	Transfer out of AR failed putting 0's into the B register.
		06	LOC 00000 = + 00000077	KJ Counter Write.	Failure to change contents of location 00000 could be due to XJ counter bypassing WRITE.
		77	other error LOC 0 ≠ 00000005	other KS Counter logic.	Manually single-step instruction and check mechanization.
CPKJ02-XX	Instruction: LXA 5, 2 (70 1 00005) Logic tested: KJ Counter, LXA with direct addressing, B register clearing during instruction access. Initial conditions: BR = 3 LOC 00031 = 00000002 LOC 00032 = +00000000 LOC 00005 = 00200007 LOC 00000 = 00000002 A Reg = -37000006 Correct answer: LOC 00031 = 00000005	01	LOC 00032 ≠ 00000000	Indirect addressing.	Indirect addressing occurred when it shouldn't have.
		02	LOC 00001 = 00000005	TRO$\overline{B}$RCPB BR to CPB transfer.	Bank 0 selected instead of Bank 3. BR either wasn't loaded with No. 3 or the BR to ROA transfer failed.
		03	LOC 00030 = 00000005	(G07 • G08) to EOA transfer.	IR1 (LOC 30) selected instead or IR2 (LOC 31) G Register transfer failure.
		04	LOC 00000 = 00000005	CPB to EOA transfer.	EOA was cleared instead of loaded with address of IR.
		05	LOC 00031 = 00000006	BYG	
		06	LOC 00031 = -00000005	BZG	Instruction access logic B cleared during state 10.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
		07	LOC 00031 = 37000005	BNG	
		77	LOC 00031 ≠ 00000005	other KJ counter logic.	Manually single-step instruction and check mechanization.
CPKJ03-XX	Instruction: LXA 5, 6 (70 3 00005) Logic tested: Addressing Logic and LXA instruction Initial conditions: LOC 00012 = 00000000 LOC 00013 = 00000002 LOC 00007 = 00200007 Correct answer: LOC 00013 = 00000005	01	LOC 12 = 00000007	IDR- DEX-	Both indexing and indirect occurred.
		77	LOC 13 ≠ 00000005	other KJ counter logic.	Manually single-step instruction and check mechanization.
CPKJ04-XX	Instruction: IXA * 7, 3 (72 6 00007) Logic tested: Address modification logic, IXA instruction KJ counter A0S2 Initial conditions: BR = 0 LOC 00002 = 00000007 LOC 00071 = 00000000 LOC 00007 = 00200070 Correct answer: LOC 00002 = 00000077	01	LOC 00002 = 00000025	INI IDR DEX	Indexing occurred, indirect did not.
		02	LOC 00002 = 00000000	A0S2- EDA to CPB transfer	Input to B Reg at KJ04 time is all zero's.
		03	LOC 00002 = 00000002	EOAG	EOA gate failed to set at KJ03 time.
		04	LOC 00002 = 00000007	SBY write EOA to CPB transfer CPB to B transfer.	B Reg did not change at KJ04 time or write failed.
		05	LOC 00077 = 00000077	EOAG	EOA did not change at KJ05 time.
		77	LOC 00002 ≠ 00000077	other KJ counter logic.	Manually single-step instruction and check mechanization.
CPKJ05-XX	Instruction: JXA 70, 1 Logic tested: JXA with indirect addressing Initial conditions: BR = 05 (KJOP13) LOC 00050 = 00000007 LOC 00000 = (KJOP06) = TRV EVI Correct answer: PC should be incremented by one, not two.	01	PC = 0 Next instruction was missed, transfer to loc 0 occurred.	AIPC	PC was cleared. PC was present without data at KJ05 time. KJOP 13 = 500000 for BR = 5
		77	PC + 2 occurred (next instruction was skipped).	COMP, SAOF, AOF, Timing Logic KJ Counter.	Failure in the JXA logic such that PC + 2 was loaded into program counter.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKJ06-XX	Instruction: JXA * 2, 3 (74 6 00002) Logic tested: JXA, indirect addressing, (I) > E Initial conditions: BR = 05 LOC 2 = 200007 (KJOP03) LOC 52 = 37777774 (KJOP08) LOC 0 = KJOP07 = TRU EV 77A Correct answer: 37777774>7 PC skip.	77	PC failed to skip.	PCG-, AIPC, indirect addressing.	Program counter should be incremented by 2 because content of location 52 (effective address) is greater than content of location 2 (index register).
CPKJ07-XX	Instructions: JXA 7, 1 (74 0 00007) Logic tested: JXA with (I) = E Initial conditions: BR = 05 LOC 50 = 00000007 LOC 0 = TRU EV 77B Correct answer: Program counter should increment by one (not skip).	77	Program counter did not increment by one.	SAS- Timing Logic AOF was set.	
CPKJ08-XX	Instruction: JXD * 2, 3 (76 6 00002) Logic tested: KJ Counter JXD Logic Initial conditions: BR = 05 LOC 2 = 00200007 (KJOP03) LOC 52 = 00000077 LOC 0 = TRU EV 77C Correct answer: Next instruction should be skipped	01	Next instruction was executed and LOC 00052 = 00077776	JXD Class 1	Indexing occurred indirect failed no PC skip resulted.
	LOC 52 = 00000070	02	LOC 00052 = 00077672	SAS- COMP- SYBG- KJ03 counted.	First B register complement.
		03	LOC 00052 = 00077726	KJ04, EOA	EOA Reg fails to change at AJ04 time.
		04	LOC 00052 = 00000000 Program counter incremented by two.	AOS2- TROEOACPB- COMP- COMP B, 3	Adder Failure (B + AR) B + AR Failure; second complement of B failed. Zero's stored in B register at KJ08 time. This could be caused by not complimenting B at KJ06 time, failure of EOAG at KJ07 time. Failure of the KJ counter, failure of the BYG at KJ08 time.
		05	LOC 00052 = 00000077 Program counter incremented by two.	TRIBCPB- SBYG- TROEOACPB- SARG- EOA => B	BREG = initial value (77_8); EOA should equal 70_8, AR value re-added to B reg AR failed to clear. Failure to transfer EOA to B reg at KJ05 time.
		10	LOC 00052 = 77707	BYG	Failure or BYG at KJ06 time.
		77	LOC 00052 = 00000070	Timing Logic KJ Counter.	Manually single-step instruction and check mechanization.

Maintenance Error Printouts - Continued.

f. KF Counter Tests.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKF00-XX	Instruction: CR 1, 0, KFW, 0 (07000001/00010273). Logic tested: Central Processor A, B, AR and Shift Counter Register, KF sequence counter and KF Sequence Counter and KF Counter PC control logic. Initial conditions: (KFW) = 00000000 (A) = +12341234 (KFOP1) Correct answer: (KFW) = 00000000 (A) = +12341234 (KFOP1)	01	AIPC at ONE level.	AIPC	Invalid increment of Program Counter. Display content of shift counter, then check associated logic.
		02	(A) ≠ +12341234	TROBCPB- TRIACPB-	Original content of A Register (KFOP1) failed to restore. Display content of location 001040_8, then check associated logic.
		04	A Register save failed.	TRIBA-	Display content of memory location 001040_8, then check associated logic.
		10	Bit selector save failed.	TRIEOACPB- SEOA14-, SEOA18-, SEOAG- and G08.	Display content of memory location 001041_8, then check associated logic.
		20	Bit selector save location contains ZERO.	TROGCPB- TRIEOACPB- SEOA14- SEOA18- SEOAG	Display content of memory location 0010418; then check associated logic.
		40	A Register and bit selector saves failed.	Memory Address logic.	Display contents of memory locations 001041_8 and 001040_8; then check associated logic.
		70	(KFW) ≠ 0	KF counter (State 1100)	Display content of location KFW, then check associated logic.
CPKF01-XX	Instruction: CR 0, 0, KFW, 0 (07000000/00010273). Logic tested: Arithmetic Unit A, B, AR, and shift counter logic. KF sequence counter, KF Counter PC control logic and Bit Selector Decodes. Initial conditions: -25222525 (KFOP2) Correct answer: 25225252 (KFOP7) Actual answer contained in KFW.	01	AIPC at ONE level.	AIPC BS = 0	Invalid Increment of Program Counter. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 25225252	BS = 0 KF counter SLA and SRA	Manipulation using B22 • B23 shift operation failure. Display content of memory location KFW; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
		03			This represents the sum of the above error vectors indicating that both have failed.
CPKF02-XX	Instruction: CR 2, 0, KFW, 0 (07000002/00010273). Logic tested: Central Processor A, B, AR and SHC Registers, KF sequence counter, KF counter PC control logic and bit selector Decodes. Initial conditions: 35252525 (KFOP3) Correct answer: 25252525 (KFOP8) Contained actual answer in location KFW.	01	(KFW) ≠ 25252525	BS = 0 KF counter SLA and SRA	Manipulation Failure using B22 • B23 shift operation. Display content of memory location KFW; then check associated logic.
CPKF03-XX	Instruction: CR 3, 0, ACC, 0 (07000005/06010273) Logic tested: Control Processor A, B, AR and Shift Counter Registers; KF Sequence Counter, and Bit Selector decodes. Initial conditions: -16525252 (KFOP5) Correct answer: -12525252 (KFOP9) Actual answer contained in QRG	01	(QRG) ≠ -12525252	B23 • B22	Manipulation Failure using B23 • B22 shift operation. Display contents of A Register; then check associated logic.
		02	A Register was not manipulated	AR = ACC	Display content of A Register; then check associated logic.
		04	Manipulation of A Register save location failure.	AR = ACC	Display content of location 001041_8; then check associated logic.
CPKF04-XX	Instruction: JSA 1, 0, KFW, 0 (07000001/00010273) Logic tested: Central Processor A, B, AR and Shift Counter Registers; KF sequence counter, KF counter PC control logic and bit selector decodes. Initial conditions: -17777777 (KCFC1) Correct answer: -37777777 (KFOP6) Actual answer contained in KFW	01	AIPC at ONE level	BS = 0	AIPC Error A01 • SHC21 = 0 No skip condition. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -37777777	BS = 0	SHC22 • A01: 1 A01 Function Failed. Display content of KFW; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKF05-XX	Instruction: CS 1, 0 KFW, 0 (07000001/03010273) Logic tested: Central Processor A, B, AR and Shift Counter Registers; KF sequence counter, KF counter, PC control logic and bit selector decodes. Initial conditions: 20000000 (KCF1) Correct answer: 20000000 (KCF1) Actual answer contained in KFW	01	AIPC is at the ONE level	BS = 0	AIPC Error SHC20 • SHC21 = 0. No skip condition. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 20000000	BS = 0	SHC23 • A01: 1A01. Display content of KFW; then check associated logic.
CPKF06-XX	Instruction: JSA 5, 0, KFW, 0 (07000005/00010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter, KF counter PC control logic and bit selector decodes. Initial conditions: -36777777 (KCPC5) Correct answer: -37777777 (KFOPG) Actual answer stored in KFW.	01	AIPC is at the ONE level.	BS = 1	AIPC error A05 • 21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 37777777	BS = 1	SHC22 • A05 = 1A05. Function failed. Display content of KFW; then check associated logic.
CPKF07-XX	Instruction: CS 5, 0, KFW, 0 (07000005/03010273) Logic tested: Central Processor A, R, AR and shift counter register. KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: 01000000 (KCF5) Correct answer: 01000000 (KCF5) Actual answer contained in KFW.	01	AIPC is at the ONE level.	BS = 1	AIPC • SHC20 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 01000000	BS = 1	SHC23 • A05 = 1A05. Display content of KFW; then check associated logic.
CPKF08-XX	Instruction: JSA 9, 0, KFW, 0 (07000011/06010273)	01	AIPC is at the ONE level.	BS = 2	AIPC error A09 • SHC21 = 0. Display content of shift counter; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Logic tested: Central Processor A, B, AR, and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37737777 (KCFC9) Correct answer: -37777777 (KFOP6) Actual answer contained in KFW	02	(KFW) ≠ -37777777	BS = 2	SHC22 • A09 = 1A09 function failed. Display content of KFW; then check associated logic.
CPKF09-XX	Instruction: CS 9, 0, KFW, 0 (07000011/03010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter, KF counter PC control logic and bit selector decodes. Initial conditions: 00040000 (KCF9) Correct answer: 00040000 (KCF9) Actual answer contained in KFW.	01	AIPC is at the ONE level.	BS = 2	AIPC SHC20 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00040000	BS = 2	SHC23 • A09 = 1A09 or test bit pickup of other normally "OFF" functions. Display content of KFW; then check associated logic.
CPKF10-XX	Instruction: JSA 12, 0, KFW, 0 (07000014/06010273) Logic tested: Central Processor A, B, AR and shift shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37773777 (KCFC12) Correct answer: -37777777 (KFOP6) Actual answer contained in KFW.	01	AIPC is at the ONE level.	BS = 3	AIPC error A12 • SHC21 = 0. Display content of shift counter, then check associated logic.
		02	(KFW) ≠ -37777777	BS = 3	SHC22 • A13 = IA13 function failed. Display content of KFW; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKF11-XX	Instruction: CS 12, 0, KFW, 0 (07000014/03010273) Logic tested: Central Processor A, B, AR and shift counter, KF counter PC control logic and bit selector decodes. Initial conditions: 00004000 (KCF12) Correct answer: 00040000 (KCF12) Actual answer contained in KFW.	01	AIPC is at the ONE level.	BS = 3	AIPC SHC20 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00040000	BS = 3	SHC23 • A13 = IA13. Display content of KFW; then check associated logic.
CPKF12-XX	Instruction: JSA 19, 0, KFW, 0 (07000023/06010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37777757 (KCFC19) Correct answer: -37777777 (KFOP6) Actual answer contained in KFW.	01	AIPC is at the ONE level.	BS = 4	AIPC error A19 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -37777777	BS = 4	SHC22 • A17 = IA17 function failed. Display content of KFW; then check associated logic.
CPKF13-XX	Instruction: CS 19, 0, KFW, 0 (07 19, 0/03 KFW, 0) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter, KF counter PC control logic and bit selector decodes. Initial conditions: +00000020 (KCF19) Correct answer: +00000020 (KCF19) Actual answer contained in KFW.	01	AIPC is at the ONE level.	BS = 4	AIPC error SHC20 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000020	BS = 4	SHC23 • A17 = IA17. Display content of KFW; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKF14-XX	Instruction: JSA 23, 0, KFW, 0 (07000027/06010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter; KF counter PC counter logic and bit selector decodes. Initial conditions: -37777776 (KCFC23) Correct answer: -37777777 (KFOP6) Actual answer found in location KFW.	01	AIPC is at the ONE level.	BS = 5	AIPC error A23 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -37777777	BS = 5	SHC21 • A21 = IA21 function failed. Display content of KFW; then check associated logic.
CPKF15-XX	Instruction: CS 23, 0, KFW, 0 (07000027/03010273) Logic tested: Central Processor A, B, AR, and shift counter registers; KF sequence counter, KF counter PC counter control logic and bit selector decodes. Initial conditions: +00000001 (KCF23) Correct answer: +00000001 (KCF23) Actual answer found in KFW.	01	AIPC is at the ONE level.	BS = 5	AIPC error/SHC20 • SHC21 = 0. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000001	BS = 5	SAC23 • A17 = IA17. Display content of KFW; then check associated logic.
CPKF16-XX	Instruction: JSR 1, 0, KFW, 0 (07000001/04010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter, KF counter PC control logic and bit selector decodes Initial conditions: -37777777 (KFOP6) Correct answer: -17777777 (KCFC1) Actual answer contained in KFW.	01	AIPC is at the ZERO level.	BS = 0	PC failed to skip SHC21 • A01 = AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -17777777	BS = 0	Test SHC23 • A01 inputs. Display content of KFW; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKF17-XX	Instruction: JRR 1, 0, KFW, 0 Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: 00000000 (KFOP10) Correct answer: 00000000 (KFOP10) Actual answer contained in KFW.	01	AIPC is at the ZERO level.	BS = 0	PC failed to skip SHC20 • A01-: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000000	BS = 0	Test SHC22 • A01- inputs. Display content of KFW; then check associated logic.
CPKF18-XX	Instruction: JSR 5, 0, KFW, 0 (07000005/04010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37777777 (KFOP6) Correct answer: -36777777 (KCFC5) Actual answer contained in KFW.	01	AIPC is at the ZERO level.	BS = 1	PC failed to skip SHC21 • A05: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -36777777	BS = 1	Test SHC23 • A05 inputs. Display content of KFW; then check associated logic.
CPKF19-XX	Instruction: JRR 5, 0, KFW, 0 (07000005/10010273) Logic tested: Central Processor A, B, AR and shift counter register; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: 00000000 (KFOP10) Correct answer: 00000000 (KFOP76) Actual answer contained in KFW.	01	AIPC is at the ZERO level	BS = 1	PC failed to skip SHC20 • A05-: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000000	BS = 1	Test SHC22 • A05- inputs. Display content of KFW; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
CPKF20-XX	Instruction: JSR 9, 0, KFW, 0 (07000011/04010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37777777 (KFOP6) Correct answer: -37737777 (KCFC9)	01	AIPC is at the ZERO level.	BS = 2	PC failed to skip SHC21 • A09: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -37737777	BS = 2	Test SHC23 • A09 inputs. Display content of KFW; then check associated logic.
CPKF21-XX	Instruction: JRR 9, 0, KFW, 0 (07000011/10010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter, KF counter PC counter logic and bit selector decodes. Initial conditions: 00000000 (KFOP10) Correct answer: 00000000 (KFOP10) Actual answer contained in KFW	01	AIPC is at the ZERO level.	BS = 2	PC failed to skip SHC20 • A09-: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000000	BS = 2	Test SHC22 • A09- inputs. Display content of KFW; then check associated logic.
CPKF22-XX	Instruction: JSR 12, 0, KFW, 0 (07000014/04010273) Logic tested: Central Processor A, B, AR, and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37777777 (KFOP6) Correct answer: -37773777 KCFC12 Actual answer contained in KFW.	01	AIPC is at the ZERO level.	BS = 3	PC failed to skip SHC21 • A13: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -37773777	BS = 3	Test SHC23 • A13 inputs. Display content of KFW; then check associated logic.
CPKF23-XX	Instruction: JRR 12, 0, KFW, 0 (07 12, 0/10 KFE, 0) Logic tested: Central Processor A, B, AR, and shift counter register; KF sequence counter; KF counter PC control logic and bit selector decodes.	01	AIPC is at the ZERO level.	BS = 3	PC failed to skip SHC20 • A13-: AIPC. Display content of shift counter; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	00000000 (KFOP10) Correct answer: 00000000 (KFOP10) Actual answer contained in KFW	02	(KFE) ≠ 00000000	BS = 3	Test SHC22 • A13- inputs. Display content of KFW; then check associated logic.
CPKF24-XX	Instruction: JSR 19, 0, KFW, 0 (07000023/04010273) Logic tested: Central Processor A, B, AR, and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37777777 (KFOP6) Correct answer: -37777757 (KCFC19) Actual answer contained in KFW	01	AIPC is at the ZERO level.	BS = 4	PC failed to skip SHC21 • A17: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ -3777757	BS = 4	Test SHC23 • A17 inputs. Display content of KFW; then check associated logic.
CPKF25-XX	Instruction: JRR 19, 0, KFW, 0 (07000023/10010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: 00000000 (KFOP10) Correct answer: 00000000 (KFOP10) Actual answer contained in KFW.	01	AIPC is at the ZERO level.	BS = 4	PC failed to skip SHC20 • A17: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000000	BS = 4	Test SHC22 • A17- inputs. Display content of KFW; then check associated logic.
CPKF26-XX	Instruction: JSR 23, 0, KFW, 0 (07000027/04010273) Logic tested: Central Processor A, B, AR, and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: -37777777 (kFOP6)	01	AIPC is at the ZERO level.	BS = 5	PC failed to skip SHC21 • A21: AIPC. Display content of shift counter; then check associated logic.

Maintenance Error Printouts - Continued.

Printout	Test description	Error vector XX=	Error	Logic associated with failure	Suggested further checks and remarks
	Correct answer: -37777776 (KCF23)	02	(KFW) ≠ -37777776	BS = 5	Test SHC23 • A21 input. Display content of KFW; then check associated logic.
CPKF27-XX	Instruction: JRR 23, 0, KFW, 0 (07000027/10010273) Logic tested: Central Processor A, B, AR and shift counter registers; KF sequence counter; KF counter PC control logic and bit selector decodes. Initial conditions: 00000000 (KFOP10) Correct answer: 00000000 (KFOP10) Actual answer contained in KFW.	01	AIPC is at the ZERO level.	BS = 5	PC failed to skip SHC20 • A21-: AIPC. Display content of shift counter; then check associated logic.
		02	(KFW) ≠ 00000000	BS = 5	Test SHC22 • A21- input. Display content of KFW; then check associated logic.

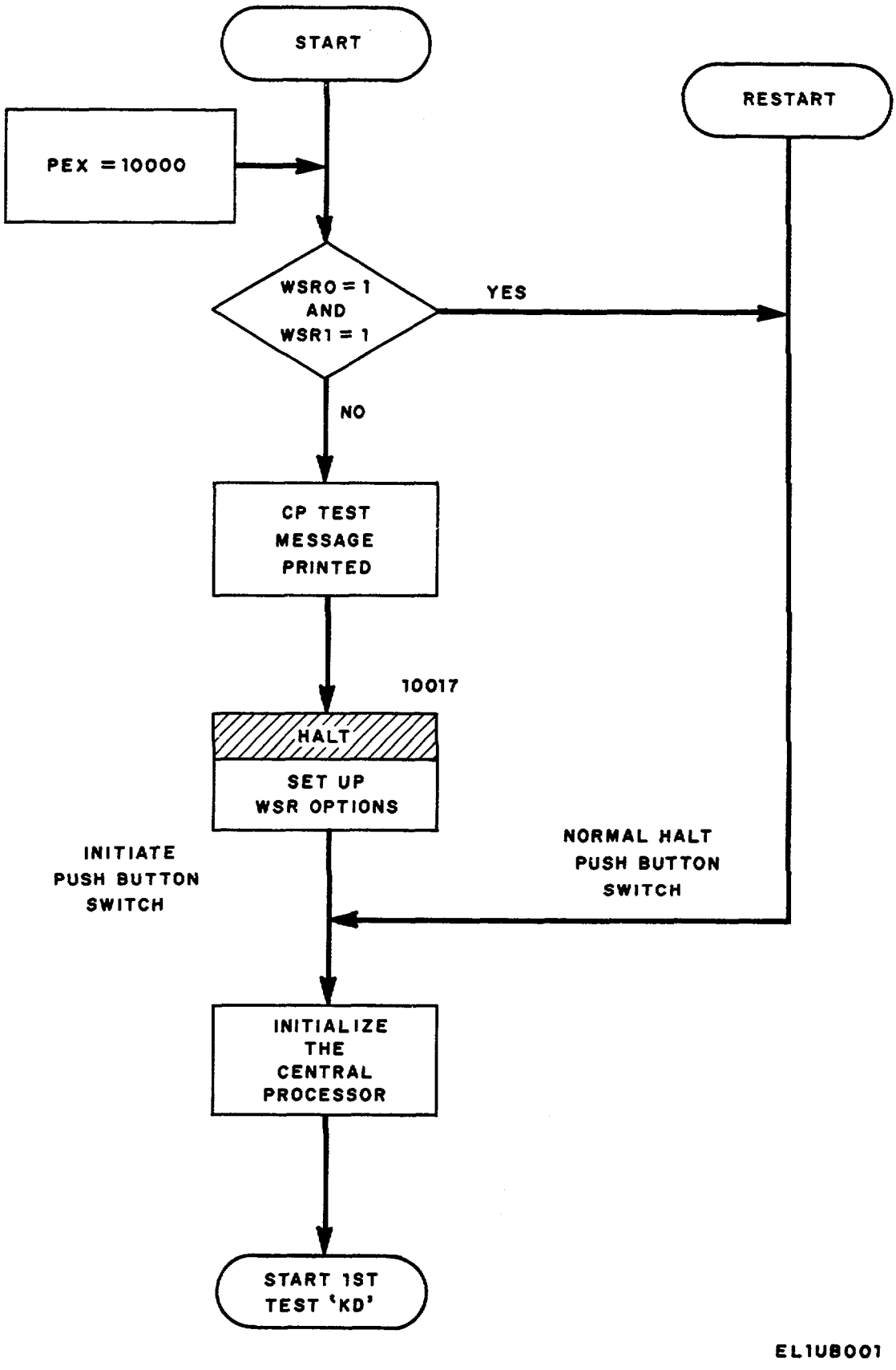


Figure 1 (1). Central processor Logic Data Flow Diagram (Sheet 1 of 6).

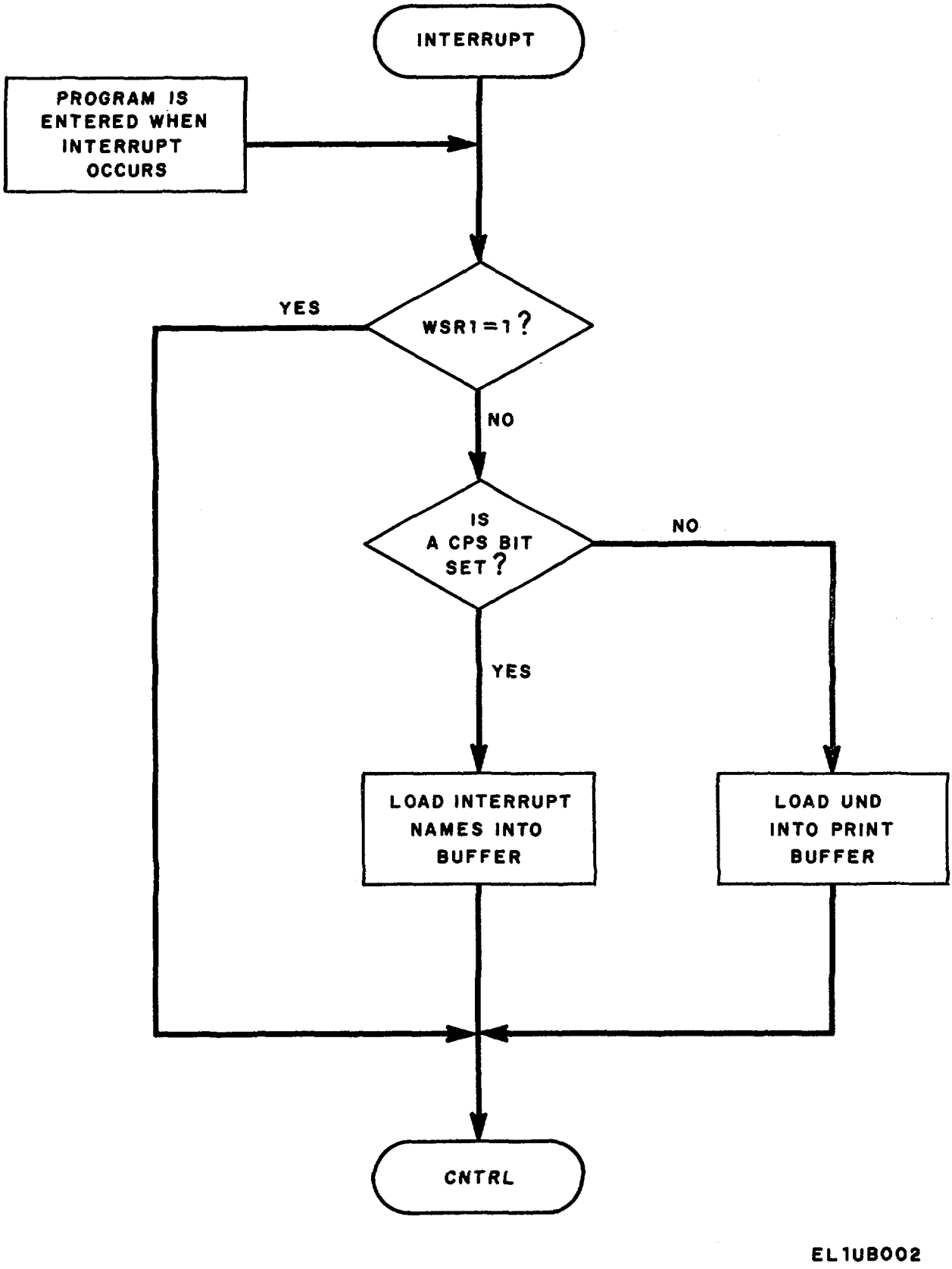


Figure 1 (2). Central Processor Logic Data Flow Diagram (Sheet 2 of 6).

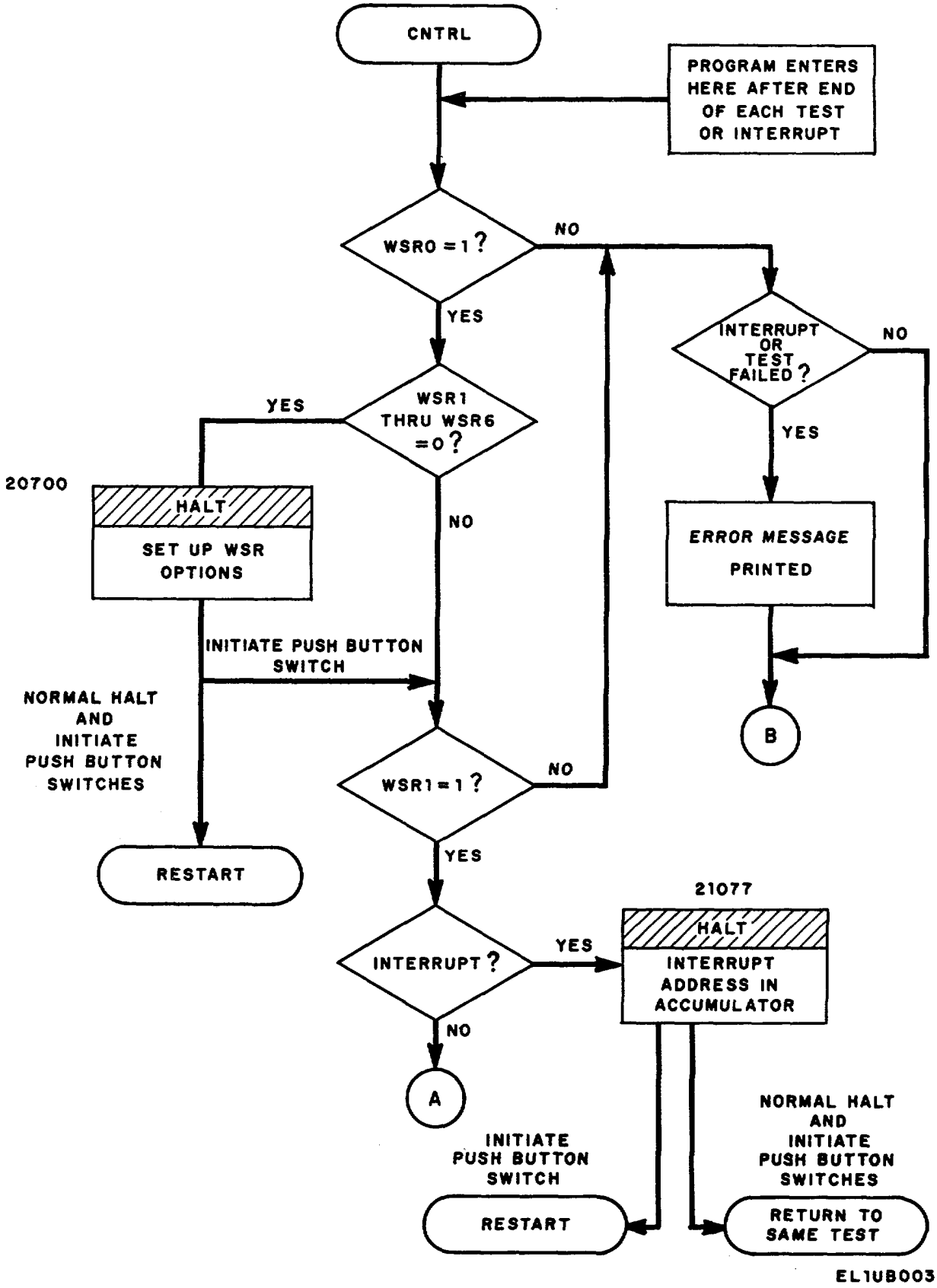


Figure 1 (3). Central Processor Logic Data Flow Diagram (Sheet 3 of 6).

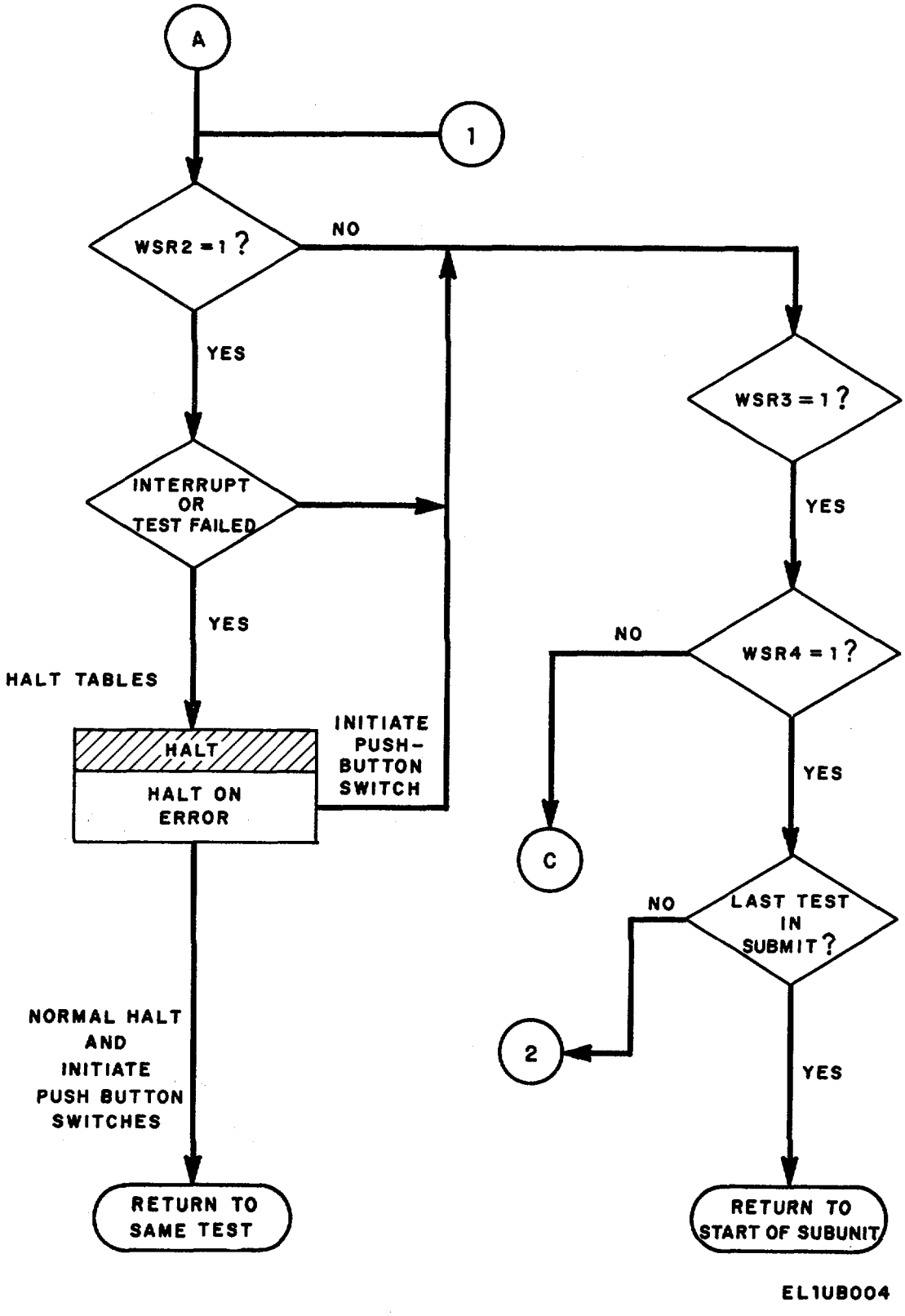


Figure 1 (4). Central Processor Logic Data Flow Diagram (Sheet 4 of 6).

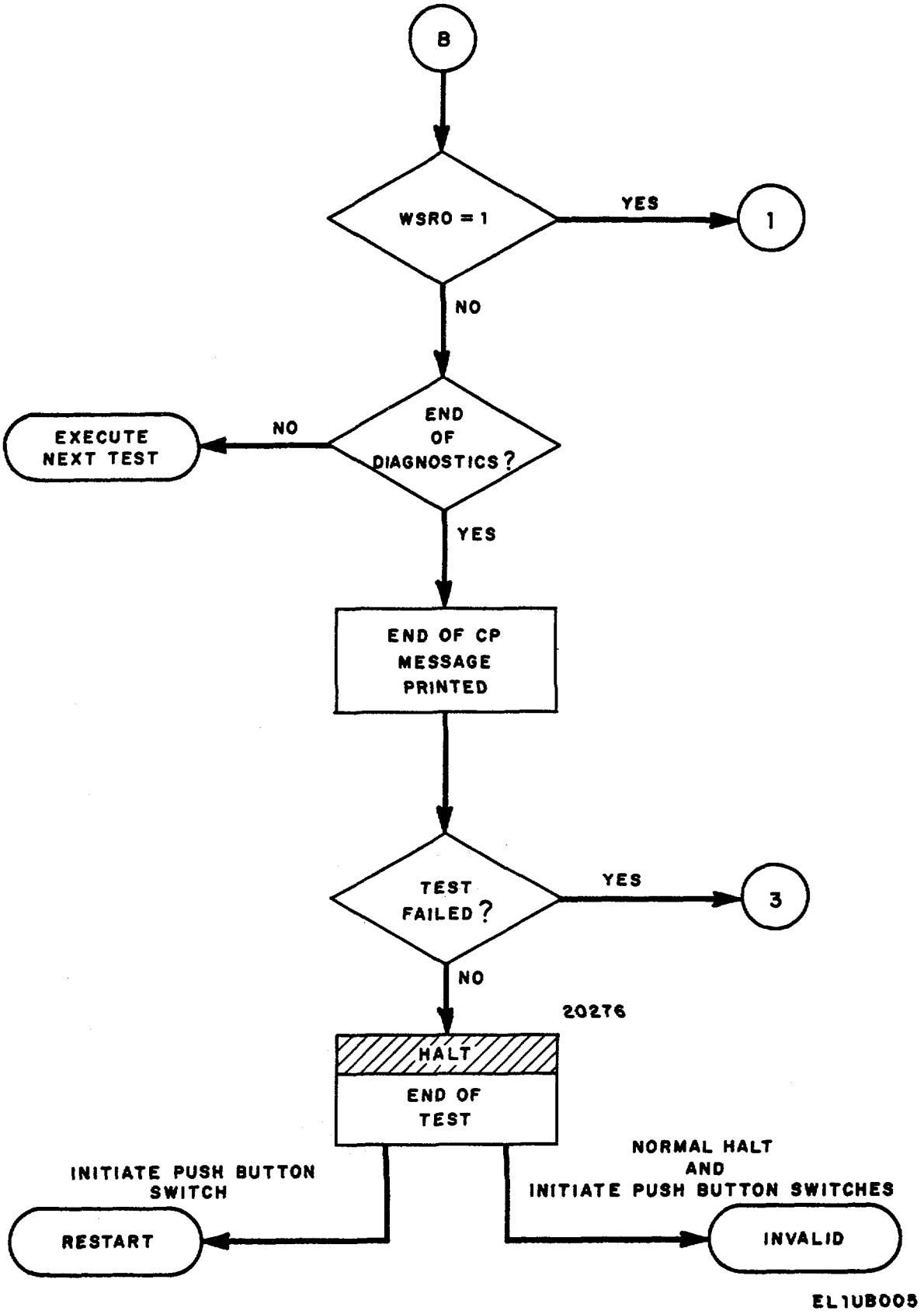


Figure 1 (5). Central Processor Logic Data Flow Diagram (Sheet 5 of 6).

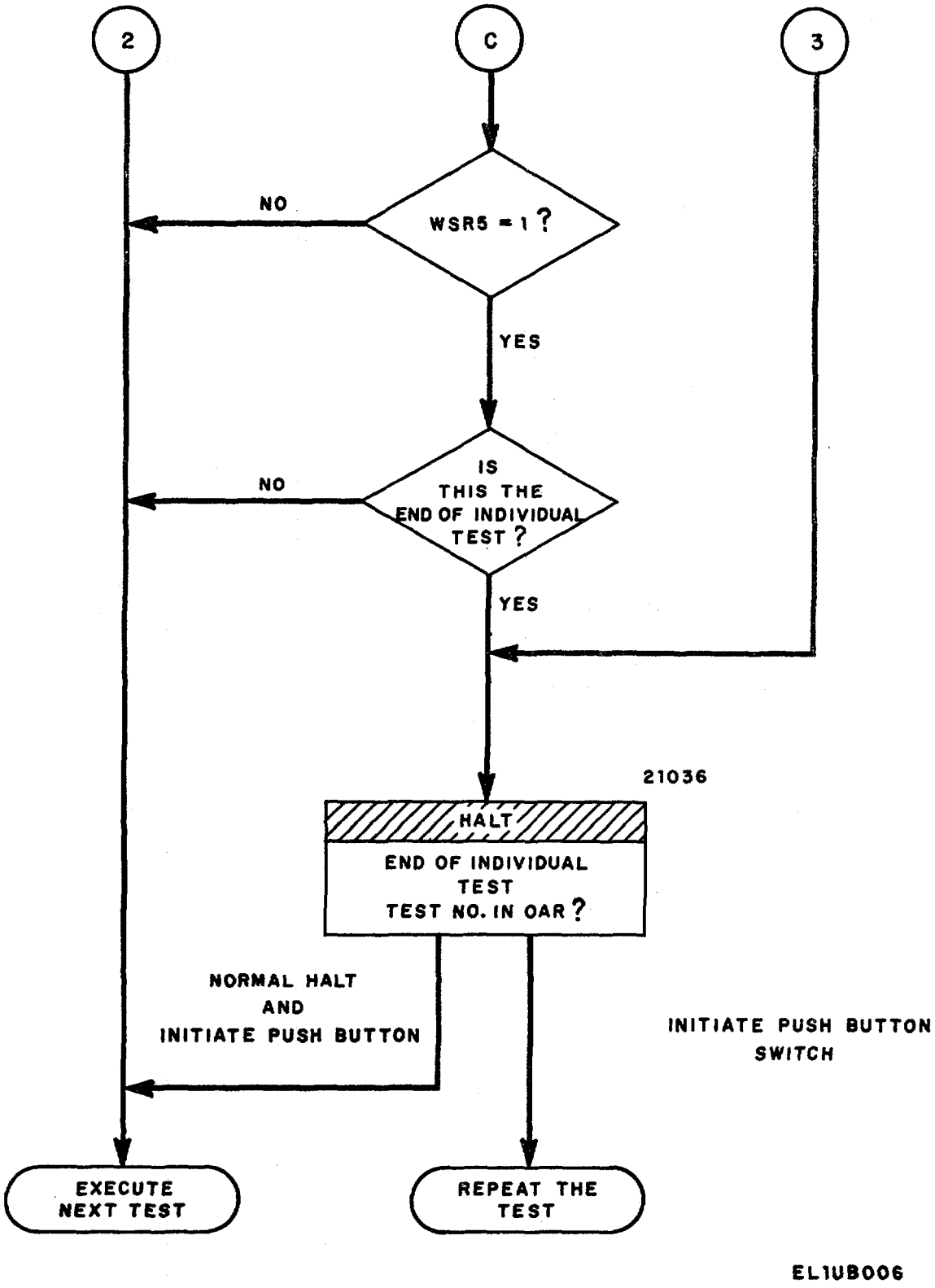


Figure 1 (6). Central Processor Logic Data Flow Diagram (Sheet 6 of 6).

EXHIBIT C

MEMORY DIAGNOSTIC PROGRAM

Section I. GENERAL

The Memory diagnostic program is used to establish the veracity of the AN/TTC-38(V) electronic circuitry associated with the storage and retrieval of data. To assist maintenance personnel, the diagnostic program contains a sample listing of possible error messages (Section III) and the corrective action required.

The diagnostic program is executed in two parts: Segment A of the program is read into memory page zero (which also contains the loader programs) and is used to completely check memory pages 1 and 2. Segment B is initially read into memory page zero but after being entered, this segment (together with the loader programs, and any other contents of page zero) is read into memory page 2. This is done so that segment B of the program is positioned to execute a complete checkout of memory page zero.

Error printouts generated during the Memory diagnostic program employ a format which indicates the failed location and the type of error involved. For example, the page number can be determined from a six digit address such as BCDDDD, where:

(1) If C is 0 through 4, the address is on page 0.

(2) If C is 5 through 7, the page number is determined by B.

(a) B = 0, page 0.

(b) B = 1, page 1.

(c) B = 2, page 2.

a. A typical memory write/mad error message is as follows: A-256321 W-77777777R-77773777, where:

A indicates page 2, memory address 16321.

W indicates an all ones (1's) pattern to be written into the addressed memory location.

R indicates the a one (1) was not read from bit 12 of the memory location.

b. A typical data parity error message is as follows: DPE XXXXXX, where:

DPE identifies a data parity error.

XXXXXX indicates the page and location of the program halt associated with the parity error.

The address and data involved with a data parity error printout is also identified by a write/read error printout. If the source of the program interrupt is other than a data parity error, the program will halt at address 00002601 for an illegal instruction or a instruction parity error or will halt at address 00002607 for all remaining interrupts. The accumulator will contain the address at which the interrupt occurred and the cause of the interrupt can be determined by examining the content of the CPS register.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO CONVERT THE OPERATIONAL PRELOADER PROGRAM TO THE OFF-LINE DIAGNOSTIC PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE AND THE REGISTER SELECT to PEX.
3. Set the WSR toggle switches to 00277750.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.

5.1. Set the RUN/ONE INSTR toggle switch to ONE INSTR.

6. Set the WSR toggle switches to 55137754.

7. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions must be loaded into memory before proceeding. If the entries appearing in parenthesis on the char are already loaded into memory, proceed to step 42 below.

Preloader Instructions Chart

Address	*Instruction*
00277750	01077761
00277751	00002404
00277762	05200377
00277763	24077755
00277764	22077750
00277755	70100000
00277756	70000001
002777n6	01077760
00277760	00002400
00277761	02200040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62501776 (62500476)
00277773	72100001
00277774	74100107 (74100235)
00277775	22077756
00277776	00000000

8. Set the MEMORY guarded switch to the UNPROTECTED position.
9. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
10. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
11. Verify that the RUN/ONE INSTR toggle switch is set to ONE INSTR.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL rotary switch to Store and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.

22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. St the WSR toggle switches to 55137754.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the correct address.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the correct instruction number.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY AND THE REGISTER SELECT to MEM.
28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 6500476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the -BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 74100235.
38. Set the OPERATIONAL CONTROL rotary switch to STORE.
39. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 7410025.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE OFF-LINE
DIAGNOSTIC LOADER PROGRAM INTO MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the leader tape moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.

47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
49. Set the WSR toggle switches to 00277750.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.
52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tape strip leads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
55. Set the PARITY ERROR HALT toggle switch to OFF.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.
58. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
59. Set the MEMORY guarded switch to the UNPROTECTED position.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.
61. Set the printer motor control BYPASS toggle switch to BYPASS.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE MEMORY
DIAGNOSTIC PROGRAM INTO MEMORY

62. Load the Memory Diagnostic (SM-D-751716) and Memory-Memory and Control XFR (SM-D-751717) Diagnostic Program tapes on the paper tape reader.

NOTE

The three segments of the Memory-Memory and Control XFR diagnostic tape must be loaded into memory prior to leading the two segment Memory diagnostic tape.

63. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
64. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tape move.
65. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
66. St the OPERATIONAL CONTROL rotary switch to STORE.
67. Set the WSR toggle switches to 00000500.
68. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000500.
69. Set the OPERATIONAL CONTROL rotary switch to CMPT.
70. Press the INITIATE pushbutton switch and observe that:
    a. Diagnostic program tape loads into memory.
    b. PRGM HALT Indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000681.
71. Press the INITIATE pushbutton switch for a total of four (4) times to load the first segment (A) of the memory diagnostic tape and verify that the same indications obtained in step 70 above are observed.
72. Set the REAL TIME CLOCK guarded switch to the ENABLE position.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING
ADDRESS INTO THE PROGRAM COUNTER

73. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
74. Press the CLEAR pushbutton switch.

75. Set OPERATIONAL CONTROL rotary switch to STORE.
76. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
77. Set the WSR toggle switches to 00002000.
78. Press the INITIATE pushbutton switch and observe that the BUS INDICTOR displays a reading of 00002000 (memory page 0, location 2000).
79. Set the system status panel LOCAL PRINTER toggle switch to ON and press the RESET pushbutton switch.
80. Set the WSR toggle switches to all 0's.

THE FOLLOWING PROCEDURES ARE USED TO TEST PAGE 1 AND 2
USING SEGMENT A IN PAGE ZERO

80.1 Set the MEMORY guarded switch to the UNPROTECTED position.
81. Set the OPERATIONAL CONTROL rotary switch to COMPT.
81.1 Set the RUN/ONE INSTR toggle switch to RUN.
82. Press the INITIATE pushbutton switch and observe the following after approximately 50 seconds.
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00002507.
    c. END MEM A message is generated on page printer.

THE FOLLOWING PROCEDURES ARE USED TO TEST PAGE ZERO:
SEGMENT B IS LOADED INTO PAGE ZERO AND THEN TRANSFERRED TO
PAGE 2

83. Press the NORMAL HALT and CLEAR pushbutton switches and observe that the PRCS HALT indicator is illuminated.
84. Set the OPERATIONAL CONTROL rotary switch to STORE.
85. Set the WSR toggle switches to 00000506.
86. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays 00000506.
87. Set the OPERATIONAL CONTROL rotary switch to CMPT.
88. Press the INITIATE pushbutton switch and observe:
    a. Segment B of the diagnostic tape lads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000645.

THE FOLLOWING PROCEDURES ARE USED TO LOAD
THE CONTENTS OF MEMORY PAGE ZERO
INTO MEMORY PAGE 2

89. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
90. Set the OPERATIONAL CONTROL rotary switch to STORE.
91. Set the WSR toggle switches to 00000664.
92. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000664.
93. Set the OPERATIONAL CONTROL rotary switch to CMPT.
94. Press the INITIATE pushbutton switch and observe:
    a. PRGM HALT indicator Illuminates.
    b. BUS INDICATOR displays a reading of 00000702.

THE FOLLOWING PROCEDURES EXECUTE SEGMENT
B TO TEST PAGE ZERO

95. Set the OPERATIONAL CONTROL rotary switch to STORE.
96. Set the WSR toggle switches to 00242000.

97. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator is illuminated.
98. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00242000.
99. Set the WSR toggle switches to all 0's.
100. Set the OPERATIONAL CONTROL rotary switch to CMPT.
101. Press the INITIATE pushbutton switch and observe the following after approximately 25 seconds:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00242507.
    c. END MEM B message is generated on the page printer.

Section III. TROUBLESHOOTING CHART

Malfunction	*Probable cause*	*Corrective action*
Error messages indicate write/read malfunction in two or more memory pages.	Faulty DLP assembly A11 (Memory data register stage failure).	Replace DLP assembly A11; then repeat test.
Error message indicates write/read malfunction in memory page 1. malfunction).	Faulty DLX assembly A12 (inhibit select switch or sense amplifier	Replace DLX assembly A12; then repeat test.
Error message indicates write/read malfunction in memory page 2. malfunction).	Faulty DLX assembly A13 (inhabit select switch or sense amplifier	Replace DLX assembly A13; then repeat test.
Error message indicates write/read malfunction memory page 0. malfunction).	Faulty DLP assembly A11 (inhabit select switch or sense amplifier	Replace DLP assembly A11; then repeat test.
Data parity error (DPE) messages occur on two or more memory pages.	Faulty DLP assembly A11 (memory data register parity bit stage failure).	Replace DLP assembly A11; then repeat test.
Data parity error (DPE) messages occur in memory page 1.	Faulty DLX assembly A12.	Replace DLX assembly A12; then repeat test.
Data parity error (DPE) occurs in memory page 2.	Faulty DLX assembly A13.	Replace DLX assembly A13; then repeat test.
Data parity error (DPE) occurs in memory page 0.	Faulty DLP assembly A11.	Replace DLP assembly A11; then repeat test.

Section IV. UNSCHEDULED INTERRUPTS

If the diagnostic program halts at a BUS INDICATOR reading of 00002747, the diagnostic program is attempting to generate an output to the local page printer but the Character Ready is too long.

a. Press the system status panel RESET pushbutton switch and restart the diagnostic program at step 42, Section II.

b. If the diagnostic program continues to halt at address 00002747, replace the three (3) sync circuit cards associated with the local page printer.

If the diagnostic program halts at a BUS INDICATOR reading of 00003026, the diagnostic program has timed out when using the local page printer.

a. Press the system status panel RESET pushbutton switch and restart the diagnostic program at step 62, Section II.

b. If the program continues to halt at address 00003026, replace the three (3) sync circuit cards associated with the local page printer.

Section V. TROUBLESHOOTING TRANSIENT MALFUNCTIONS

1. Execute steps 1 through 41 of the Diagnostic Program, Section II.
2. Set the WSR toggle switches 00 and 06 to a 1.
3. Set the memory cards H-L switch to position H.
4. Set the OPERATIONAL CONTROL rotary switch to CMPT.
5. Press the INITIATE pushbutton switch and observe that the program continues to loop on the complete diagnostic program without stopping.
6. If no errors are detected after approximately 10 minutes, reset the WSR06 bit and observe:
   a. PRGM HALT indicator illuminates.
   b. BUS INDICATOR displays a reading of 00002507.
7. Select any other option (Section VI) or group of options and press the INITIATE pushbutton switch.
8. Reset all WSR bits, except WSR00, to stop the testing cycle.
9. Set both memory card H-L switches to L.
10. Set WSR toggle switches 00 and 06 to a 1.
11. Press the INITIATE pushbutton switch and observe that the same indications obtained in step 6 above are obtained.
12. Execute steps 42 through 61 of the Diagnostic Program, Section II.
13. Set the OPERATIONAL CONTROL rotary switch to CMPT.
14. Set WSR0 and WSR06 to a 1.
15. Press the INITIATE pushbutton switch and observe that the program continues to loop on the complete diagnostic program without stopping.
16. If no errors are detected after approximately 10 minutes, reset WSR06 and observe that:
   a. PRGM HALT indicator illuminates.
   b. BUS INDICATOR displays a reading of 00002507.
17. Set both memory card H-L switches to the normal (center) position.

Section VI. PROGRAM OPTIONS

Option 1 = WSR0 and WSR1 set: (Inhibit Printer)

In this mode, all printing on the teletype is bypassed. Whatever information that would normally be printed as a failure report will have to be determined by reading the memory locations that contain information.

A data parity error (DPE) will halt the diagnostic program at address location 2612 and the accumulator has the exact address at which the processor interrupt occurred. A write/read error will not produce an error indication.

Option 2 = WSR0 and WSR2 set: (Halt on Error)

This mode is used to discover errors as they occur. Whenever an error does occur, the pattern number, address, and word read is placed in the A and Q registers, respectively, and the program halts.

A write/read error will halt the diagnostic program at address location 2571. The A register bits 06 through 23 will equal the location read that failed and the A register bits 0 through 02 will equal the pattern number. The Q register will equal incorrect data read from memory.

Option 3 = WSR0 and WSR3 set: (Loop on Individual Pattern)

This mode is used to keep the diagnostic program operating within a specific pattern. The program will halt at address location 2153 if the incorrect pattern is set into the WSR toggle switches. Select the correct pattern number from the chart below and press the INITIATE pushbutton switch to loop.

Pattern No.	Description	WSR12	WSR13	WSR14
0	All zeros (0's) for fluxchange	0	0	0
1	All ones (1's) for non-fluxhange	0	0	1
2	Write address into memory	0	1	0
3	Write address complement into memory	0	1	1
4	Worst case pattern for sensors	1	0	0

Option 4 = WSR0 and WSR4 set: (Loop on Particular Page)

The mode is used to keep the diagnostic program operating within a specific page. Unless option 3 above is selected, the diagnostic program will loop on all patterns. The program will halt at address location 2127 if an incorrect page has been selected for the particular segment of the program. Select the correct page number from the chart below and press the INITIATE pushbutton switch to loop.

Legal page	Page	WSR10	WSR11
Segment B only	0	0	0
Segment A and B	1	0	1
Segment A only	2	1	0

Option 5 = WSR0 and WSR5 set: (Halt at End of Pattern Test)

The diagnostic program will halt at address location 2423. The address will be stored in the A register and the pattern number will be stored in the Q register. Press the NORMAL HALT pushbutton switch and set the REGISTER SELECT rotary switch to the desired register position. The BUS INDICATOR will display either the address or pattern number as selected.

Option 6 = WSR0 and WSR6 set: (Loop on Entire Test)

This mode is used to loop this entire diagnostic program. Segment A will loop on page 1 and 2 using all test pattern. Segment B will loop on page zero using all test patterns.

Option 7 = WSR0 and WSR7 set: (Store Memory Test Pattern with 10 Writes per Location)

Location 00003107 can be altered to either increase or decrease the number of write instructions. The number of writes should be entered using the octal equivalent.

Option 8 = WSR0 and WSR23 set: (Restore Contents of Memory Page following Segment B test)

This option must be executed any time the user transfers from Segment B back to Segment A of the diagnostic program. Set the PEX to 664 in order to restore the loader program to page zero and then read in Segment A into memory.

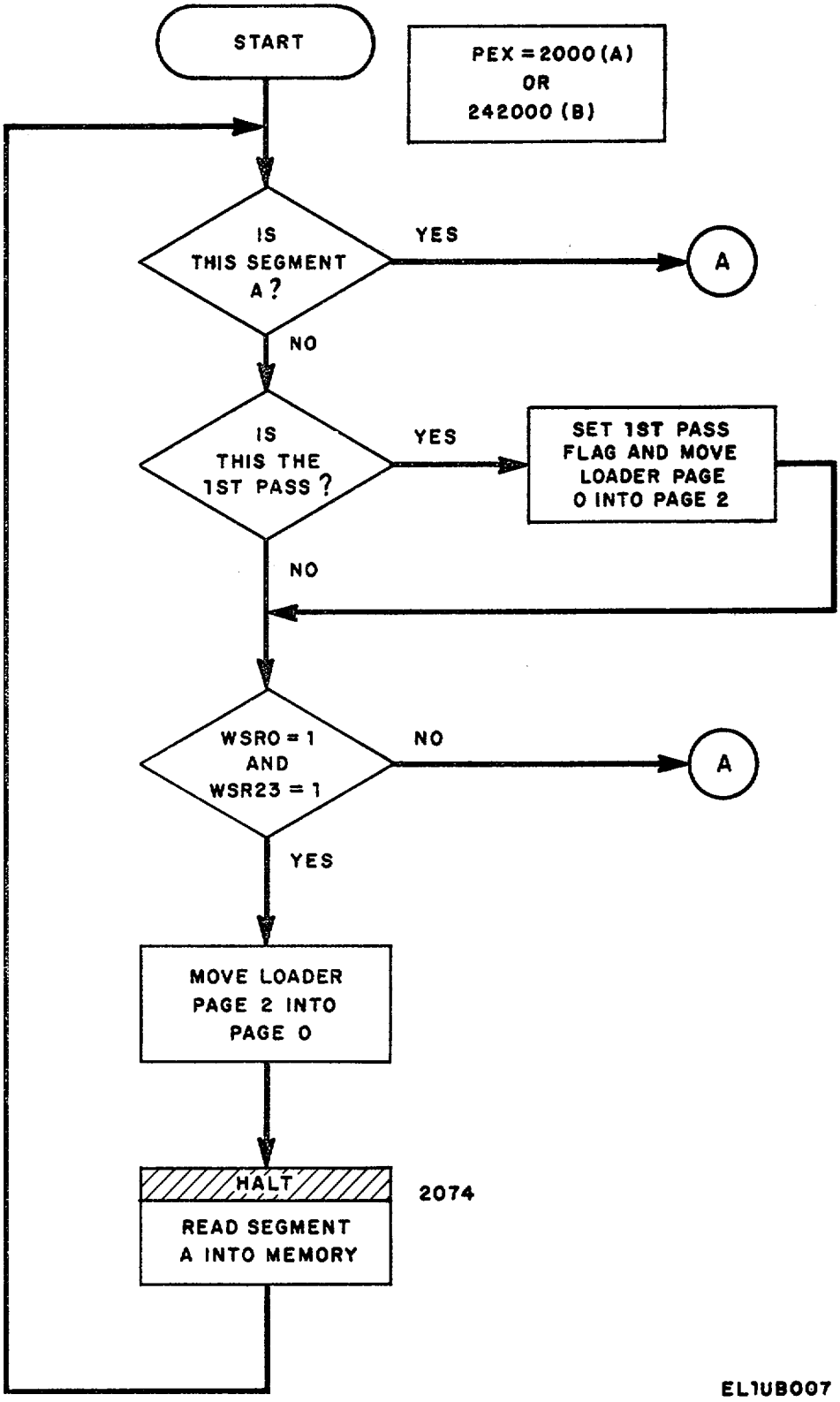


Figure 2 (1). Memory Logic Data Flow Diagram (Sheet 1 of 7).

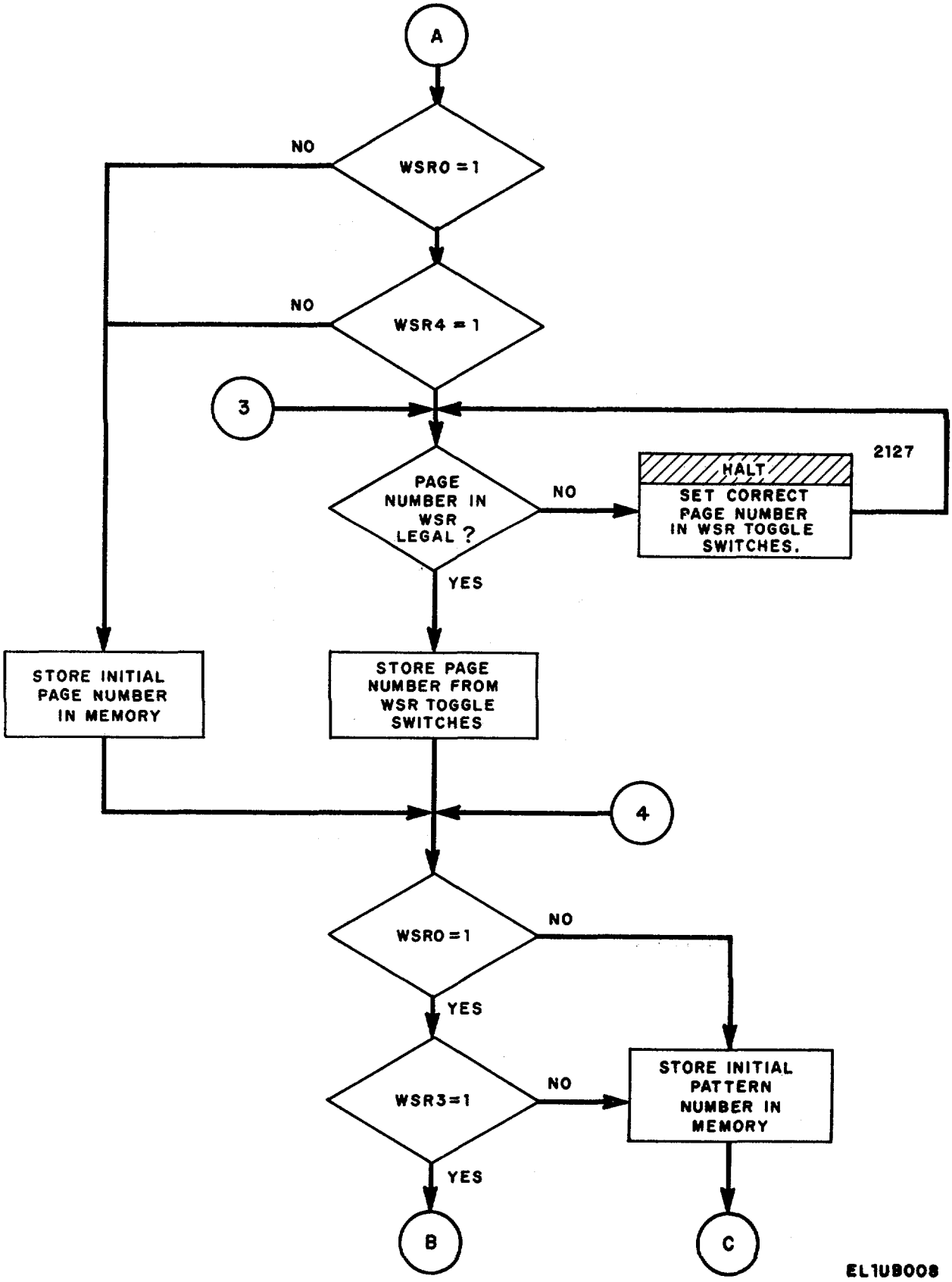


Figure 2 (2). Memory Logic Data Flow Diagram (Sheet 2 of 7).

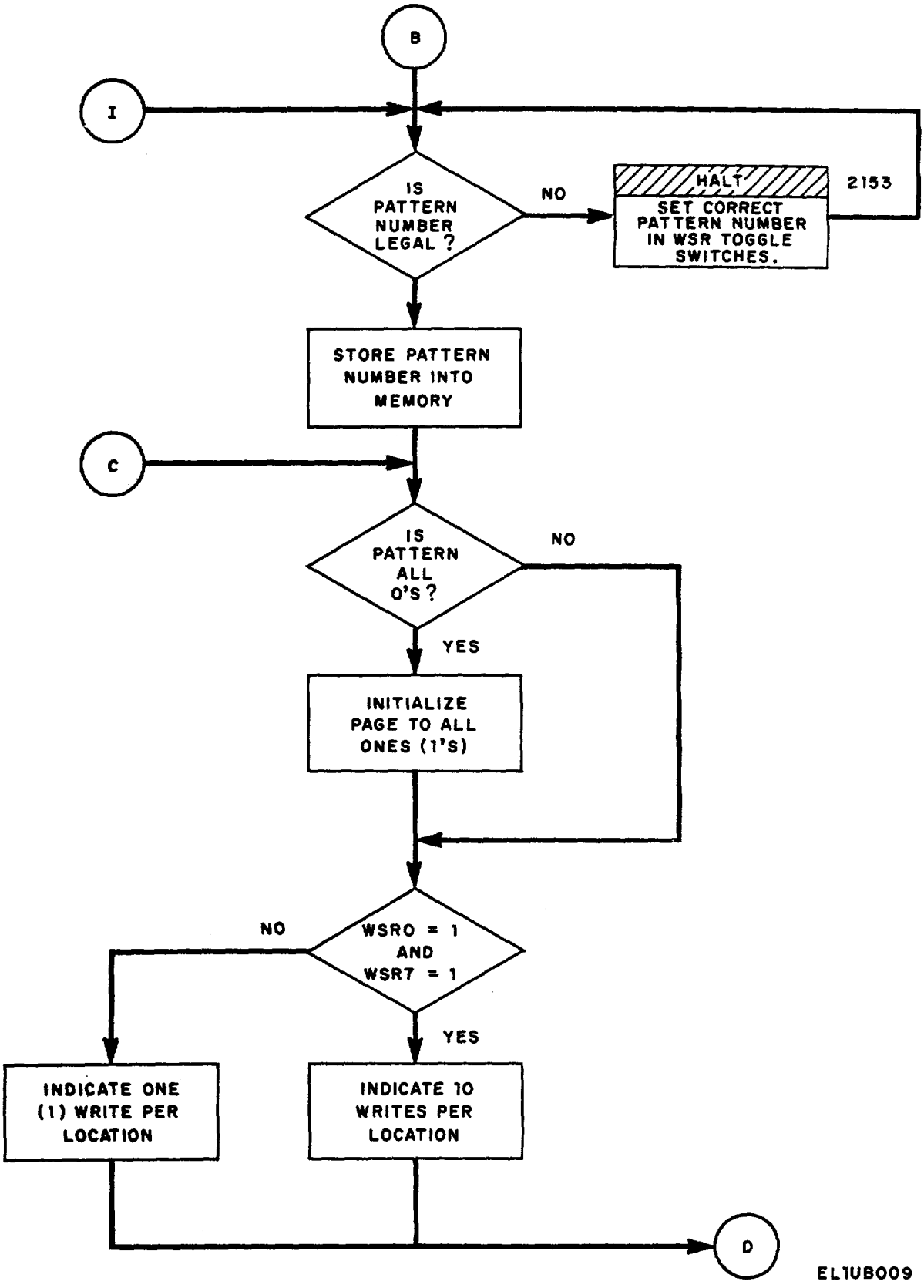


Figure 2 (3). Memory Logic Data Flow Diagram (Sheet 3 of 7).

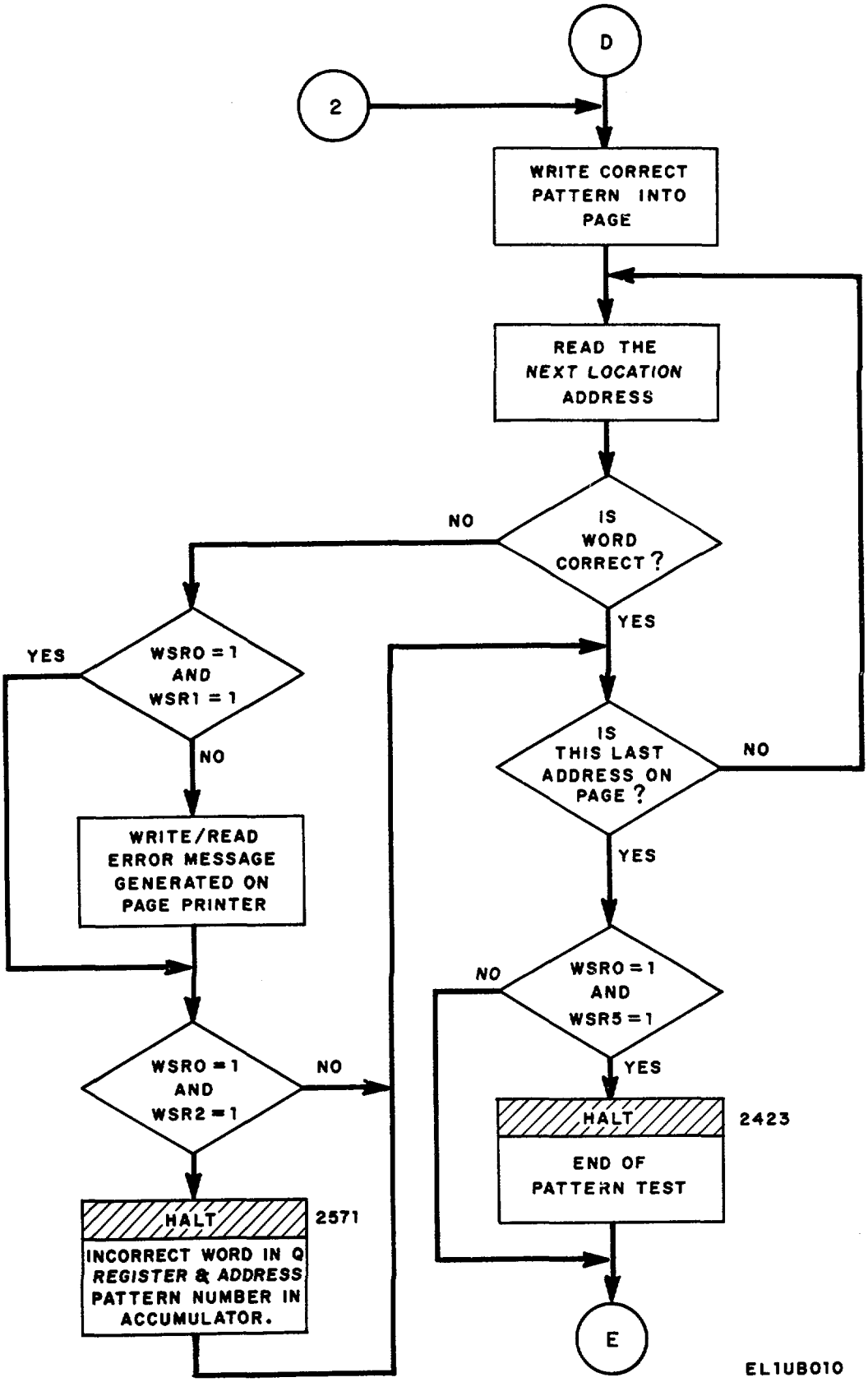


Figure 2 (4). Memory Logic Data Flow Diagram (Sheet 4 of 7).

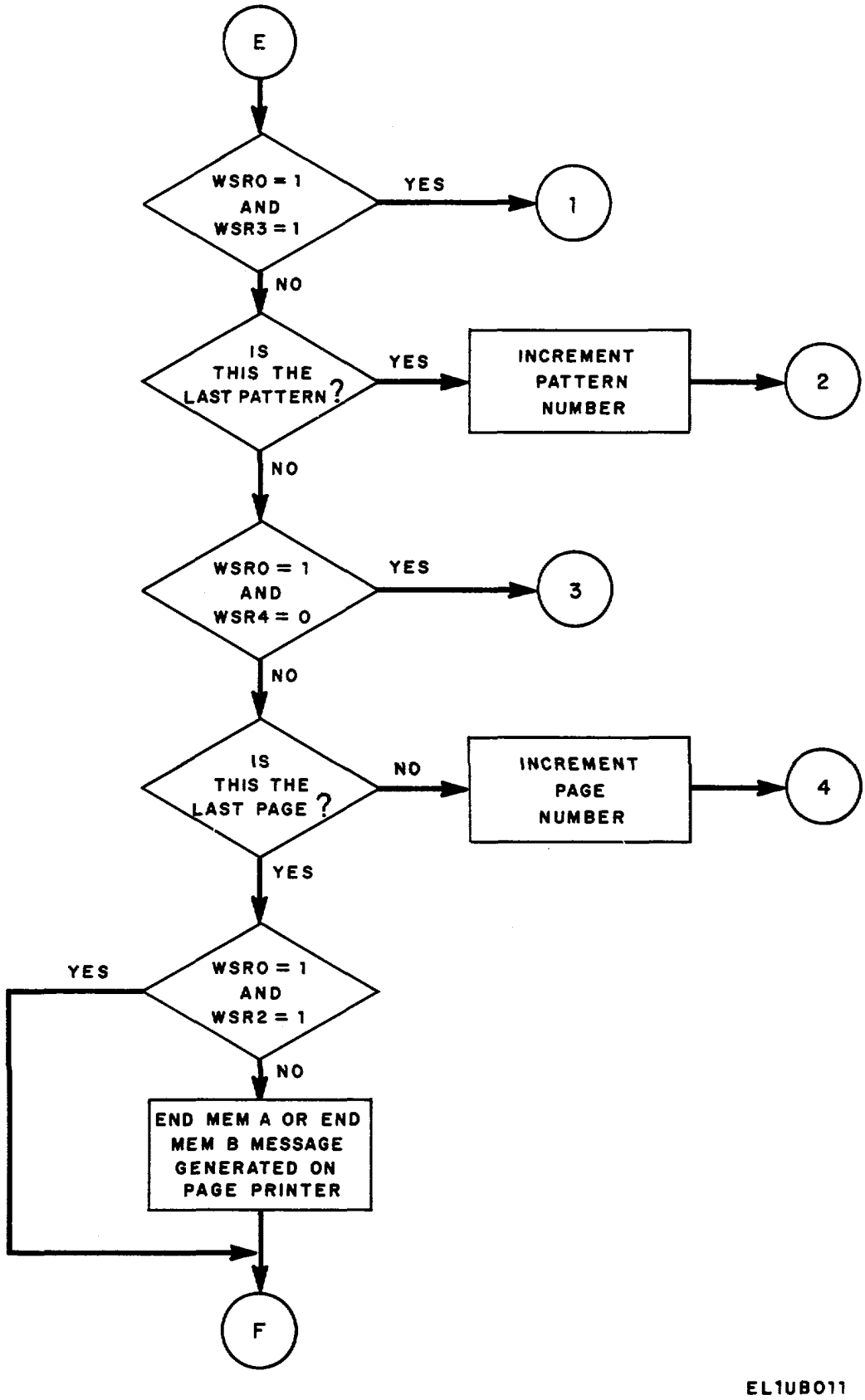


Figure 2 (5). Memory Logic Data Flow Diagram (Sheet 5 of 7).

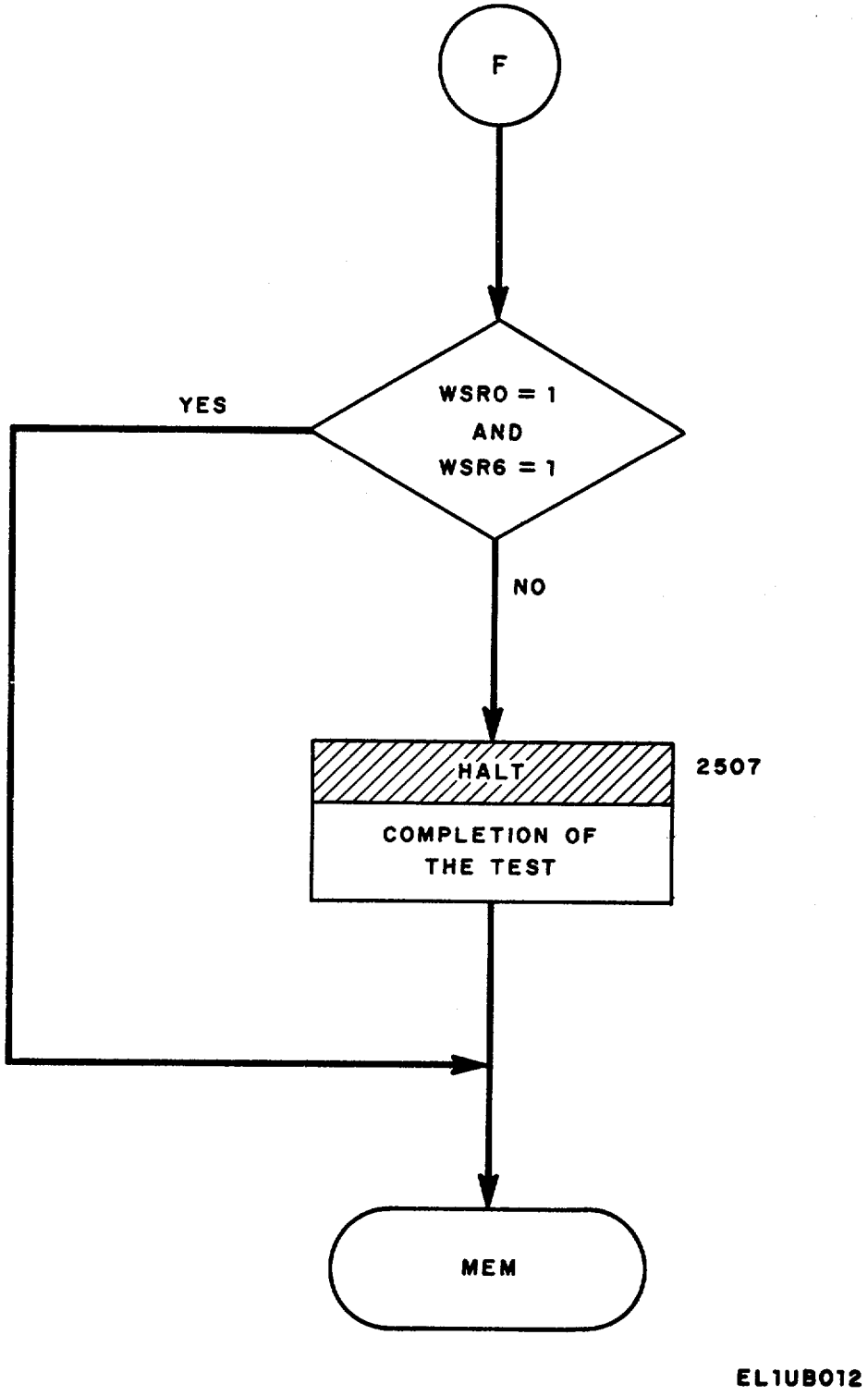


Figure 2 (6). Memory Logic Data Flow Diagram (Sheet 6 of 7).

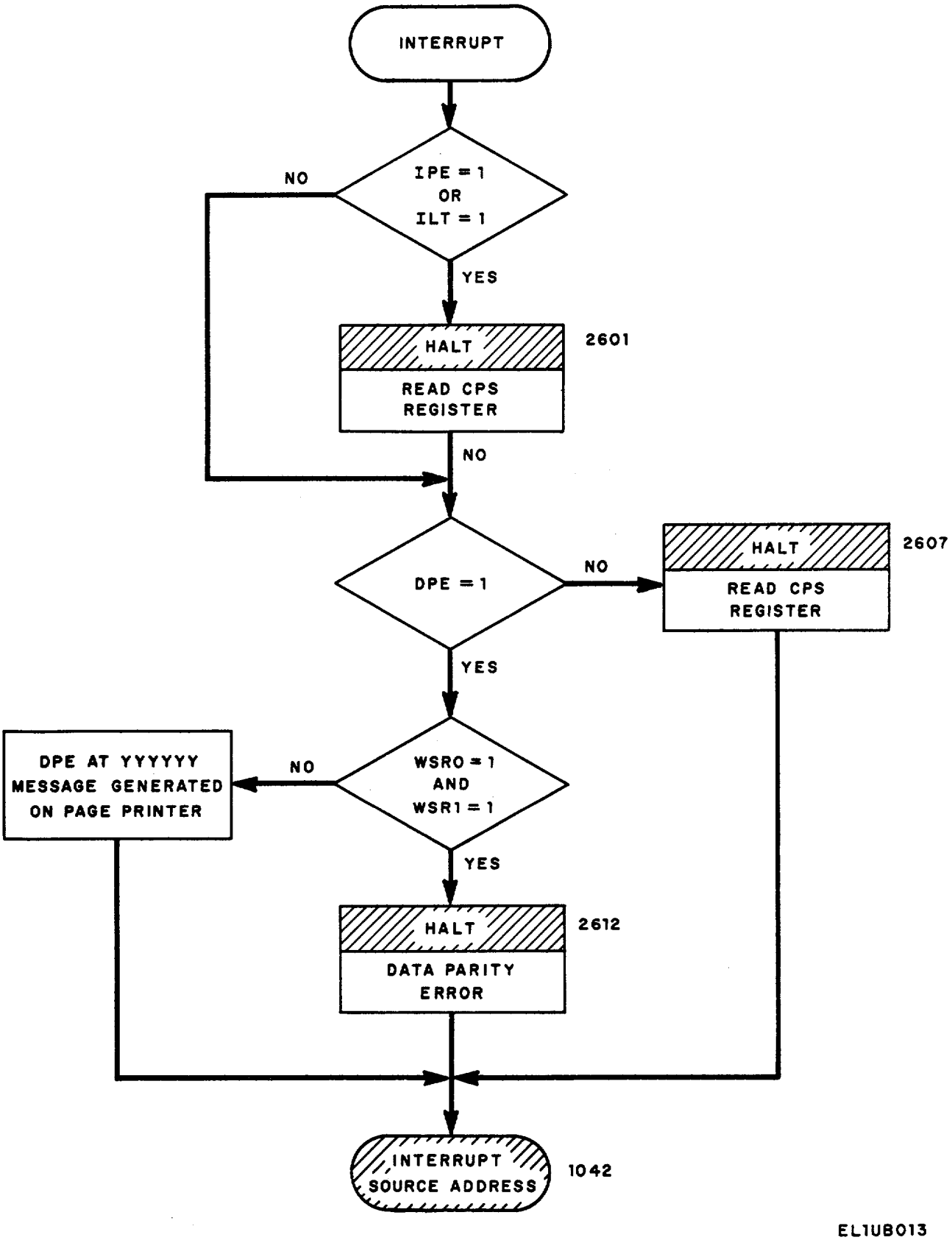


Figure 2 (7). Memory Logic Data Flow Diagram (Sheet 7 of 7).

EXHIBIT D

COMMON CONTROL SYNCHRONIZER DIAGNOSTIC PROGRAM

Section I. GENERAL

The Common Control Synchronizer diagnostic program is used whenever memory-to-memory, functional assignment control panel, or peripheral device data transfer problems are encountered. The diagnostic procedures check the central processor-synchronizer interface and data handling capability. Successful completion of the diagnostic program verifies synchronizer control logic, establishes the existence and correct operational ability of each synchronizer to receive and store selected data patterns, and checks the buffer register and data steering circuitry of the AN/TTC-38(V).

Error printouts generated during the execution of the diagnostic program can be used to minimize the search for malfunctioning logic circuits. After executing the corrective action, the diagnostic program should be repeated to verify that the AN/TTC-38(V) system is now functional.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO
CONVERT THE OPERATIONAL PRELOADER PROGRAM
TO THE OFF-LINE DIAGNOSTIC PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
3. Set the WSR toggle switches to 00277750.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
6. Set the WSR toggle switches to 5513774.
7. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or a absent, the on-line program preloader instructions must be loaded into memory before proceeding. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 42 below.
8. Set the MEMORY guarded switch to the UNPROTECTED position.
9. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator Illuminates.
10. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
11. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.

17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.
22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 55137754.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the correct address.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the correct instruction number.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

Preloader Instructions Chart

Address	*Instruction*
00277750	01077761
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277767	01077760
00277760	00002400
00277761	02200040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62601776 (62500476)
00277773	72100001
00277774	74100107 (74100235
00277776	22077756
00277776	00000000

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 62500476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
33. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 74100235.
38. Set the OPERATIONAL CONTROL rotary switch to STORE.
39. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO
LOAD THE OFF-LINE DIAGNOSTIC LOADER
PROGRAM INTO MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the loader tape moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
49. Set the WSR toggle switches to 00277780.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.
52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tape strip loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
55. Set the PARITY ERROR HALT toggle switch to OFF.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.

58. Set the REAL TIME CLOCK guarded switch to the ENABLE position.
59. Set the MEMORY guarded switch to the PROTECTED position.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.
61. Set the printer motor control BYPASS toggle switch to BYPASS.

THE FOLLOWING PROCEDURES LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

62. Load the common Control Sync (SM-D-751720) and Remote Device Sync (SM-D-751721) Diagnostic Program tapes on the paper tape reader.
63. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
64. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
65. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
66. Set the WSR toggle switches to 0000500.
67. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 0000500.
68. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tape moves.
69. Set the OPERATIONAL CONTROL rotary switch to CMPT.
70. Press the INITIATE pushbutton switch and observe:
    a. Diagnostic program tape loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
71. Rewind the diagnostic program tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
72. Remove the diagnostic tape reel from the paper tape reader because it will cause an error printout when the diagnostic program is executed.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING ADDRESS INTO THE PROGRAM COUNTER

73. Set the REGISTER SELECT rotary switch to PEX.
74. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
75. Press the CLEAR pushbutton switch.
76. Set the OPERATIONAL CONTROL rotary switch to STORE.
77. Set the WSR toggle switches to 00020000.
78. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00020000.
79. Set the system status panel RESET SELECT LOCAL PRINTER toggle switch to ON and press the RESET pushbutton switch.
80. Set the WSR toggle switches to all 0's.

THE FOLLOWING PROCEDURES ARE USED TO EXECUTE THE DIAGNOSTIC ROUTINE

81. Set the OPERATIONAL CONTROL rotary switch to CMPT.
82. Set all system status pane RESET SELECT toggle switches to ON position and press the RESET pushbutton several times.
83. Return all system status panel RESET SELECT toggle switches to the OFF position.
84. Press the INITIATE pushbutton switch and observe that:
    a. CS TEST message is generated on the page printer.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 00023212.
    d. END CS TEST message is generated on the page printer.

85. Visually inspect for a flashing FUNCTION CODE indicator lamp on the Functional Assignment Control Panel (FACP).
86. Press the FACP CLEAR pushbutton switch and observe that the FUNCTION CODE indicator is extinguished.

Section III. POSSIBLE PROGRAM HALTS

Halt Address	*Remarks*
00020455	More than 8 unscheduled interrupts occurred while executing the diagnostic program. Proceed to the Bootstrap Diagnostic Program test the CPS logic.
00021047	The BUSY bit associated with the local page printer will not reset. Restart the program at step 73, Section II.

Section IV. PROCEDURES TO EXECUTE A FAILING INPUT/OUTPUT INSTRUCTION BY THE MAINTENANCE CONTROL PANEL

1. Utilize any available error messages to determine the input/output instruction that is failing.
2. Set the appropriate system status panel RESET SELECT toggle switch and press the RESET pushbutton several time.
3. For any write instruction, the accumulator must be loaded with the data as follows:
   a. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
   b. Set the REGISTER SELECT rotary switch to position A.
   c. Set the WSR toggle switch bits 16 through 23 to the desired data.
   d. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the WSR toggle switch settings.
4. Execute the failing input/output instruction as follows:
   a. Set the REGISTER SELECT rotary switch to position A.
   b. Set the WSR toggle switches to 0120CCDD; where,
   CC = Device
   00 = RPT - Remote Page Printer
   04 = PTP - Punch
   10 = LPP - Local Page Printer
   14 = EXR - Spare TTY receiver
   20 = EXT - Spare TTY transmitter
   24 = PTR - Paper Tape Reader
   30 = MTM - Memory to Memory
   34 = TYR - Remote TTY receiver
   40 = TYT - Remote TTY transmitter
   44 = FACP - Functional Assignment Control Panel
   DD = Instruction
   00 = Read Status
   01 = Clear Out - Reset Busy Bit
   04 = Read data and Reset CHRRDY
   10 = Write Status and Set CHRRDY
   14 = Write Data and Set CHRRDY
   20 = Read Status and Set Busy Bit.
   c. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR.
   d. Set the RUN/ONE INSTR toggle switch to RUN.
   e. Press the INITIATE pushbutton switch and observe that the ACTIVE indicator illuminates.
   f. Use the logic drawings in TM 11-5805-628-34-6 and an oscilloscope to troubleshoot the fault.

5. The following represents status that will appear in the accumulator when executing a status instruction:

Bit	*Remarks*
16	TRE - Timing Read Error
17	VA - Device Alarm
18	BB-Busy Bit
20	CHAR. LOST - Character Lost.

Section V. SYNCHRONIZER ERROR PRINTOUTS

Malfunction	Probable cause	Corrective action
1. PIOCS 01-XX where XX is two-digit number.	Processor timeout fault.	Use other processor to control AN/TTC-38(V).
2. PIOCS02-01	Data read from paper tape reader (PTR) synchronizer buffer differs from data written into it by test program.	Replace following cards in sequence. Rerun test after each replacement (1) A16A103 (2) A16A102 (3) A16A101
3. PIOS03-XX-YYY where XX is 01 through 12, XX and YYY both identify faulty synchronizer. For XX = 77 see 10 below: XX YY 01 RPP (remote page printer) 02 PTP (paper tape punch) 03 LPP (local page printer) 04 EXR (extra receive) 05 EXT (extra transmit) 06 PTR (paper tape reader) 07 MTM (memory to memory) 10 TYR (teletype receive) 11 TYT (teletype transmit) 12 FAC (FACP)	Data read from synchronizer YYY buffer differs from data written into it by test program.	Replace following synchronizer YYY cards in sequence. Rerun test after replacement. (1) MOS 3 (2) MOS 2 (3) MOS 1
4. PIOCS04-XXYY where XX is 01 through 12, refer to 3 above, for XX and YYY, for XX = 77 see 10 below.	Busy bit (BB) failed to set in synchronizer YYY.	Replace synchronizer YYY MOS 2 card. Rerun test.
5. PIOCS05-XX-YY where XX is 01 through 12, refer to 3 above for XX and YYY, for XX = 77 see 10 below.	Busy bit (BB) failed to reset in synchronizer YYY.	Replace synchronizer YYY MOS 2 card. Rerun test.
6. PISC06-XX-YYY where XX is 01 through 12, refer to 3 above for XX and YYY, for XX = 77 see 10 below.	Character ready (CH RDY) failed to set in synchronizer YYY.	Replace synchronizer YYY MOS 2 card. Rerun test.
7. PIOCS07-XX-YY where XX is 01 01 through 12, refer to 3 above for XX and YYY, for XX = 77 see 10 below.	Character ready (CH RDY) failed to reset in synchronizer YYY.	Replace synchronizer YYY MOS 2 card, Rerun test.
8. PIOCS08-XX-YYY-DO = XXX where XX is 01 through 04 XX and XXX identify data sent to synchronizer buffer by test program. For XX = 77 see 10 below. XX XXX 01 200 02 325	Data read from synchronizer YYY buffer differs from data written into it. Data written as XXX.	Replace the following synchronizer YYY cards in sequence. Rerun test after each replacement. (1) MOS 3 (2) MOS 2 (3) MOS 1

Malfunction	Probable cause	Corrective action
03 352 04 277 Refer to 3 above for YYY.		
9. Piocsop-XX-FAC where XX is a two-digit number.	Error indicator malfunction in FACP.	Use other processor to control AN/TTC-38(V).
10. PIOCS XX TMO AT LOC XXXXX PGE 00 PIOCS XX-77-YYY.	Synchronizer YYY did not respond in time when executing instruction at XXXXX during test XX.	Replace synchronizer YYY MOS 2 card. Rerun test.

EXHIBIT E

REMOTE DEVICES DIAGNOSTIC PROGRAM

Section I. GENERAL

The Remote Devices diagnostic program is used whenever data transfer problems are encountered with the operation of the remote page printer, remote teletypewriter, or spare remote teletypewriter. Successful completion of the program verifies the operational capabilities of the synchronizers, modem lines, and devices for the AN/TTC-38(V) configuration selected.

Printing errors which may be observed while running the tests and ASCII and Baudot code printouts are included. A remote devices replacement table identifying driver and receiver cards and the modem modules are also included. After executing the suggested corrective action, the diagnostic procedures should be repeated to verify the system is operating properly.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO CONVERT THE
OPERATIONAL PRELOADER PROGRAM TO THE OFF-LINE
DIAGNOSTIC PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.

2.1. Set the RUN/ONE INSTR toggle switch to ONE INSTR.

3. Set the WSR toggle switches to 00277750.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
6. Set the WSR toggle switches to 55137754.
7. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions must be loaded into memory before proceeding. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 42 below.
8. Set the MEMORY guarded switch to the UNPROTECTED position.
9. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
10. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
11. Verify that the RUN/ONE INSTR toggle switch is set to ONE INSTR.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.

17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.

Preloader Instructions Chart

Address	*Instruction*
00277760	01077751
00277751	00002404
00277762	06200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	02000040
00277762	24077764
00277763	01077764
00277764	00002404
00277765	34000020
00277766	36000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62501776 (62500476)
00277773	72100001
00277774	74100107 (4100235)
00277775	22077756
00277776	00000000

22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 561377654.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chat.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the correct address.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches the correct instruction number.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 62500476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
33. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 74100235.
38. Set the OPERATIONAL CONTROL rotary switch to STORE.
39. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE OFF-LINE DIAGNOSTIC LOADER PROGRAM INTO MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the loader tape moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle to ONE INSTR.
49. Set the WSR toggle switches to 00277750.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.
52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tape strip loads into memory.
    b. PRGM HALT indicator illuminates the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
55. Set the PARITY ERROR HALT toggle switch to OFF.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.
58. Set the REAL TIME CLOCK guarded switch to the ENABLE position.
59. Set the REGISTER SELECT rotary switch to PEX.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.

61. Set the printer motor control BYPASS toggle switch to BYPASS.
62. Set the MEMORY guarded switch to the PROTECTED position.
63. Set both modem L-B NOR-LOC rotary switches to NOR.

THE FOLLOWING PROCEDURES LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

64. Load the Common Control Sync (SM-D-751720) and Remote Devices Sync (SM-D-751721) Diagnostic Program tapes on the paper tape reader.

NOTE

The one segment of Common Control Sync diagnostic program must be loaded into memory prior to loading the one segment Remote Devices Sync diagnostic tape.

65. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
66. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT Indicator extinguishes.
67. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
68. Set the WSR toggle switches to 00000500.
69. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000500.
70. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tape moves.
71. Set the OPERATIONAL CONTROL rotary switch to CMPT.
72. Press the INITIATE pushbutton switch and observe that:
    a. Diagnostic program tape loads into memory.
    b. PRGM HALT indicator illuminates a the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
73. Press the INITIATE pushbutton switch a second time to read-in the Remote Devices Sync diagnostic segment into memory. The same indications observed in step 72 above should be observed.
74. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
74.1 Set the ASR toggle switches to 32642.
74.2. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
74.3. Set the WSR toggle switches to 00000037.
74.4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000040.
74.5. Set the OPERATIONAL CONTROL rotary switch to STORE.
74.6. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000037.
74.7. Set the REGISTER SELECT rotary switch to PEX.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING ADDRESS INTO MEMORY

75. Press the NORMAL HALT pushbutton switch and observe the PRCS HALT indicator illuminates.
75.1. Press the CLEAR pushbutton switch.
76. Set the OPERATIONAL CONTROL rotary switch to STORE.
77. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
78. Set the WSR toggle switches to 00025000.
79. Press the INITIATE pushbutton switch and observe the BUS INDICATOR displays a reading of 00025000.

THE FOLLOWING PROCEDURES ARE USED TO
TEST THE LOCAL PAGE PRINTER

80. Observe that the page printer has been marked out-of-service:
    a. Set the ON-LINE processor function code to 17.
    b. Set ASR bit 09 and ASR bit 21 to a 1.
    c. Press the READ pushbutton switch.
81. Set the WSR toggle switches to 70000200.
82. Set the OPERATIONAL CONTROL rotary switch to CMPT.
83. Set the RUN/ONE INSTR toggle switch to RUN.
84. Press the INITIATE pushbutton switch and observe that:
    a. Complete alphabet message is generated on page printer.
    b. BUS INDICATOR displays a reading of 00027576.

NOTE

If the diagnostic program halts at any address other than 00027576, refer to the HALT TABLE below and replace the specified cards in order. Repeat the procedures in steps 80 through 84 above after each replacement.

BUS INDICATOR reading	*Suggested Replacements*
00026410	A16A133 (MOS 2)
00026451	A16A133 (MOS 2)
00026502	A16A133 (MOS 2)
00026532	A16A133 (MOS 2)
00026612	A16A133 (MOS 2)
00026652	A16A133 (MOS 2)
00026704	A16A133 (MOS 2)
00026743	A16A133 (MOS 2)
00027017	A16A134, A16A133, A16A132, in sequence
00027055	A16A134, A16A133, A16A132, in sequence
00027105	A16A134, A16A133, A16A132, in sequence
00027245	A16A134 (MOS 3)
00027315	A16A134 (MOS 3)
00027352	A16A134 (MOS 3)
00027411	A16A134 (MOS 3)
00027505	A16A134 (MOS 3)
00027450	Verify REAL TIME CLOCK guarded switch is in ENABLE position. Verify
00025243	the setting of WSR toggle switches.
00025375	
00026262	Execute the bootstrap diagnostic program.
00025435	

85. Set the ON-LINE processor ASR bit 21 to 0 and ASR bit 20 to 1.
86. Press the READ pushbutton switch.

THE FOLLOWING PROCEDURES TEST THE
REMOTE PAGE PRINTER WITH EITHER
THE REMOTE TTY OR SPARE TTY

87. Set the ON-LINE processor ASR bits 07, 10, 13, and 21 to 1.
88. Press the READ pushbutton switch and observe that the following message is generated on the local page printer:
    DEV #0 out SVC
    DEV #3 out SVC
    DEV #6 out SVC
89. Set the WSR toggle switches to the following:
    a. If the remote page printer code select is Baudot:
        (1) Remote tty = 00020007
        (2) Spare tty = 00020003

b. If the remote page printer code select is ASCII:
(1) Remote tty = 00000007
(2) Spare tty = 00000003

90. Set the OPERATIONAL CONTROL rotary switch to CMPT and REGISTER SELECT to PEX.
91. Set the RUN/ONE INSTR toggle switch to RUN.
92. Press the INITIATE pushbutton switch and observe that:
a. DEVICE TEST message is generated on page printer (indicates program is running tests 01 through 04).
b. END TEST message is generated at completion of test 04.
c. BUS INDICATOR displays a reading of 00027576.
93. Observe that the following test message(s), depending on the classmarking, is generated on the remote page printer.

A. ASCII Test Message

!'$%&'()*+,-./0123456789:; =? ABCDEFGHIJKLMNOPQRSTUVWXYZ +
ABCDEFGHIJKLMNOPQRSTUVWXYZ

B. BAUDOT Test Message

ABCDEFGHIJKLMNOPQRSTUVWXYZ

94. If the observed test message in step 80 above is inaccurate, replace cards A16A120, A16A119, and A16A118, in sequence, and repeat the procedures in steps 87 through 93 above after each replacement.
95. Place a vertical strap 4-wire patch cord on the common equipment panel between either the remote page printer (PTR) to the remote tty (TTY) or spare tty (SPTTY).

NOTE

Both devices must be in either the direct or modem configuration which can be determined by the position of the toggle switches at the rear of the system status panel.

96. Set the system status panel REMOTE PRINTER and TTY or SPARE TTY toggle switches to ON.
97. Press the RESET pushbutton switch several times.
98. Press the INITIATE pushbutton switch and observe:
a. Change ASCII/Baudot SW SYNC A message is generated on page printer.
b. BUS INDICATOR displays a reading of 00031217 (indicates test 05 through 09 have been completed).

THE FOLLOWING PROCEDURES TEST THE TIMING READ ERROR FLIP- FLOP

99. Set the remote page printer code select switch (located behind the system status panel) to BAUDOT and the remote tty to ACSII position.
100. Press the INITIATE pushbutton switch and observe:
a. CHANGE ASCII/BAUDOT SW SYNC MAYBE message generated on page printer.
b. BUS INDICATOR displays a reading 00031457 (indicates completion of test 10).
101. Set the remote tty or spare tty code select switch to agree with the remote page printer code select switch.
102. Press the INITIATE pushbutton switch and observe:
a. Test 12 BYPASSED and END TEST message generated on page printer.
b. BUS INDICATOR displays a reading of 00032252 (indicates completion of test 11).
103. Remove the patch cord inserted in step 95 above.
104. Set the ON-LINE processor ASR bit 21 to 0 and ASR bit 20 to 1.

THE FOLLOWING PROCEDURES TEST EITHER
THE REMOTE TTY - SYNC A AND B OR
SPARE TTY SYNC A AND B

105. Set the ON-LINE processor ASR bits 10, 13, 21 to 1.
106. Press the READ pushbutton switch.
107. Set the WSR toggle switches to the following:
    a. If the remote device code select is BAUDOT:
        Remote tty = 00021007
        Spare tty = 00020403
    b. If the remote device code select is ASCII:
        Remote tty = 00001007
        Spare tty = 00000403
108. Set the OPERATION CONTROL rotary switch to CMPT and the REGISTER SELECT to PEX.
109. Set the RUN/ONE INSTR toggle switch to RUN.
110. Press INITIATE pushbutton switch and observe:
    a. DEVICE TEST and END TEST message generated on page printer.
    b. BUS INDICATOR displays a reading of 00027576.
111. Observe that the test message generated on the appropriate remote device is identical to that observed in step 93 above.
112. If the test message is inaccurate, replace the following cards, in sequence, and repeat the test:

Remote tty	*Spare tty*
A16A114	A16A139
A16A113	A16A128
A16A112	A16A127
A16A109	A16A126

113. Place a 2-wire patch cord on the COMMON EQUIPMENT PANEL between the send and receive pairs of the appropriate remote device quad connector. The setting of the mode select switch (rear of system status panel) determines if the direct or modem quad should be used.
114. Set the appropriate system status panel remote device toggle switch to ON.
115. Press the RESET pushbutton several times.
116. Press the INITIATE pushbutton switch and observe:
    a. CHANGE ASCII/BAUDOT SW SYNC A message is generated on local page printer.
    b. BUS INDICATOR displays a reading of 00031217 (Indicates tests 05 through 09 have been completed).
117. Press INITIATE pushbutton switch and observe:
    a. CHANGE ASCII/BAUDOT SW SYNC A MAYBE message is generated on local page printer.
    b. BUS INDICATOR displays a reading of 00031457 (Indicates test 10 had been completed).

NOTE

Test 10 cannot be executed correctly. Ignore any error messages related to test 10.

118. Press the INITIATE pushbutton switch and observe that:
    a. PRCM HALT Indicator illuminates.
    b. TEST 12 BYPASSED and END TEST messages are generated on the local page printer.
    c. BUS INDICATOR displays a reading of 00032252.
119. Remove the patch cord inserted in step 113 above and restore the system to it original configuration.
120. Press the NORMAL HALT pushbutton switch.

121. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
122. Set the WSR toggle switches to 00032303.
123. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00032303.
124. Set the WSR toggle switches to the following:
    a. If the remote device code select is BAUDOT:
        Remote tty = 00061007
        Spare tty = 00060403
    b. If the remote device code select is ASCII:
        Remote tty = 00041007
        Spare tty = 00040403
125. Notify the remote device operator that a typing test is to begin.
126. Press the INITIATE pushbutton.
127. Observe that approximately 3 minutes after the last test character has been received:
    a. PGRM HALT indicator illuminates.
    b. END TEST message is generated on page printer.
    c. BUS INDICATOR displays a reading of 00032252.
128. Set the ON-LINE processor function code to 17 and mark the appropriate remote devices in-service:
        ASR10 = 1 Spare tty
        ASR13 = 1 Remote tty
        ASR20 = 1 In-service
129. Press the READ pushbutton switch.

Section III. PROCEDURES TO MARK REMOTE DEVICES OUT-OF-SERVICE

1. Set the function code to 17.
2. Set the ASR toggle switches to 0's.
3. Select the device to be marked out-of-service:
    07 = remote page printer
    08 = tape punch
    09 = page printer
    10 = spare tty
    11= tape reader
    12 = memory-to-memory channel
    13 = remoter tty
    14 = FACP
4. Set ASR toggle switch bit 21 to a 1.
5. Press the READ pushbutton switch.

Section IV. ASCII AND BAUDOT CODE PRINTOUTS

XXX	ASCII	Baudot Key	XXX	ASCII	XXX	ASCII	XXX	ASCII
001	NUL	A	047	+	116	M	163	P
002	SOH	B	050	.	117	N	164	Q
003	STX	C	051	(	120	O	165	R
004	ETX	D	062	)	121	P	167	S
005	EOT	E	053	*	122	Q	170	T
006	ENQ	F	054	+	123	R	171	U
007	ACK	G	055	,	124	S	172	V
010	BEL	H	056	-	125	T	173	W
011	BS	I	057	•	126	U	174	X
012	HT	J	060	/	127	V	175	Y
013	LF	K	061	0	130	W	176	Z
014	VT	L	062	1	131	X	177	(
015	FF	M	063	2	132	Y	200	/
016	CR	N	064	3	133	Z	201	)
017	SO	O	065	4	134	(	202	
020	S	P	066	5	135	/	203	DEL
021	DLE	Q	067	6	136	)		
022	DC1	R	070	7	137			
023	DC2	S	071	8	140	-		
024	DC3	T	072	9	141			
025	DC4	W	073	∅	142	a		
026	NAK	V	074		143	b		
027	SYN	W	075	)	144	c		
030	ETB	X	076	=	145	d		
031	CAN	Y	077	,	146	e		
032	EM	Z	100		147	F		
038	UB	LETTERS SHIFT	101	•	150	CR		
064	ESC	FIGURES SHIFT	102	A	151	LF		
035	FS	SPACE	103	B	152	G		
086	GS	CARRIAGE RETURN	104	C	153	H		
037	RS	LINE FEED	105	D	154	I		
040	US		106	E	155	J		
041	SP		107	F	156	K		
042	-		110	G	157	L		
043			111	H	160	M		
044	=		112	I	161	N		
046	$		113	J	162	O		
046	(		114	K				
			115	L				

Section V. REMOTE DEVICES REPLACEMENT TABLE

Synchronizer	Driver cards	Receiver cards	Modem modules
TYR		A16A109, A16A177, A16A116	A13A1
TYT	A16A109	•	A13A2
RPP	A16A109	•	A13A3
EXT	A16A126	•	A13A4
EXR	•	A16A126, A16A117, A16A116	A13A5
LPP	A16A136	•	
PTP	A16A141	•	
PTR	•	A16W116, A16A117, A16A115	

Section VI. ERROR PRINTOUT MESSAGES

Printout	Probable cause	Corrective action
1. IODVA-XX-XXX where XX = 01 or 02 and XXX = 001 or 002.	Status register filed.	Replace MOS2 card synchronizer A. Repeat test.
2. IODVA-XX AT LOC XXXXXX PGE 00 IODVA XX-077 where XX = 01, 02 or 03 and XXXXXX identifies an address in memory page 0.	Synchronizer A did not respond in time when executing instruction at XXXXXX.	Replace MOS2 card synchronizer A. Repeat test.
3. IODVA-03-XXX where XXX is 000, 125, 252 or 377 and represents data sent to buffer register by test program.	Data read from synchronizer A buffer register differs from data written. Data written was XXX.	Replace following synchronizer A cards in sequence. Repeat test after each replacement. (1) MOS 3 (2) MOS 2 (3) MOS 1
4. IODVA-04-XXX. With CODE SELECT switches set to ASCII XXX = 001 through 20 and identifies ASCII character which failed. With switches set to 75 BAUD XXX - 001 through 037 and identifies Baudot character which failed.	Data read from synchronizer A buffer register differs from data written. Data written is identified by XXX.	Replace MOS 3 synchronizer A.
5. IODVA-04-775	Incorrect timing for full ASCII or BAUDOT table.	Replace following card in sequence. Repeat test after each replacement. (1) MOS 3 synchronizer A (2) A7A216
6. IODVA-04-776	Incorrect timing for single character.	Replace following cards in sequence. Repeat test after replacement. (1) MOS 3 synchronizer A (2) A16A216
7. IODVA-04-TMOAT LOC XXXXXX PGE00 IODVA-04-777 where XXXXXX.identifies an address in memory page 0.	Synchronizer A did not respond in time when executing instruction at XXXXXX.	Replace MOS 2 card synchronizer A. Repeat test.
8. IODVB-XX-XXX where XX = 05 or 06 and XXX = 001 or 002.	Status register failed.	Replace MOS 2 card synchronizer B. Repeat test.
9. IODVB-XX-TMO AT LOC XXXXXX PGE 00 IODVB-XX-077 where XX = 05, 06 or 07 and XXXXXX identifies an address in memory page 0.	Synchronizer B did not respond in time while executing instruction at XXXXXX.	Replace MOS 2 card synchronizer B. Repeat test.
10. IODVB-07-XXX where XXX = 000, 126 252, or 377 and represents data sent to buffer register by test program.	Data read from synchronizer differs from data written. Data written was XXX.	Replace following synchronizer B cards in sequence. Repeat test after each replacement. (1) MOS 3 (2) MOS 2 (3) MOS 1

Printout	Probable cause	Corrective action
11. IODVB-08-XXX where XXX-0001 or 003.	Status register failed.	Replace MOS2 card synchronizer B. Repeat test.
12. IODVB-08-002 (1) Test 4 failed. (2) Test 4 did not fail.	Related to results of test 04. (1) Refer to test 4. (2) Interrupt failure.	Relate to results of test 04. (1) Perform corrective action required for test 4 failure (1 above.) (2) Replace following device B cards in sequence. Repeat test after each replacement. (*a*) MOS 3 (*b*) MOS 2 (*c*) Receiver (*d*) Modem
13. IODVB-08-TMO-AT LOC XXXXXX PGE00 where XXXXXX identifies an address in memory page 0.	Illegal interrupt.	Replace following synchronizer B cards in sequence. Repeat test after each replacement. (1) MOS 3 (2) MOS 2
14. IODVB-XX-TMD AT LOC XXXXXX PGE00 IODVB-XX-077 where where XX = 08, 09 or 10 and XXXXXX identifies an address in memory page 0.	Synchronizer did not respond on time when executing instruction at location XXXXXX.	Replace following cards in sequence. Repeat test after each replacement. (1) MOS 2 synchronizer A (2) MOS 2 synchronizer B
15. IODVB-09-001 (1) Test 4 failed. (2) Test 4 did not fail.	Related to result of test 4. (1) Refer to test 4. (2) Character lost (CHLST) failed.	Related to result of test 4. (1) Perform corrective action required for test 4 failure. (2) Replace the following device B cards in sequence. Repeat after each replacement. (*a*) MOS3 (*b*) MOS2 (*c*) Receiver (*d*) Modem
16. IODVB-09-002	Status register failed.	Replace MOS2 card synchronizer B. Repeat test.
17. IODVB-01-001 (1) Test 4 failed.	Related to result of test 4. (1) Refer to test 4.	Related to result of test 4. (1) Perform corrective action required for test 4 failure. (2) Replace following device B cards in sequence. Repeat test after each replacement. (*a*) MOS3 (*b*) MOS2 (*c*) Receiver (*d*) Modem
18. IODVB-10-002	Status register failed.	Replace MOS2 card synchronizer B. Repeat test.
19. IODVB-11-XXX. With CODE SELECT switches set to ASCII XXX = 001 through 203 and identifies ASCII character which failed with the switches set to 75 BAUD XXX = 001 through 037 and identifies Baudot character which failed. (1) Test 4 failed. (2) Test 4 did not fail.	Related to result of test 4. (1) Refer to test 4. (2) Data transfer failure.	Related to result of test 4. (1) Perform correction action required for test 4 failure. (2) Replace following device B cards in sequence. Repeat test after each replacement. (a) MOS3 (b) MOS2 (c) Receiver (d) Modem

Printout	Probable cause	Corrective action
20. IODVB-XX-774 where XX = 11 or 12.	Status register failed.	Replace following cards in sequence. Repeat test after each replacement. (1) MOS2 synchronizer B (2) MOS2 synchronizer A
21. IODVB-11-776	Timing error.	Replace following cards in sequence. Repeat test after each replacement. (1) MOS1 synchronizer B (2) MOS3 synchronizer B (3) A7A216 (4) MOS1 synchronizer A (5) MOS 3 synchronizer A
22. IODVB-XX-TMO AT LOC XXXXXX PGE00 IODVB-XX-777 where XX = 11 or 12.	Synchronizer did not respond in time when executing instruction at location XXXXXX.	Replace following cards in sequence. Repeat test after each replacement. (1) MOS2 synchronizer B (2) MOS2 synchronizer A

EXHIBIT F

FUNCTIONAL ASSIGNMENT CONTROL PANEL DIAGNOSTIC PROGRAM

Section I. GENERAL

The Functional Assignment Control Panel (FACP) diagnostic program is used to test the functions involved in the transmission of data and instructions from the Central Processor to the FACP and the verification of FACP generated codes. The series of tests requires the interaction of manual depression of the pushbutton switches and the response of the diagnostic program to the FACP generated character codes.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO CONVERT THE OPERATIONAL PRELOADER PROGRAM TO THE OFF-LINE DIAGNOSTIC PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PFX.
3. Set the WSR toggle switches to 00277750.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
6. Set the WSR toggle switches to 55137754.
7. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions *must be loaded into memory before proceeding*. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 42 below

Address	*Instruction*
00277750	01077751
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	02200040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001

Address	*Instruction*
00277770	74000003
00277771	220777757
00277772	62501776 (62500476)
00277773	72100001
00277774	74100107 (74100235)
00277775	22077756
00277776	00000000

8. Set the MEMORY guarded switch to the UNPROTECTED position.
9. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
10. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
11. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL ROTARY SWITCH TO STORE and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.
22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 55137754.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the *correct address*.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the *correct instruction number*.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.

28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 63500476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
33. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 74100235.
38. Set the OPERATIONAL CONTROL rotary switch to STORE.
39. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE OFF-LINE DIAGNOSTIC LOADER PROGRAM INTO MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the loader tape moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
49. Set the WSR toggle switches to 00277750.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.
52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tape strip loads into memory.
    b. PRGM HALT Indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
55. Set the PARITY ERROR HALT toggle switch to OFF.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.
58. Set the REAL TIME CLOCK guarded switch to the DISABLE position and the MEMORY guarded switch to the PROTECTED position.
59. Set the REGISTER SELECT rotary switch to PEX.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.
61. Set the printer motor control BYPASS toggle switch to BYPASS.

THE FOLLOWING PROCEDURES LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

62. Load the Paper Tape Reader/Punch (SM-D-751722) and FACP (SM-D-751719) diagnostic program tape on the paper tape reader.

NOTE

The two segment Paper Tape Reader/Punch diagnostic program must be loaded into memory prior to loading the one segment FACP diagnostic program.

63. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
64. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
65. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
66. Set the WSR toggle switches to 00000500.
67. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 0000050.
68. Press the system status pane RESET pushbutton switch several times and observe that the diagnostic tape moves.
69. Set the OPERATIONAL CONTROL rotary switch to CMPT.
70. Press the-INITIATE pushbutton switch and observe:
    a. Diagnostic program tape loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
71. Press the INITIATE pushbutton for a total of three (3) times to read-in the FACP diagnostic program and observe that the same Indications obtained in step 70 above are obtained.
72. Rewind the diagnostic program tape by setting the system status panel TAPE READER REWIND toggle switch to ON.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING ADDRESS INTO THE PROGRAM COUNTER

73. Set the REGISTER SELECT rotary switch to PEX.
74. Press the NORMAL HALT pushbutton switch and observe the PRCS HALT indicator Illuminates.
75. Press the CLEAR pushbutton switch.
76. Set the OPERATIONAL CONTROL rotary switch to STORE.
77. Set the WSR toggle switches to 00001000.
78. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00001000.
79. Set the system status panel RESET SELECT LOCAL PRINTER toggle switch to ON and press the RESET pushbutton switch.
80. Set the WSR toggle switches to all zeros.

THE FOLLOWING PROCEDURES ARE USED TO TEST THE INDICATOR LAMPS

81. Set the FACP LAMP TEST rotary switch to IND.
82. Press the FACP TEST pushbutton switch and observe that all Indicators illuminate.
83. Set the LAMP TEST rotary switch, in sequence, to DRO position 0 through 9 and press the TEST pushbutton switch. Observe that the selected digit is displayed on all readout indicators.
84. Set the LAMP TEST rotary switch to CLR.
85. Press the TEST pushbutton switch and observe that all readout Indicators extinguish.

THE FOLLOWING PROCEDURES ARE USED TO EXECUTE THE
DIAGNOSTIC ROUTINES

86. Set the OPERATIONAL CONTROL rotary switch to CMPT.
87. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00010015.
    c. FACP TEST message is generated on the local page printer.
88. Press the INITIATE pushbutton switch and observe that the FACP READY indicator lamp starts flashing (this indicates the end of tests 1 through 4).
89. Verify that all FACP indicators and digital readout indicators are off.
90. Press the FACP CONTINUE pushbutton switch and observe that the readout Indicator listed in the table below starts flashing and its DRO begins to fill in with the corresponding list of numbers.

Order	*DRO and indicator*	*Displayed in DRO*
1	TERMINAL NO	0101
2	TERMINAL TYPE	02
3	CLASS CODE	03
4	DIR NO	404
5	TRK GR NO	505
6	CONF	06
7	GR MIN COUNT	07
8	MODE II TERM NO	6086
9	SPCL CKT NO	09
10	PR NO	10
11	SL NO	11
12	STATUS	12
13	LINE GP NO	13
14	ALTN SL NO	14
15	FUNCTION CODE	5
16	RANK	6
17	PRI TRK GR NO	017
18	ALTN TRK GR NO	018
19	FIXED DIR NO/TRFC CNT	19019
20	FIXED DIR NO/TRFC CNT	02020
21	PR-SL-XXX/NNVXXXX	2121210
22	NARROW BAND-TOTAL	22
23	NARROW BAND-FO	23
24	NARROW BAND-FLASH	24
25	NARROW BAND-IMMED	25
26	NARROW BAND-PRI	26
27	WIDE BAND-TOTAL	27
28	WIDE BAND-PREC	28
29	OPERATORS-CALLS	29
30	OPERATORS-RECALLS	30
31	OPERATORS-INFO	31
32	OPERATORS-INTCP	32
33	TRUNK GR TRAFFIC-INCOM	33
34	TRUNK GR TRAFFIC-OUTGO	34
35	TRUNK GR TRAFFIC-RPMPT	35
36	TRUNK GR TRAFFIC-ATB	36
37	TRUNK GR TRAFFIC-LKOUT	37
38	READY	38
39	EERROR	39
40	STORE	40
41	READER TO TTY	41
42	READER TO SP TTY	42
43	READER TO PUNCH	43

91. Continue to press the CONTINUE pushbutton switch until all entries have been tested. At the completion of the table, observe that the READY indicator illuminates.

NOTE

The FACP readout indicators that do not have a DRO of its own will use the STATUS DRO.

92. Press one of the pushbutton switches listed in the table below and observe that the STATUS DRO displays the corresponding number.

NOTE

Any erroneous codes a displayed in the PRI TRK GRP NO readout indicator, the ERROR indicator illuminates, and the error message is generated on the local page printer.

93. To terminate the test, press the CONTINUE pushbutton switch and observe that the READY indicator illuminates.

Pushbutton	*Status display*
READER TO TTY	41
READER TO SP TTY	42
READER TO PUNCH	43
PRINT	44
PUNCH	45
PRINT STOP	46
PUNCH STOP	47
ASSIGN	48
CHANGE	49
DELETE/RESET	50
DISPLAY	51
FACP CLEAR	52
FIELD CLEAR	53
STORE AND REPEAT	54
STORE	55
REMOTE I/O INHIBIT	56
LINE LOAD	57
TERMINAL SERVICE	58
TERMINAL NO ASGMT	59
DIRECTORY NO AGSMT	60
TRK GR NO	61
PR ROUTING	62
SL ROUTING	63
ALTN SL ROUTING	64
OP/JXX ROUTING	65
FIXED DIR ROUTING	66
PRST CONF ENTRY	67
LINE GR ENTRY	68
DAC ROUTING	69
TRUNK TEST	70
STATUS	71
TRAFFIC METERS	72
TRK GR METERS	73

94. Press one of the digit pushbuttons listed in the table below and observe that the STATUS digital readout displays the corresponding number listed and all other DRO digits display the selected digit.

Digit pushbutton	*Status display*
1	74
2	75
3	76
4	77
5	78
6	79
7	80
8	81
9	82
0	83

95. Repeat the procedure for each digit listed in any order. To terminate the test, press the CONTINUE pushbutton switch and observe that the READY indicator illuminates.
96. Set the FACP INTCP CALLS rotary switch to one of the positions listed in the following chart.

INTCP CALLS switch positions	*Status display*
OPR	84
INFO	85
ERROR	86

97. Press the ENTER pushbutton switch and observe that the STATUS digital readout indicator display the corresponding number.
98. Press the CONTINUE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00011612.
    c. END OF FP message is generated on the local page printer.

Section III. TROUBLESHOOTING CHART

Malfunction	Probable cause	Corrective action
During FACP lamp test one or more of the following errors occur.		**NOTE** **All replacements are in FACP A7.**
a. Any single indicator fails to light.	*a.* Defective (1) bulb (2) lamp driver	*a.* Replace (1) bulb, retest (2) lamp driver card for falling indicator or group. Repeat test.
b. Any single indicator or group of related indicators fails to light or extinguish.	*b.* Defective lamp driver.	*b.* Replace lamp driver card for failing indicator indicator or group. Repeat test.
Any DRO or related group of DRO's fail to display selected digit.	Defective (1) DRO storage (2) DRO address gate. (3) DRO	Replace (1) DRO storage card. (2) DRO address gate card. Repeat test. (3) DRO. Repeat test.
a. Any group of DRO's fail to display 000 digit.	*a.* Defective DRO bus gates.	*a.* Replace A222 card, repeat test.
b. AR DRO's fail to display digits 8 and 9.	*b.* Defective DRO bus or address gates. (1) DRO bus gates (2) DRO address gates.	*b.* Replace gate card: (1) A238 card. Repeat test. (2) A221 card. Repeat test.
c. All DRO's fail to display a digit 0 through 7.	*c.* Defective DRO bus or address gates. (1) DRO bus gates. (2) DRO address gates.	*c.* Replace gate card: (1) A138 card. Repeat test. (2) A221 card. Repeat test.
d. Any single DRO or group of DRO's fail to display combina- of numbers not listed above.	*d.* Defective bus gates.	*d.* Replace A223 card. Repeat test.
While running FACP off-line test any of following printout occur before END of FACP TEST printout:		
a. FP01-XX where XX is 01, 02 or 03.	*a.* Status register fault.	*a.* Replace A230 card. Repeat test.
b. FP01-04.	*b.* *B*B failed to set.	*b.* Replace A230 card. Repeat test.
c. FP02-XX where XX is 01 or 02.	*c.* Status register failed to clear,	*c.* *R*eplace A230 card. Repeat test.
d. FP03-01.	*d.* FACP failed to detect program error.	*d.* Replace following cards in sequence. Repeat test after each replacement. (1) A238 (2) A233 (3) A227 (4) A127 (5) A140

Malfunction	Probable cause	Corrective action
e. FP04-XX where XX is 01 or 02.	*e.* FACP failed to detect program error.	*e.* Replace A140 card. Repeat test.
f. FP04-04.	*f.* RRF failed to reset.	*f.* Replace A230 card. Repeat test.
g. FP05-01.	*g.* CH RDY failed to reset.	*g.* Replace A230 card. Repeat test.
h. FP05-02.	*h.* Pushbutton entry for CONTINUE failed.	*h.* Replace following cards in sequence. Repeat test after each card placement. (1) Group 1 for CONTINUE switch. (2) Group 2 for CONTINUE switch.
i. FP05-03.	*i.* CH RDY failed to reset.	*i.* Replace A230. Repeat test.
j. FP06-01. Relate this printout to error during test No. 6 of indicators.	*j.* Related to indicator errors recorded during test.	*j.* Replace cards related to errors recorded during test.
(1) DRO correct but Indicator failed.	(1) Lamp gates.	(1) Replace following cards in sequence, for failing indicator. Repeat test after each replacement. (*a*) Indicator driver (*b*) Indicator gate (*c*) Field indicator register. (*d*) CAR decoder.
(2) Incomplete DRO display with correct indicator lt.	(2) Address counter.	(2) Replace following cards in sequence. Repeat test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A137 (*f*) A134 (*g*) A140 (*h*) A127
(3) Incorrect DRO display with correct indicator lit and all DRO's lit.	(3) Write buffer.	(3) Replace A123 card. Repeat test.
(4) Incorrect indicator lights and correct display appears in wrong DRO's.	(4) Indicator addressing. (*a*) Address decoding.	(4) Replace addressing or switch decoding cards. (*a*) Replace following cards in sequence. Repeat test after each replacement. *1.* A237 *2.* A238 *3.* A240 *4.* A243 *5.* A239
	(*b*) Switch decoding.	(*b*) Replace following cards in sequence. Repeat test after each replacement. *1.* Group 2 for failing switch. *2.* Group 1 for failing switch. *3.* Group 2 for failing switch. *4.* Group 3 for failing switch
(5) No errors recorded during test.	(5) Counter.	(5) Replace following cards in sequence. Repeat test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A137 (*f*) A134 (*g*) A140 (*h*) A127
k. FP07-01. This printout should only occur when testing ERROR and STORE indicators.	*k.* ERRF failed to set.	*k.* Replace A140 card. Repeat test.

Malfunction	Probable cause	Corrective action
l. FP07-02. Relate this printout to error recorded during test no. 7 of indicators.	*l.* Related to indicator error recorded during test.	*l.* Replace cards related to error recorded during test.
(1) DRO correct but indicator failed.	(1) Lamp gates.	(1) Replace following cards in sequence, for the failing indicator. Repeat test after each replacement. (*a*) Indicator driver (*b*) Indicator gate (*c*) Field indicator register (*d*) CAR decoder
(2) Incomplete DRO display.	(2) Address counter.	(2) Replace following cards in sequence. Repeat test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A137 (*f*) A134 (*g*) A140 (*h*) A127
(3) Incorrect DRO display with correct indicator lit and all DRO's lit.	(3) Write buffer.	(3) Replace A123 card. Repeat test.
(4) Incorrect indicator lights and correct display appears in wrong DRO's.	(4) Indicator addressing. (*a*) Address decoding.	(4) Replace addressing or switch decoding. (*a*) Replace following cards in sequence. Repeat test after each replacement. *1.* A237 *2.* A238 *3.* A240 *4.* A243 *5.* A239
	(*b*) Switch decoding.	(*b*) Replace following cards in sequence. Repeat test after each card replacement. *1.* Group 1 for failing switch. *2.* Group 2 for failing switch. *3.* Group 3 for falling switch.
(5) No errors recorded during test.	(5) Address counter.	(5) Replace following cards in sequence. Request test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A137 (*f*) A134 (*g*) A140 (h) A127
m. FP08-01. PRI TRK GR NO displays a 3 digit code.	*m.* Incorrect code entry.	*m.* Repeat test to insure you made correct entry, then replace following cards in sequence. Repeat test after card replacement. (1) Group 1 for failing switch. (2) Group 2 for failing switch. (3) Group 3 for failing switch.
n. FP08-02. Relate this printout to errors recorded during test no. 8 of indicators.	*n.* Related to indicator errors recorded during test.	*n.* Replace cards related to error recorded during test.
(1) DRO correct but indicator failed.	(1) Lamp gates.	(1) Replace following cards in sequence, for the failing indicator. Repeat test after each replacement.

Malfunction	Probable cause	Corrective action
		(*a*) Indicator driver (*b*) Indicator gate (*c*) Field indicator register (*d*) CAR decoder
(2) Incomplete DRO display.	(2) Address counter.	(2) Replace following cards in sequence. Repeat test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A137 (*f*) A134 (*g*) A140 (*h*) A127
(3) Incorrect DRO display with correct indicator lit and all DRO's lit.	(3) Write buffer.	(3) Replace A123 card. Repeat test.
(4) Incorrect indicator lights and correct display appears in wrong DRO's.	(4) Indicator addressing. (*a*) Address decoding.	(4) Replace addressing or switch decoding. (*a*) Replace following cards in sequence. Repeat test after each replacement. *1.* A237 *2.* A238 *3.* A240 *4.* A243 *5.* A239
	(*b*) Switch decoding.	(*b*) Replace following cards in sequence. Repeat test after each card replacement *1.* Group 1 for failing switch. *2.* Group 2 for failing switch. *3.* Group 3 for failing switch.
(5) No errors recorded during test.	(5) Address counter.	(5) Replace following cards in sequence Repeat test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A137 (*f*) A134 (*g*) A140 (*h*) A127
o. FP08-03	*o.* BB failed to set	*o.* Replace A230 card. Repeat test.
p. FP08-77	*p.* CH RDY failed to set.	*p.* Replace A230 card. Repeat test.
q. FP09-01	*q.* Incorrect digit entry.	*q.* Replace following cards in sequence. Repeat test after each card replacement. (1) Group 1 for failing digit (2) Group 2 for failing digit (3) Group 3 for failing digit
r. FP09-02	*r.* Address counter.	*r.* Replace following cards in sequence. Repeat test after each replacement. (1) A240 (2) A138 (3) A135 (4) A136 (5) A137 (6) A134 (7) A140 (8) A127

	Malfunction	Probable cause	Corrective action
s.	FP09-03. Relate this printout to errors recorded during test no. 9 of indicators.	*s.* Related to indicator errors recorded during tests.	*s.* Replace cards related to error recorded during test.
	(1) Odd digits fail.	(1) Switch decoding.	(1) Replace following cards in sequence. Repeat test after each replacement. (*a*) A114 (*b*) A109
	(2) Digits 4, 5, 6, and 7 failing.	(2) Switch decoding.	(2) Replace following cards in sequence. Repeat test after each replacement. (*a*) A103 (*b*) A104
	(3) Random digit errors.	(3) Switch decoding.	(3) Replace following cards in sequence. Repeat test after each replacement. (*a*) A103 (*b*) A104 (*c*) A114 (*d*) A109
	(4) No errors recorded during test.	(4) Address counter.	(4) Repeat following cards in sequence. Repeat test after each replacement. (*a*) A240 (*b*) A138 (*c*) A135 (*d*) A136 (*e*) A187 (*f*) A134 (*g*) A140 (*h*) A127
t.	FP09-04	*t.* CH RDY failed to set.	*t.* Replace A230 card. Repeat test.
u.	FP10-01. PRI TRK GR NO displays 3 digit code. Relate printout to errors recorded during test no. 10 of indicators.	*u.* Incorrect command entry.	*u.* Repeat test to insure you make the correct entry.
	(1) INTCP CALLS OPR fails.	(1) Switch decoding.	(1) Replace following cards in sequence. Repeat test after each card replacement. (*a*) Group 1 for OPR switch. (*b*) Group 2 for OPR switch (*c*) Group 3 for OPR switch.
	(2) INTCP CALLS INFO fails.	(2) Switch decoding.	(2) Replace following cards in sequence. Repeat test after each card replacement. (*a*) Group 1 for INFO switch. (*b*) Group 2 for INFO switch.
	(3) INTCP CALLS ERROR fails.	(3) Switch decoding.	(3) Replace following cards in sequence. Repeat test after each card replacement. (*a*) Group 1 for ERROR switch. (*b*} Group 2 for ERROR switch. (*c*) Group 3 for ERROR switch.
v.	FP10-02	*u.* Address counter.	*v.* Replace following cards in sequence. Repeat test after each replacement. (1) A240 (2) A138 (3) A135 (4) A136 (5) A137 (6) A134 (7) A140 (8) A127
w.	FP10-77	*w.* CH RDY failed to set.	*w.* Replace A230 card. Repeat test.

Section IV. DRO CARD REPLACEMENT

DRO		DRO address	DRO store	Address gate
TERMINAL NO	UNITS	4A0	A211	A202
	TENS	4A1	A211	A202
	HUNDREDS	4A2	A211	A202
	THOUSANDS	4A3	A211	A202
TERMINAL TYPE	UNITS	2A0	A207	A216
	TENS	2A1	A207	A216
CLASSCODE	UNITS	2B0	A207	A216
	TENS	2B1	A207	A216
DIR NO/TRK GP NO	UNITS	3A0	A208	A218
	TENS	3A1	A209	A218
	HUNDREDS	3A2	A209	A219
CONF/GR MIN CT	UNITS	2C0	A207	A217
	TENS	2C1	A208	A217
MODE II TERM NO	UNITS	4B0	A212	A203
	TENS	4B1	A212	A203
	HUNDREDS	4B2	A212	A203
	THOUSANDS	4B3	A212	A203
SPCL CKT NO/PR NP/SL NO	UNITS	2D0	A208	A217
	TENS	2D1	A208	A217
STATUS/LINE GR NO/ALTN	UNITS	2E0	A208	A218
SL NO	TENS	2E1	A208	A218
FUNCTION CODE/RANK		1A0	A207	A202
PRI TRK PP NO	UNITS	3B0	A209	A219
	TENS	3B1	A209	A219
	HUNDREDS	3B2	A209	A219
ALTN TRK GP NO	UNITS	3C0	A209	A204
	TENS	3C1	A211	A204
	HUNDREDS	3C2	A211	A203
FIXED DIR NO/TRFC CNT	UNITS	5A0	A212	A204
	TENS	5A1	A212	A204
	HUNDREDS	5A2	A213	A204
	THOUSANDS	5A3	A213	A204
	TEN THOUSANDS	5A4	A213	A206
PR-SL-XXX/NNX-XXXX	SL UNITS	7A4	A214	A206
	SL TENS	7A5	A214	A206
	SL HUNDREDS	7A6	A214	A206
	NN UNITS	7A0	A213	A205
	TENS	7A1	A213	A205
	HUNDREDS	7A2	A213	A205
	THOUSANDS	7A3	A214	A205

Section V. INDICATOR CARD REPLACEMENT

Indicator	Indicator address	Lamp driver	Lamp gate	Field indicator register	CAR decoder
TERMINAL NO	ID 204	A153	A149		
TERMINAL TYPE	ID 202	A152	A150		
CLASSCODE	ID 212	A152	A150		
DIR NO	ID 203	A153	A149		
TRK OR NO	ID 213	A153	A149		
CONF	ID 222	A152	A150		
GR MIN COUNT	ID 242	A152	A160		
MOD II TERM NO	ID 214	A153	A148		
SPCL CKT NO	ID 252	A152	A150		
PR NO	ID 262	A152	A150		
SL NO	ID 272	A152	A150		
STATUS	ID 302	A153	A150		
LINE OR NO	ID 232	A152	A150		
ALTN SL NO	ID 312	A153	A151		
FUNCTION CODE	ID 201	A152	A151		

Indicator		Indicator address	Lamp driver	Lamp gate	Field indicator register	CAR decoder
RANK		ID 211	A152	A151		
PRI TRK GR NO		ID 223	A153	A149		
ALT TRK GR NO		ID 233	A153	A149		
FIXED DIR NO/TRFC CNT		ID 205	A153	A148		
PR-SL-XXX/NNX-XXXX		ID 207	A153	A148		
NARROWBAND	TOTAL	ID 206	A153	A147		A237
	FO	ID 216	A153	A147		A237
	FLASH	ID 226	A153	A147		A237
	IMMED	ID 236	A153	A147		A237
	PRI	ID 246	A153	A147		A237
WIDEBAND	TOTAL	ID 256	A153	A147		A237
	PREC	ID 266	A153	A147		A237
OPERATORS	CALLS	ID 276	A154	A147		A237
	RECALLS	ID 306	A154	A147		A231
	INFO	ID 326	A154	A147		A237
	INTCP	ID 316	A154	A147		A237
TRUNK GR TRAFFIC	INCOM	ID 336	A154	A146		A237
	OUTGO	ID 346	A154	A146		A237
	PRMPT	ID 356	A154	A146		A237
	ATB	ID 366	A154	A146		A237
	LKOUT	ID 376	A154	A146		A237
READY		ID 220	A152	A148		
ERROR		ID 230	A152	A148		
STORE		ID 240	A152	A148		
READER TO TTY			A152		A144	
READER TO SPTTY			A152		A144	
READER TO	PUNCH		A152		A144	
INTCP CALLS	ENTER		A152		A146	

Section VI. PUSHBUTTON CARD REPLACEMENT

Pushbutton	Code	Group 1	Group 2	Group 3
READER TO TTY	041	A113, A103, A114, A108	A109, A113	
READER TO SPTTY	042	A113, A103, A114, A108	A107, A104, A109	
READER TO PUNCH	043	A113, A103, A114, A108,	A107, A104, A109	A133
PRINT	044	A113, A103, A114, A108	A107, A104	A109, A133
PUNCH	045	A113, A103, A114, A108	A107, A104	
PRINT STOP	046	A113, A103, A114, A108	A107, A104	
PUNCH STOP	047	A113, A103, A114, A108	A107, A104	A109, A133
ASSIGN	101	A132, A133, A114	A109	
CHANGE	102	A132, A133, A114	A107, A103, A104, A108	
DELETE/RESET	103	A132, A133, A114	A107, A103, A104 A108	A109 A104, A108
DISPLAY	104	A132, A133, A114	A107, A103, A104, A108	
FACP CLEAR	105	A132, A133, A114	A107, A110, A104 A108	A109
FIELD CLEAR	106	A132, A133, A114	A107, A103,	
STORE AND REPEAT	107	A132, A133, A114	A107, A103, A104, A108	A109

Pushbutton	Code	Group 1	Group 2	Group 3
STORE	110	A132, A133, A114	A113, A109, A108	
CONTINUE	111	A132, A133, A114	A113, A109, A108	
TERMINAL SERVICE	141	A132, A133, A114	A113, A103, A108	A109
TERMINAL NO ASGMT	142	A132, A133, A114	A113, A103, A108	A107, A104
DIRECTOR NO ASGMT	143	A132, A133, A114	A113, A103, A108	A107, A104, A109
TRK GR NO	144	A132, A133, A114	A113, A103, A108	A107, A104
PR ROUTING	145	A132, A133, A114	A113, A103, A108	A107, A104, A109
SL ROUTING	146	A132, A13, A114	A113, A103, A108	A107, A104
ALTN SL ROUTING	147	A132, A13, A114	A113, A103, A108	A107, A104, A109
OP/JXX ROUTING	150	A132, A133, A114	A113, A103, A108, A109	
FIXED DIR ROUTING	151	A132- A133, A114	A113, A103, A108, A109	
PRST CONF ENTRY	152	A132, A133, A114	A113, A103, A108, A109	A107, A104
LINE GR ENTRY	153	A132, A133, A114	A113, A103, A108, A109	A107, A104
DAC ROUTING	154	A132, A133, A133, A114	A113, A103, A108, A109	A107, A104
TRUNK TEST	155	A132, A133, A114	A113, A103, A108, A109	A107, A104
STATUS156	A132, A133,	A113, A103 A114	A113, A103 A108, A109	A104
TRAFFIC METERS	157	A132, A133, A114	A113, A103, A108, A109	A107, A104
TRK GR METERS	160	A132, A133, A114	A113, A103, A108	
REMOTE I/O INHIBIT	201	A132, A103, A108	A109, A133, A114	
LINE LOAD	202	A132, A103, A108	A107, A104	
INTCP CALLS OPR	203	A132, A103, A108	A107, A104	A109, A133, A114
INTCP CALLS INFO	204	A132, A103, A108	A107, A104	
INTCP CALLS ERROR	206	A132, A103, A108	A107, A104	A109, A133, A114
ENTER	210			
0	240			
1	241	A132, A103, A108	A109, A133, A114	
2	242	A132, A103, A108	A107, A104	
3	243	A132, A103, A108	A107, A104	A109, A133, A114
4	244	A132, A103, A108	A107, A104	
5	245	A132, A103, A108	A107, A104	A109, A133, A114
6	246	A132, A103, A108	A107, A104	
7	247	A132, A103, A108	A107, A104	A109, A133, A114
8	260	A132, A103, A108	A113, A109	
9	251	A132, A103, A108	A113, A109	A133, A114

EXHIBIT G

BOOTSTRAP DIAGNOSTIC PROGRAM

Section I. GENERAL

The Bootstrap diagnostic program exercises the fundamental logic in the Central Processor and its associated memory. The program is divided into three sections: the first section checks the basic ability of the processor to read the loader and bootstrap program into memory, assuming that the preloader was successfully loaded. The second section checks out a few basic instructions and the fundamental capacity of the registers. The third section programs more comprehensive checks, interrupt checks and memory checks. Program halts are the key identifying output of each section.

It must be noted that the Bootstrap diagnostic program destroys the contents or memory so that preloader and loader instructions must be reentered to continue testing.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO CONVERT THE OPERATIONAL PRELOADER PROGRAM TO THE OFF-LINE DIAGNOSTIC PRELOADER PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
3. Set the WSR toggle switches to 0027760.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
6. Set the WSR toggle switches to 55137754.
7. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions must be loaded into memory before proceeding. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 42 below.
8. Set the MEMORY guarded switch to the UNPROTECTED position.
9. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.

Preloader Instructions Chart

Address	*Instruction*
00277750	01077751
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	02200040
00277762	24077757
00277763	0 377764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62501776 (62500476}
00277773	72100001
00277774	74100107 (4100235)
00277775	22077756
00277776	00000000

10. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
11. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.
22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 55137754.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the *correct address*.

c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the *correct instruction number*.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 6400476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
33. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 74100235.
38. Set the OPERATIONAL CONTROL rotary switch to STORE.
38. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD
THE OFF LINE DIAGNOSTIC LOADER PROGRAM INTO
MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper taps reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the loader moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
49. Set the WSR toggle switches to 00277750.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.
52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch and observe that:
    a. Off-line diagnostic loader tap strip loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.

54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.
55. Set the PARITY ERROR HALT toggle switch to ON.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.
58. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
59. Set the REGISTER SELECT rotary switch to PEX.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.
61. Set the printer motor control BYPASS toggle switch to BYPASS.
61.1. Set the MEMORY guarded switch to the UNPROTECTED position.

THE FOLLOWING PROCEDURES LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

62. Load the Bootstrap (SM-D-751714) and Maintenance Control Panel (SM-D-741718) Diagnostic Program tapes on the paper tape reader.
63. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
64. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
65. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
65. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
66. Set the WSR toggle switches to 00000500.
67. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000500.
68. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tape moves.
69. Set the OPERATIONAL CONTROL rotary switch to CMPT.
70. Press the INITIATE pushbutton switch and observe that:
    a. Segment A of the diagnostic program tape loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.

THE FOLLOWING PROCEDURES ARE USED TO LOAD THE STARTING ADDRESS INTO THE PROGRAM COUNTER

71. Set the REGISTER SELECT rotary switch to PEX.
72. Press the NORMAL HALT pushbutton switch and observe the PRCS HALT indicator illuminates.
73. Press the CLEAR pushbutton switch.
74. Set the OPERATIONAL CONTROL rotary switch to STORE.
75. Set the WSR toggle switches to 00001051.
76. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00001051.
77. Set the WSR toggle switches to all zeros.
78. Set the ASR toggle switches to all zeros.

THE FOLLOWING PROCEDURES ARE USED TO EXECUTE THE SECOND SECTION OF THE BOOTSTRAP ROUTINES

79. Set the OPERATIONAL CONTROL rotary switch to CMPT.
80. Press the INITIATE pushbutton and observe that the PRGM HALT indicator illuminates and the BUS INDICATOR displays a reading of 00001053. (This showed that the program successfully executed a TRU and HLT instruction.)
81. Press the INITIATE pushbutton and observe that the PRGM HALT indicator Illuminates and the BUS INDICATOR displays a reading of 00002540.

THE FOLLOWING PROCEDURES ARE USED TO EXECUTE THE THIRD
SECTION OF THE BOOTSTRAP ROUTINES

82. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates and the PRGM HALT indicator extinguishes.
83. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
84. Set the WSR toggle switches to 0000506.
85. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000506.
86. Set the OPERATIONAL CONTROL rotary switch to CMPT.
87. Press the INITIATE pushbutton switch and observe:
    a. Segment B of the diagnostic program tap loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
88. Set the REGISTER SELECT to PEX.
89. Press the NORMAL HALT pushbutton switch and observe the PRCS HALT indicator illuminates.
90. Press the CLEAR pushbutton switch.
91. Set the OPERATIONAL CONTROL rotary switch to STORE.
92. Set the WSR toggle switches to 00003562.
93. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 000562.
94. Set the OPERATIONAL CONTROL rotary switch to CMPT.
95. Set the WSR toggle switches to all zeros.
96. Press the INITIATE pushbutton and observe that the PRGM HALT Indicator illuminates and the BUS INDICATOR displays a reading of 0000513.
97. Set the PARITY ERROR HALT toggle switch to OFF and the REAL TIME CLOCK guarded switch to ENABLE.
98. Press the INITIATE pushbutton and observe that the PRGM HALT indicator illuminates and the BUS INDICATOR displays a reading of 00206547.

Section III. BOOTSTRAP LOADING HALT TABLE

a. Section I.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	Following halt may occur while loading the bootstrap diagnostic program.		
00000-001050		Address bit(s) lost.	
001053-001055		AC to PC transfer failed. Address bit(s) picked up.	
377777			Press INITIATE to start test section B.
001052	Program halt.		

b. Section II.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(1) *Car Accumulator Check.* (*a*) Check sign bit.		
001271		A00 cannot be cleared.	
	(*b*) Check is 01-23.		
001223		Bit in A cannot be cleared.	Display A to determine failing bit.
	(2) *CLA Instruction Check, Memory Access.* (*a*) CLA a word coins all zeros.		
001277		Zeros transfer from memory failed.	Display A and B to determine failing bits.
	(*b*) CLA a word containing 37777777. If transfer fails, CLA a constant of 77777. If both CLA instructions fail LGE a word containing 37777777.		
001305		CLA failed. CLA a constant succeeded.	
001310		CLA and CLA a constant failed. LGE succeeded.	
001311		All instructions failed.	
	(*c*) CLA a word with only one bit set. Repeat for all bit positions (00-23).		
001372		A00 not transferred.	Display A and B to determine where bit was lost.
001373-001421		Bit not transferred. Symbolic address indicates bit that failed (01-23).	Display A and B to determine where bit was lost.
	(3) *CLA Instruction Check, No Memory Access.* (*a*) CLA a constant of 77777.		
001425		No hits transferred.	

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*b*) CLA a constant with only one hit set. Repeat for fifteen bit positions (09-23).		
001465-001503		Bit not transferred. Symbolic address indicates bit that failed (09-23).	
	(4) *LGE Instruction Check.* (*a*) LGE a word containing all zeros with A = 0.		
001507		Bit other than 00 failed.	Display A and B to determine bit that failed.
001512		Only bit 00 failed.	
	(*b*) LGE a word containing all zeros with A = 7777777.		
001517		Bits 101-23 failed.	
	(*c*) LGE a word containing all ones with A = 7777777.		
001524		Bits 01-23 failed.	
	(*d*) LGE a word with only one bit set with A = 0. Repeat for all bit positions (00-23).		
001635		Bit 00 failed.	
001636-0		Bit failed. Symbolic address indicates bit that	
01664		failed (01-23).	
	(*e*) Set only one bit A, LGE with a word containing all zeros. Repeat for each bit position (A00-A23).		
001775		Bit 00 failed.	
001776-		Bit failed. Symbolic address indicates bit that	
02024		failed (01-23).	
	(*f*) LGE a word containing all ones with A = 7777777.		
002030		Bit failed.	Display A and B to determine bit that failed.
002033		Bit 00 failed.	
	(5) *LGM Instruction Check.* (*a*) LGM a word containing all ones with A = 0.		
002040		Bit failed.	Display A and B to determine bit that failed.
	(*b*) LGM a word containing all zeros with A = 77777777.		
002045		Bit failed.	Display A and B to determine bit that failed.
	(*c*) LGM a word containing all ones with A = 77777777, then LGE results with a word containing all ones.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
002033		Bit failed.	Display A to identify bit that failed.
	(6) *LGA Instruction Check.* (*a*) LGA a word containing 40000000 with A = 0.		
002056		Bit 00 failed.	
	(*b*) LGA a word containing 40000000 with A = 40000000.		
002061		Bit 00 failed.	
	(*c*) LGA a word containing all zeros wit A = 77777777, then LGE the results with a word containing all ones.		
002066		Bit failed.	Display A to determine bit that failed.
	(*d*) LGA a word containing all ones with A = 0, then LGE the results with a word containing all ones.		
002073		Bit failed.	Display A to determine bit that failed.
	(*e*) LGA a word containing 25252525 with A = 52525252, then LGE results with a word containing all ones.		
002100		Bit failed.	Display A to determine bit that failed.
	(*f*) LGA a word containing 52525252 with A = 25252525, then LGE results with a word containing all ones.		
002105		Bit failed.	Display A to determine bit that failed.
	(*g*) LGA a word containing 2525252 with A = 0, then LGE results with a word containing 52525252.		
002112		Bit failed.	Display A to determine bit that failed.
	(*h*) LGA a word containing 25252525 with A = 0, then LGE results with a word containing 25252525.		
002117		Bit ailed.	Display A to determine bit that failed.
	(7) *TRP Instruction Check.* (*a*) CLA a word containing all ones then execute TRP.		
002123		TRP succeeded with A00 = 1.	Display A for A00 = 1.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*b*) CLA a word containing all zeros, then execute TRP.		
002126		TRP failed with A00 = 0.	Display A for A00 = 0.
	(8) *Register Check.* CLA each CPU register and check contents.		Display A to determine bits that failed.
		BR ≠ 0. Q ≠ 0. RTC ≠ 0. SBR ≠ 0. IAR ≠ 0. LSR ≠ 0. CPD incorrect. CPS incorrect.	
	(9) *STR Instruction Check, Part 1.* (*a*) STR a word containing all ones to location 001141. If transfer fails STR a word containing all ones to Q. If second STR fails, RPA a word containing all ones to Q.		
002226		STR To 001141 failed. STR to Q succeeded.	
002233		Both STR attempts failed. RPA succeeded.	
002234		All instructions failed.	
	(*b*) If STR to 1141 succeeded, test high order bits (00-08). LGM the contents of location 1141 with a word containing 77700000.		
002237		Bit 00 failed.	
002242		Bit (from 01-081 failed.	Display A to determine bit (01-08) that failed.
	(*c*) If high order bit test succeeds test low order bits (09-23). LGM the contents of location 001141 with a word containing 00077777. If transfer failed RPA a word containing all ones to location 001141.		
002253		STR to 001141 failed. RPA succeeded.	Display A to determine bit (09-23) that failed.
002254		STR and RPA failed to load low order bits (09-23) in location 001141.	
	(10) *RPA/STA Instruction Check.* (*a*) RPA a word containing 00077777 to location 001141.		
002263		RPA failed.	

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*b*) RPA a word containing all ones to location 001141.		
002272		Bit 00 was changed during RPA.	
002275		Bits 01-08 were changed during RPA.	
	(*c*) STA a word containing all ones to location 001141.		
002304		Bits 00-08 failed to clear on STA instruction.	Display A to determine bits that failed.
	(11) *STR Instruction Check Part 2.* (*a*) STR a word containing all ones in location 001141. If transfer fails STR to Q. If STR to location 001141 fails and STR to Q succeeds load contents of location 001141 in A.		
002322		Both instructions failed.	
002324		STR to location 001141 Failed. STR to Q succeeded.	Display A to determine bit(s) that failed.
	(*b*) STR a word containing all zeros in location 001141.		
002333		STR failed.	Display A to determine bits that failed.
	(12) *Memory Check, Addresses 003561 to 006500*. (*a*) Each memory location tested has its address written into it. Each location is then read to verify the contents.		
002406		Defective location was found.	Display A for address of defective location. Note A00 = 1.
	(*b*) When testing is resumed, the program will halt when the next highest good location is found.		
002424		First good location after BB470 halt. Note A00 = 0.	Display A for address of first good location found since last BB470 halt.
	(*c*) When testing is resumed, the program will halt when the next highest defective location found (BB470 halt). Alternate halts for defective and nondefective locations continues until location 006500 is checked. (*d*) Each memory location has the compliment of its address written into it. Each location is then read to verify the contents.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
002302		Defective location was found.	Display A for address of first good location. Note A00 = 1.
	(*e*) When testing is resumed, the program will halt when the next highest good location is found.		
002521		First good location found after (BB490) halt.	Display A for address of first good location found after last BB490 halt. Note A00 = 0.
	(*f*) When testing is resumed, the program will halt when the next highest defective location is found. (BB490 halt). Alternate halts for defective and non-defective location continue until location 006500 is checked.		
002536		Errors were found during memory test. These tests must run error free before further tests can be made.	
002537		Memory test successfully completed. Load remainder of bootstrap test.	

c. Section III

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(1) *Register Gating Checks.* (*a*) STR a word containing all ones to A. A check is made to insure Q gating was not enabled.		
004134		STR to A also enabled Q gates.	
	(*b*) STR a word containing all ones to Q. Check is made of remaining registers to determine if any other gates were enabled.		
004142		BR gates enabled.	Display BR.
004145		ETC gates enabled.	Display RTC.
004152		SBR gates enabled.	Display SBR.
004157		IAR gates enabled.	Display IAR.
004164		OAR gates enabled.	Display OAR.
004170		LSR gates enabled.	Display LSR.
004175		CPS gates enabled.	Display CPS.
004202		CPD gates enabled.	Display CPD.
	(*c*) STR a word containing all ones to OAR. A check is made of remaining registers to determine if any other gates were enabled.		
004211		BR gates enabled.	Display BR.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
004215		RTC gates enabled.	Display RTC.
004221		SBR gates enabled.	Display SBR.
004226		JAR gates enabled.	Display JAR.
004232		Q gates enabled.	Display Q.
004236		LSR gates enabled.	Display LSR.
004243		CPS gates enabled.	Display CPS.
004250		CPD gates enabled.	Display CPD.
	(*d*) CLA a word containing all on from A. If transfer fails, CLA 77777777 from OAR. If this transfer succeeds CLA a word containing 77777777 from Q.		
004262		CLA from A and OAR both failed.	
004272		CLA from A failed. CLA from OAR succeeded. CLA from Q failed.	
004273		CLA from A failed. CLA from OAR and Q both succeeded.	
	(*e*) CLA WORD SWITCH REGISTER check for all ones or all zeros.		
004277		WORD SWITCH REGISTER not all ones.	Set WORD SWITCH REGISTER to all ones or all zeros.
004304		WORD SWITCH REGISTER not all zeros.	Press NORMAL HALT then INITIATE.
	(*f*) STR a word contains 37777777 to CPD. Check if transfer fails CLA a word containing all on from OAR. If STR to CPD succeeds, check status of bit 00 on CLA from CPD.		
004314		STR to CPD failed. CLA from OAR succeeded.	
004315		Both instructions failed.	
004322		Bit 00 picked up on STR to CPD.	
	(*g*) STR a word containing 40000000 to CPD.		
004331		Bit 00 lost or bit picked up on STR to CPD.	
	(*h*) STR a word containing all ones to Q. If transfer fails, LDQ with a memory location containing all ones.		
004342		STR to Q failed. LDQ succeeded.	
004343		Both instructions failed.	
004347		Bit failed in STR to Q.	Display A to determine bit that failed.
	(i) STR a word containing all zeros to Q.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
004354	(*j*) STR a word containing 37777777 to CPS.	Bit in Q cannot be cleared.	Display A to determine bit that failed.
004364		Bit lost in STR to CPS.	Display A to determine bit that failed. (Lost bit = 1.)
004372	STR a word containing all zeros to CPS. (*k*) STR a word containing 77777660 to RTC. If transfer fails CLA from PC.	Bit failed to clear in CPS.	Display A to determine bit that failed.
004403		STR to RTC failed. CLA from PC succeeded.	Display A to determine contents of RTC.
004404		Both instructions failed.	
004407		Bit failed on STR to RTC.	Display A to determine bit that failed.
	(2) *Interrupt Checks.* (*a*) STR a word containing 20000000 to CPS. STR a word containing 60000000 to CPD. Check for interrupt.		
004425		Bus 01 failed to interrupt.	
004431		Incorrect PC stored on interrupt.	Display location 0001042 to determine PC contents stored in interrupt.
	(*b*) STR a word containing 10000000 to CPS. STR a word containing 50000000 to CPD. Check for interrupt.		
004445		Bus 02 failed to interrupt.	
	(*c*) STR a word containing 04000000 to CPS. STR a word containing 44000000 to CPD. Check for interrupt.		
004460		Bus 03 failed to interrupt.	
	(*d*) STR a word containing 02000000 to CPS. STR a word containing 42000000 to CPD. Check for interrupt.		
004473		Bus 04 failed to interrupt.	
	(*e*) STR a word containing 01000000 to CPS. STR a word containing 41000000 to CPD. Check for interrupt.		
004506		Bus 05 failed to interrupt	

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*f*) STR a word containing 00400000 to CPS. STR a word containing 40400000 to CPD. Check for interrupt		
004521		Bus 06 failed to interrupt.	
	(*g*) STR a word containing 0020000 to CPS. STR a word containing 40200000 to CPD. Check for interrupt.		
004534		Bus 07 failed to interrupt.	
	(*h*) STR a word containing 00100000 to CPS. STR a word containing 40100000 to CPD. Check for interrupt.		
004547		Bus 08 failed to interrupt.	
	(*i*) STR a word containing 00040000 to CPS. STR a word containing 40040000 to CPD. Check for interrupt.		
004562		Bus 09 failed so interrupt.	
	(*j*) STR a word containing 00020000 to CPS. STR a word containing 40020000 to CPD. Check for interrupt.		
004575		Bus 10 failed to Interrupt.	
	(*k*) STR a word containing 00010000 to CPS. STR a word containing 40010000 to CPD. Check for interrupt.		
004610		Bus 11 failed to interrupt.	
	(*l*) STR a word containing 00000200 to CPS. STR a word containing 40000200 to CPD. Check for interrupt.		
004623		Bus 16 failed to interrupt.	
004627		CPD 00 failed to reset alter Interrupt occurred.	
	(*m*) Attempt to execute an illegal instruction - 11004637. Check for interrupt.		
004637		Interrupt failed.	
004651		Incorrect CPS bit set for illegal instruction interrupt.	Display A to determine bit set.
	(3) *Interrupt Errors.* One of following halts occurs during normal testing.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
004673		Instruction parity error occurred.	IPE is printed. Display A for address of instruction causing error.
004712		Date parity error occurred.	DPE is printed.
004737		Illegal instruction was decoded.	ILI is printed. Display A for address of instruction causing error.
004756		Remote teletype interrupt occurred.	IO is printed.
004772		Memory protect violation occurred.	CXR is printed. Display A for address violated.
005015		Control transfer initiated.	CXR is printed.
005030		Spare teletype interrupt occurred.	RTC is printed.
005032		Interrupt occurred from unknown source.	Display A for PC contents at time of interrupt.
005045		Program should resume after halt. Failure indicates halt interrupt did not occur.	
005056		Unintentioned halt interrupt occurred.	Display A for PC contents at time of interrupt.
005063		CPD 09 not set. Program halt failed.	IO CHECK is printed.
005101		Timeout interrupt failed when nonexistent device is addressed.	
	(4) *Real Time Clock Checks.*		
005173		RTC Is running with REAL TIME CLOCK switch set to DISABLE.	
005122	Program halt. Set PARITY ERROR HALT switch to OFF, set REAL TIME CLOCK switch to ENABLE.		
005202		RTC overflow occurs too quietly.	
005205		RTC was not reset on overflow.	
005221		RTC operating excessively fast.	
005231		RTC operating fast.	
005255		RTC overflow interrupt failed or RTC running slightly slow.	
	(5) *Memory Check Locations 00000-003561 and 006500-37737.* (*a*) Each memory location tested has its address written into it. Each location is then read to verify the contents		
005322		Interrupt location (001043) written into. Display A to determine actual contents of location 001043.	Location 001043 should contain 22004660 (INIT).
005351		Defective memory location found.	Display A for address of defective location. Note A00 =1. To loop on defective location press NORMAL HALT then INITIATE.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*b*) When testing is resumed the program will halt when the next highest god location is found.		
005371		First good location after BC680 halt.	Display A for address of first good location found since last BC680 halt. Note A00 = 0.
	(*c*) When testing is resumed, the program will halt at the next highest defective location (BC680 halt). Alternate halts for defective and non-defective locations continue until location 37737 is checked. (*d*) Each memory location has the complement of its address written into it. Each location is then read to verify the contents.		
005521		Interrupt location (001043) written into.	Location 001043 should contain 22004660 (INT). Display A to determine actual contents of 001043.
005554		Defective memory location found.	Display A for address of defective location. Note A00 = 1. To loop on defective location press NORMAL HALT, then INITIATE.
	(*e*) When testing is resumed the program will halt when the next highest good location is found.		
005575		First good location after BC710 halt.	Display A for address of first good location found since last BC680 halt. Note A00 = 0.
	(*f*) When testing is resumed, the program will halt at the next highest defective location (BC710 halt). Alternate halts for defective and non-defective locations continues until location 37737 is checked. (6) *Index Register Checks.* (*a*) Set BR to all ones. Check.		
005737		BR failed to set.	Display A to determine bit that failed. (failed bit = 1.)
	(*b*) Reset BR.		
005743		BR bit failed to reset.	Display A to determine bit that failed.
	(*c*) CLA IR1 in bank 001.		
005747		Wrong memory location read. (Should have read location 000000.)	Display A for address of location read.
	(*d*) CLA BRL 3 in bank 00.		
005754		Wrong memory location read. (Should have read location 0000007)	Display A for number of memory locations displaced.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*e*) Set BR to all ones. CLA IR1 in bank 77.		
005763		Wrong memory location read. (Should have read location 000770.)	Display A for number of memory locations displaced.
	(*f*) CLA BRL3 in bank 77.		
005770		Wrong memory location read. (Should have read location 000777.)	Display A for number of memory locations displaced.
	(*g*) STR a word containing 70705010 to IR1, bank 77. CLA location 000770. LGE with a word containing 00005010.		
006003		Bit other an address written to IR1.	Display A for bit picked up.
006004		Only sign bit and address written to IR1.	
	(*h*) STR a word containing 14500023 n BRL3 in bank 77. CLA location 00000777. LGE with a word containing 14500023.		
006017		Sign bit failed to clear.	Display A to determine if additional bits failed to clear.
006020		Bit other than sign failed to clear.	Display A to determine bit that failed to clear.
	(7) *Register Transfer Checks.* (*a*) STR award containing 00077777 to SBR. Check results.		
006027		No ones transferred to SBR.	
006027		One or more bit failed.	Display A to determine bits that failed. (Failed bit = 1.)
	(*b*) STR a word containing all zeros to SBR. Check results.		
006037		Bit failed to clear in SBR.	Display A to determine bit that failed.
	(*c*) CLA the OAR, LGE was a word containing 03707777.		
006043		STR failed during test (1) (*b*.)	Display A to determine bit that failed.
	(*d*) STR a word containing all zeros to OAR. LGM a word containing 7767777 with new contents of OAR.		
006051		Bit in OAR failed to clear.	Display A to determine bit that failed
	(*e*) CLA the PC. LGE a word confining 00006052 with PC.		
006055		PC transfer failed.	Display A to determine bit that failed.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*j*) STR a word containing 00077777 IAR. LGE a word containing 03707777 with new contents d IAR.		
006064		Bit picked up or dropped in STR to IAR.	Display A to determine bit failed.
	(*g*) STR a word containing all zeros to IAR. Check.		
006073		Bit in IAR failed to clear.	Display A to determine bit that failed.
	STR a word containing all ones to LSR. LGE a word containing 01000077 with new contents of LSR.		
006102		Bit in LSR failed to set.	Display A to determine bit that failed. (failed bit = 1.)
	STR a word containing all zeros to LSR. Check.		
006107		Bit in LSR failed to clear.	Display A to determine bit that failed.
	(8) *Indirect Addressing Check.* CLA with indirect addressing - check.		
006113		Indirect addressing failed.	
	(9) *Indexing Checks.* (*a*) Clear BR. STR a word containing all ones to IR1, IR2, IR3 and IR4 in bank 00. CLA each index register and verify contents.		
006174		Bit in IR1 failed to set.	Display A to determine hit that failed. (bit failed =-1.)
006200		Bit in IR2 failed to set.	Display A to determine hit that failed. (bit failed = 1.)
006204		Bit in IR3 failed to set.	Display A to determine bit that failed. (bit failed = 1.)
006210		Bit in IR4 fail to set.	Display A to determine bit that failed. (bit failed = 1.)
	(*b*) STR a word containing all zeros to IR1, IR2, 1R3 and IR4 in bank 00. CLA each index register and verify contents.		
006222		Bit in IR1 failed to clear.	Display A to determine bit that failed.
006226		Bit in IR2 failed to clear.	Display A to determine bit that failed.
006232		Bit in IR3 failed to clear.	Display A to determine bit that failed.
006236		Bit in IR4 failed to clear.	Display A to determine bit that failed.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(*c*) Clear BR. STR a word containing all zeros in IR1 bank 00. CLA indexing unit IR1 bank 00.		
006123		Indexing failed.	Display A for number of memory locations displaced.
	(*d*) STR a word containing 00000001 to IR1 bank 00. Set BR to 77. STR a word containing all zeros to IR1 bank 77. CLA location 3771 indexed by IR1. LGE with location 3771 direct addresses (Location 003771 = 00000001).		
006135		Address indexed by wrong IR.	Exclusive OR contents of A with 00000001 to determine contents of memory location actually accessed.
	(*a*) STR a word containing all zeros to IR4. STR a word containing 00000001 to IR1. STR a word containing 00000002 to IR2. STR a word containing 00000003 to IR3. CLA location 3771 indexed by IR4.		
006153 006157 006158		Resulted in indexing by IR1, IR2 or IR3.	Exclusive OR contents of A with 00000002 to determine contents of memory location actually accessed.
	(10) *Index Register Store Checks.* STR a word of all ones to locations to assigned IR1, IR2, IR3, and IR4. After the contents of each index register with an STR to IR.		
006251	STR a word containing 00040000 to IR1. Check.	Bit(s) in IR1 failed to clear.	Display A for bit that failed. (failed bit = 1.)
006257	STR a word containing 00040001 to IR2. Check.	Bit(s) in IR2 failed to clear.	Display A for bit that failed. (failed bit = 1.)
006265	STR a word containing 00040002 to IR3. Check.	Bit(s) in IR3 failed to clear.	Display A for bits that failed. (failed bit = 1.)
006273	STR a word containing 00040003.	Bit(s) in IR4 failed to clear.	Display A for bit that failed. (failed bit = 1.)
	(11) *Index Register Access Checks.* (*a*) CLA location 37740 (IR1), 37741 (IR2), 37742 (IR3) and 37743 (1R3) indexed by IR1.		
006300		IR1 not accessed. IR1 = 00040000.)	Exclusive OR contents of A with 00040004 to determine contents of location actually accessed.
006304		IR2 not accessed. (IR2 = 00040001.)	Exclusive OR contents of A with 0040001 to determine contents of location actively accessed.

Halt Location	*Test Description*	*Test Result*	*Further Checks*
006310		IR3 not accessed. (IR3 = 00040002.)	Exclusive OR contents of A with 00040002 to determine contents of location actually accessed.
006314		IR4 not accessed. (IR4 = 00040003.)	Exclusive OR contents of A with 00040003 to determine contents of location actually accessed.
	(*b*) CLA location 37140 (IR1) indexed by IR1, IR2, IR3 and IR4.		
006320		IR1 not accessed.	Exclusive OR contents of A with 00040000 to determine contents of address actually accessed.
006324		IR2 not accessed.	Exclusive OR contents of A with 00040001 to determine contents of location actually accessed.
006352		IR3 not accessed.	Exclusive OR contents of A with 00040002 to determine contents of location actually accessed.
006334		IR4 not accessed.	Exclusive OR contents of A with 00040003 to determine contents of location actually accessed.
	{12) *Adders Checks* (*a*) STR a word containing 00025252 to IR1. CLA to location 012525 indexed by IR1. Check.		
006344		Failed to address location 077777.	Exclusive OR contents of A with 14500023 to determine contents of location actually accessed.
	(*b*) STR a word containing 00012525 to IR1. CLA to location 025252 indexed by IR1. Check.		
006352		Failed to address location 077777.	Exclusive OR contents of A with 14500013 to determine contents of location actually accessed.
	(*c*) CLA location 012525 indexed by IR1.		
006360		Failed to address location 025252.	Exclusive OR contents of A with 00400000 to determine contents of location actually accessed.
	(*d*) STR a word containing 0015252 to IR1. CLA to location 15252 indexed by IR1.		
006370		Failed address location 032524.	Exclusive OR contents of A with 145000213 to determine contents of location actually accessed.
	(*e*) Set BR to 77. STR a word containing 00077777 to IR1. CLA location 000001 indexed by IR1.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
006402		Failed to address location 000000.	Exclusive OR contents of A with 00400000 to determine contents of location actually accessed.
	(*f*) STR a word containing 00000001 to IR4. CLA location 06401 indexed by IR4 with indirect addressing.		
006410		Failed to address location 06377.	Exclusive OR contents of A with 55400001 to determine contents of location actually accessed.
	(13) *EOAX Register Checks.* (*a*) STR a word containing 00006414 to PEX.		
006413		STR to PEX failed.	Display PEX to determine bit that failed.
	(*b*) LGM a word containing 00300000 wit PCS.		
006417		EOAX bits not reset.	
	(*c*)STR 00106423 to PEX.		
006422		PC transfer failed.	
	(*d*) LGE the PEX with a word containing 00106423.		
006426		EOAX bit 1 failed to set.	
	(*e*) STR 00206432 to PEX.		
006431		PC transfer failed.	
	(*f*) LGE the PEX with a word containing 002006432.		
006435		EOAX bit 2 failed to set.	
	(*g*) STR 00306441 to PEX.		
006440		PC transfer failed.	
	(*h*) LGE the PEX with a word containing 00306441.		
006444		EOAX bit 1 or 2 failed to set.	Display A to determine bit that failed (failed bit = 1).
	(*i*) STR 00006450 to PEX.		
000447		PC transfer failed.	
006460		PC overflow failed.	
	(14) *Indirect Addressing Checks.* (*a*) STR a word containing 22006506 in location 37703 page 1. Using indirect addressing, STR a word containing 22006510 in location. 37704 page 1 using indirect addressing. (*b*) CLA location 37703 page 2 using indirect addressing.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
006476		Indirect addressing failed.	Display A for contents of location actually accessed.
	(*c*) CLA location 33704 page 2 using indirect addressing.		
006503		Indirect addressing failed.	Display A for contents of location actually accessed.
	(*d*) TRU to location 37703 page 1.		
006505		Indirect transfer to page 1 failed.	
	(*e*) TRU to location 37704 page 2.		
006507		Indirect transfer to page 1 failed.	
	(*f*) CLA location 000000 using indirect indexed addressing.		
006514		Indirect Indexing failed.	Display A for contents of location actually accessed.
	(*g*) STR 00007777 to IR4. STR 00100000 to location-020000. STR 22000305 to location 00160000 using Indirect addressing. TRU to location 020000 using indexed addressing.		
	(*h*) STR a word in location 020000 page 0. CLA a word from location 020000 with page bit (bit 09) set.	TRU indexed indirect failed.	
006535		Failed to access location 020000 page 0.	Exclusive OR contents of A with 22000532 to determine contents of location actually accessed.
	(*i*) STR to location 020000 page 0. CL.A to location 020000 page 2 with page bit (bit 09) = 0.		
006545		Page bit control failed.	Exclusive OR contents of A with 00277704 to determine contents of location actually accessed.
006547	End of test.		

d. *Miscellaneous Halts.*

Halt Location	*Test Description*	*Test Result*	*Further Checks*
	(1) *Memory Error Halts.* The following halts should not be encountered during the bootstrap and memory off-line diagnostic test.		

Halt Location	*Test Description*	*Test Result*	*Further Checks*
005700		This halt can be encountered only as a result of attempts to continue testing after a BC740 or BC750 halt.	REDO BASIC MEM is printed.
005714		This halt can be encountered only as a result of attempts to continue testing after one or more BC680 or BC710 halts.	CALL IN MAIN MEM TEST is printed.
005713		Incorrect status received from local page printer when attempting BC740 printout.	
005730		This halt can be encountered only as a result of attempts to continue testing after one or more BC680 or BC710 halts.	CALL IN MAIN MEM TEST is printed.
005727		Incorrect status received from local page printer when attempting BC750 printout.	
	(2) *Transfer Error Halts.*		
377700		TRN occurred with A = 00000000.	
377701		TRP occurred with A = 7777777.	
377702		TRZ occurred with A = 7777777.	
	(3) *Print Routine Halts.*		
006607	Read status and set BB.		
006617	Write character.		
006621	Read status.		
006666	Write status.		

EXHIBIT H

MEMORY-TO-MEMORY DIAGNOSTIC PROGRAM

Section I. GENERAL

The Memory-to-Memory diagnostic program is used to test the logic circuits and functions associated with the transfer of information from one processor to the other and to verify the proper operation of the control transfer logic. The particular tests in the Memory-to-Memory diagnostic program proceed along a path of increasing usage of mechanization and logic associated with the memory-to-memory transfer operation which is the receipt and transmission of data and status information between processors.

The diagnostic program consists of two sections; one of which is loaded into the "transmitting processor" and the other section is loaded into the "receiving processor." The "transmitting processor" contains the interrupt processor routine, the teletype print routine, the memory-to-memory test routine, the transfer control routine, and the idle routine. The "receiving processor" contains routines to read the data transmitted by the *active processor* routines to return the data, control transfer interface routines, an interrupt processor control routine and an error printout routine.

Section II. DIAGNOSTIC PROGRAM

THE FOLLOWING PROCEDURES ARE USED TO CONVERT
THE OPERATIONAL PRELOADER PROGRAM TO THE
OFF-LINE DIAGNOSTIC PRELOADER PROGRAM

1. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
2. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
3. Set the WSR toggle switches to 00277750.
4. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
5. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
6. Set the WSR toggle switches to 55137754.
7. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions *must be loaded into memory before proceeding*. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 42 below.
8. Set the MEMORY guarded switch to the UNPROTECTED position.
9. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
10. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
11. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
12. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
13. Press the CLEAR pushbutton switch.
14. Set the WSR toggle switches to 00277750.

15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQ1 and the REGISTER SELECT to MEM.
17. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
19. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
20. Set the WSR toggle switches to 00277750.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.

Preloader Instructions Chart

Address	*Instruction*
00277750	01077751
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	02000040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62501776 (62500476)
00277773	72100001
00277774	74100107 (74100235)
00277775	22077756
00277776	00000000

22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 55137754.
24. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the *correct address*.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the *correct instruction number*.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.

g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
26. Set the MEMORY guarded switch to the UNPROTECTED position.
27. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
28. Set the ASR toggle switches to 277772.
29. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
30. Set the WSR toggle switches to 62400476.
31. Set the OPERATIONAL CONTROL rotary switch to STORE.
32. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
33. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
34. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
35. Set the ASR toggle switches to 277774.
36. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
37. Set the WSR toggle switches to 74100235.
38. Set the OPERATIONAL CONTROL rotary switch and observe that the BUS INDICATOR displays a reading of 74100235.
40. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
41. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD
THE OFF-LINE DIAGNOSTIC LOADER PROGRAM
INTO MEMORY

42. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
44. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
45. Press the system status panel RESET pushbutton switch several times and observe that the loader tape moves.
46. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
47. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
48. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
49. Set the WSR toggle switches to 00277750.
50. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
51. Set the OPERATIONAL CONTROL rotary switch to CMPT.
52. Set the RUN/ONE INSTR toggle switch to RUN.
53. Press the INITIATE pushbutton switch an observe that:
    a. Off-line diagnostic loader tape strip loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
54. Rewind the loader tape by setting the system status panel TAPE READER REWIND toggle switch to ON.

NOTE

The procedures outlined in steps 1 through 54 above must be repeated on the other processor, using the other Maintenance Control Panel.

65. Set the PARITY ERROR HALT toggle switch to OFF.
56. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
57. Set the ADV-RPT toggle switch to ADV.
58. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
59. Verify that the REGISTER SELECT rotary switch is set to PEX.
60. Set the CONTROL TRANSFER toggle switch to DISABLE.
61. Set the printer motor control BYPASS toggle switch to BYPASS.
62. Set the MEMORY guarded switch to the PROTECTED position.

THE FOLLOWING PROCEDURES LOAD THE
DIAGNOSTIC PROGRAM INTO MEMORY

63. Load the Memory (SM-D-751716) and Memory-to-Memory and Control XFR (SM-D-751717) diagnostic program tapes on the paper tape reader.
64. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
65. Press the NORMAL HALT pushbutton switch and observe that the PRGM HALT indicator extinguishes and the PRCS HALT indicator illuminates.
66. Set the OPERATIONAL CONTROL rotary switch to STORE.
67. Set the WSR toggle switches to 00000500.
68. Press the INITIATE pushbutton switch and observe the BUS INDICATOR displays a reading of 00000600.
69. Press the system status panel RESET pushbutton switch and observe that the diagnostic tape moves.
70. Set the OPERATIONAL CONTROL rotary switch to CMPT.
71. Set the RUN/ONE INSTR toggle switch to RUN.
72. Press the INITIATE pushbutton switch and observe that:
    a. Diagnostic tape begins to load into memory.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 0000631.
73. Press the INITIATE pushbutton switch twice more to load-in all three segments of the Memory-to-Memory diagnostic program and observe that the same indications observed in step 72 above are obtained.
74. Repeat the procedures outlined in steps 63 through 73 above on the other processor, using the other Maintenance Control Panel.

THE FOLLOWING PROCEDURES ARE USED TO
SELECT THE TRANSMITTING (PROCESSOR A)
AND THE RECEIVING PROCESSOR (PROCESSOR B)

75. Set the REGISTER SELECT rotary switch to CPS on both processors.
    a. If the desired processor to be selected as the transmitting processor has its CPS Bit 23 set (BUS INDICATOR bit 23 is illuminated), press the CONTROL TRANSFER MANUAL pushbutton switch twice and observe that the BUS INDICATOR bit extinguishes and then illuminates.
    b. If the desired processor to be selected as the transmitting processor (processor A) does not have is CPS bit 23 set (BUS INDICATOR bit 23 is illuminated), press the CONTROL TRANSFER MANUAL pushbutton switch three times and observe that the bit illuminates, extinguishes, and then illuminates again.

NOTE

By pressing the CONTROL TRANSFER MANUAL pushbutton more than once it verifies that the transfer tree is in its initial state. The reader Is cautioned to remember which processor is "A" (CPS bit 23-1) and which processor is "B" (CPS bit 23-0) throughout the remainder of the test.

THE FOLLOWING PROCEDURES ARE USED TO
START THE OFF-LINE DIAGNOSTIC PROGRAM

76. Set both REGISTER SELECT rotary switches to PEX.
77. Press both NORMAL HALT pushbutton switches and observe that both PRGM HALT indicators illuminate.
78. Press both CLEAR pushbutton switches.
79. Set both OPERATIONAL CONTROL rotary switches to STORE.
80. Set the WSR toggle switches to 00010000 on the transmit processor (A) and to 00015600 on the receive processor (B).
81. Press the INITIATE pushbutton switch on transmit processor (A) and observe that the BUS INDICATOR displays a reading of 00010000.
82. Press the INITIATE pushbutton switch on receive processor (B) and observe that BUS INDICATOR displays a reading of 00015000.
83. Set the system status panel RESET SELECT LOCAL PRINTER toggle switch to ON and press the RESET pushbutton switch.
84. Set the WSR toggle switches to all zeros on both panels.
85. Set both OPERATIONAL CONTROL rotary switches to CMPT.
86. Set the system status panel RESET SELECT MEM/MEM toggle switch to ON and press the RESET pushbutton several times.
87. Press the INITIATE pushbutton switch on both processors and observe that:
    a. Both PRGM HALT Indicators illuminate.
    b. Transmit processor (A) BUS INDICATOR displays a reading of 00010015.
    c. Receive processor (B) BUS INDICATOR displays a reading of 00015015.
    d. MM TEST PROCA message is generated on page printer from transmit processor.
    e. REC CP RDY message is generated on page printer from receiving processor.
88. To successfully execute the following procedure, *the specified actions must be performed within 5 seconds of the PRGM HALT indicator illuminating with the stated BUS INDICATOR displays*.

BUS INDICATOR	Operator action	Processor action
00010015	Press INITIATE pushbutton on (A).	Starts test.
00015015	Press INITIATE pushbutton on (B).	Starts test.
00000017	Set CONTROL TRANSFER AUTO toggle switch to ENABLE.	Control transfer to (B) and then back to (A).
00000022	Set CONTROL TRANSFER AUTO toggle switch to DISABLE and press CONTROL TRANSFER MANUAL pushbutton switch.	Control transfers to (B).
00000023	Press CONTROL TRANSFER MANUAL pushbutton switch.	Control transfers to (A).

89. Observe that both PRGM HALT Indicators illuminate and the transmitting processor (A) BUS INDICATOR displays a reading of 00013300 and the receiver processor (B) BUS INDICATOR displays 00016251.

Section III. ERROR PRINTOUTS

Printout	Test description	Error vector XX =	Error	Logic associated with failure	Suggested further checks and remarks
1. CT01-XX	Instruction: (Processor A) SL1 STR (CPS)	01	CPS 08 failed to reset.		
	Logic tested: (Processor A) KL counter CPS register	02	CPS 11 is set.		Should be set only when control transfer is in progress.
	Initial conditions: (Processor A) (A) = 00000000	03	CPS 22 not set.		Check CPS 08 in processor B. CPS22 is reflection of CPS in alternate processor.
	CONTROL TRANSFER AUTO set to DISABLE	04	CPS 23 not set.		
	Correct answer: (Processor A) (CPS) = 00000003				
2. CT04-XX	Instruction: (Processor A) STR (CPS)	01	Interrupt failed to occur.		
	Logic tested: (Processor A) Interrupt logic	02	CPS 11 failed to reset after interrupt.		
	CPS register CPS register	03	CPS 23 reset as a result of interrupt.		
	Initial conditions: (Processor A) CPS 08 = 0 CPS 08 = 0				
	CONTROL TRANSFER AUTO set to DISABLE				
	Correct answer: Interrupt occurs and program interrupt routine is entered.				
3. CT01-XX	Instruction: (Processor A) SL1 STR (CPS)	01	CPA 08 failed to reset.		
	Logic tested: (Processor A) KL counter	02	CPS 11 is set.		Should be set only when control transfer is in progress.
	CPS register	03	CPS 22 not set		
	Initial conditions: (Processor A) (A) = 00000000	04	CPS 23 not set.		Check CPS 08 in processor B. CPS22 is reflection of CPS 98 in alternate processor.
	CONTROL TRANSFER AUTO set to DISABLE				
	Correct answer: (Processor A) (CPS) = 00000003				
4. CT04-XX	Instruction: (Processor A) STR (CPS)	01	Interrupt failed to occur.		
	Logic tested: (Processor A) Interrupt logic	02	CPS 11 failed to reset after interrupt.		

Printout	Test description	Error vector XX =	Error	Logic associated with failure	Suggested further checks and remarks
	CPS register CPD register Initial conditions: (Processor A) CPS 08 = 0 CPD 08 = 0 CONTROL TRANSFER AUTO set to DISABLE Correct answer: Interrupt occurs and program interrupt routine is entered.	03	CPS 23 reset as a result of interrupt.		

Section IV. TROUBLESHOOTING CHART

Malfunction	Probable cause	Corrective action
MMDR-01 (reported by Processor B)	Data received by processor B differs from data expected. Data expected was 377, 252, 125 and 000 in that order.	Replace following cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS1
MMDR-76 (reported by Processor B)	Processor A failed to send character to buffer register.	Replace MOS2 card. Repeat test.
MMMT14-XX	Attempt to send a block of data containing 22 transmissions of 377, 252, 125 and 00. How processor A to processor B failed.	Refer to XX condition.
a. Where XX is 74 or 75.	*a.* Processor B failed to accept data.	*a.* Replace MOS2 card. Repeat test.
b. Where XX is 76.	*b.* Processor B failed to return data.	*b.* Replace MOS2 card. Repeat test.
c. Where XX is 77.	*c.* Data returned from processor B differs from data sent by processor A.	*c.* Replace following cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS1
MMBL-XX (reported by Processor B)	Attempt by processor B to receive and return a block of data containing 22 transmissions of 377, 252, 125 and 000 failed.	Refer to XX condition.
a. Where XX is 74.	*a.* Processor A did not accept returned data.	*a.* Replace MOS2 card. Repeat test.
b. Where XX is 76.	*b.* Processor A failed to send data.	*b.* Replace MOS2 card. Repeat test.
c. Where XX is 77.	*c.* Data received by processor B differs from data expected.	*c.* Replace following cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS1
While running control transfer test, any of following printouts may occur prior to END OF CLT XFR TEST printout.		**NOTE** **Cards located in synchronizer A16.**
a. CT01-XX where XX is 01 through 04.	*a.* Processor A control transfer logic defective.	*a.* Refer malfunction to higher category maintenance.
b. CT01-05	*b.* Alarm register circuits defective.	*b.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Remove I/O inhibit alarm. (*a*) Alarm latch. (*b*) Alarm gate. (*c*) Bus drivers. (2) Line load set alarm. (*a*) Alarm latch. (*b*) Alarm gate. (*c*) Bus drivers.
c. CT02-XX where XX is 01 through 05.	*c.* Control transfer logic processor A failed during automatic control transfer processor A to processor B.	*c.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
d. CR02-06	*d.* Alarm register	*d.* Replace following Remote I/O inhibit alarm cards in sequence. Repeat test after each replacement. (1) Alarm latch (2) Alarm gate (3) Bus drivers.

Malfunction	Probable cause	Corrective action
e. CT03-XX where XX is 06, 07, or 10.	*e.* Control transfer logic. Processor A failed during automatic control transfer processor B to processor A.	*e.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
f. CT03-11	*f.* Alarm register.	*f.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Line load set alarm. (*a*) Alarm latch (*b*) Alarm gate. (*c*) Bus drivers. (2) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate. (*c*) Bus drivers. (3) Spare alarm (*a*) A247 (*b*) A248 (*c*) A249 (*d*) A250
g. CT04-XX where XX is 01 through 03.	*g.* Processor A control transfer logic.	*g.* Refer malfunction to higher category maintenance.
h. CT04, 04	*h.* Alarm register.	*h.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Spare alarm. (*a*) A247 (*b*) A248 (*c*) A249 (*d*) A250 (2) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers (3) Line load set alarm (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers
i. CT04, 77	*i.* Automatic control transfer inhibit logic processor A.	*i.* Replace A222 card. Repeat test.
j. CT-5-XX where XX is 01 through 04.	*j.* Control transfer logic Processor A failed during manual control transfer processor A to processor B.	*j.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
k. CT05-05	*h.* Alarm register.	*k.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Line load set alarm. (*a*) Alarm latch. (*b*) Alarm gate. (*c*) Bus driver. (2) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus driver (3) Spare alarm (*a*) A247

Malfunction	Probable cause	Corrective action
		(*b*) A248 (*c*) A249 (*d*) A250
l. CT06-XX where XX is 06, 07, or 10.	*l.* Control transfer logic. Processor A failed during manual control transfer processor B to processor A.	*l.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
m. CT06-11	*m.* Alarm register.	*m.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus driver (2) Spare alarm (*a*) A247 (*b*) A248 (*c*) A249 (*d*) A250
n. CT07-XX where XX is 70 or 71. This printout occurs only when WORD SWITCH REGISTER bit 3 option is selected.	*n.* Control transfer logic processor A.	*n.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
o. MMAC-XX (reported by processor B where XX is 07, 10 or 11.	*o.* Control transfer logic processor B during automatic control transfer processor A to processor B.	*o.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
p. MMAC-12 (reported by processor B.	*p.* Alarm register.	*p.* Replace following remote I/O inhibit alarm cards in sequence. Repeat test after each replacement. (1) Alarm latch (2) Alarm gate (3) Bus drivers.
q. MMAC-XX (reported by processor B) where XX is 13 through 15.	*q.* Automatic control transfer inhibit logic processor B.	*q.* Replace A222. Repeat test.
r. MMAC-16 (reported by processor B).	*r.* Alarm register.	*r.* Replace following remote I/O inhibit alarm cards. Repeat test after each replacement. (1) Alarm latch (2) Alarm gate (3) Bus drivers
s. MMRC-XX (reported by processor B) where XX is 01 through 05.	*s.* Control transfer logic processor B during automatic control transfer processor B to processor A.	*s.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220
t. MMRC-06	*t.* Alarm register.	*t.* Replace following system alarm cards sequence. Repeat test after each replacement.

Malfunction	Probable cause	Corrective action
		(1) Line load set alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers (2) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers (3) Spare alarm (*a*) A247 (*b*) A248 (*c*) A249 (*d*) A250
u. MMC-XX (reported by processor B) where XX is 06, 07 0r 10.	*u.* Control transfer logic processor B during manual control transfer processor A to processor B.	*u.* Replace following cards in sequence. Repent test after each replacement. (1) A224. (2) A221 (3) A223 (4) A222
v. MMC-11 (reported by processor B).	*v.* Alarm register.	*v.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Line load set alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers (2) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers. (3) Spare alarm. (*a*) A247 (*b*) A248 (*c*) A249 (*d*) A250
w. MMRM-XX (reported by processor B) where XX is 01 through 04.	*w.* Control transfer logic processor B during manual control transfer processor B to processor A.	*w*. Replace following cards in sequence. Repeat test after each replacement. (1) A224. (2) A221 (3) A223 (4) A222 (5) A220
x. MMRM-05 (reported by processor B).	*x.* Alarm register.	*x.* Replace following system alarm cards in sequence. Repeat test after each replacement. (1) Remote I/O inhibit alarm. (*a*) Alarm latch (*b*) Alarm gate (*c*) Bus drivers (2) Spare alarm. (*a*) A247 (*b*) A248 (*c*) A249 (*d*) A250
y. MMAT-XX (reported by processor B) where XX is 70 or 71. This printout occurs only when WORD SWITCH REGISTER bit 3 option is selected.	*y.* Control transfer logic processor B.	*y.* Replace following cards in sequence. Repeat test after each replacement. (1) A224 (2) A221 (3) A223 (4) A222 (5) A220

EXHIBIT I

PAPER TAPE READER/PAPER TAPE PUNCH DIAGNOSTIC PROGRAM

Section I. GENERAL

This diagnostic program is used whenever data transfer problems are encountered with the Paper Tape Reader (PTR) or Paper Tape Punch (PTP) and is designed to check the functional operation of the processor-synchronizer and device synchronizer interface. The PRP/PTR diagnostic program is divided into manual and programmed tests. Since the testing of the Paper Tape Reader require paper punch test tapes, it is required that the paper tape punch portion of the diagnostic program be executed first.

The WSR toggle switch bit positions control the sequence of tests executed for the Paper Tape Reader and indicate the format of the data to be processed. The program reads the paper tape and examines each character read for validity and the timing of the data transfer is monitored to ensure the timing is within tolerance.

There are three (3) paper tape formats which are processed: Octal, ASCII, and Constant Value. If the Octal character is selected, the program generates 10 blocks of 100 characters each for a total of 1,000 characters. The block consists of the following data:

Block Number	*Data*
1	0
2	1
3	2
4	4
5	10
6	20
7	40
8	100
9	200
10	377

If the ASCII character is selected, the program generates 10 blocks of 128 characters. The 128 characters represent all possible combinations for ASCII. The characters are also displayed on the local page printer one block at a time. The tape can be prematurely terminated by setting the WSR toggle switch bit 13 to a 1. The ASCII character tape is used when executing the Paper Tape Reader test.

If the constant character is selected, WSR toggle switch bits 16 through 23 should specify the particular character. The program generates 100 characters per block and 25 blocks for a total of 2,500 characters before terminating by itself. The constant character tape is used in the timing section of the Paper Tape Reader test. To terminate prematurely, WSR toggle switch bit 13 should be set to a 1; the program will terminate after it has completed the block of 100 characters that it is presently processing.

A summary of the various formats is contained in the following chart:

	WSR Bits										
Format	13	14	15	16	17	18	19	20	21	22	23
Constant Character		1	0	(Data for Constant Character)							
ASCII		0	1								
Octal		0	0								
Invalid		1	1								
Terminate	1										

Section II. DIAGNOSTIC PROGRAM

1. Set the MEMORY guarded switch to the PROTECTED position.
2. Set the PARITY ERROR HALT toggle switch to OFF.
3. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
4. Set the ADV-RPT toggle switch to ADV.
5. Set the REAL TIME CLOCK guarded switch to the DISABLE position.
6. Set the CONTROL TRANSFER toggle switch to DISABLE.
7. Set the printer motor control BYPASS toggle switch to BYPASS.

THE FOLLOWING PROCEDURES LOAD THE TABLE
OF INSTRUCTIONS FOR EXERCISING THE PTP

8. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
9. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
10. Press the CLEAR pushbutton switch.
11. Set the WSR toggle switches to 00000776.
12. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
13. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000776.
14. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
15. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000776.
16. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
17. Set the WSR toggle switches to each of the instruction entries listed below and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.

Address	*Instructions*
00000776	01200420
00000777	00000000
00001000	01001001
00001001	00000400
00001002	05200020
00001003	24001005
00001004	22001000
00001005	55200XXX
00001006	60037757
00001007	01001010
00001010	00000414
00001011	22001000

NOTE

XXX is the octal equivalent of the character to be repeatedly punched on the test; e.g., XXX would be 125 for a 01, 010, 101 punched character pattern or 252 for a 10, 101,010 punched character pattern.

18. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
19. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX. Observe that the BUS INDICATOR displays a reading of 00001012.
20. Set the WSR toggle switches to 00000776.
21. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 00000776.

22. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
23. Set the WSR toggle switches to 56137754.
24. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified in step 17 above.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY the REGISTER SELECT to MEM.
b. Set the ASR toggle switches t the *correct address*.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the *correct instruction number*.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

25. Set the system status panel RESET SELECT TAPE PUNCH and TAPE READER toggle switches to ON.
26. Press the system status panel RESET pushbutton switch several times.

THE FOLLOWING PROCEDURES ARE USED TO
OBTAIN A LEADER ON THE PTP

27. Press the paper tape punch OFF pushbutton switch.
28. Set the LINE-OFF-LOCAL rotary switch to OFF.
29. Press the paper tape punch ON pushbutton switch and obtain approximately 1/2 foot leader.
30. Press the paper tape punch OFF pushbutton switch.
31. Set the LIN-OFF-LOCAL rotary switch to LINE.
32. Press the Paper tape punch ON pushbutton switch.
33. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX. Observe that the BUS INDICATOR displays a reading of 00001012.
34. Set the WSR toggle switches to 00000776.
35. Press the INITIATE pushbutton switch and observe the BUS INDICATOR displays a reading of 0000076.
36. Set the OPERATIONAL CONTROL rotary switch to CMPT.
37. Set the RUN/ONE INSTR toggle switch to RUN.
38. Press the INITIATE pushbutton switch and observe that the paper taps punch starts to generate a tape of selected characters.
39. Visually inspect the punched tape for the correct format:

Tape								*Character*
0	0	0	0	0.	0	0	0	377
0		0	0	.	0	0		266
	0	0		0.	0		0	155
		0		.	0			044

40. After a sufficient amount of punched tape has been generated, press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
41. Load the paper tape (step 40 above) on the paper tape reader.

NOTE

The data portion (punched holes) must be under the read head for starting the test.

42. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
43. Press the system status panel RESET pushbutton switch several times and observe that the paper tape moves.
44. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
45. Press the CLEAR pushbutton switch.
46. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
47 Set the WSR toggle switches to 00002000.
48. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
49. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 00002000.
50. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.
51. Set WSR toggle switches to the instruction entries listed below and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.

Address	*Instruction*
002000	01002001
002001	00002400
002002	02200040
002003	24002000
002004	01002005
001005	00002404
002006	60027757
002007	05200XXX
002010	24002000
002011	00002000
002012	22002000

NOTE

XXX is the octal equivalent of the constant character punched on the test tape.

52. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
53. Set the WSR toggle switches to 00002000.
54. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00002000.
55. Set the RUN/ONE INSTR toggle switch to RUN.
56. Set the OPERATIONAL CONTROL rotary switch to CMPT.
57. Press the INITIATE pushbutton switch and observe that:
    a. Test tape reads into memory.
    b. PRGM HALT indicator illuminates.
    c. BUS INDICATOR displays a reading of 00002012.
58. Set the REGISTER SELECT rotary switch to position A and observe that the BUS INDICATOR displays whatever data entered in XXX.

THE FOLLOWING PROCEDURES ARE USED TO CONVERT
THE OPERATIONAL PRELOADER PROGRAM TO THE
OFF-LINE DIAGNOSTIC PRELOADER PROGRAM

59. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
60. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.

61. Set the WSR toggle switches to 00277750.
62. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
63. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
64. Set the WSR toggle switches to 55137754.
65. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the on-line program preloader instruction entries chart below. If the entries do not agree, or are absent, the on-line program preloader instructions *must be loaded into memory before proceeding*. If the entries appearing in parenthesis on the chart are already loaded into memory, proceed to step 100 below.
66. Set the MEMORY guarded switch to the UNPROTECTED position.
67. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT Indicator illuminates.
68. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
69. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
70. Verify that the CLOCK OPERATE CONTROL rotary switch is in the CONT position.
71. Press the CLEAR pushbutton switch.
72. Set the WSR toggle switches to 00277750.
73. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
74. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL and the REGISTER SELECT to MEM.

Address	*Instruction*
00277750	01077751
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	00002400
00277761	00200040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020
00277766	35000010
00277767	72000001
00277770	74000003
00277771	220777571
00277772	62501776 (62500476)
00277773	72100001
00277774	74100107 (74100236)
00277775	22077756
00277776	00000000

75. Set the WSR toggle switches to the instruction entries listed in the on-line preloader instruction chart and press the INITIATE pushbutton switch after each setting. Observe that the BUS INDICATOR displays the entered instruction.
76. Press the NORMAL HALT pushbutton switch an observe that the PRCS HALT indicator lights.
77. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.

78. Set the WSR toggle switches to 00277750.
79. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays the address listed.
80. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
81. Set the WSR toggle switches to 55137754.
82. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the *correct address*.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the *correct instruction number*.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

83. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
84. Set the MEMORY guarded switch to the UNPROTECTED position.
85. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
86. Set the ASR toggle switches to 277772.
87. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62501776.
88. Set the WSR toggle switches to 62500476.
89. Set the OPERATIONAL CONTROL rotary switch to STORE.
90. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
91. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
92. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 62500476.
93. Set the ASR toggle switches to 277774.
94. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100107.
95. Set the WSR toggle switches to 74100235.
96. Set the OPERATIONAL CONTROL rotary switch to STORE.
97. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.
98. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
99. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 74100235.

THE FOLLOWING PROCEDURES ARE USED TO LOAD
THE OFF-LINE DIAGNOSTIC LOADER PROGRAM INTO MEMORY

100. Load the off-line diagnostic loader tape (SM-D-752126) on the paper tape reader.
101. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
102. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.

103. Press the system status panel RESET pushbutton switch several times and observe that the loader tape moves.
104. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
105. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
106. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
107. Set the WSR toggle switches to 00277750.
108. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00277750.
109. Set the OPERATIONAL CONTROL rotary switch to CMPT.
110. Set the RUN/ONE INSTR toggle switch to RUN.
111. Press the INITIATE pushbutton switch and observe:
    a. Diagnostic loader tape strip loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00277777.
112. Rewind the loader tape by setting the system status panel TAPE READ REWIND toggle switch to ON.

THE FOLLOWING PROCEDURES LOAD THE DIAGNOSTIC PROGRAM INTO MEMORY

113. Load the Paper Tape Reader/Punch (SM-D-751722) and FACP (SM-D-751719) diagnostic program tapes on the paper tape reader.
114. Set the paper tape reader MODE SELECT toggle switch to REEL and the PWR switch to ON.
115. Press the NORMAL HALT pushbutton switch and observe that the PRGM HALT indicator extinguishes and the PRCS HALT indicator illuminates.
116. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
117. Set the WSR toggle switches to 00000500.
118. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00000500.
119. Press the system status panel RESET pushbutton switch several times and observe that the diagnostic tape moves.
120. Set the OPERATIONAL CONTROL rotary switch to CMPT.
121. Press the INITIATE pushbutton switch and observe that:
    a. Diagnostic program tape loads into memory.
    b. PRGM HALT indicator illuminates at the completion of tape loading.
    c. BUS INDICATOR displays a reading of 00000631.
122. Press the INITIATE pushbutton switch a second time to read-in the 2nd segment of the diagnostic program. Observe that the same indications obtained in step 121 above are obtained.

THE FOLLOWING PROCEDURES ARE USED TO PERFORM THE PROGRAMMED PORTION OF THE PTP AND PTR

123. Visually inspect that at least 1/4 reel of tape is loaded on the paper tape punch.
124. Set the LINE-OFF-LOCAL rotary switch to LINE.
125. Press the paper tape punch ON pushbutton switch.
126. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
127. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
128. Set the ASR toggle switches to 15631.
129. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00015631.

130. Set the OPERATIONAL CONTROL rotary switch to STORE.
131. Set the WSR toggle switches to 22017100.
132. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 22017100.
133. Set the OPERATIONAL CONTROL rotary switch to STORE SEQL.
134. Set the WSR toggle switches to the instruction entries listed in the table below and set the ASR toggle switches to the listed address locations. Press the INITIATE pushbutton switch after each setting and observe the BUS INDICATOR displays the entered data.

Address location		Instruction	
(To allow for writing the end of record (377) before generating the trailer)			
15631	22017100	TRU	PATCH
17100	5520377	CLAC	/377
17101	0106252	SSS	WTDTPP
17102	0017102	HLT	*
17103	55016435	CLA	CHDLY
17104	26016437	TSA	IDLE
17105	26015554	TSA	PUHDTR
17106	22015632	TRU	RTN
(To initialize the delay time to characters/second)			
11252	22011600	TRU	PATCH
11600	55200310	CLAC	/310
11601	60016266	STR	DELTIM
11602	70000000	LXA	0, 1
11603	55200000	CLAC	/0
11604	22011253	TRU	RTN
(To allow for increased timing)			
11463	72000001	IXA	1, 1
11646	22011605	TRU	PATCH
11605	55411610	CLA	TABLE-A, 1
11606	24011471	TRZ	PTDEL
11607	22011465	TRU	RTN
(To allow for testing the last time through)			
11453	55200001	CLAC	01
11454	12015746	ADD	CHSRED
11455	02200037	LGMC	/37
11456	60015746	STR	CHSRED
11457	05200024	LGEC	/24
11460	22011633	TRU	PATCH
11633	24011463	TRZ	PTEDBL
11634	55016266	CLA	DELTIM
11635	22011461	TRU	RTN
11461	2401147	TRZ	PTDEL
11462	22011323	TRU	PTTROL
(To allow for consistent premature termination)			
11500	24017107	TRZ	PATCH
17107	55037774	CLA	WSR
17110	02202000	LGMC	/2000
17111	24015322	TRZ	PT12B
17112	22015631	TRU	PT12U
11177	24011636	TRZ	PATCH
11636	55037774	CLA	WSR
11637	02202000	LGMC	/2000
11640	24010407	TRZ	PT06B
11641	22011201	TRU	PT06ZB
11445	02202000	LGMC	/2000
(To reduce the size of trailer 1 leader)			
15736	00000200		

Address location	Instruction
(To allow for reset timing)	
11473	70000000
(Delay times)	
11610	00000310
11611	00000303
11612	00000257
11613	00000252
00614	00000233
11615	00000226
11616	00000202
11617	00000175
11620	00000151
11621	00000144
11622	00000120
11623	00000113
11624	00000067
11625	00000062
11626	00000036
11630	00000017
11631	00000005
11632	00000000

135. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
136. Set the WSR toggle switches to 00015000.
137. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays a reading of 00015000.
138. Set the RUN/ONE INSTR toggle switch to RUN.
139. Set the OPERATIONAL CONTROL rotary switch to CMPT.
140. Press the INITIATE pushbutton switch and observe that:
    a. PRGM HALT indicator illuminates.
    b. PTP TEST message i generated on page printer.
    c. BUS INDICATOR displays a reading of 00015014.
141. Set the WSR toggle switch bits 00 through 06 to zero.
142. Press the INITIATE pushbutton switch and observe that the PRGM HALT indicator illuminates and the BUS INDICATOR displays a reading of 00015310.

THE FOLLOWING PROCEDURES ARE USED TO GENERATE AN ASCII TAPE

143. Set the WSR toggle switches to 00000400.
144. Press the INITIATE pushbutton switch and observe that:
    a. ASCII characters are being punched.
    b. ASCII characters being punched are also generated on the local page printer.
    c. END OF PT message generated on page printer at the end of 10 blocks of data.
    d. PRGM HALT indicator illuminates.
    e. BUS INDICATOR displays a reading of 00015660.

NOTE

To prematurely terminate before 10 lines. of characters are punched, set WSR toggle switch bit 13 to a 1.

145. Press the INITIATE pushbutton on switch and observe that the BUS INDICATOR displays a reading of 00015310.

THE FOLLOWING PROCEDURES ARE USED TO GENERATE THE CONSTANT CHARACTER TAPE REQUIRED FOR THE PTR TIMING TEST

146. Set the WSR toggle switches to 00000155.
147. Press the INITIATE pushbutton switch and observe that the paper tape punch begins to generate a 155 character tape.
148. After approximately 5-feet of data is generated, set WSR toggle switch bit 13 to a 1 and observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00015660.
    c. END OF PT message is generated on the page printer.
149. Press the NORMAL HALT pushbutton switch and then, in turn, the INITIATE pushbutton switch observe that:
    a. PRGM HALT indicator illuminates.
    b. BUS INDICATOR displays a reading of 00010014.
    c. PR TEST message i generated on the page printer.

THE FOLLOWING PROCEDURES EXECUTE THE PAPER TAPE READER TEST

150. Set the WSR toggle switches to 00000400.
151. Load the ASCII test tape (step 144 above) on the paper tape reader.
152. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
153. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
154. Press the system status panel RESET pushbutton switch and observe that the ASCII test tape moves.
155. Press the INITIATE pushbutton switch and observe that the PRGM HALT indicator illuminates and the BUS INDICATOR displays a reading of 00010373. (This indicates that PT-O1 through PT-05 tests have been executed).
156. Press the INITIATE pushbutton switch and observe that:
    a. Program starts to read the test tape.
    b. All correct ASCII characters read am generated on the page printer.
    c. PRGM HALT indicator illuminates at completion of read-in.
    d. BUS INDICATOR displays a reading of 00011232.
    e. END OF PTS-SYNC TEST message is generated on the page printer.

NOTE

If the ASCII test tape was generated with less than 10 blocks of data (step 144 above), the reading of the tape must be terminated (WSR bit 13 to a 1) at the start of the last block of data.

157. If the program does not halt at the completion of the tape read-in, press the NORMAL HALT pushbutton switch and observe what numerical range the BUS INDICATOR is displaying:

Range	*Remarks*
10576 to 10745	If no ASCII characters are printed on the local page printer, the program never found the beginning of record which is a 377 character. If the ASCII characters are printed on the local page printer, the program never found the end of record which is a 377 character.

158. At this point in the diagnostic program, three options are available to the reader. It is recommended however, that option 1 be used:

Option 1 - PTR Timing Test

    a. Press the INITIATE pushbutton switch and observe that:
        (1) PRGM HALT indicator illuminates.
        (2) BUS INDICATOR displays a reading of 00011274.
        (3) SET WSR to CHAR message is generated on the page printer.
    b. Proceed to step 159 below.

Option 2 - Rerun PTR Test

a. Press the NORMAL HALT pushbutton switch and then, in turn, the INITIATE pushbutton switch and observe that:
(1) PRGM HALT Indicator illuminates.
(2) BUS INDICATOR displays a reading of 00011233.

b. Press the INITIATE pushbutton switch a *2nd* time and observe that:
(1) PRGM HALT Indicator illuminates.
(2) BUS INDICATOR displays a reading of 00010373.

c. Proceed to step 150 above.

Option 3 - Run PTP Test

a. Press the NORMAL HALT pushbutton switch and, in turn, the INITIATE pushbutton switch and observe that:
(1) PRGM HALT Indicator illuminates.
(2) BUS INDICATOR displays a reading of 00011233.

b. Press the NORMAL HALT and INITIATE pushbutton switch a 2nd time and observe that:
(1) PRGM HALT indicator illuminates.
(2) BUS INDICATOR displays a reading of 00015014.

c. Proceed to step 143 or 146 above.

THE FOLLOWING PROCEDURES EXECUTE THE PTR TIMING TEST

159. Load the constant character test tape (step 148 above) on the paper tape reader.
160. Set the paper tape reader MODE SELECT toggle switch to STRIP and the PWR switch to ON.
161. Set the system status panel RESET SELECT TAPE READER toggle swish to ON.
162. Press the system status panel RESET pushbutton switch several times and observe that the test tape moves.
163. Set the WSR toggle switches to 00000155.
164. Press the INITIATE pushbutton switch and observe that the PRGM HALT Indicator illuminates and the BUS INDICATOR displays a reading of 00011300.
165. At this point in the diagnostic program, two options are available to the reader. It is recommended, however, that option 1 be used:

Option 1 - Automatic PTR Timing Test

a. Press the NORMAL HALT and then the INITIATE pushbutton switches and observe that the tape is reading 10 characters per block and each block at a different rate, starting at 5 characters per second and increasing in increments to 200 characters per second.

b. After approximately 3 minutes, set WSR toggle swish bit 13 to a 1 and observe that:
(1) PRGM HALT Indicator illuminates.
(2) BUS INDICATOR displays a reading of 00011232.

Option 2 - Manual PTR Timing Test

a. Press the INITIATE pushbutton switch and observe that the PRGM HALT Indicator illuminates and the BUS INDICATOR displays a reading of 00011315.

b. Select a delay time for the characters per second desired from the chart below and enter it in WSR toggle switch bits 16 through 23.

Characters per second	*Time Delay (ms)*	*WORK SWITCH REGISTER bit 16-23*
5	200	310
10	195	303
30	175	257
35	170	252
50	155	233
55	150	226
75	130	202
80	125	175
100	105	151
105	100	144
125	80	120
130	75	113
150	55	067
166	50	062
175	30	036
180	65	031
190	15	017
200	5	005

NOTE

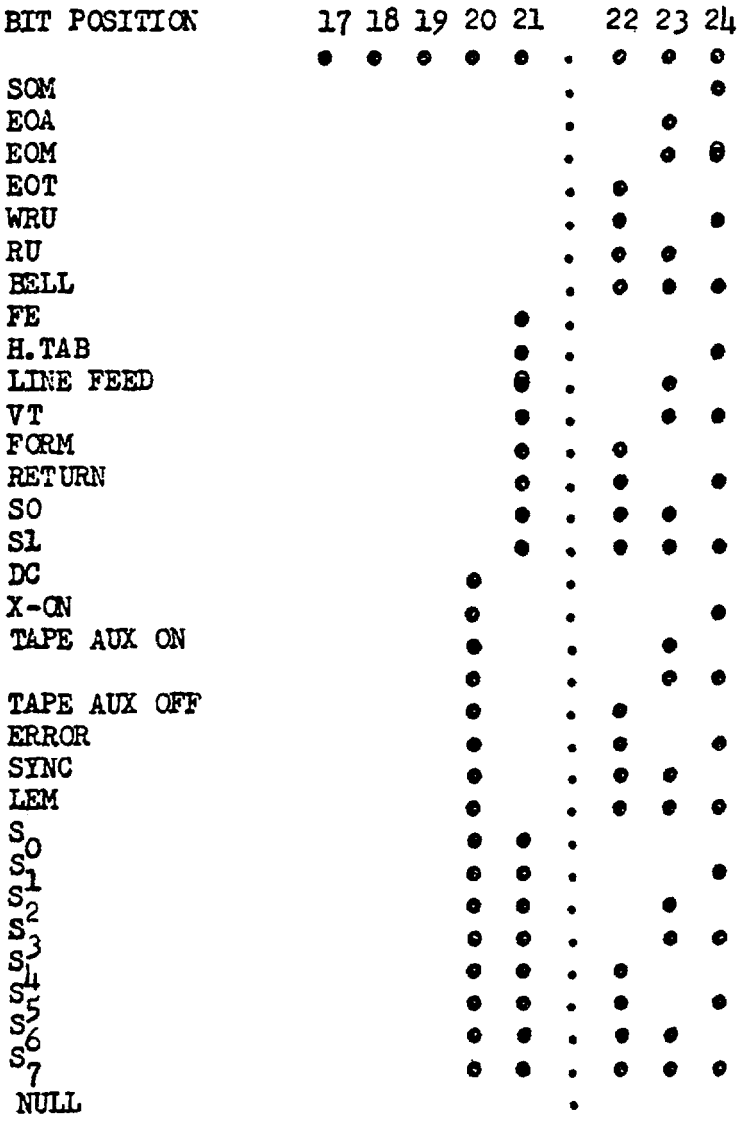
WSR toggle switch bits 16 through 23 permit time delay selections from zero through 255. However, character frequencies less than 5/seconds or greater than 200/seconds cannot be selected.

c. Press the INITIATE pushbutton switch and observe that the tape is read-in at the rate specified in *b* above.
d. After approximately 3-minutes, set WSR toggle switch bit 15 to a 1 and observe that:
(1) PRGM HALT indicator illuminates.
(2) BUS INDICATOR displays a reading of 00011232.

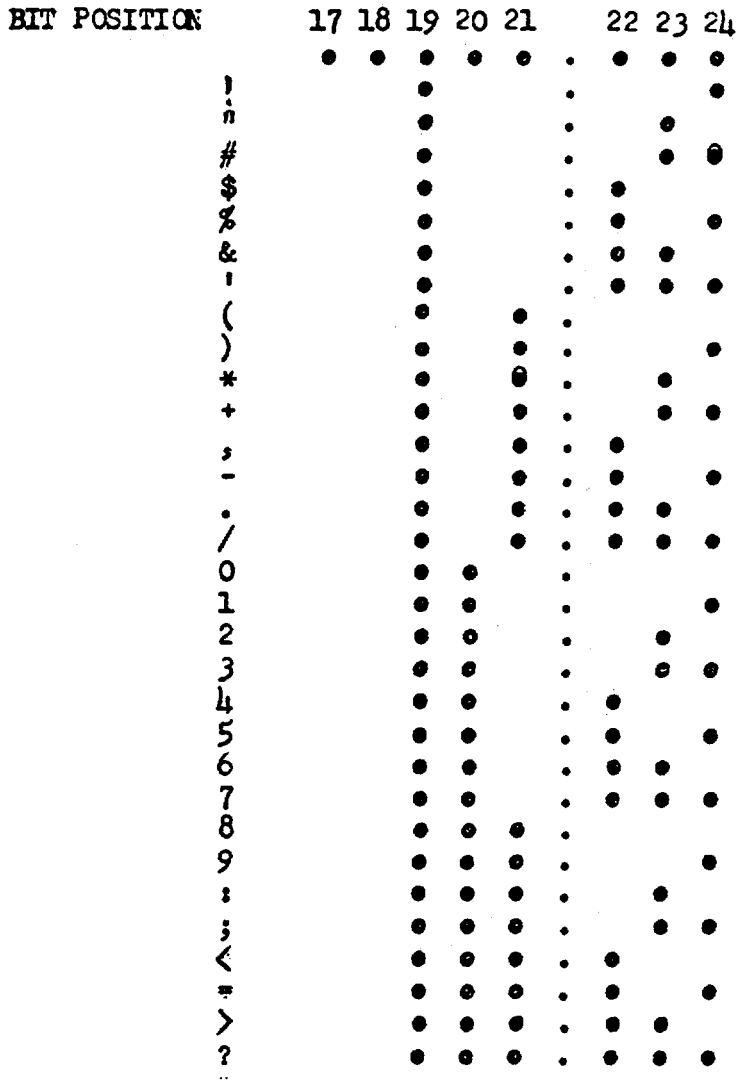
Section III. POSSIBLE PROGRAM HALTS

Halt address	*Remarks*
10422	WSR toggle switches incorrectly set.
11016 or 11111	CHRDY is not getting set. Press the system status panel RESET pushbutton switch and then the INITIATE pushbutton switch to continue.
10735	1200 characters were read without detecting the first character.

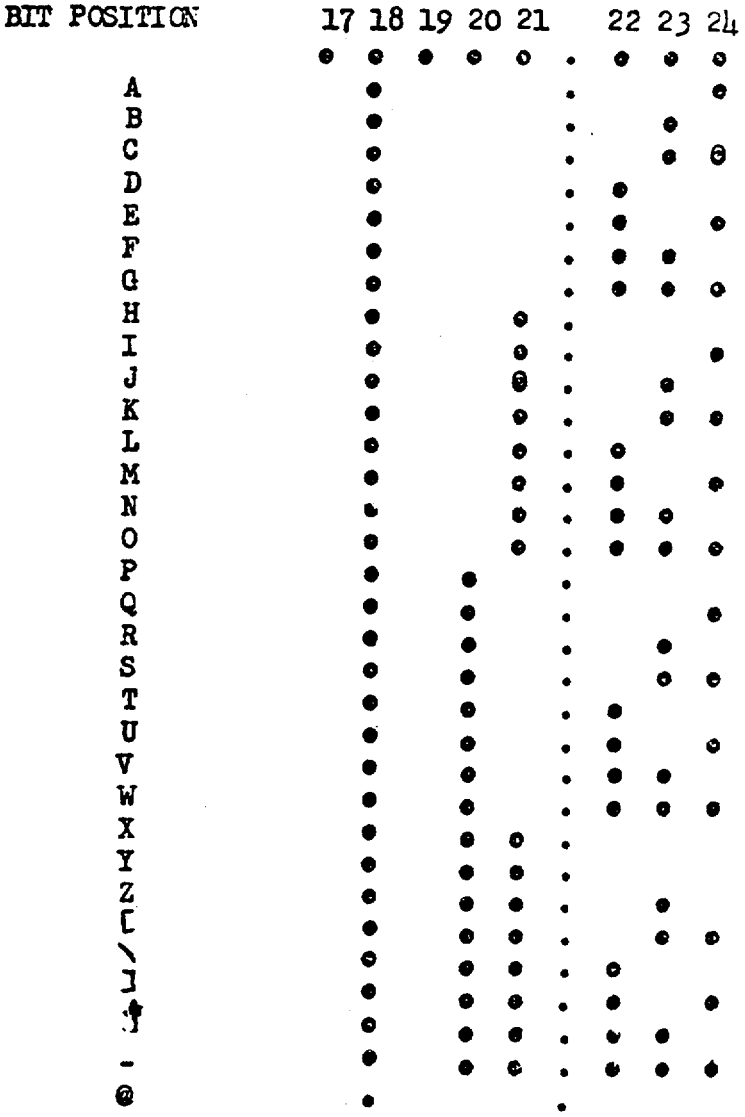
Section IV. ASCII Character Format



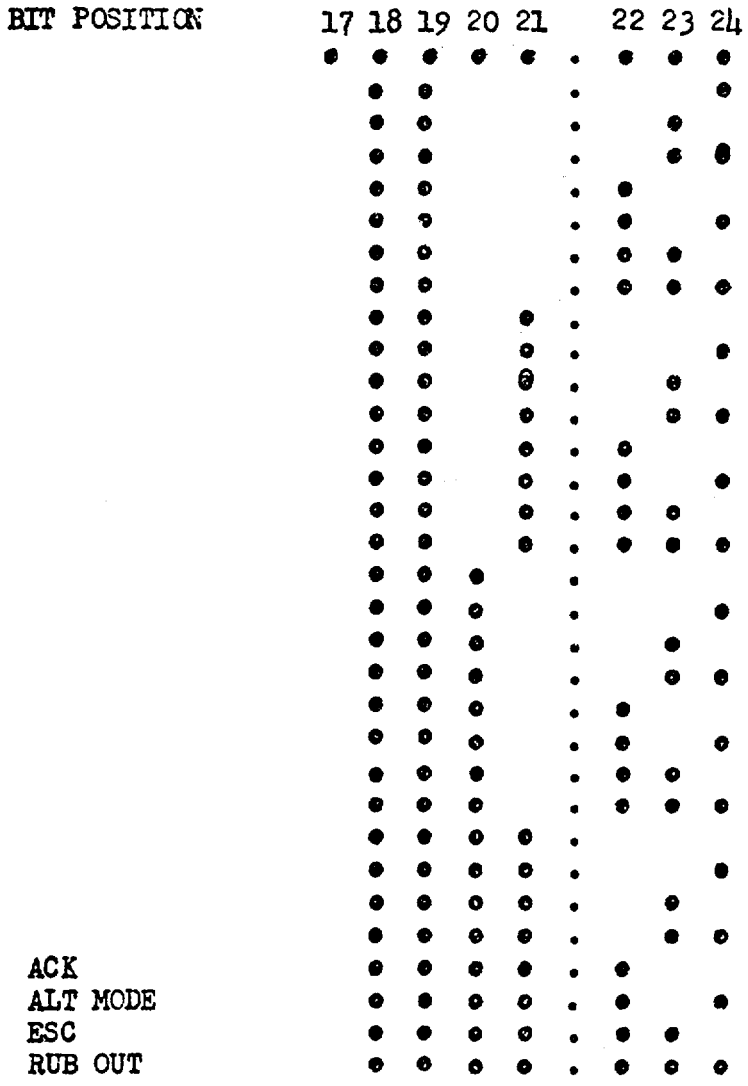
Section IV. ASCII Character Format



Section IV. ASCII Character Format



Section IV. ASCII Character Format



Section V. MAINTENANCE ERROR PRINTOUTS

Printout	Probable cause	Corrective action
While running PRT/PTP off-line test, any of the following printouts may occur before END OF PT printout:		
a. Set WSR to CHAR.	*a.* WORD SWITCH REGISTER not set properly for PTR timing test.	*a.* Set tape format code in WORD SWITCH REGISTER bits 14-23 and press INITIATE.
b. PT XX-01 where XX is 01, 02 or 03.	*b.* Status register failed.	*b.* Replace following PTR synchronizer cards in sequence. Repeat test after each replacement. (1) MOS2 (2) MOS3
c. PT XX-02 where XX is 01, 02 or 03.	*c.* PTR not ready.	*c.* Check reader for tape and position of LOOP/REEL switch. (1) Replace PTR synchronizer MOS2 card. Repeat test. (2) Replace PTR. Repeat test.
d. PT XX-03 where XX is 02 or 04.	*d.* Status register failed.	*d.* Replace following PTR synchronizer cards in sequence. Repeat test after each replacement. (1) MOS2 (2) MOS3
e. PT XX-01 where XX is 04 or 05.	*e.* PTR not ready.	*e.* Check reader for tape and position of LOOP/REEL switch. (1) Replace PTR synchronizer MOS2 card. Repeat test. (2) Replace PTR. Repeat test.
f. PT 04-02.	*f.* Buffer register failed to clear.	*f.* Replace following PTR cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS2 (3) MOS1
g. PT04-04.	*g.* PTR not ready.	*g.* Check reader for tape and position of LOOP/REEL switch. (1) Replace PTR synchronizer MOS2 card. Repeat test. (2) Replace PTR. Repeat test.
h. PT05-02.	*h.* Status register failed.	*h.* Replace following PTR synchronizer in sequence. Repeat test after each replacement. (1) MOS2 (2) MOS3
i. PT05-XX where XX is 03, 04, 05 or 06.	*i.* Data read from PTR synchronizer buffer differs from data written into it by test program. Data written was as follows: XX = 03 data was 377 XX = 04 data was 252 XX = 05 data was 125 XX = 06 data was 000	*i.* Replace following PTR synchronizer cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS2 (3) MOS1
j. PT06-XX where XX is 01 or 10.	*j.* CH RDY set too fast.	*j.* Replace following PTR synchronizer cards in sequence. Repeat after each replacement. (1) MOS3 (2) MOS2
k. TE PRT TOOK AAA for CH RDY to SET. PT06-XX where XX is 02, 09 or 77, and AAAA is actual time between characters received.	k. CH RDY failed to set within allotted time.	k. Replace following in sequence. Repeat test after each replacement. (1) Receiver cards (2) PTR synchronizer MOS 3 card.

Printout	Probable cause	Corrective action
		(3) PTR synchronizer MOS2 card. (4) Paper tape reader.
l. PTG06-XX where XX is 05 or 12.	*l.* Status register failed.	*l.* Replace following PTR synchronizer cards in sequence. Repeat test after each replacement. (1) MOS2 (2) MOS3
m. PT06-07	*m.* No start character received. (1) Data buffer (2) PTR error	*m.* Check tape to be sure start character (377) is present and passed under read head. (1) Replace PTR synchronizer MOS3 card. Repeat test. (2) Replace PTR. Repeat test.
n. PTR READ ERROR DATA XXX DATA EXPECTED YYY DELAY ZZZMS PT06-14 where XXX is format code for character read and YYY is format code for character expected. ZZZ is actual delay between characters received. Find XXX and YYY for ASCII codes.	*n.* Format selection, data input or PTR. (1) Data input	*n.* Check that format selection (WSR 14-23) is correct for tape being read. (1) Replace following PTR cards in sequence. Repeat test after each replacement. (*a*) Receivers (*b*) MOS3 (*c*) MOS1 (2) Replace PTR. Repeat test.
o. PTXX-01 where XX is 07, 10, 11, 12, 13.	*o.* Status register failed.	*o.* Replace following PTR synchronizer cards in sequence. (1) MOS2 (2) MOS3
p. PT08-02	*p.* Status register failed.	*p.* Replace following PTP synchronizer cards in sequence. Repeat test after each replacement. (1) MOS2 (2) MOS3
q. PT10-02	*q.* Buffer register failed to clear.	*q.* Replace following PTP synchronizer cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS2 (3) MOS1
r. PT10-03	*r.* Status register failed.	*r.* Replace following PTP synchronizer cards in sequence. Repeat test after each replacement. (1) MOS2 (2) MOS3
s. PT11-XX where XX is 02, 03. 04 or 05.	*s.* Data read from PTP synchronizer buffer differs from data written into it by test program. Data written was as follows: XX = 02 data was 377 XX = 03 data was 262 XX = 04 data was 125 XX = 05 data was 000	*s.* Replace following PTP synchronizer cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS2 (3) MOS1
t. PT12-XX where XX is 01 or 02.	*t.* Timing error.	*t.* Replace following PTP synchronizer cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS2

Printout	Probable cause	Corrective action
u. PT13-01	*u.* PTR not ready.	*u.* Check reader for tape and position of LOOP/REEL switch. (1) Replace PTR synchronizer MOS2 card. Repeat test. (2) Replace PTR. Repeat test.
v. PT13-XX where XX is 02 or 10.	*v.* CH RDY set too fast.	*v.* Replace following PTR synchronizer cards in sequence. Repeat test after each replacement. (1) MOS3 (2) MOS2
w. PTR READ ERROR DATA XXX DATA EXPECTED YYY DELAY ZZZ MS PT13-03 where XXX is format code for character expected, ZZZ is actual delay between characters received. Find XXX and YYY for ASCII characters.	*w.* Format selection, data input or PTR. (1) Data input.	*w.* Check that format selection (WSR 14-23) is correct for tape being read. (1) Replace following PTR cards in sequence. Repeat test after each replacement. (*a*) Receivers (*b*) MOS3 (*c*) MOS1 (2) Replace PTR. Repeat test.

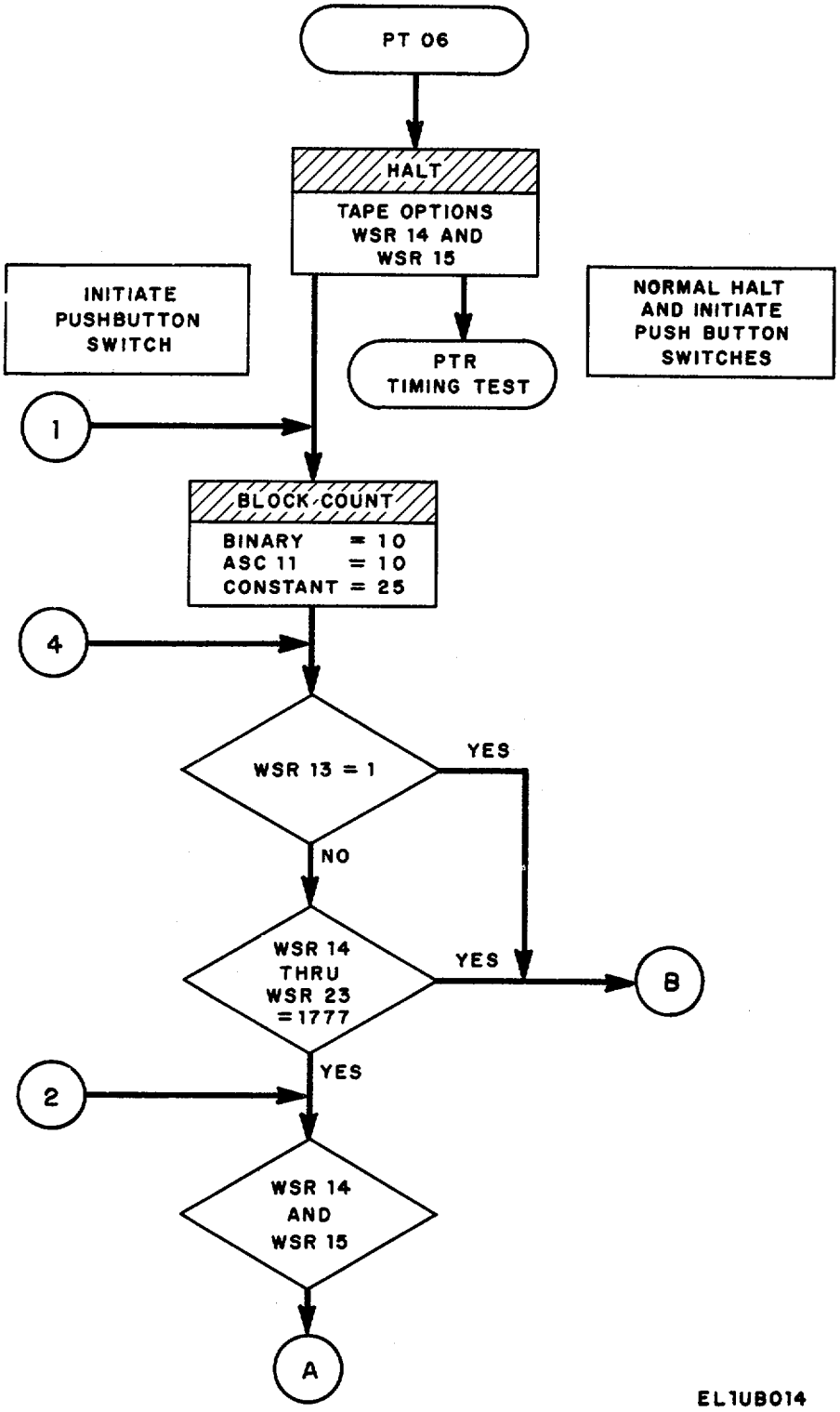


Figure 3 (1). Paper tape reader logic data flow diagram (Sheet 1 of 7).

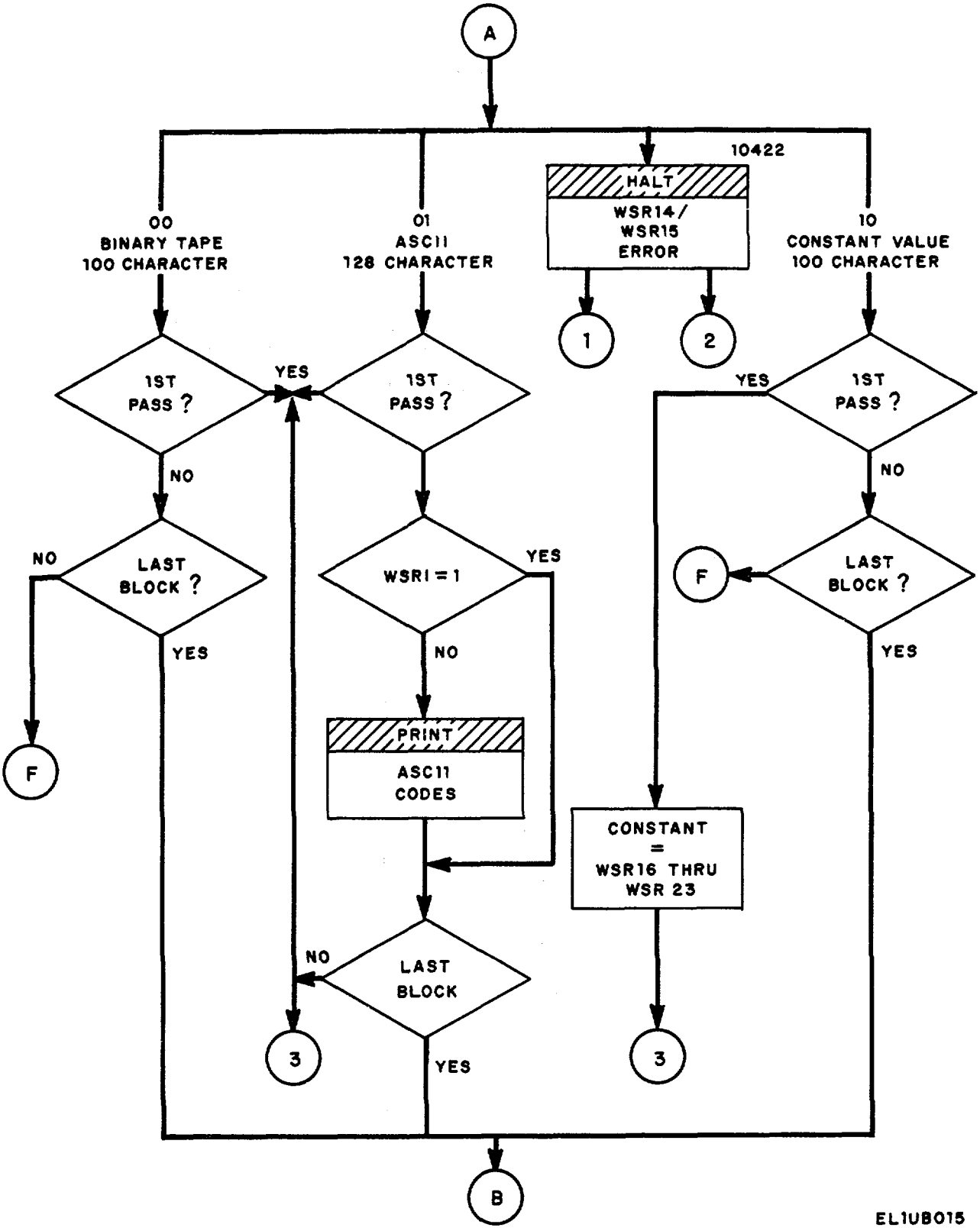


Figure 3 (2). Paper tape reader logic data flow diagram (Sheet 2 of 7).

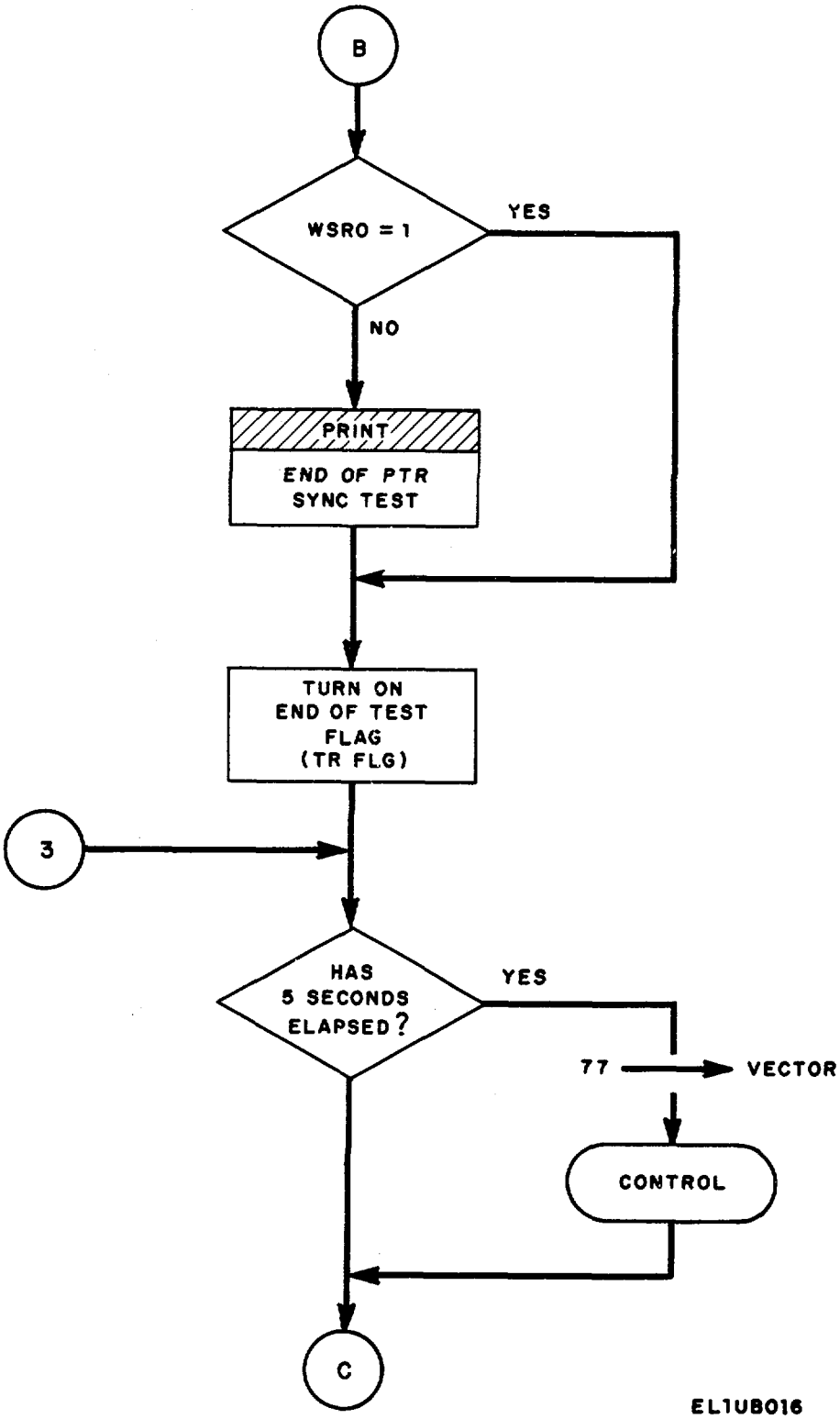


Figure 3 (3). Paper tape reader logic data flow diagram (Sheet 3 of 7).

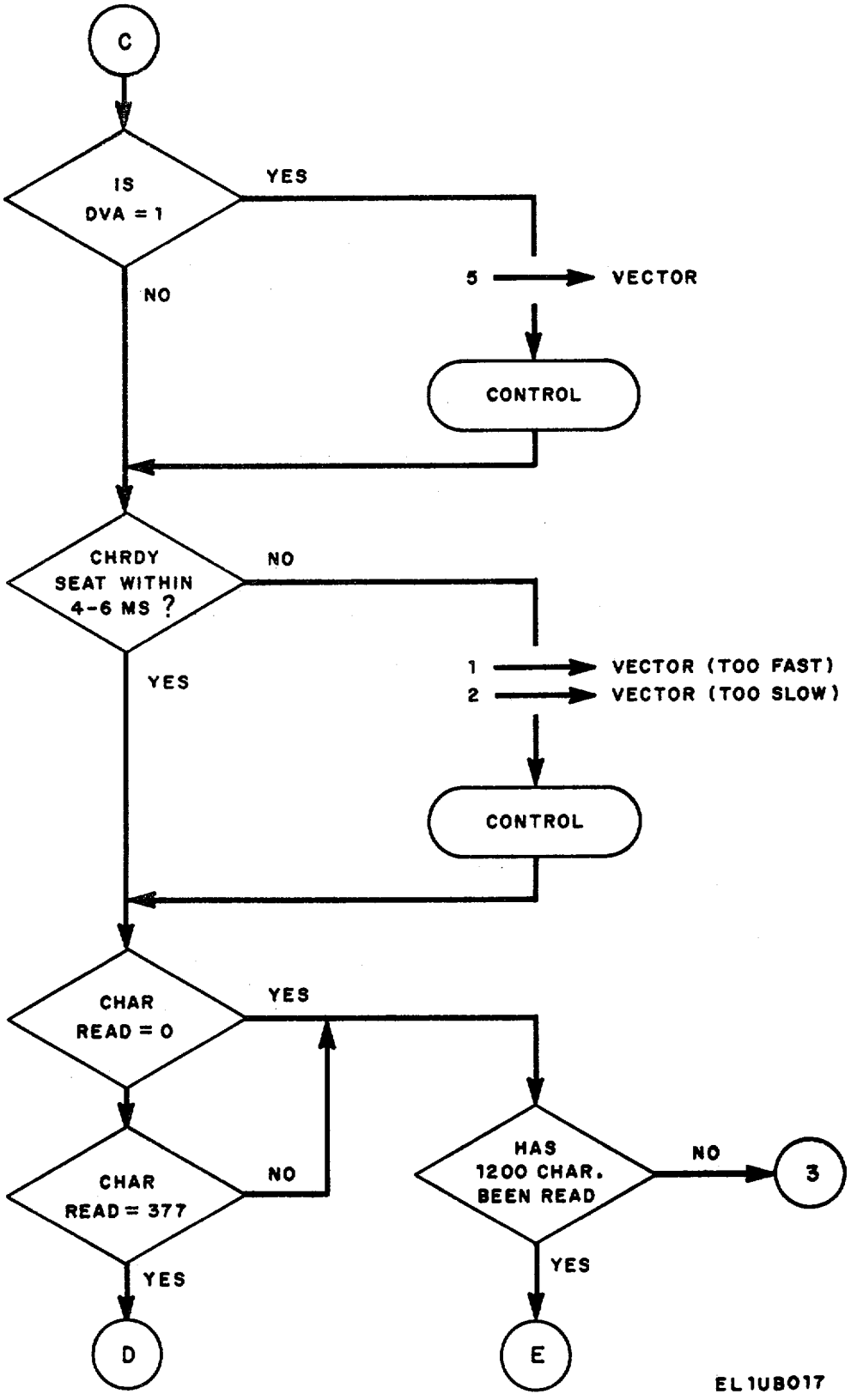


Figure 3 (4). Paper tape reader logic data flow diagram (Sheet 4 of 7).

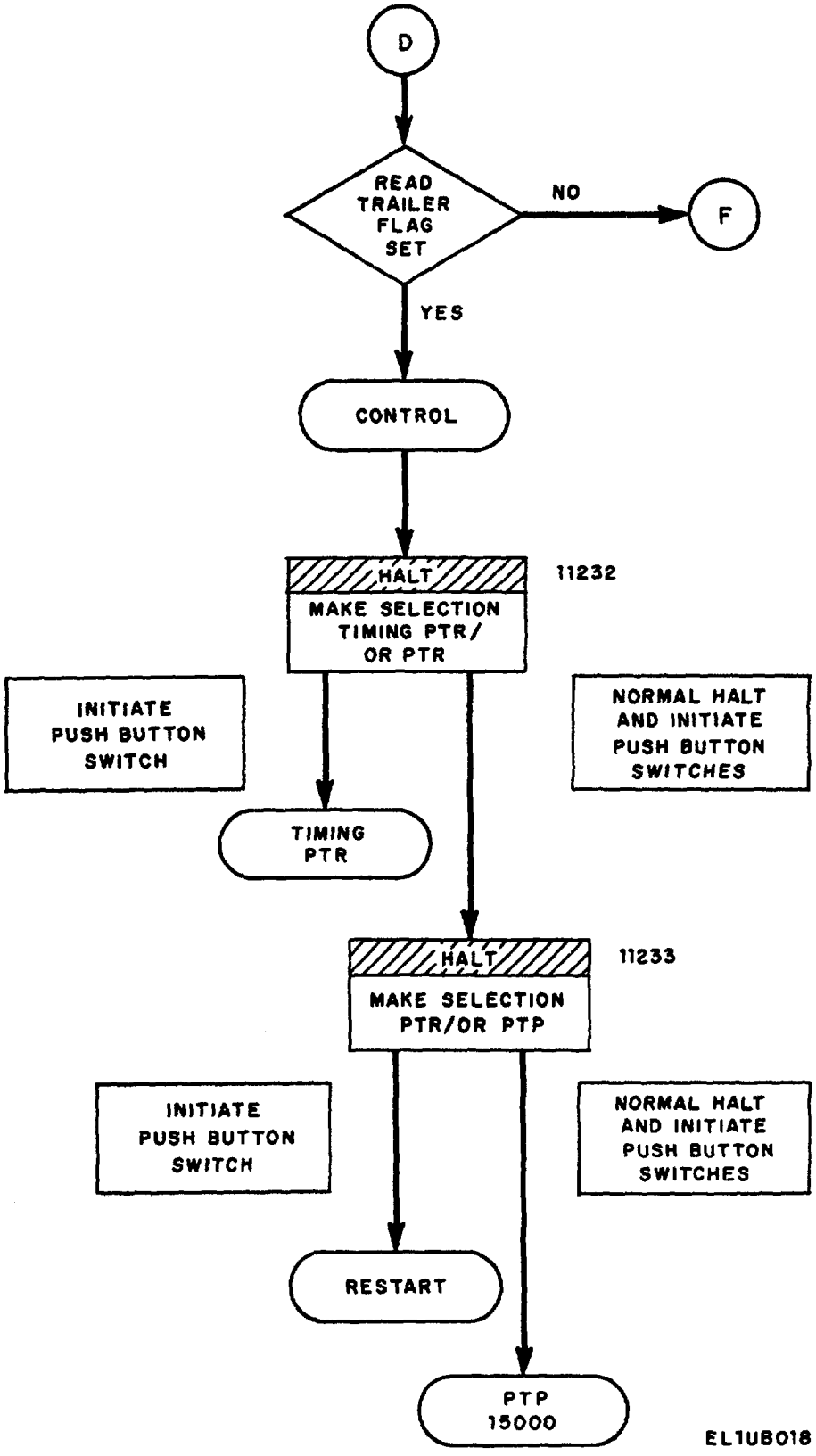


Figure 3 (5). Paper tape reader logic data flow diagram (Sheet 5 of 7).

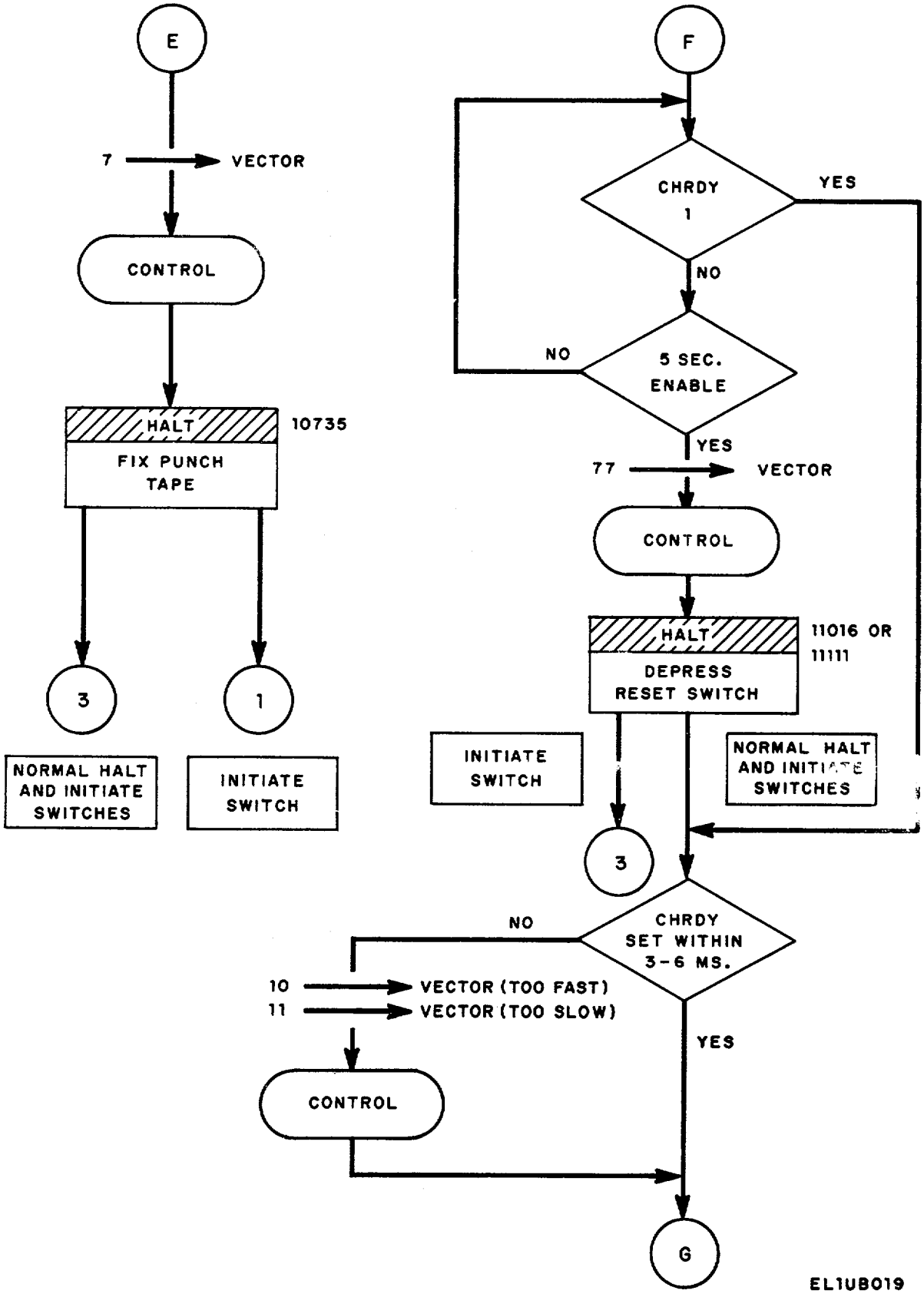


Figure 3 (6). Paper tape reader logic data flow diagram (Sheet 6 of 7).

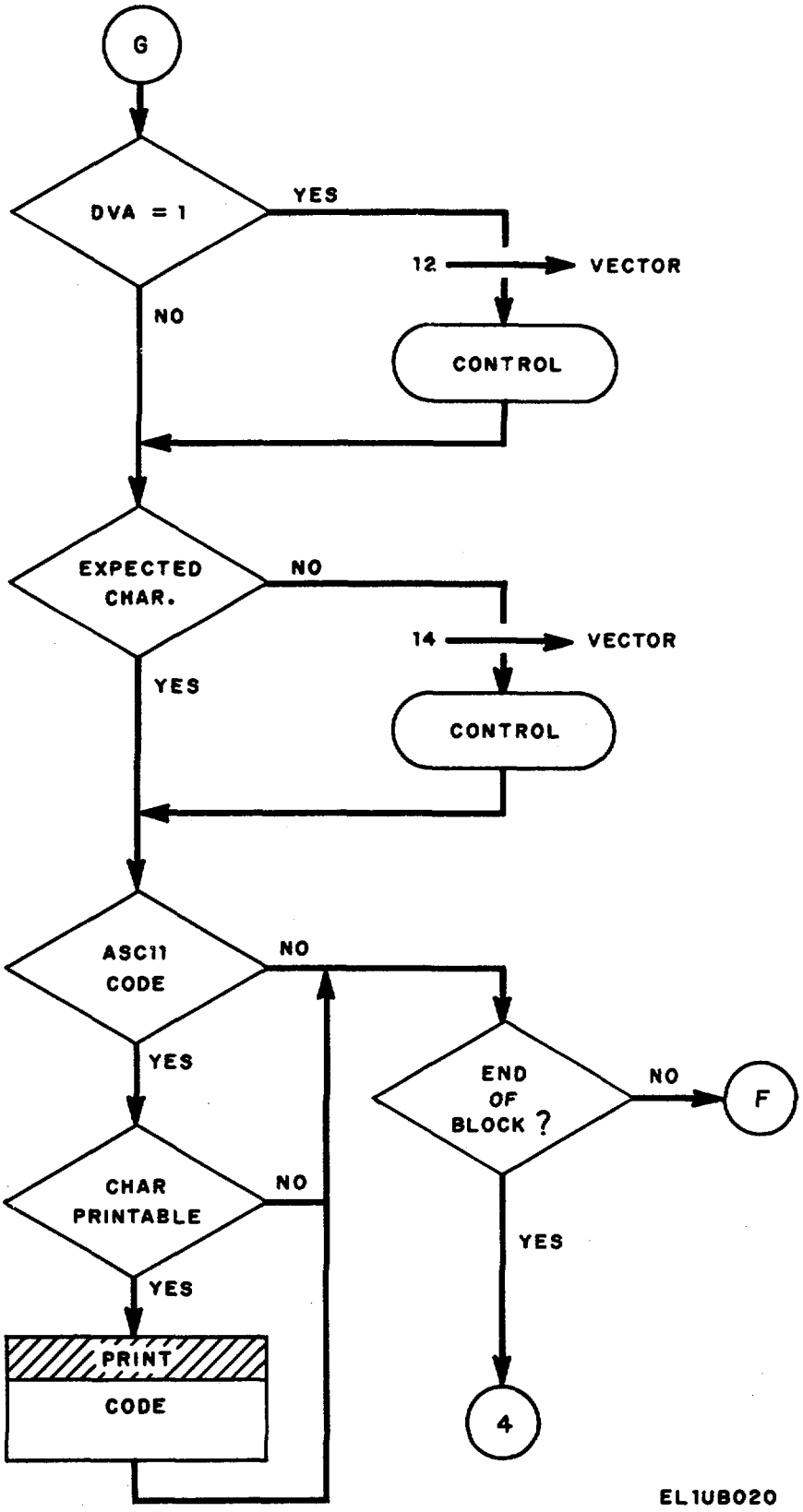


Figure 3 (7). Paper tape reader logic data flow diagram (Sheet 7 of 7).

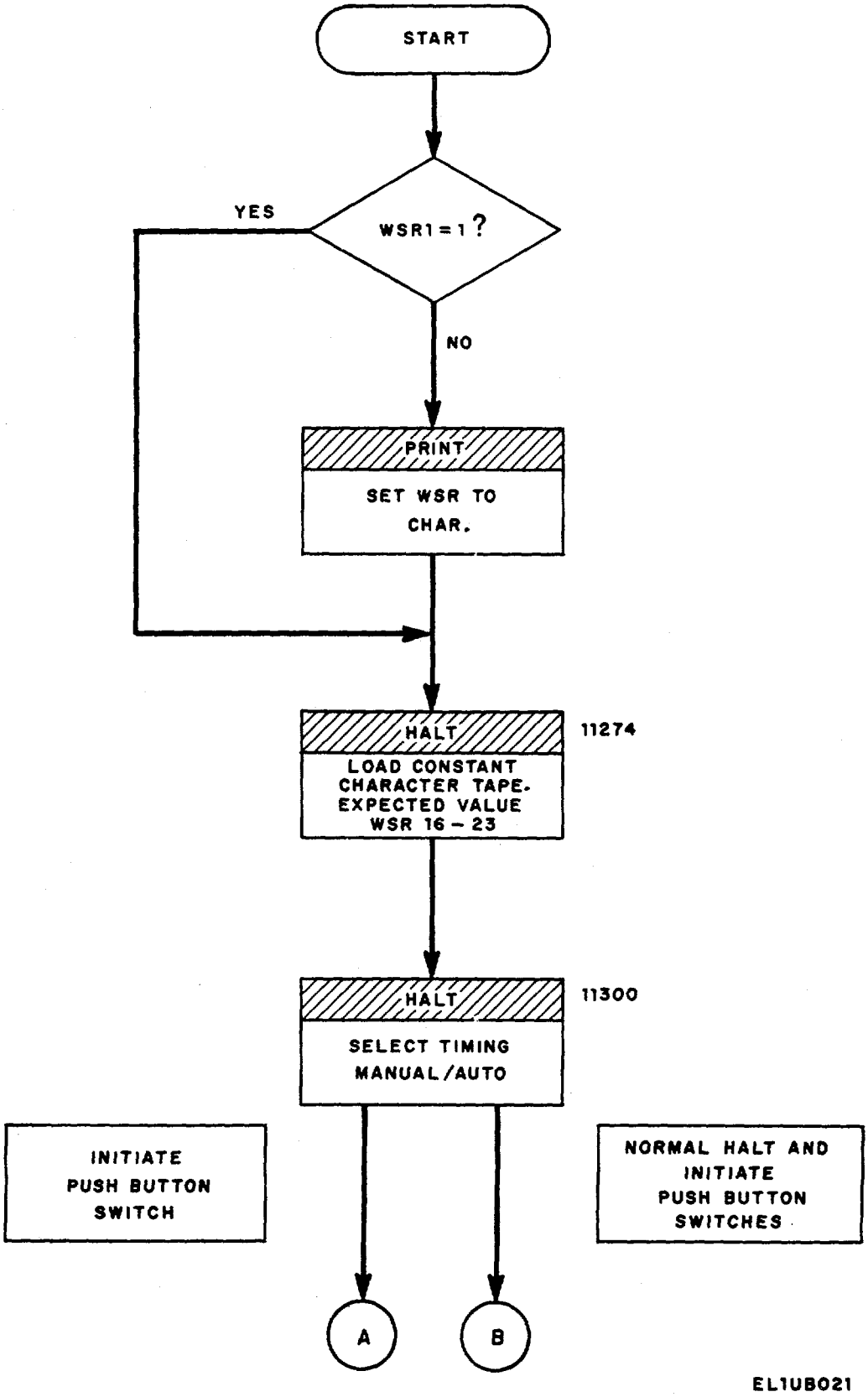


Figure 4 (1). Paper tape reader timing test logic data flow diagram (Sheet 1 of 4).

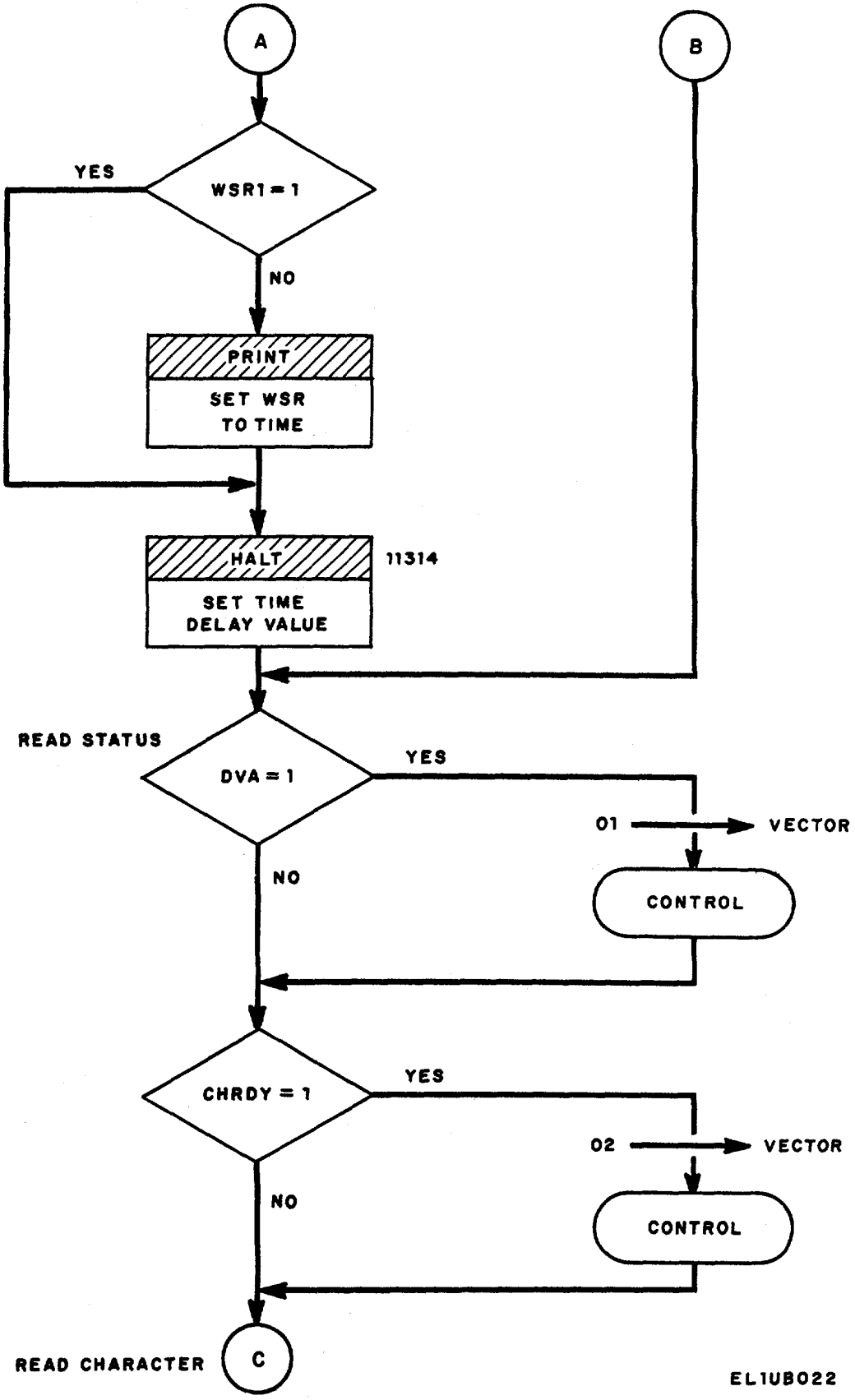


Figure 4 (2). Paper tape reader timing test logic data flow diagram (Sheet 2 of 4).

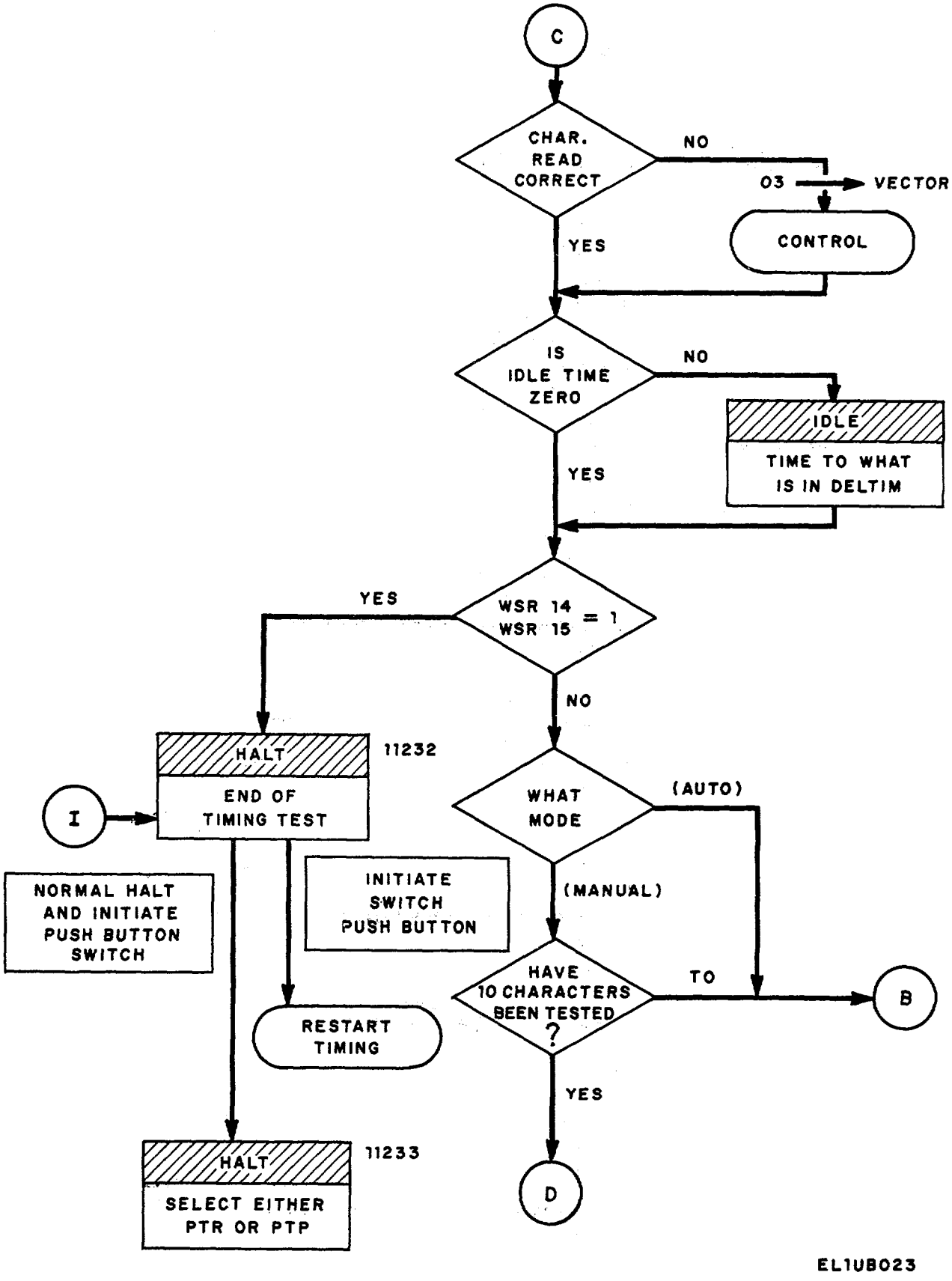


Figure 4 (3). Paper tape reader timing test logic data flow diagram (Sheet 3 of 4).

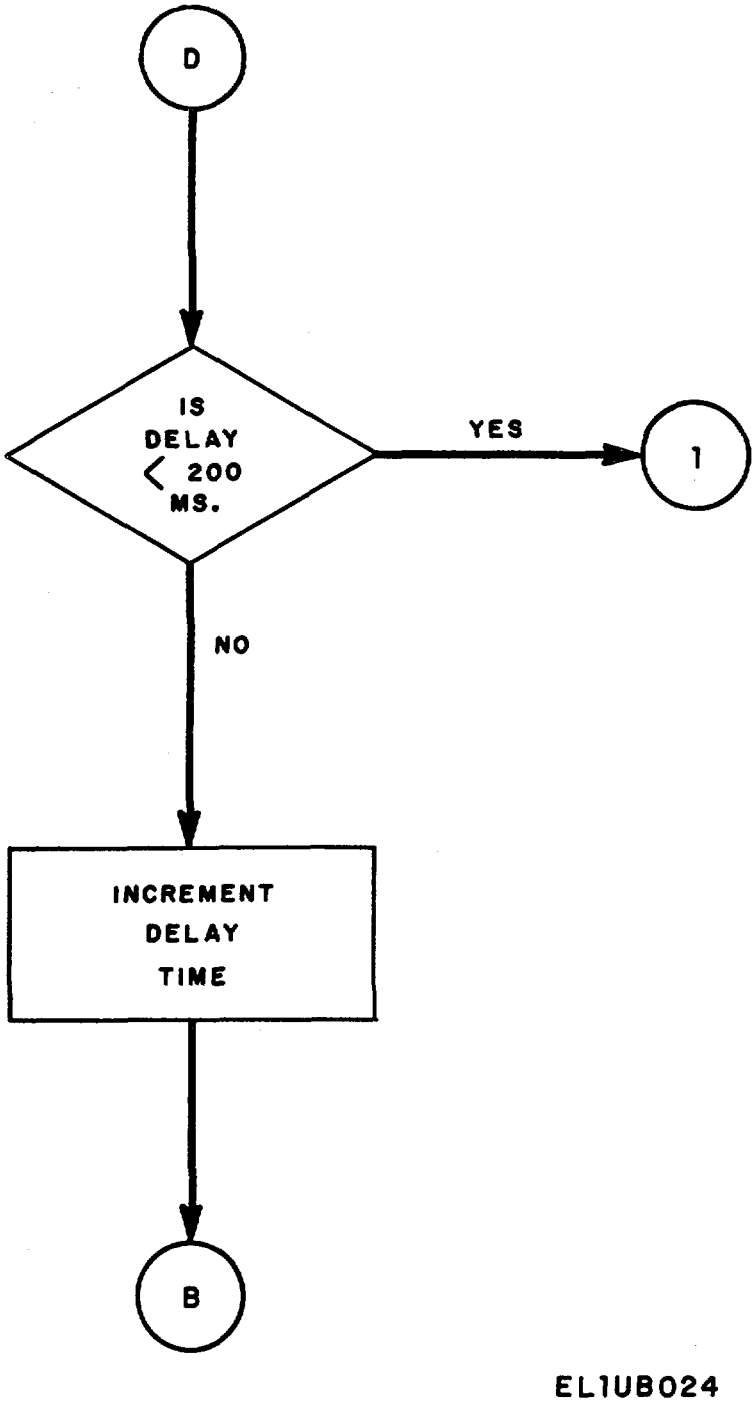


Figure 4 (4). Paper tape reader timing test logic data diagram (Sheet 4 of 4).

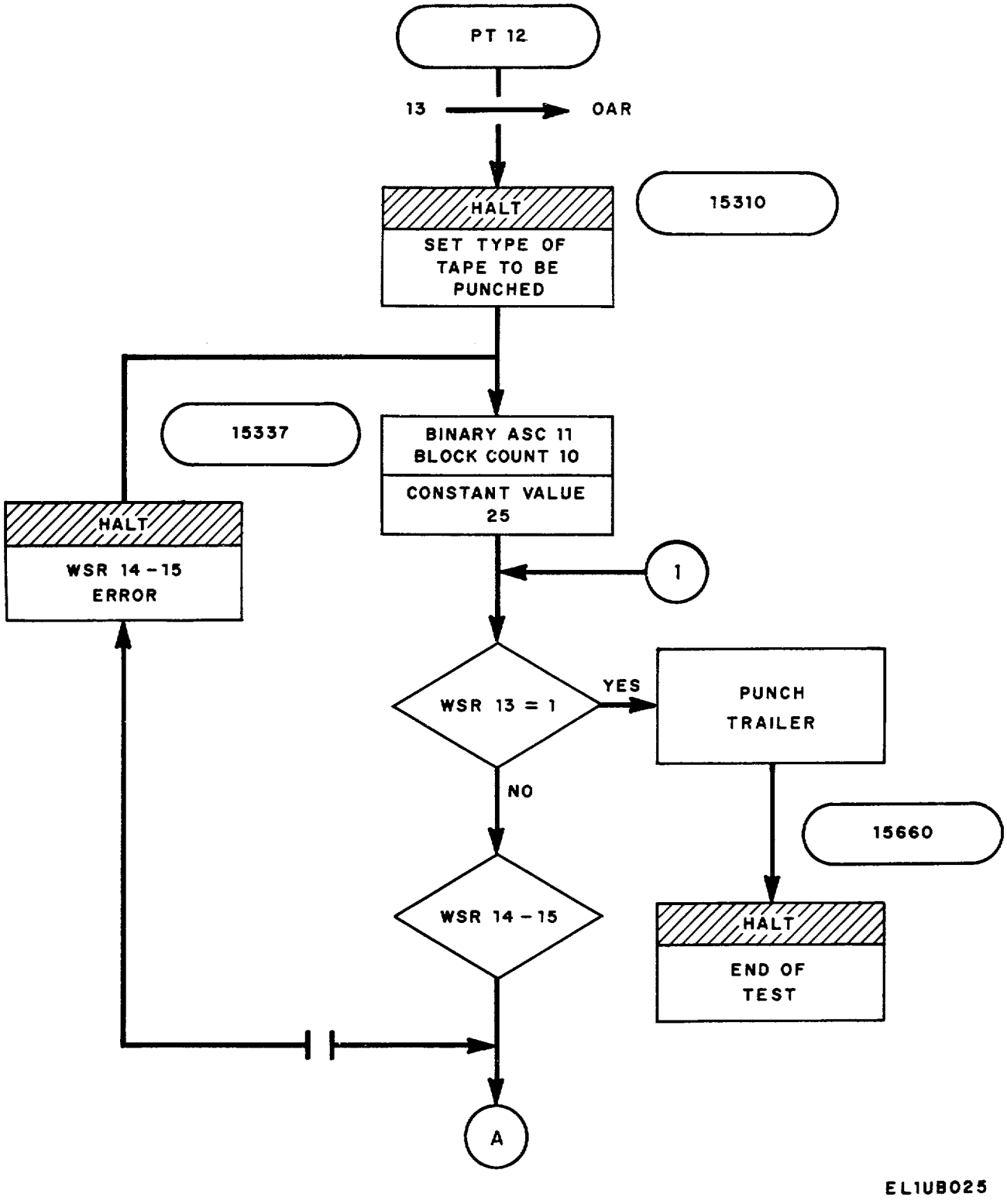


Figure 5 (1) , Paper tape punch logic data flow diagram (Sheet 1 of 3).

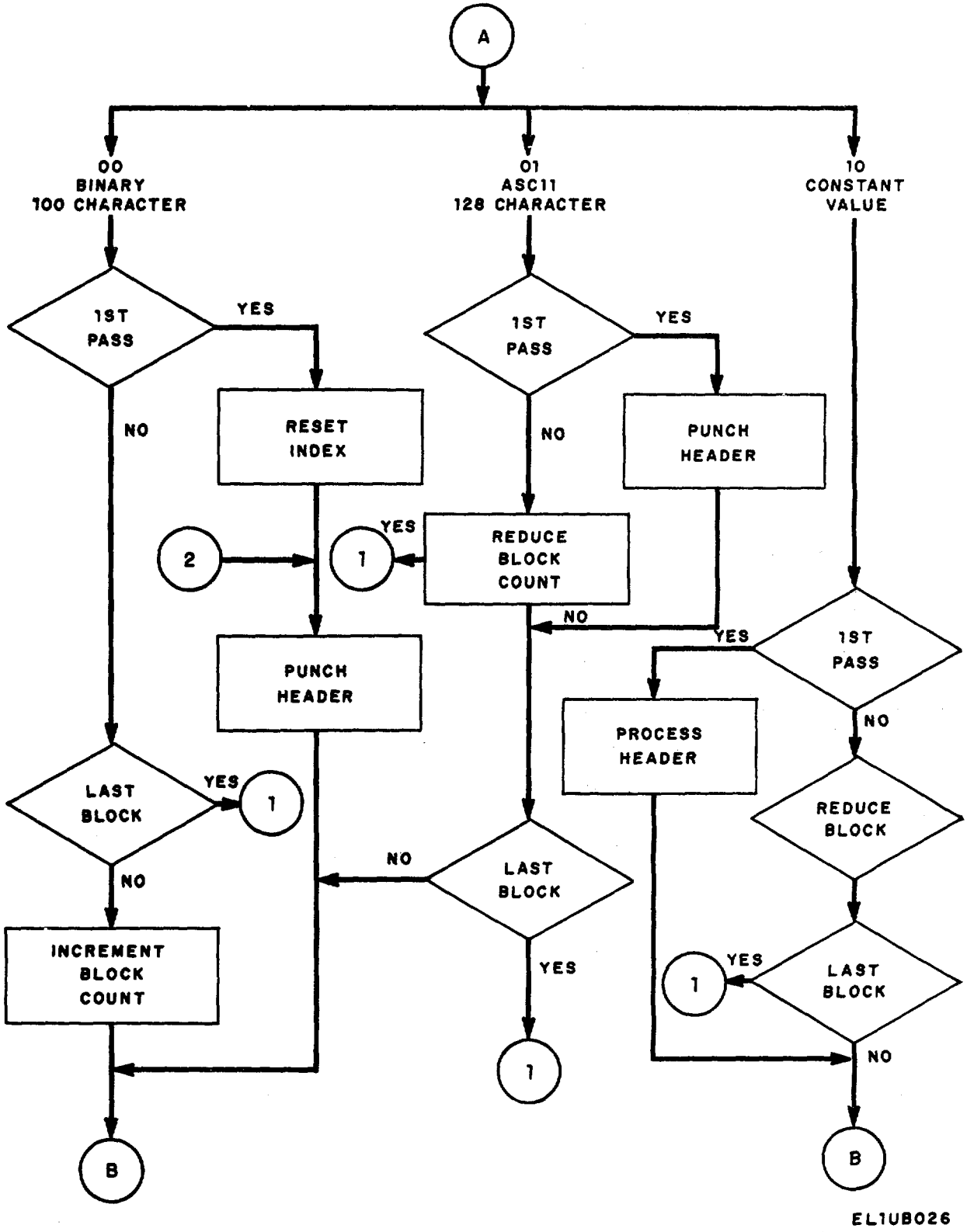


Figure 5 (2). Paper tape punch logic data flow diagram (Sheet 2 of 3).

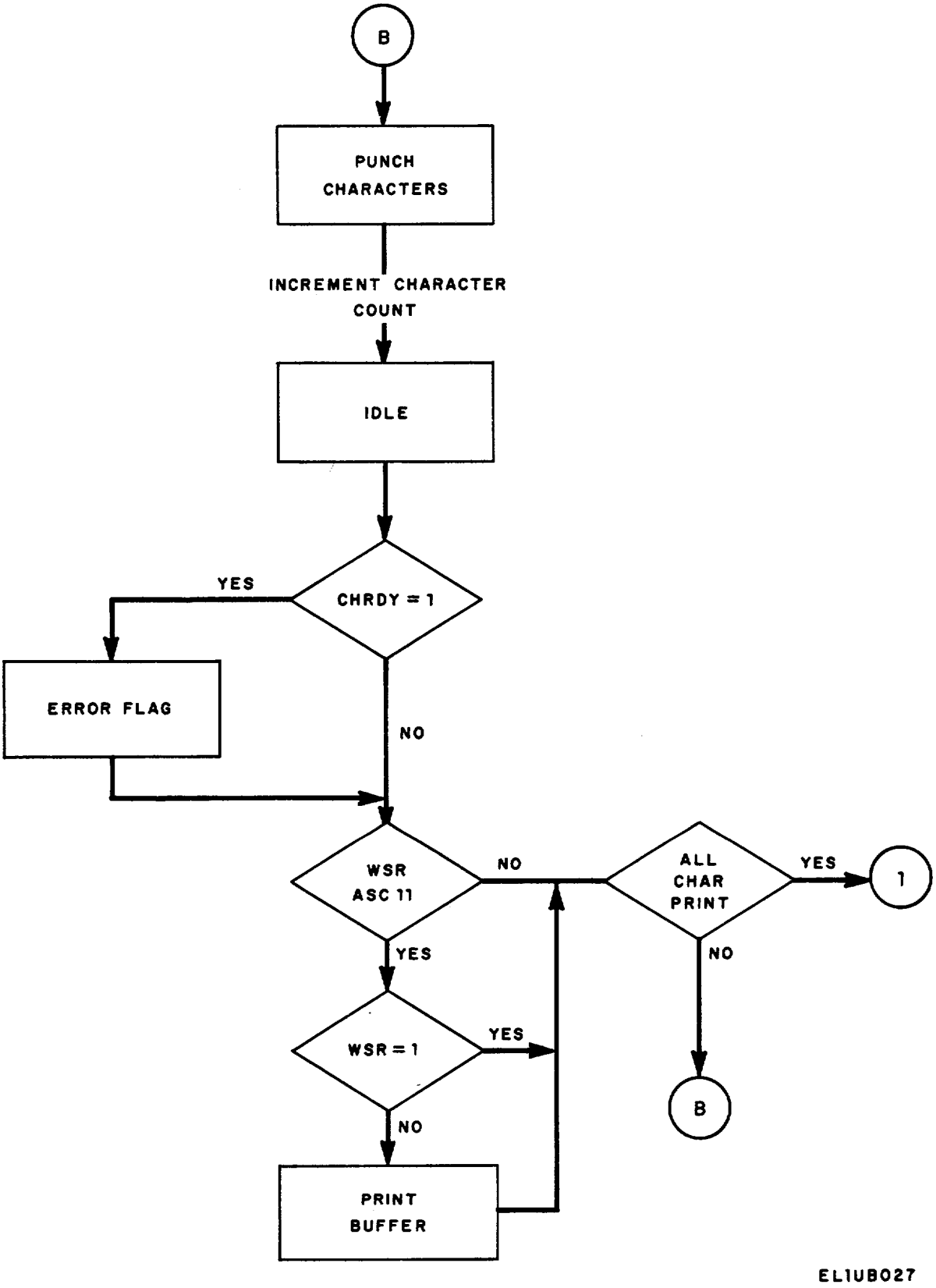


Figure 5 (3). Paper tape punch logic data flow diagram (Sheet 3 of 3).

EXHIBIT J

RESTORING OPERATIONAL PROGRAM

Section I. GENERAL

The diagnostic programs are essentially divided into two groups. If either the Maintenance Control Panel, Central Processor, Memory, Bootstrap, or Memory-to-Memory diagnostic programs are executed, the procedures outlined in Section II must be performed in order to restore the AN/TTC-38(V) to an operating condition. If the Common Control Synchronizer, Remote Device, Functional Assignment Control Pane, or Paper Tape Reader/Paper Tape Punch diagnostic programs are executed, the procedures outlined in Section III must be performed in order to restore the equipment to an operating condition.

Section II. INITIAL SETUP OF EQUIPMENT

1. Set all WSR toggle switches to 0 (down).
2. Set CLOCK OPERATE CONTROL rotary switch to CONT.
3. Set MEMORY guarded switch to UNPROTECTED position.
4. Set REGISTER SELECT rotary switch to MEM and the OPERATIONAL CONTROL to STORE SEQLY.
5. Set RUN/ONE INSTR toggle switch to RUN.
6. Press COORDINATE and INITIATE pushbutton switches and observe that ACTIVE Indicator lights.
7. Press NORMAL HALT pushbutton switch twice and observe that PRCS HALT indicator lights.
8. Set OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
9. Set RUN/ONE INSTR toggle switch to ONE INSTR.
10. Press CLEAR pushbutton.
11. Set WSR toggle switches to 00277750.
12. Press INITIATE pushbutton switch and observe that BUS INDICATOR display reads 00277750.
13. Set OPERATIONAL CONTROL rotary switch to STORE SEQLY and the REGISTER SELECT to MEM.
14. Set WSR toggle switches to the instruction entries listed in attached chart and press INITIATE pushbutton after each setting. Observe that BUS INDICATOR displays entered instruction.

Address	*Instruction*
00277750	01077751
00277751	00002404
00277752	05200377
00277753	24077755
00277754	22077750
00277755	70100000
00277756	70000001
00277757	01077760
00277760	00002400
00277761	02200040
00277762	24077757
00277763	01077764
00277764	00002404
00277765	34000020

Address	*Instruction*
00277766	35000010
00277767	72000001
00277770	74000003
00277771	22077757
00277772	62501776
00277773	72100001
00277774	74100107
00277775	22077756
00277776	00000000

15. Press NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator lights.
16. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
17. Set the WSR toggle switches to 00277750.
18. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays 00277750.
19. Set the OPERATIONAL CONTROL rotary switch to CONT PNL INSTR and the REGISTER SELECT to position A.
20. Set the WSR toggle switches to 55137754.
21. Press INITIATE pushbutton switch and observe that the BUS INDICATOR reading agrees with the entries specified on the chart.

NOTE

The following procedures will correct an erroneous address entered from the chart of specified addresses and instructions.

a. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
b. Set the ASR toggle switches to the *correct address*.
c. Press INITIATE pushbutton switch and observe that the BUS INDICATOR displays the correct address.
d. Set the WSR toggle switches to the *correct instruction number*.
e. Set the OPERATIONAL CONTROL rotary switch to STORE.
f. Press INITIATE pushbutton switch and observe BUS INDICATOR displays the correct instruction.
g. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
h. Press INITIATE pushbutton switch and verify that the BUS INDICATOR displays the correct instruction.

22. Place operational program strip tape (SM-D-751709 on paper tape reader.
23. Set paper tape reader MODE SELECT toggle switch to STRIP and POWER ON/OFF toggle switch to ON.
24. Set system status panel RESET SELECT TAPE READER toggle switch to ON.
25. Press system status panel RESET pushbutton switch several times and observe that tape strip moves.
26. Press NORMAL HALT pushbutton switch and observe that PRCS HALT indicator lights.
27. Set OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
28. Set RUN/ONE INSTR toggle switch to ONE INSTR.
29. Set WSR toggle switches to 00277750.
30. Press INITIATE pushbutton switch and observe that BUS INDICATOR displays 00277750.
31. Set OPERATIONAL CONTROL rotary switch to CMPT.
32. Set RUN/ONE INSTR toggle switch to RUN.

33. Press INITIATE pushbutton switch and observe:
    a. Tape begins to load into memory.
    b. PRGM HALT indicator lights at end of tape loading.
    c. BUS INDICATOR displays 00277777 at completion of tape read-in.
34. Remove operational program tape strip.
35. Press NORMAL HALT pushbutton switch and observe PRCS HALT Indicator lights.
36. Set OPERATIONAL CONTROL rotary switch to STORE and REGISTER SELECT to PEX.
37. Set WSR toggle switches to 00002000.
38. Press the CLEAR and INITIATE pushbutton switches, in turn, and observe BUS INDICATOR displays 00002000.
39. Place page 0, 1, and 2, each in turn, on paper tape reader and press the system status panel RESET pushbutton switch several times and observe that the tape(s) move.
40. Set OPERATIONAL CONTROL rotary switch to CMPT.
41. Set RUN/ONE INSTR toggle switch to RUN.
42. Press INITIATE pushbutton switch and observe tapes start to load and when complete BUS INDICATOR displays 00002056 and the PRGM HALT indicator lights.
43. Set system status panel TAPE REWIND switch to ON and remove the data base tapes when rewound.
44. Place current directory tape on paper tape reader and press system status RESET pushbutton switch several times to see if tape moves.
45. Press NORMAL HALT pushbutton switch and observe PRCS HALT indicator lights.
46. Set MEMORY guarded switch to PROTECTED position.
47. Check to be sure the REAL TIME CLOCK rotary switch is set to the ENABLE position.
48. Set OPERATIONAL CONTROL rotary switch to STORE and REGISTER SELECT to PEX.
49. Set WSR toggle switches to 00240000 for the AN/TTC/38(V)1 or to 60240000 for the AN/TTC-38(V)2.
50. Press INITIATE pushbutton switch and observe BUS INDICATOR displays either 00240000 or 60240000.
51. Set OPERATIONAL CONTROL rotary switch to CMPT.
52. Press INITIATE pushbutton switch and observe that the ACTIVE Indicator is illuminated.
53. Set function code to 13.
54. Set ASR bit 21 to a 1 to read in current directory tape.
55. Press READ pushbutton switch.
56. Rewind the current directory after completion.
57. Load the patch tapes, if any, in the paper tape reader.
58. Set MEMORY guarded switch to UNPROTECTED position.
59. Set ASR bit 22 to 1 read in the patch tapes.
60. Press READ pushbutton switch for each patch tape.
61. At the completion, set the MEMORY guarded switch to the PROTECTED position.
62. Load the data base update tape(s), if required, on the paper tape reader.
63. Set ASR bit 23 to a 1 to read the data base update tape(s).
64. Press the READ pushbutton switch for each data base update tape.
65. If the PROCESSOR STATUS ON-LINE indicator illuminates, set the function code to 03.
66. Press READ pushbutton switch.

Section III. RESTORING PRELOADER

1. Press NORMAL HALT pushbutton switch and observe that PRCS HALT indicator illuminates.
2. Set RUN/ONE INSTR toggle switch to ONE INSTR.
3. Set the ASR toggle switches to 00277772.
4. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY and the REGISTER SELECT to MEM.
5. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 62500476.
6. Set the MEMORY guarded switch to the UNPROTECTED position.
7. Set the WSR toggle switches to 62501776.
8. Set the OPERATIONAL CONTROL rotary switch to STORE.
9. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 62501776.
10. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
11. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 62501776.
12. Set the ASR toggle switches to 277774.
13. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 74100235.
14. Set the WSR toggle switches to 74100107.
15. Set the OPERATIONAL CONTROL rotary switch to STORE.
16. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 74100107.
17. Set the OPERATIONAL CONTROL rotary switch to MEMORY DISPLAY.
18. Press the INITIATE pushbutton switch and observe that BUS INDICATOR displays a reading of 74100107.
19. Set all WSR toggle switches to 0's.
20. Set the CLOCK OPERATE CONTROL rotary switch to CONT.
21. Set the MEMORY guarded switch to the PROTECTED position.
22. Set the REGISTER SELECT rotary switch to MEM and the OPERATIONAL CONTROL to STORE SEQL.
23. Set the RUN/ONE INSTR toggle switch to RUN.
24. Press the COORDINATE and INITIATE pushbutton switches and observe that the ACTIVE Indicator illuminates.
25. Place the operational program strip tape (SM-D-751709) on the paper tape reader.
26. Set the paper tape reader MODE SELECT toggle switch to STRIP and the POWER ON/OFF to ON.
27. Set the system status panel RESET SELECT TAPE READER toggle switch to ON.
28. Press the system status pane RESET pushbutton switch several times and observe that the operational program strip tape moves.
29. Press the normal HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
30. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
31. Set the RUN/ONE INSTR toggle switch to ONE INSTR.
32. Set the WSR toggle switches to 00277750.
33. Press the INITIATE pushbutton switch and observe that the BUS INDICATOR displays 00277750.
34. Set the OPERATIONAL CONTROL rotary switch to CMPT.
35. Set the RUN/ONE INSTR toggle switch to RUN.

36. Press the INITIATE pushbutton switch and observe that:
    a. Operational program strip tape loads into memory.
    b. PRGM HALT indicator illuminates at end of loading process.
    c. BUS INDICATOR displays 00277777.
37. Remove the tape strip from the paper tape reader.
38. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator illuminates.
39. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
40. Set the WSR toggle switches to 00002000.
41. Press the INITIATE and CLEAR pushbutton switches, in turn, and observe that the BUS INDICATOR displays 00002000.
42. Place page 0 on the paper tape reader.
43. Set the paper tape reader MODE SELECT toggle switch to READ and press the system status panel RESET pushbutton switch several times and observe that the data base tape moves.
44. Set the OPERATIONAL CONTROL rotary switch to CMPT.
45. Set the RUN/ONE INSTR toggle switch to RUN.
46. Press the INITIATE pushbutton switch and observe that:
    a. Data base tape (page 0) loads into memory.
    b. PRGM HALT indicator illuminates at end of loading process.
    c. BUS INDICATOR displays 00002056.
47. Set the system status panel TAPE REWIND toggle switch to ON and then remove the tape reel from the paper tape reader.
48. Press the NORMAL HALT pushbutton switch and observe that the PRCS HALT indicator Illuminates.
49. Set the REAL TIME CLOCK toggle switch to ENABLE.
50. Set the OPERATIONAL CONTROL rotary switch to STORE and the REGISTER SELECT to PEX.
51. Set the WSR toggle switches to 00240000 for the AN/TTC-38(V)1 or to 60240001 for the AN/TTC-38(V)2.
52. Press the INITIATE pushbutton switch and observe the BUS INDICATOR displays 00240000 or 60240001.
53. Set the OPERATIONAL CONTROL rotary switch to CMPT.
54. Press the INITIATE pushbutton switch and observe that the ACTIVE indicator illuminates.
55. Place the current directory tape reel on the paper tape reader.
56. Set the paper tape reader MODE SELECT toggle switch to REEL and the POWER ON/OFF to ON.
57. Press the system status panel RESET pushbutton switch several times and observe that the tape reel move.
58. Set the function code to 13.
59. Set ASR bit 21 to a 1 and press the READ pushbutton switch to read in the current directory.
60. Rewind the current directory after completion.
61. Load the data base update tapes, If required, in the paper tape reader.
62. Set the MODE SELECT switch to STRIP.
63. Set ASR bit 23 to a 1 and press the READ pushbutton to read in the data base update tapes
64. If the PROCESSOR STATUS ON-LINE indicator illuminates, set the function code to 03 and press the READ pushbutton switch to connect the processor to the network.

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

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Major General, United States Army
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ARNG & USAR: None.
For explanation of abbreviations used, see AR 310-50.

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