60471180

CONTROL DATA CORPORATION

COMMUNICATIONS CONTROL INTERCOM VERSION 3 DIAGNOSTIC HANDBOOK

CDC® COMPUTER SYSTEMS
255X SERIES
NETWORK PROCESSOR UNIT
HOST OPERATING SYSTEM
NOS/BE

REVISION RECORD

REVISION	DESCRIPTION
A	Initial Release under NOS/BE
6/13/78	

Publication No.
60471180

Revision letters I, O, Q, and X are not used.

Address comments concerning this manual to:

Control Data Corporation
Publications and Graphics Division
3519 West Warner Avenue
Santa Ana, CA 92704

or use Comment Sheet in the back of this manual.

Printed in the United States of America

LIST OF EFFECTIVE PAGES

New features, as well as changes, deletions, and additions to information in this manual, are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV
Cover	-								
Title	-								
ii thru vii	A								
1-1 thru 1-7	A								
2-1 thru 2-44	A								
3-1 thru 3-36	A								
4-1 thru 4-25	A								
A-1 thru A-6	A								
B-1 thru B-5	A								
C-1	A								
D-1	A								
E-1	A								
F-1 thru F-3	A								
Comment Sheet	A								
Mailer	-								
Back Cover	-								

PREFACE

This handbook describes messages associated with Version 3 of the Communications Control INTERCOM (CCI 3.0) that is used with the CONTROL DATA 2550 Series Network Processing Unit (NPU). The CCI is the operating software for the NPU which provides front-end and remote message distribution functions for a CDC 6000 or CYBER 70/170 host computer system. The CYBER host system operates under control of the NOS/BE operating system.

Two types of diagnostics are described: the inline diagnostic that is an integral part of the CCI, and the optional on-line diagnostics for testing network lines. Off-line diagnostics are discussed in the appropriate hardware reference manuals.

The purpose of these descriptions is to assist system operators and customer engineers (CEs) in the isolation of system faults. Any codes appearing within these messages are described and defined. Brief instructions on dump interpretation are also provided. To interpret the dump, either with or without a halt code, the user will need a link edit listing of the CCI for this NPU.

Diagnostic information for the NPU can be divided into the following categories:

- service messages to the host computer which are not related to an NPU halt; these inline diagnostic messages include alarms, CE errors, and statistics (described in section 2)
- halt codes and dump interpretation information (described in section 3)
- on-line diagnostic tests (described in section 4)
- off-line diagnostic tests (described in the NPU Hardware Reference Manual, MSMP Diagnostic Reference Manual, MOS Cookbook, and in the ODS Reference Manual; other equipment-oriented hardware tests are described in the appropriate hardware maintenance manual for the individual equipment)

The CE error codes, statistics service messages, halt codes, and on-line diagnostic test responses are given in the form of Diagnostic Decision Logic Tables (DDLTs) which aid the troubleshooter in interpreting the message and isolating and correcting the hardware or software malfunction.

CONVENTIONS USED

Throughout this handbook, the following conventions are used in the presentation of statement formats, operator type-ins, and diagnostic messages:

ALN	Upper case letters indicate words, acronyms, or mnemonics either required by the network software in input to it, or produced as output.
aln	Lower case letters identify variables for which values are supplied by the NAM or terminal user, or by the network software as output.
. . .	Ellipsis indicates that omitted entities repeat the form and function of the entity last given.
[ ]	Square brackets enclose entities that are optional; if omission of any entity causes the use of a default entity, the default is underlined.
{ }	Braces enclose entities from which one must be chosen.

Unless otherwise specified, all references to numbers are to decimal values, and all references to characters are to 8-bit ASCII coded characters.

RELATED MANUALS

Further information related to the 2550 Series NPU software, as well as hardware, is contained in the publications listed below. These publications are available through the Control Data Literature Distribution Services, Minneapolis, Minnesota.

Publication Title	Publication Number
Communications Control INTERCOM, Version 3, Reference Manual	60471150
Communications Control INTERCOM, Version 3, System Programmer's Reference Manual	60471160
MSMP Diagnostic Reference Manual	96700000
Network Processor Unit Hardware Reference Manual (for 2551-1, 2551-2, and 2552-2)	60472800
Network Processor Unit Hardware Maintenance Manual (for 2551-1, 2551-2, and 2552-2)	60472000
ODS 2 Reference Manual	96768410
CYBER 18-20/30 Systems Maintenance Manuals (MOS Cookbook) - 3 volumes	96768681 96768682 96768683

Communications Multiplex Hardware Maintenance Manual	96768610
CYBER 170, CYBER 70 and 6000 Series Concurrent Maintenance Library Reference Manual	60454740

CDC manuals can be ordered from Control Data Literature Services, 8001 Bloomington Freeway, Minneapolis, MN 55420.

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features or undefined parameters.

CONTENTS

1. INTRODUCTION 1-1

Diagnostics Available 1-1
Use of Diagnostic Decision Logic Tables 1-1
Assumptions 1-1
Conditions 1-1
Responses 1-1
CE Error and Statistics Messages 1-1
Halt Codes/Dumps 1-3
Operator-Initiated On-Line Diagnostics 1-3
Entering Diagnostic Mode DDLT 1-3

2. CE ERROR AND STATISTICS MESSAGES 2-1

CE Error Messages 2-1
Statistics Messages 2-1

3. HALT CODE MESSAGES AND DUMP INTERPRETATION 3-1

Halt Codes 3-1
NPU Dumps 3-2
Dump Interpretation Without Halt Message 3-2
Interpretation Instructions 3-2
NPU Console Commands 3-2

4. ON-LINE DIAGNOSTIC TESTS 4-1

Operating Instructions 4-1
Response Format 4-1
Internal Loopback Test 4-1
External Loopback Test 4-2
Modem Loopback Test 4-3
DDLTs For On-Line Diagnostic Tests 4-3
Communications Line Fault Isolation 4-3
CLA Internal and External Loopback Test Modes 4-3
External Data Loopback Mode 4-6
Preliminary Information Required 4-6
External Data Loopback Tests 4-23
Suggested Loopback Test Sequence 4-23

APPENDIXES

A Standard Character Sets A-1
B Glossary B-1
C System Messages C-1
D Data Line Problem Solving D-1
E CLA Replacement E-1
F Commands F-1

FIGURES

1-1 Sample DDLT 1-2
1-2 Flowchart Showing Entry to Diagnostics 1-4
2-1 Flowchart for CE Error Codes DDLT 2-5
2-2 Flowchart for Statistics Messages DDLT 2-
3-1 Flowchart for Halt Codes DDLT 3-3
3-2 Sample NPU Dump 3-34
3-3 NPINTAB Table Starting Address Format 3-36
4-1 CLA Status Word 4-6
4-2 Flowchart for On-Line Diagnostic DDLTs 4-7
4-3 Loopback Points 4-24

TABLES

1-1 DDLT for Entering Diagnostic Mode 1-5
2-1 CE Error Codes 2-2
2-2 CE Error Message Text Definitions 2-3
2-3 CE Error Codes DDLT 2-6
2-4 Statistics Message Text Definitions 2-39
2-5 Statistics Message Type = 01 (NPU Statistics) 2-42
2-6 Statistics Message Type = 02 (Line Statistics) 2-43
2-7 Statistics Message Type = 03 (Mode 4 Terminal Statistics) 2-44
3-1 Halt Codes DDLT 3-4
3-2 Address Table 3-35
4-1 Modem Classes 4-2
4-2 Responses to Start On-Line Diagnostic Test Commands from NPU Console 4-3
4-3 On-Line Diagnostic Test Error Codes 4-4
4-4 Responses to Terminate Diagnostic Test Command from NPU Console 4-6
4-5 External Loopback Test 4-6
4-6 On-Line Diagnostics DDLT 4-9
4-7 Common Modems and Loopback Tests Available 4-23

DIAGNOSTICS AVAILABLE

Three types of diagnostic are available for the 2550 Series Network Processing Unit (NPU):

- automatic inline diagnostics (These are of four types: alarm messages sent to the networks operators console, CE error messages sent to the host computer; statistics service messages sent to the host computer; and halt codes which are interpreted together with the associated 255X dump in postmortem diagnostics.)
- operator-initiated on-line diagnostics
- operator-initiated off-line diagnostics

The interpretation and procedures for inline and on-line diagnostics are described in this manual. The interpretation and procedure for off-line diagnostics are described in the NPU Hardware Maintenance Manual, in the ODS Manual and in the MSMP Diagnostic Reference Manual.

For ease of operation, most of the diagnostics in this handbook are given in the form of Diagnostic Decision Logic Tables (DDLTs).

USE OF DIAGNOSTIC DECISION LOGIC TABLES

DDLTs are provided to:

- start the diagnostic mode
- analyze errors detected by CE error messages
- analyze errors indicated by statistics service messages
- analyze halt codes/dumps
- perform operator-initiated on-line diagnostics

A flowchart giving a simplified overview of each DDLT is also provided.

DDLTs identify and isolate equipment malfunctions in replaceable assemblies. The DDLT analyzes a situation for specific conditions and then directs the customer engineer to those actions that will correct the situation, with the most likely action listed first. The table is arranged in five sections: assumptions, conditions, responses, actions, and sequence of actions (see the DDLT example in figure 1-1).

ASSUMPTIONS

The upper section of the DDLT contains the prerequisites for the specific tests to be performed. The DDLT is valid only if all assumptions are true.

CONDITIONS

The center left section of the DDLT contains the conditions or tests to be made. They are in the form of questions that can be answered yes or no.

RESPONSES

The center right section of the DDLT contains the response to the question asked in the Conditions section. Note that each condition, or question, can be answered with a yes (Y) or a no (N). The example chosen for figure 1-1 has four unique situations, numbered from 1 to 4; left to right. The shaded area in the example shows the conditions that define situation 3.

The first condition limits the range of response codes. If the response code is yes, check the next condition. In the example, the response is no, the appropriate test has not been run. Note that the next condition cannot be checked. Reading down column 3, it is discovered that only one action (marked by an X) is appropriate. The operator takes this action; that is, he runs the CLA external loopback test. That test will give its own response code which will take the operator back through the DDLT again.

Note that if the response to both the first two conditions was a yes, the operator would have taken the action in column 1 (third condition = yes) or column 2 (third condition = no). In either case, there would have been more than one action that could be taken. The operator would perform each action in the sequence indicated until the action fixed the problem, or until all suggested actions were tried.

The DDLTs presume all operator inputs are entered correctly. Any incorrect entry may cause the DDLT to direct an incorrect action. Hence, if any doubt exists about the accuracy of the operator entry, always repeat the sequence of DDLT steps that led up to an action before taking further actions.

CE ERROR AND STATISTICS MESSAGES

CE error messages are generated by the CCI (the NPU operating system) in response to hardware error conditions detected while processing messages. CE error messages are generated in response to individual failures and are sent to the host; alarm messages are generated when the number of failures for a class of CE error messages passes a threshold level. This message is directed to the network operator's console. The only console involved with diagnostic processing is the NPU console.

Statistics service messages are generated for individual lines and terminals are disabled as a system default option. Both CE error and statistics service messages are passed upline to the host computer engineering file where they can later be processed by the Hardware Performance Analyzer (HPA), one of the host application programs. These messages are described in section 2.

ASSUME

1. The Communications Control INTERCOM is loaded, initialized and operating at least to the idle state.
2. MLIA is working since the system has not halted.
3. After each corrective action, the test should be retried.
4. The operator is familiar with the DDLT format.
5. The operating instructions for the on-line diagnostics are given on the previous pages.

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Look at the eighth byte of data in the diagnostic test response at the console. This is the response code. Is the response code AB thru DB, or DF?	Y	Y	Y	N
2. Have you already successfully tested the CLA in the external loopback mode using an external test connector? (If the CLA type does not allow an external loopback test, have you run the internal loopback mode successfully?)	Y	Y	N	-
3. Have you already run the modem loopback mode test on this communications line with the local modem looped back towards the CLA successfully?	Y	N	-	-

ACTIONS	SEQUENCE			
1. Replace the local modem.	1	4	-	-
2. Have local telephone central office check the local telephone line.	2	5	-	-
3. Run the CLA loopback external mode test.	-	-	X	-
4. You have misinterpreted the directions. Return to sheet 6 and run the DDLT again.	-	-	-	X
5. Run the modem loopback mode test on this communications line with the local modem looped back towards the CLA.	-	1	-	-
6. If the local modem has no loopback, replace the modem cable.	-	2	-	-
7. If the local modem has no loopback, replace the CLA.	-	3	-	-

Figure 1-1. Sample DDLT

NOTE

Other inline messages (such as line failure) and failure messages (such as the host computer detecting a failure of the NPU by means of timing out an operation) are described elsewhere, since these messages are not a part of the CCI diagnostic software package.

HALT CODES/DUMPS

In case of a fatal error which causes the NPU to stop, an NPU subroutine normally saves the cause of the stoppage in the form of a halt code. Then the information in the NPU main memory, the microprocessor file 1 registers, and a microprocessor checksum are dumped into a host computer file. This file is processed by a dump analyzer utility program in the host. The resulting data is output on a printer or CRT.

Analysis of the halt code and the associated dump aids the CE/analyst in determining the NPU malfunction. In some cases, the halt code message is not generated. In these cases it is still possible to analyze the failure using information that was saved in the dump operation. Halt codes and dump interpretation are discussed in section 3.

OPERATOR-INITIATED ON-LINE DIAGNOSTICS

From the NPU console, the operator can initiate on-line diagnostics. To aid in running the tests, the operator has the option of directing selected service messages to the NPU console. Commands to perform the individual tests are entered from the NPU console. The tests themselves are closed-loop tests for individual network lines. As a part of the tests, eight characters of data are sent on a closed-loop path. The returned characters are compared with the transmitted characters to provide a data quality check along with the other test functions.

The line to be tested must be dialed to some unused CLA address. Then, in order of increasing complexity, the line may be tested by a CLA internal loop test, by a modem loop test, or an external loop test. The last named test requires a jumper plug; the others require only the proper software commands and (in some cases) positioning of test switches on local or remote equipment. Additional line checking may be requested of the telephone company. Additional terminal tests (self tests) are described in the hardware manuals for the terminal hardware.

On-line, operator-initiated diagnostics are discussed in section 4.

ENTERING DIAGNOSTIC MODE DDLT

Figure 1-2 is a flowchart indicating the mode of entering diagnostic operations. Table 1-1 is the entry mode in DDLT format.

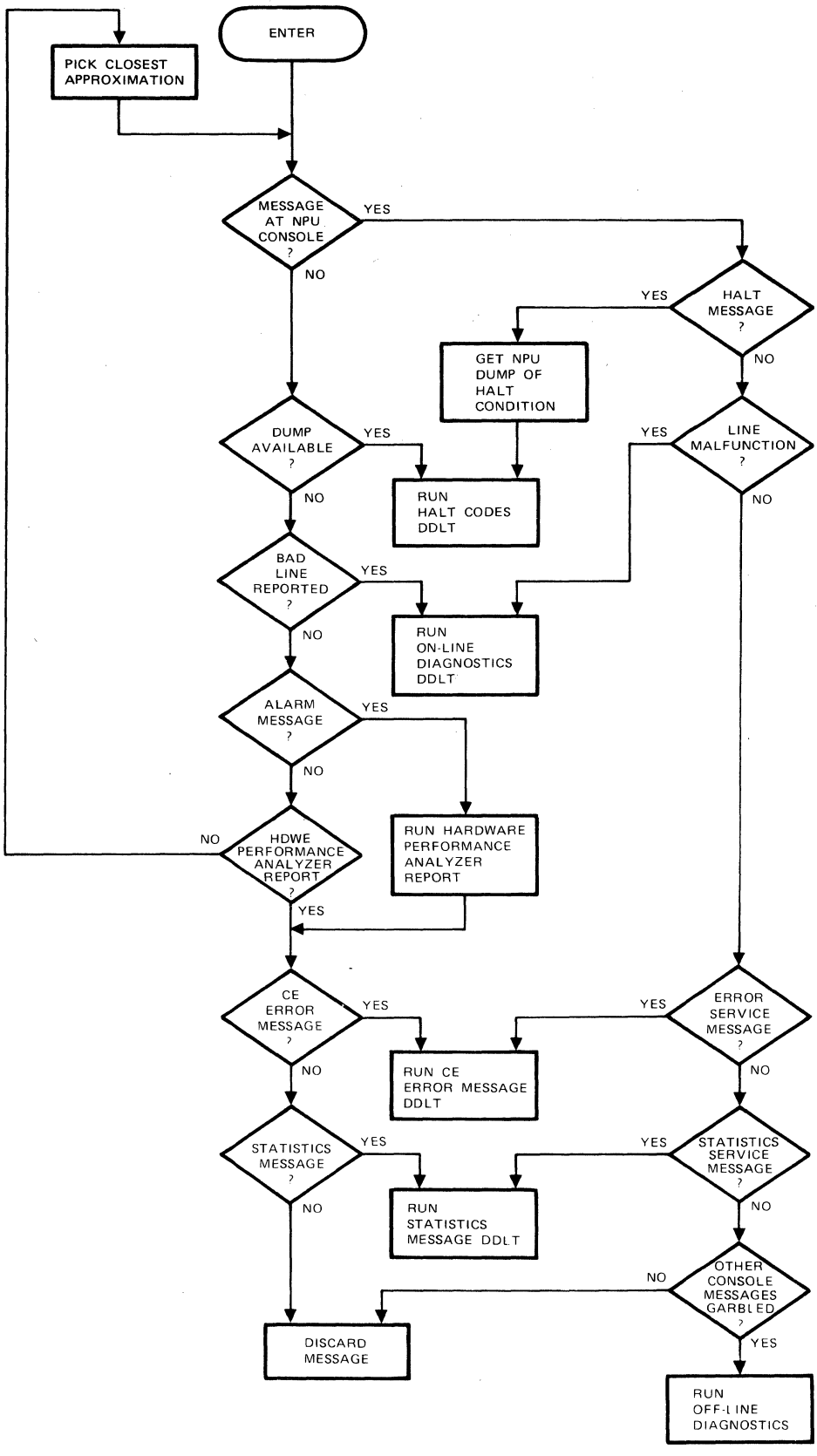


Figure 1-2. Flowchart Showing Entry to Diagnostics

TABLE 1-1. DDLT FOR ENTERING DIAGNOSTIC MODE (Sheet 1 of 3)

ASSUME
1. Operator is familiar with DDLT format.

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Are you responding to messages on the NPU console?	Y	N	N	N	N	N
2. Are you responding to a dump?	-	Y	N	N	N	N
3. Are you responding to a terminal user's telephone call stating that his line is not working, or to a network system operator's report that a line is bad?	-	-	Y	N	N	N
4. Are you responding to a HPA (Hardware Performance Analyzer) report?	-	-	-	Y	N	N
5. Are you responding to a CE or statistics message from the NPU?	-	-	-	-	-	Y
ACTIONS	**SEQUENCE**					
1. Go to sheet 2.	X	-	-	-	-	-
2. Go to section 3 (System Halt Codes).	-	X	-	-	-	-
3. Go to section 4 (On-line Diagnostics) and run diagnostics on the specified line(s) following the communications line fault isolation techniques described at the end of section 4.	-	-	X	-	-	-
4. Go to sheet 3.	-	-	-	X	-	-
5. Pick the condition most similar to one of the four listed conditions. Then take the action indicated.	-	-	-	-	X	-
6. Run HPA in the host to obtain more information on the malfunctioning line, MLIA, or coupler. Then go to sheet 3.	-	-	-	-	-	X

TABLE 1-1. DDLT FOR ENTERING DIAGNOSTIC MODE (Sheet 2 of 3)

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Are you responding to a system halt?	Y	N	N	N	N	N
2. Are you responding to a line-related problem?	-	Y	N	N	N	N
3. Are you responding to a service message?	-	-	Y	N	N	N
4. Look at the PFC byte of the service message. Does the PFC byte = 0A and the SFC byte = 00? (This indicates a CE error message.)	-	-	Y	N	N	N
5. Does the PFC byte = 0A and the SFC byte = 01? (This indicates an alarm message.)	-	-	-	Y	N	N
6. Does the PFC byte = 07? (This indicates a statistics message.)	-	-	-	-	Y	N
ACTIONS	**SEQUENCE**					
1. Take an NPU dump and go to section 3 (Halt Code DDLTs). NOTE: INTERCOM should have already initiated the dump.	X	-	-	-	-	-
2. Go to section 4 (On-line Diagnostics) and run diagnostics on the specified line(s).	-	X	-	-	-	-
3. Go to section 2 (CE Error Messages).	-	-	X	-	-	-
4. Discard the message (alarm message).	-	-	-	X	-	-
5. Go to section 2 (Statistics Messages).	-	-	-	-	X	-
6. This message is garbled. If other console messages are also garbled, run off-line MSMP console diagnostics during PM (preventive maintenance) period. Otherwise, discard this message.	-	-	-	-	-	X

TABLE 1-1. DDLT FOR ENTERING DIAGNOSTIC MODE (Sheet 3 of 3)

CONDITIONS	SITUATIONS		
	1	2	3
1. Are you responding to a CE error message?	Y	N	N
2. Are you responding to a statistics message?	-	Y	N
ACTIONS	**SEQUENCE**		
1. Go to section 2 (CE Error Messages).	X	-	-
2. Go to section 2 (Statistics Messages).	-	X	-
3. On HPA reports, only CE error messages and statistics messages concern the CCI system. Ignore other types of message.	-	-	X

Two types of inline messages are of intererst to the customer engineer:

- A CE error message details an equipment failure. It is sent to the host engineering file.
- A statistics service message (SM) gives a history of device (NPU or terminal) or line functioning. It is sent upline to the host engineering file. After one SM has been generated for each device or line, the cycle begins again. Statistics SMs are also generated when any counter holding statistics information overflows. A line statistics SM is generated when a line is disconnected or deleted. A terminal statistics SM is generated when a terminal is deleted.

Message interpretation and suggested CE actions are given in this section.

CE ERROR MESSAGES

A service message is created for every detected hardware-related abnormality. This includes all NPU-related hardware such as the coupler, MLIA, loop multiplexers, and CLAs; and also all connected hardware such as modems, lines, and terminals. The creation of a CE error file report is separate from, and in addition to, statistics accumulated in the NPU and periodically supplied to the host.

To prevent swamping the NPU or host with error messages when an oscillatory condition arises, an error counter is incremented each time an error message is generated. When the counter reaches a pre-established (at program build) threshold, the error event is discarded rather than recorded. The counter is periodically reset to zero by timing out another counter whose threshold is also a pre-established parameter.

The format for CE error messages (with each byte containing two hexadecimal digits or one ASCII character) is:

Link header	DN	SN	CN =00	P/RES/ BT=04	PFC =0A	SFC =00	EC	TEXT

where:

DN	Destination node	
SN	Source node	
CN	Connection number - 00 for service messages	
P/RES	Unused	
BT	Block type - 4 is CMD block	
PFC	Primary function code - 0A	CE error message
SFC	Secondary function code - 00	CE error message
EC	Error codes (see table 2-1)	
TEXT	Error-code-dependent text (see table 2-2)	

It is possible to display messages at the NPU console by use of the /SUP command (described in on-line diagnostics in section 4). If this is done, the link header is suppressed and the displayed bytes are numbered as shown above. The displayed format is:

nn nn nn nn - first four displayed bytes
nn nn nn nn . . nn - all other displayed bytes

Such CE error messages can be divided into six categories as follows:

1. Modem signal messages (error codes 01 thru 03, 0B, and 0C)
2. CLA messages (error codes 04 thru 0A and 0D thru 10)
3. MLIA messages (error code 11)
4. Coupler messages (error codes 20 thru 24, and 26 thru 29)
5. Real-time clock messages (error code 18)
6. Unused codes (all others)

Figure 2-1 is a flowchart summarizing the DDLT procedure for CE error messages. Table 2-3 lists the CE error messages in DDLT form. The suggested action to be taken by the CE when the message occurs is contained in the DDLT.

NOTE

In the CE Error Messages DDLT, all references to the off-line diagnostic refer to diagnostics listed and described in the NPU Hardware Maintenance Manual, the ODS Manual, and the MSMP Diagnostic Reference Manual. Procedures for running those diagnostics and hints on using them to isolate equipment malfunctions are provided in those manuals.

STATISTICS MESSAGES

Statistics messages are normally disabled. They can be enabled from the local console by doing a Ⓖ/SUPⒹ△LOC,7,FF,1ⒹⒼ. The NPU contains a statistics reporting timer (interval selected at program build time) that causes statistics messages to be generated at pre-established intervals. Statistics blocks are maintained for the NPU, for each line control block, and for each terminal control block. One such block is dumped and cleared at each timer timeout. Therefore, the accumulation period for a statistic is equal to the number of statistics blocks multiplied by the timer interval in seconds.

In addition to the normal statistics message generated by timer timeout, disconnecting or disabling a line causes the associated statistics block to be dumped and cleared. A terminal statistics block is also dumped and cleared when the logical connection to the terminal is broken. If a counter contained within a statistics block overflows, that counter is set to all ones and the statistics block is dumped and cleared.

TABLE 2-1. CE ERROR CODES

Code (Hexadecimal)	Significance
01	Disconnect of switched line ($\overline{DSR}$)
02	Abnormal data set ready (DSR) or clear to send (CTS)
03	Abnormal data carrier detect ($\overline{DCD}$)
04	Unsolicited output data demand (ODD)
05	CLA address out of range
06	Illegal mux loop cell format
07	Unsolicited input
08	Input mux loop error
09	Output mux loop error
0A	TIP event receiver timeout for ODD
0B	TIP event receiver timeout for DCD
0C	Abnormal secondary data carrier detect (SDCD)
0D	Excessive CLA status messages
0E	Framing error
0F	Next character not available (output)
10	Data transfer overrun (output)
11	MLIA error status
12	Upline break counter overflow
13	Invalid DBC
14 . . . 1F	Not used
20	Deadman timeout
21	Spurious coupler interrupt
22	Chain address zero
23	Hardware timeout on input
24	Input data transfer terminated by PPU
25	Not used
26	Not used
27	Output data transfer terminated by PPU
28	Hardware timeout on output
29	End of operation (EOP) missing

For all types of statistics messages, the first several bytes of the message are the same. The remaining bytes are unique to each message type. Format of the common bytes is as follows:

Link header	DN	SN	CN =0	P/RES/ BT=4	PFC =7	SFC	TEXT

where:
- DN — Destination node - 00 - engineering file in host
- SN — Source node - originating NPU
- CN — Connection number - 00 for statistics message
- P/RES — Unused
- BT — Block type - 4 = CMD block
- PFC — Primary function code - 7 = statistics message
- SFC — Secondary function code
  - 01 = NPU statistics
  - 02 = Line/trunk statistics
  - 03 = Terminal statistics
- TEXT — See table 2-4

TABLE 2-2. CE ERROR MESSAGE TEXT DEFINITIONS (Sheet 1 of 2)

<table>
<tr><th>Error Codes (Hexadecimal)</th><th>Text Definition</th></tr>
<tr><td>01
thru
10</td><td>
<table>
<tr><td>P</td><td>00</td><td>S1</td><td>S2</td></tr>
</table>

where: P — Port number (CLA address)
S1 — CLA status byte 1 (logical format) } S1 and S2 not used for
S2 — CLA status byte 2 (logical format) } ECs 04-07, 0A, 0B, 10

CLA status byte 1

bits
<table>
<tr><td>CTS</td><td>DSR</td><td>DCD</td><td>RI</td><td>QM</td><td>SQD</td><td>ILE</td><td>OLE</td></tr>
</table>

CLA status byte 2

bits
<table>
<tr><td>PES</td><td>DTO</td><td>FES</td><td>NCNA</td><td></td><td></td><td></td><td></td></tr>
</table>
Unused

where:
CTS — Clear to send
DSR — Data Set ready
DCD — Data carrier detect
RI — Ring indicator
QM — Quality monitor
SQD — Signal quality detector
ILE — Input loop error
OLE — Output loop error
PES — Parity error status
DTO — Data transfer overrun
FES — Framing error status
NCNA — Next character not available
</td></tr>
<tr><td>11</td><td>
<table>
<tr><td>ET</td><td>ILE</td><td>LD</td><td>AL</td></tr>
</table>

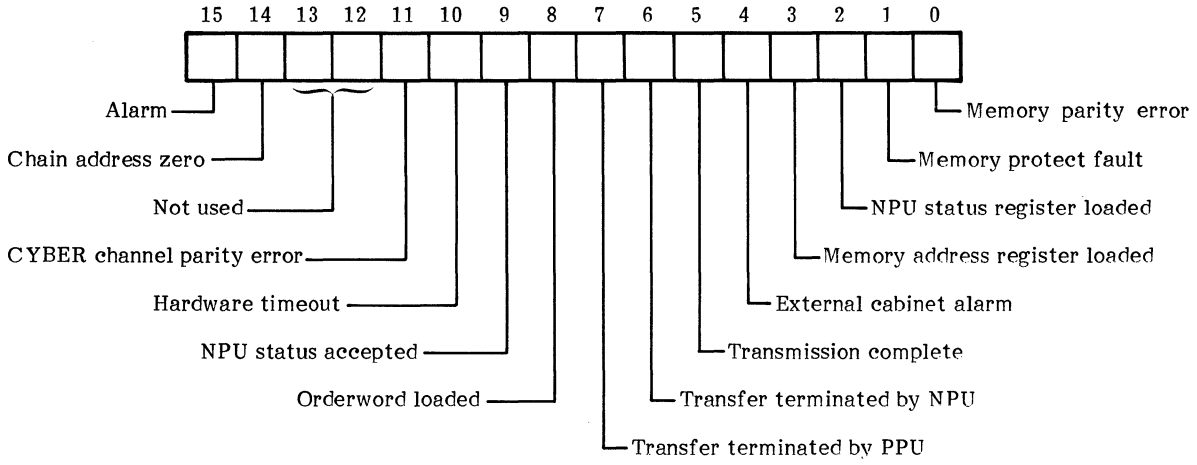
where:
ET — Error type (00 = Error condition restored
01 = Error counts given
02 = MLIA failure)
ILE — Input loop error count } only listed if ET = 01
LD — Lost data count } (2 bytes each)
AL — Alarm count }
</td></tr>
<tr><td>12</td><td>
<table>
<tr><td>RC</td><td>P</td><td>00</td><td>CA</td><td>TA</td></tr>
</table>

where:
RC — Reason code
2 = no response
3 = bad response
4 = error response
P — Port
CA — Cluster address
TA — Terminal address
</td></tr>
</table>

TABLE 2-2. CE ERROR MESSAGE TEXT DEFINITIONS (Sheet 2 of 2)

Error Codes (Hexadecimal)	Text Definition
13	P | 00 | CA | TA | IDBC where: P Port; CA Cluster address; TA Terminal address; IDBC Illegal DBC (6, 7, 14, or 15)
20	LS | NS where: LS Last state; NS Current state
21 thru 24	CP | ST where: CP and ST Coupler status word†
27 thru 29	CP | ST where: CP and ST Coupler status word†

†Coupler Status Word (CP and ST)



The remaining statistics message bytes are shown in table 2-4. Byte assignment and byte meaning are also given in that table for each of the three statistics message types. The information in the statistics messages is stored in host files. This information is most easily made available by running the Host Performance Analyzer Program as described in the Communications Multiplex Hardware Maintenance Manual.

Figure 2-2 is a flowchart summarizing the DDLT procedures for the three types of statistics messages. Tables 2-5, 2-6, and 2-7 are the DDLTs for NPU, trunk/line, and terminal statistics messages.

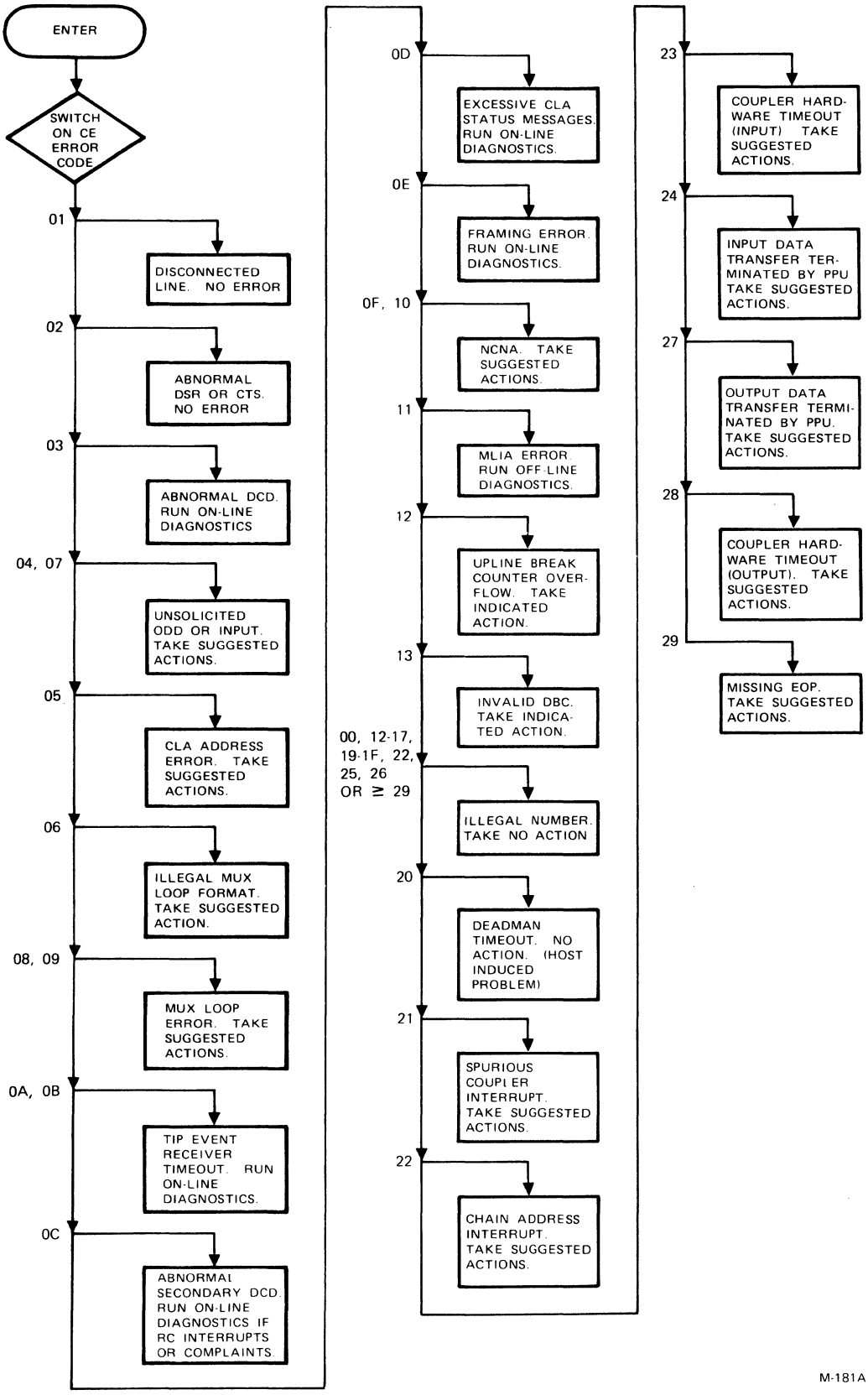


Figure 2-1. Flowchart for CE Error Codes DDLT

TABLE 2-3. CE ERROR CODES DDLT (Sheet 1 of 33)

Error Code Selection

ASSUME

1. Operator is familiar with DDLT format.
2. CE error message has error code.

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Look at the EC byte of the CE error message to find the error code (byte follows SFC byte). Is the error code = 01?	N	N	N	N	N	Y
Is the error code = 02?	N	N	N	N	Y	-
Is the error code = 03?	N	N	N	Y	-	-
Is the error code = 04?	N	N	Y	-	-	-
Is the error code = 05?	N	Y	-	-	-	-

ACTIONS	SEQUENCE					
1. Go to sheet 2.	X	-	-	-	-	-
2. Go to sheet 14.	-	X	-	-	-	-
3. Go to sheet 13.	-	-	X	-	-	-
4. Go to sheet 12.	-	-	-	X	-	-
5. Go to sheet 11.	-	-	-	-	X	-
6. Go to sheet 10.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 2 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 06?	N	N	N	N	N	Y
2. Is the error code = 07?	N	N	N	N	Y	-
3. Is the error code = 08?	N	N	N	Y	-	-
4. Is the error code = 09?	N	N	Y	-	-	-
5. Is the error code = 0A?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 3.	X	-	-	-	-	-
2. Go to sheet 17.	-	X	-	-	-	-
3. Go to sheet 16.	-	-	X	-	-	-
4. Go to sheet 16.	-	-	-	X	-	-
5. Go to sheet 13.	-	-	-	-	X	-
6. Go to sheet 15.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 3 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 0B?	N	N	N	N	N	Y
2. Is the error code = 0C?	N	N	N	N	Y	-
3. Is the error code = 0D?	N	N	N	Y	-	-
4. Is the error code = 0E?	N	N	Y	-	-	-
5. Is the error code = 0F?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 4.	X	-	-	-	-	-
2. Go to sheet 21.	-	X	-	-	-	-
3. Go to sheet 20.	-	-	X	-	-	-
4. Go to sheet 19.	-	-	-	X	-	-
5. Go to sheet 18.	-	-	-	-	X	-
6. Go to sheet 17.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 4 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 10?	N	N	N	N	N	Y
2. Is the error code = 11?	N	N	N	N	Y	-
3. Is the error code = 12?	N	N	N	Y	-	-
4. Is the error code = 13?	N	N	Y	-	-	-
5. Is the error code = 14?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 5.	X	-	-	-	-	-
2. Go to sheet 25.	-	X	-	-	-	-
3. Go to sheet 24.	-	-	X	-	-	-
4. Go to sheet 23.	-	-	-	X	-	-
5. Go to sheet 22.	-	-	-	-	X	-
6. Go to sheet 21.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 5 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 15?	N	N	N	N	N	Y
2. Is the error code = 16?	N	N	N	N	Y	-
3. Is the error code = 17?	N	N	N	Y	-	-
4. Is the error code = 18?	N	N	Y	-	-	-
5. Is the error code = 19?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 6.	X	-	-	-	-	-
2. Go to sheet 25.	-	X	X	X	X	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 4 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 10?	N	N	N	N	N	Y
2. Is the error code = 11?	N	N	N	N	Y	-
3. Is the error code = 12?	N	N	N	Y	-	-
4. Is the error code = 13?	N	N	Y	-	-	-
5. Is the error code = 14?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 5.	X	-	-	-	-	-
2. Go to sheet 25.	-	X	-	-	-	-
3. Go to sheet 24.	-	-	X	-	-	-
4. Go to sheet 23.	-	-	-	X	-	-
5. Go to sheet 22.	-	-	-	-	X	-
6. Go to sheet 21.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 5 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 15?	N	N	N	N	N	Y
2. Is the error code = 16?	N	N	N	N	Y	-
3. Is the error code = 17?	N	N	N	Y	-	-
4. Is the error code = 18?	N	N	Y	-	-	-
5. Is the error code = 19?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 6.	X	-	-	-	-	-
2. Go to sheet 25.	-	X	X	X	X	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 6 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 1A?	N	N	N	N	N	Y
2. Is the error code = 1B?	N	N	N	N	Y	-
3. Is the error code = 1C?	N	N	N	Y	-	-
4. Is the error code = 1D?	N	N	Y	-	-	-
5. Is the error code = 1E?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 7.	X	-	-	-	-	-
2. Go to sheet 25.	-	X	X	X	X	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 7 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 1F?	N	N	N	N	N	Y
2. Is the error code = 20?	N	N	N	N	Y	-
3. Is the error code = 21?	N	N	N	Y	-	-
4. Is the error code = 22?	N	N	Y	-	-	-
5. Is the error code = 23?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 8.	X	-	-	-	-	-
2. Go to sheet 29.	-	X	-	-	-	-
3. Go to sheet 28.	-	-	X	-	-	-
4. Go to sheet 27.	-	-	-	X	-	-
5. Go to sheet 26.	-	-	-	-	X	-
6. Go to sheet 25.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 8 of 33)

Error Code Selection

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the error code = 24?	N	N	N	N	N	Y
2. Is the error code = 25?	N	N	N	N	Y	-
3. Is the error code = 26?	N	N	N	Y	-	-
4. Is the error code = 27?	N	N	Y	-	-	-
5. Is the error code = 28?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 9.	X	-	-	-	-	-
2. Go to sheet 32.	-	X	-	-	-	-
3. Go to sheet 31.	-	-	X	-	-	-
4. Go to sheet 25.	-	-	-	X	X	-
5. Go to sheet 30.	-	-	-	-	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 9 of 33)

Error Code Selection

CONDITIONS	SITUATIONS		
	1	2	3
1. Is the error code = 29?	N	N	Y
2. Is the error code $\geq$ 2A?	N	Y	-
ACTIONS	**SEQUENCE**		
1. You have misinterpreted instructions. Go back to sheet 1 and try again.	X	-	-
2. Go to sheet 25.	-	X	-
3. Go to sheet 33.	-	-	X

CE Error Message 01 - Disconnected Switched Line

ASSUME

The CLA status handler detected a disconnect for a switched line. This message occurs during normal traffic handling when a dial-up connection is terminated.

NOTE: This should not be considered to be an error.

CONDITIONS

None.

ACTIONS

None.

CE Error Message 02 - Abnormal DSR or CTS ASSUME

Abnormal operation of the data set ready (DSR) or clear to send (CTS) modem signals was detected by the CLA status handler. An invalid sequence of modem signal changes or the normal disconnect sequence on some types of line protocols will cause this error message.

NOTE: This message occurs in the normal sequence of disconnecting on some lines. Do not treat this as an error message.

CONDITIONS
None.

ACTIONS
None.

CE Error Message 03 - Abnormal DCD ASSUME

Abnormal operation of the data carrier detect (DCD) signal was detected by the CLA status handler. The DCD failing in the middle of input, or a 10-second timeout of DCD are considered to be abnormal operation. This error message indicates noise on a transmission line.

CONDITIONS	SITUATIONS 1	SITUATIONS 2
1. The byte of the CE error message following the error code contains the CLA address. Does one CLA have more than a dozen of CE error message 03 occurring during one hour?	Y	N
ACTIONS	**SEQUENCE**	
1. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the intermittent CLA line.	X	-
2. Some noise on a transmission line is to be expected. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 03 should not be a matter for concern. However, the test operator can perform the step listed above at his discretion.	-	X

CE Error Messages 04 and 07 - Unsolicited ODD or Input

ASSUME

An unsolicited output data demand (ODD) or unsolicited input was detected by the worklist processor. This is usually caused 1) by connecting and activating a CLA with an address to another active CLA, or 2) by connecting and activating a CLA which happens to give an ODD or an input before the system has enabled it, or 3) by a defective CLA. (Error message 04 is caused by an unsolicited ODD; error message 07 is caused by an unsolicited input.)

CONDITIONS	SITUATIONS		
	1	2	3
1. Has the CE error message been occurring more than a dozen times a day?	Y	Y	N
2. Have some CLAs been plugged in during this time?	Y	N	-
ACTIONS	**SEQUENCE**		
1. Check the addresses on the CLA handles for a duplicated address or for a switch set between two numbers. (The byte of the CE error message following the error code contains the CLA address.)	-	2	-
2. Run ODS load check and mainframe diagnostics.	-	3	-
3. Run MSMP MLIA diagnostics.	-	1	-
4. Run MSMP 6000 Coupler diagnostics.	-	4	-
5. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	-	5	-
6. If there are other outstanding CE error messages, follow the DDLTs for those messages.	-	6	-
7. Call CE or analyst as appropriate.	-	7	-
8. Unless the customer has reason to believe some serious fault exists, an occasional CE error message number 04 or 07 should not be a matter for concern. However, the test operator can perform the seven steps listed above at his discretion.	X	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 14 of 33)

CE Error Message 05 - CLA Address Error ASSUME

The worklist processor found a worklist entry with the CLA address equal to zero, or greater than the maximum allowed address (build time parameter). Most likely a bit of CLA address field is erroneous.

CONDITIONS	SITUATIONS 1	2
1. Has this CE error message been occurring more than a dozen times a day?	Y	N
ACTIONS	**SEQUENCE**	
1. Run ODS load check and mainframe diagnostics.	3	-
2. Run MSMP 6000 Coupler diagnostics.	2	-
3. Replace Coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	4	-
4. Run MSMP MLIA diagnostics.	1	-
5. If other CE error messages are outstanding, follow DDLT for those messages.	5	-
6. Call CE or analyst as appropriate.	6	-
7. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 05 should not be a matter for concern. However, the test operator can perform the six steps listed above at his discretion.	-	X

CE Error Message 06 - Illegal Mux Loop Format

ASSUME

The worklist processor detected an illegal loop cell format in the CIB. This is usually caused by a bad MLIA or a loop multiplexer problem. The only formats accepted are: 1) a CLA address cell followed by a data cell with an end of line frame flag, 2) a CLA address cell followed by two supervision cells (the second supervision cell has the end of line frame flag), 3) a CLA address cell followed by a data cell and two supervision cells (the second supervision cell has the end of line frame flag). This information is found by an examination of a dump. The pointer to the CIB is found at location $015D_{16}$.

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Has CE error message 06 occurred more than three times in one-half hour?	Y	Y	Y	N
2. The byte of the CE error message following the error code contains the CLA address. Did the CE error message occur for one CLA address?	Y	N	N	-
3. Did the CE error message contain CLA addresses of CLAs that reside in one loop multiplexer cage?	-	Y	N	-
ACTIONS	**SEQUENCE**			
1. Replace the primary loop multiplexer card of the loop multiplexer card cage that contains the CLAs whose addresses were in the error messages.	2	1	-	-
2. Replace MLIA card 1 (slot D in core memory machines, slot E in MOS machines).	-	2	1	-
3. Replace MLIA card 2 (slot E in core memory machines, slot F in MOS machines).	-	3	2	-
4. Replace MLIA card 3 (slot F in core memory machines, slot G in MOS machines).	-	4	3	-
5. Replace the CLA with the address indicated in the CE error message.	1	-	-	-
6. Call CE or analyst as appropriate.	3	5	4	-
7. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 06 should not be a matter for concern. However, the test operator can perform the six steps listed above at his discretion.	-	-	-	X

CE Error Messages 08 and 09 - Mux Loop Error **ASSUME**

The CLA status handler has detected a loop error. This is usually caused by noise on the multiplexer loop. Message 08 is an input loop error (ILE); message 09 is an output loop error (OLE).

CONDITIONS	SITUATIONS 1	2
1. Has CE error message 08 or 09 occurred more than three times in one-half hour on the same line number?	Y	N
ACTIONS	**SEQUENCE**	
1. Run on-line diagnostics on the CLA specified by that line number using the CLA internal loopback mode.	1	-
2. Replace the primary loop multiplexer card in the loop multiplexer cage containing the specified CLA.	2	-
3. Replace MLIA card 1 (slot D in core memory machines, slot E in MOS machines).	3	-
4. Replace MLIA card 2 (slot E in core memory machines, slot F in MOS machines).	4	-
5. Replace MLIA card 3 (slot F in core memory machines, slot G in MOS machines).	5	-
6. Replace loop multiplexer cables one at a time.	6	-
7. Call CE or analyst as appropriate.	7	-
8. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 08 or 09 should not be a matter for concern. However, the test operator can perform the seven steps listed above at his discretion.	-	X

CE Error Message 0A or 0B - TIP Event Receiver Timeout

ASSUME

Error message 0A occurs when the TIP event receiver times out an output data demand (ODD) during the transmission of a message.

Error message 0B occurs when the TIP event receiver times out because the data carrier detect (DCD) signal was missing for a period of time longer than the threshold value. These errors can be caused by a noisy transmission line, a bad modem, or a bad CLA.

CONDITIONS	SITUATIONS 1	2
1. The byte of the CE error message following the error code contains the CLA address. Is the CLA receiving more than 6 CE error messages 0A or 0B during one hour?	Y	N
ACTIONS	**SEQUENCE**	
1. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the intermittent CLA.	X	-
2. Some noise on a transmission line is to be expected. Unless the customer has reason to believe some serious fault exists, an occasional CE error message number 0A or 0B should not be a matter for concern. However, the test operator can perform the step listed above at his discretion.	-	X

TABLE 2-3. CE ERROR CODES DDLT (Sheet 18 of 33)

CE Error Message 0C - Abnormal Secondary DCD

ASSUME

Abnormal secondary DCD (received-line signal detector) was detected by the CLA status handler. This signal can be used as an interrupt signal from the terminal equipment and is monitored for a level change.

CONDITIONS	SITUATIONS		
	1	2	3
1. The byte of the CE error message following the error code contains the CLA address. Is the CLA on a line using reverse channel interrupts in its protocol?	N	Y	Y
2. Are there any complaints about the reverse channel interrupt function?	-	Y	N
ACTIONS	**SEQUENCE**		
1. Run on-line diagnostics on the intermittent CLA line using the communications line fault isolation procedures in section 4.	X	X	-
2. None. This is a normal message in response to a reverse channel interrupt.	-	-	X

CE Error Message 0D - Excessive CLA Status Messages

ASSUME

The CLA status handler detected more than 128 status messages from a CLA within one-half second. The byte of the CE error message following the error code contains the CLA line number. This flood of status messages is usually due to very noisy line conditions; however, it may also be caused by a bad CLA or a bad modem.

CONDITIONS

None.

ACTIONS

1. Using the communications line fault isolation techniques in section 4, run on-line diagnostics on the intermittent line.

CE Error Message 0E - Framing Error ASSUME

The CLA status handler has detected framing error status on the line number contained in the byte of the CE error message which follows the error code. This status is set when an asynchronous type of CLA detects a missing stop bit on a character. A missing stop bit is usually caused by noise on the transmission line.

CONDITIONS	SITUATIONS 1	SITUATIONS 2
1. Has CE error message 0E occurred more than three times in one-half hour?	Y	N
ACTIONS	**SEQUENCE**	
1. Using the communications line fault isolation techniques in section 4, run on-line diagnostics on the intermittent line.	X	-
2. Some noise on a transmission line is to be expected. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 0E should not be a matter for concern. However, the test operator can perform the step listed above at his discretion.	-	X

CE Error Messages 0F and 10 - NCNA/Data Transfer Overrun Error

ASSUME

Error 0F occurs when the CLA status handler has detected a next character not available (NCNA) condition. This is caused by a synchronous CLA not having the next character for output in time to keep the output data stream in synchronization.

Error 10 occurs when the CLA status handler has detected a data transfer overrun condition. This is caused by a CLA receiving a second character before the loop multiplexer has accepted the first character. Either problem may occur due to system overloading or due to a bad CLA.

CONDITIONS	SITUATIONS 1	2	3
1. Has CE error message 0F or 10 occurred more than three times in one-half hour?	Y	Y	N
2. The byte of the CE error message following the error code contains the CLA address. Each loop multiplexer card cage is organized so the left-most card slot has highest priority and each succeeding slot to the right has lower priority than its neighbor to the left. On the CLA card, CLA1 has a higher priority than CLA2. If the system has more than one loop multiplexer, the loop multiplexer with the highest priority has its upper cable connected to the MLIA. Check the CLA's priority placement. Are the CLAs in the proper priority placement according to line speed?	Y	N	-
ACTIONS	**SEQUENCE**		
1. Replace the CLA with the address indicated in the CE error message.	1	-	-
2. Place the CLAs in the proper priority positions according to line speed.	-	1	-
3. Call CE or analyst as appropriate.	2	2	-
4. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 0F or 10 should not be a matter for concern. However, the test operator can perform the three steps listed above at his discretion.	-	-	X

CE Error Message 11 - MLIA Error ASSUME

The MLIA interrupt handler has detected MLIA error status. This status may be caused by a faulty MLIA, faulty loop cables, or a faulty loop multiplexer.

CONDITIONS	SITUATIONS 1	2
1. Has this CE error message occurred more than three times within one-half hour?	Y	N
ACTIONS	**SEQUENCE**	
1. Run MSMP MST041 diagnostics.	X	-
2. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 11 should not be a matter for concern. However, the test operator can perform the step listed above at his discretion.	-	X

CE Error Message 12 - Upline Break Counter Overflow ASSUME Host has received an upline break signal from the Mode 4 TIP. A Mode 4 TIP terminal is not responding to the Mode 4 TIP commands.
CONDITIONS
None.
ACTIONS
1. Replace the CLA indicated in the CE error code.
2. Verify the Mode 4 terminal address is correct.
3. Verify proper operation of Mode 4 terminal.

TABLE 2-3. CE ERROR CODES DDLT (Sheet 24 of 33)

CE Error Message 13 - Invalid Data Block Clarifier (DBC)
ASSUME
The TTY TIP has detected a code of 6, 7, 14, or 15 DBC from the host. These codes are illegal.
CONDITIONS
None.
ACTIONS
1. Locate a host system analyst and determine why these codes are being used.

TABLE 2-3. CE ERROR CODES DDLT (Sheet 25 of 33)

CE Error Messages, 00, 14 thru 1F, 25, and 26; 2A or higher - Illegal
ASSUME
These are not valid CE error message codes. It is likely that the CE error code byte part of the message is garbled.
CONDITIONS
None.
ACTIONS
None.
NOTE: These CE error message numbers should not appear on the Hardware Performance Analyzer reports.

CE Error Message 20 - Deadman Timeout ASSUME
The host interface package (HIP) software has detected a deadman timeout error. Error detection occurs in HIP procedure PTSTART. CE error 20 does not necessarily indicate a failure, it can merely mean that the host failed to communicate with the 2550 within the amount of time specified by the CCP global constant ADEADTO. When the error is detected, the HIP sends a host computer-down message to all the interactive terminals in the system. The two bytes of the CE error message following the error code contain the last state of the HIP.
CONDITIONS
None. CE error message 20 normally is not an indication of a 2550 failure. The message occurs during normal operation if the host is locked out for ADEADTO time, due to higher priority local batch activity. During this period the host computer cannot communicate with the 2550 to prevent the deadman timer from expiring.
ACTIONS
None.

CE Error Message 21 - Spurious Coupler Interrupt

ASSUME

The coupler spurious interrupt condition is detected by the host interface package (HIP) software; the error detection occurs in the procedure PTINTPROC. A spurious coupler interrupt occurs when a coupler status following an interrupt does not contain one of the following: 1) a chain address zero, 2) a hardware timeout, 3) transfer terminated by the PPU, 4) transmission complete, 5) parity error, or 6) protect fault. The error message shows the actual coupler status (look at the two bytes following the error code).

CONDITIONS	SITUATIONS 1	2
1. Has CE error message 21 occurred more than three times within one-half hour?	Y	N

ACTIONS	SEQUENCE	
1. During the next PM period run off-line MSMP 6000 Coupler or Expansion Coupler diagnostics (depending on which coupler is present).	1	-
2. Replace the coupler I/O card (slot C for the 6000 Coupler, slot AA for the 6000 Expansion Coupler).	2	-
3. Replace the coupler DMA card (slot D for the 6000 Coupler, slot A for the 6000 Expansion Coupler).	3	-
4. Replace the coupler CYBER interface card (slot B for the 6000 Coupler, slot AB for the 6000 Expansion Coupler).	4	-
5. Replace status mode interrupt card (slot L).	5	-
6. Replace the TTY I/O card (slot K).	6	-
7. If there are any other CE error messages outstanding, follow the DDLTs for those messages.	7	-
8. Call CE or analyst as appropriate.	8	-
9. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 21 should not be a matter for concern. However, the test operator can perform the eight steps listed above at his discretion.	-	X

CE Error Message 22 - Chain Address Zero

Sheet is intentionally blank

CE Error Message 23 - Coupler Hardware Timeout on Input

ASSUME

The coupler hardware timeout condition is detected by the host interface package (HIP) software; the error detection occurs in procedure PTINTPROC. If the timeout occurs when the HIP is expecting input data (traffic from the 255X to the host), the PTINTPROC procedure is in state 2 (BZSTATE = AOPT 2) during the detection of the error. If the host to 255X channel is active longer than three seconds, the coupler deactivates the channel, sets bits 10 (timeout) and 15 (alarm) in the coupler status, and causes an interrupt. The CE error message contains the actual coupler status (look at the two bytes following the error code).

CONDTIONS	SITUATIONS	
	1	2
1. Has CE error message 23 occurred more than three times within one-half hour?	Y	N
ACTIONS	**SEQUENCE**	
1. During next PM period run off-line MSMP 6000 Coupler or 6000 Expansion Coupler diagnostic (depending on the coupler which is present).	1	-
2. Replace coupler CYBER interface card (slot B for 6000 Coupler, slot AB for 6000 Expansion Coupler).	2	-
3. Replace coupler I/O card (slot C for 6000 Coupler, slot AA for 6000 Expansion Coupler).	3	-
4. Replace coupler DMA card (slot D for 6000 Coupler, slot A for 6000 Expansion Coupler).	4	-
5. If there are other CE error messages outstanding, follow the DDLTs for those messages.	5	-
6. Call CE or analyst as appropriate.	6	-
7. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 23 should not be a matter for concern. However, the test operator can perform the six steps listed above at his discretion.	-	X

CE Error Message 24 - Input Data Transfer Terminated by PPU

ASSUME

The coupler transfer terminated by PPU condition is detected by the host interface package (HIP) software. The error detection occurs in procedure PTINPRCOC. If the HIP is expecting input (traffic from the 255X to the host) when the transfer terminated by PPU occurs, PTINPRCOC is in state 2 (BZSTATE = AOPT2) during the detection of the error. If the host deactivates the data channel before a data transfer is complete, bit 1 of the coupler status word is set and an interrupt occurs. The error message shows the actual coupler status (check the two bytes following the error code).

CONDITIONS	SITUATIONS 1	2
1. Has CE error message 24 occurred more than three times within one-half hour?	Y	N

ACTIONS	SEQUENCE	
1. During next PM period run off-line MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics (depending on the coupler which is present).	1	-
2. Replace the coupler CYBER interface card (slot B for the 6000 Coupler, slot AB for the 6000 Expansion Coupler).	2	-
3. Replace the coupler I/O card (slot C for the 6000 Coupler, slot AA for the 6000 Expansion Coupler).	3	-
4. Replace the coupler DMA card (slot D for the 6000 Coupler, slot AB for the 6000 Expansion Coupler).	4	-
5. If there are any other CE error messages outstanding, follow the DDLTs for those messages.	5	-
6. Call CE or analyst as appropriate.	6	-
7. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 24 should not be a matter for concern. However, the test operator can perform the six steps listed above at his discretion.	-	X

CE Error Message 27 - Output Data Transfer Terminated by PPU

ASSUME

The coupler transfer terminated by PPU condition is detected by the host interface package (HIP) software. The error detection occurs in procedure PTINPROC. If the HIP is expecting output (traffic from the host to the 255X) when the transfer terminated by the PPU occurs, then the PTINPROC program is in state 2 (BZSTATE = AOPT2) during detection of the error. If the host deactivates the data channel before a data transfer is complete, bit 7 is set and an interrupt occurs. The error message shows the actual coupler status (check the two bytes following the error code).

CONDITIONS	SITUATIONS	
	1	2
1. Has CE error message 27 occurred more than three times within one-half hour?	Y	N

ACTIONS	SEQUENCE	
1. During the next PM period run off-line MSMP 6000 Coupler or 6000 Expansion Coupler diagnostic (depending on the coupler which is present).	1	-
2. Replace the coupler CYBER interface card (slot B for the 6000 Coupler, slot AB for the 6000 Expansion Coupler).	2	-
3. Replace the coupler I/O card (slot C for the 6000 Coupler, slot AA for the 6000 Expansion Coupler).	3	-
4. Replace the coupler DMA card (slot D for the 6000 Coupler, slot A for the 6000 Expansion Coupler).	4	-
5. If there are any other CE error messages outstanding, follow the DDLTs for those messages.	5	-
6. Call CE or analyst as appropriate.	6	-
7. Unless the customer has reason to believe some serious fault exists, an occasional CE error message 27 should not be a matter for concern. However, the test operator can perform the six steps listed above at his discretion.	-	X

CE Error Message 28 - Hardware Timeout On Output

ASSUME

The coupler hardware timeout condition is detected by the host interface package (HIP) software. The error detection coding resides in procedures PTINTPROC. If the timeout occurs while the HIP is expecting output data (traffic from the host to the 255X) then the PTINTPROC program is in state 5 (BZSTATE = AOPT5) during the detection of the error. If the host to 255X channel is active longer than three seconds, the coupler will deactivate the channel, set bit 10 (timeout) and bit 15 (alarm) in the coupler status, and cause an interrupt. The CE error message contains the actual coupler status (check the two bytes following the error code).

CONDITIONS	SITUATIONS	
	1	2
1. Has CE error message 28 occurred more than three times within one-half hour?	Y	N
ACTIONS	**SEQUENCE**	
1. During the next PM period, run the off-line MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics (depending on the coupler which is present).	1	-
2. Replace the coupler CYBER interface card (slot B for 6000 Coupler, slot AB for 6000 Expansion Coupler).	2	-
3. Replace the coupler I/O card (slot C for 6000 Coupler, slot AA for 6000 Expansion Coupler).	3	-
4. Replace the coupler DMA card (slot D for 6000 Coupler, slot A for 6000 Expansion Coupler).	4	-
5. If there are any other CE error messages outstanding, follow the DDLTs for those messages.	5	-
6. Call CE or analyst as appropriate.	6	-
7. Unless the customer has reason to believe some serious fault exists, an occasional CE error message number 28 should not be a matter for concern. However, the test operator can perform the six steps listed above at his discretion.	-	X

CE Error Message 29 - Missing EOP ASSUME

The host interface package (HIP) software detected a missing end of operation (EOP) flag. In the early coupler models this error was caused by a timing problem. This coupler problem has been corrected.

CONDITIONS	SITUATIONS 1	2
1. Has CE error message 29 occurred more than three times in one-half hour?	Y	N
ACTIONS	**SEQUENCE**	
1. Run the MSMP 6000 Coupler diagnostics.	1	-
2. Replace the coupler CYBER interface card (slot B in MOS memory machines, slot A in core machines.)	2	-
3. Run ODS load check and mainframe diagnostics.	3	-
4. If there are any other outstanding CE error messages, follow the DDLTs for those messages.	4	-
5. Call CE or analyst as appropriate.	5	-
6. Unless the customer has reason to believe some serious fault exists, an occasional CE error message number 29 should not be a matter for concern. However, the test operator can perform the five steps listed above at his discretion.	-	X

TABLE 2-4. STATISTICS MESSAGE TEXT DEFINITIONS (Sheet 1 of 2)

<table>
<tr><th>Secondary Function Code</th><th>Text Definition</th></tr>
<tr><td>01</td><td>NPU STATISTICS

<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr></table> Statistics Words

where: Word 1 Service messages generated
Word 2 Service messages processed
Word 3 Bad service messages received
Word 4 Blocks discarded due to bad address
Word 5 Packets/blocks discarded due to bad format
Word 6 Times at regulation Level 4 (no regulation)
Word 7 Times at regulation Level 3
Word 8 Times at regulation Level 2
Word 9 Times at regulation Level 1
Word 10 Times at regulation Level 0
Word 11 Network assurance protocol timeout</td></tr>
<tr><td>02</td><td>LINE STATISTICS

<table><tr><td>P</td><td>00</td><td>00</td><td>00</td><td>Word 1</td><td>Word 2</td><td>Word 3</td><td>Word 4</td></tr></table>
where: P Port

Line statistics words (2 bytes each)
Word 1 Number of blocks transmitted
Word 2 Number of blocks received
Word 3 Number of characters transmitted in good blocks
Word 4 Number of characters received in good blocks</td></tr>
<tr><td>03</td><td>TERMINAL STATISTICS

<table><tr><td>P</td><td>00</td><td>CA</td><td>TA</td><td>DT</td><td>CN</td><td>Word 1</td><td>Word 2</td><td>Word 3</td></tr></table>
where: P Port
CA Cluster address
TA Terminal address
DT Device type (see below)
CN Connection number

Terminal statistics words (2 bytes each)
Word 1 Number of good blocks transmitted
Word 2 Number of good blocks received
Word 3 Number of bad blocks

bit 7 6 5 4 3 2 1 0
DT = <table><tr><td colspan="3">Device</td><td colspan="5">Terminal Class</td></tr></table></td></tr>
</table>

TABLE 2-4. STATISTICS MESSAGE TEXT DEFINITIONS (Sheet 2 of 2)

Secondary Function Code	Text Definition
03	TERMINAL STATISTICS (Continued)

Class	Terminals Supported (by device)				
	0 Console	1 Card Reader	2 Line Printer	3 Card Punch	4 Non-impact Printer
1	TTY Comp				
2					
3					
4					
5					
6					
7	2780	2780	2780	2780	
8	3780	3780	3780	3780	
9	HASP	HASP	HASP	HASP	
10	Mode 4	Mode 4	Mode 4		Mode 4

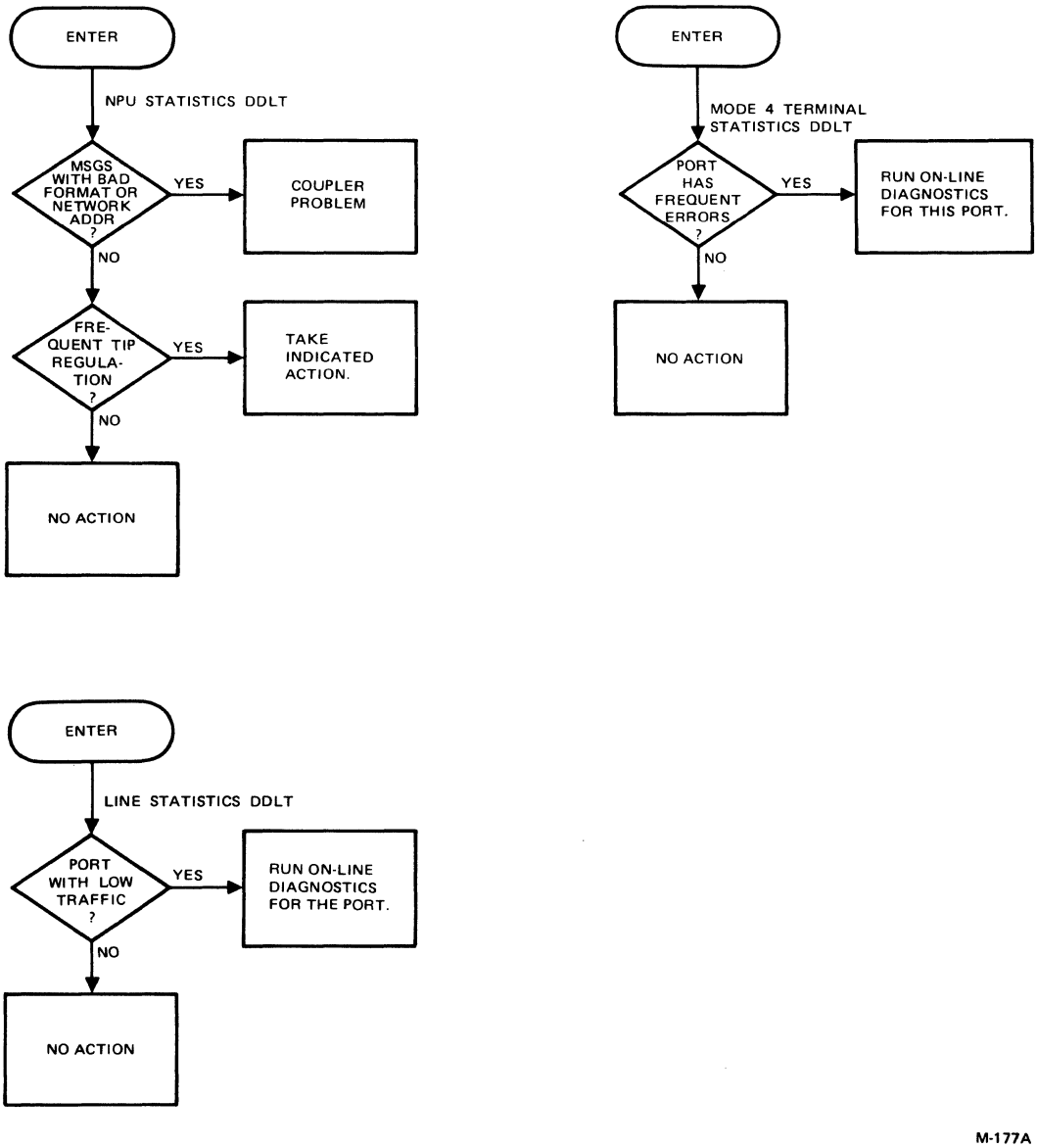


Figure 2-2. Flowchart for Statistics Messages DDLT

TABLE 2-5. STATISTICS MESSAGE TYPE = 01 (NPU STATISTICS)

ASSUME

1. Operator is familiar with DDLT format.

The NPU statistics give useful information about the 255x/host interface and about system loading. The count of blocks discarded due to bad network addresses (word 4) and the count of blocks discarded due to bad format (word 5) could indicate possible coupler problems. Statistics messages are generated periodically as well as when the statistics count for an individual equipment exceeds the threshold level.

CONDITIONS	SITUATIONS		
	1	2	3
1. Have there been any messages discarded for bad network addresses or bad format?	Y	N	N
2. Has the TIP regulation occurred frequently?	-	Y	N
ACTIONS	**SEQUENCE**		
1. Replace the coupler cards (slots B, C, and D in MOS memory machines; and slots A, B, and C in core memory machines) at next PM period.	X	-	-
2. Check the Configurations Manual to see if sufficient memory has been provided for the present load and configuration.	-	1	-
3. Check the line statistics messages. Is the NPU running at its maximum capacity? If so, take no action. Otherwise, consider any problems that are using up buffers.	-	-	X
4. Take no action.	-	-	X

TABLE 2-6. STATISTICS MESSAGE TYPE = 02 (LINE STATISTICS)

ASSUME

1. Operator is familiar with DDLT format.

The line statistics give a summary of the amount of activity by port number (line) for all ports. The most used parts of the message are: 1) the port number (first byte of text); 2) the count of the blocks transmitted from the terminal to the host (word 1 of text); and 3) the count of the blocks received from the host to the terminal (word 2 of text). These statistics would be most useful in discovering a port in a rotary configuration that was not working before the customer calls up and complains, or for comparing actual activity of the various ports to expected activity.

CONDITIONS	SITUATIONS	
	1	2
1. Does one of the rotary ports show an unusually low number of blocks of traffic compared to the rest of the rotary system? (Normally the amount of traffic should decrease as you get further away from the primary port of the rotary system.)	Y	N
ACTIONS	**SEQUENCE**	
1. During the next PM period, run on-line diagnostics on the port with the unusually low traffic following the communications line fault isolation procedures of section 4.	X	-
2. No action to be taken.	-	X

TABLE 2-7. STATISTICS MESSAGE TYPE = 03 (MODE 4 TERMINAL STATISTICS)

ASSUME

1. Operator is familiar with DDLT format.

The terminal statistics messages are most useful for checking the port (line) usage and the amount of rejected blocks per port). A high rejection rate on a port can show a port that may have intermittent problems. The messages carry the following useful information: 1) The port number (the first byte of text); 2) the number of good blocks sent from the terminal to the host, 3) the number of bad blocks sent from the terminal to the host, and 4) the number of good blocks sent from the host to the terminal. (See table 2-4 for location of these bytes in the statistics message).

CONDITIONS	SITUATIONS	
	1	2
1. Are there any ports with a high error rate (ratio of good blocks to rejected blocks)?	Y	N
ACTIONS	**SEQUENCE**	
1. During next PM period, run on-line diagnostics on the ports with high error rates following the communications line fault isolation procedures of section 4.	X	-
2. No action to be taken.	-	X

When the CCI stops the NPU because of an unrecoverable condition caused by either hardware or software errors, the CCI delivers a halt message to the NPU console. Format of the halt message is:

MM/DD HH:TT:TT	where TT:TT is hours and minutes from system initialization
HALT xxxx yyyy wwww port no zzzz buffer addr	

where:

xxxx	is the address of the program in control at the time when the halt condition occurred.
yyyy	is the halt code (hexadecimal format).
wwww port number	appears only on CLA address out of range (0005) and CLA status overflow (000D) codes.
zzzz buffer address	appears only on buffer halt codes (000A, 000B, 000C).

When such a halt occurs, the host normally executes an upline dump of the NPU main memory, micromemory, and the file 1 registers. Thereafter, the host attempts to reload the NPU main memory. This is accomplished directly through the coupler for local NPUs; it is accomplished by use of overlays in the local NPU connected to the remote NPU in the case of a remote NPU. It is also accomplished by overlays in the base portion of a 2552 NPU when dumping the multiplexer portion of a 2552 NPU.

Loading attempts continue for n times, where n is an installation time parameter. No further attempts to reload are made until the operator reactivates the loading process by:

- Master clearing the NPU by the MASTER CLEAR switch on the NPU maintenance control panel
- Entering a new load message at the host console.

The NPU can be stopped locally either by:

- Master clearing it using the MASTER CLEAR switch on the maintenance control panel
- Generating the force load service message; this can be done at the NPU console by the following command sequence:

Command	Meaning
(G)	Control and G keys; find console mode
*WM	Console in write mode; place it in read mode
(G)/OVL(D)(G)	Console goes to read mode with G ; place console in overlay mode to enter commands
*WM	Console in write mode, accepts messages

(G) DN SN CN BT PFC SFC (D) (G) byte meaning

(G) xx 00 00 04 01 01 (D) (G) byte values

- 01 01 — force load function code
- 04 — CMD block
- 00 — CN=00 for service message
- 00 — NS node in host
- xx — ID of NPU node as it appears in the initialization banner

Operator enters the force load message which appears to have come downline from the host.

HALT,xxxx,0010	xxxx is address of program calling BPHALT module, halt code = 0010_{16} indicates NPU was stopped as the result of a force load SM to the host

When a halt code message is not generated, the dump listing, generated from the host by the Network Dump Analyzer (NDA) program, must be consulted to find the cause of the failure. The CE or analyst will probably also want to consult the dump listing whenever the cause of stoppage is not apparent.

HALT CODES

Halt codes can be divided into three categories: 1) those primarily resulting from incorrect switch settings, 2) those caused by hardware malfunctions, and 3) those that can be either hardware or software problems.

The first category includes detection of a duplicate CLA address (halt code 0012). This condition is usually caused by two CLA switches being set to the same address. Such a fault can normally be corrected by the operator resetting the switches.

In the second category, the halt codes are the following:

- power failures (code 0001)
- memory parity error (code 0002)
- memory protect bit error (code 0003)
- bad MLIA initialization status (code 0011)

Such conditions are usually caused by some type of hardware failure and normally must be repaired by a CE.

The third category of halt codes (all those not already specified) are caused either by a hardware failure or by a software error. For the first three months following installation, these halts are more likely to result from software problems. After three months of service, most software problems will have been found and corrected. Thereafter, most such halts will be caused by hardware malfunctions. To correct this category of problems, the CE should normally first be called to check the hardware. If the hardware is functioning properly, a system analyst should be called.

NOTE

Have all upline dumps taken by the host available for the CE and/or the system analyst.

Figure 3-1 is a flowchart summarizing the DDLT procedures for halt messages. Table 3-1 is the DDLT for halt message interpretation.

NPU DUMPS

When the NPU is operating normally, it periodically sends status information to the host. If the NPU fails, the host detects the lack of status transmission and may initiate a dump process to transfer the contents of the NPU memory to the host.

To transfer (dump) information from the NPU to the host, the host reserves a file for the dump data and executes the following procedure:

- The host issues a Stop NPU function and then reads the three coupler registers (coupler status register, NPU status register, and orderword register). These values are saved for incorporation into the register dump record (Record 3).
- The host builds the dump header record (Record 1) containing the channel and equipment number of the coupler, the date, and the time.
- The host reads the entire NPU main memory (starting at address zero) and formats the data into blocks containing up to 120 16-bit words each, with the entire group of blocks thus constructed comprising the main memory dump record (Record 2) of the dump file.
- The host loads a Dump Bootstrap program into the NPU main memory starting at address zero and causes the program to be executed. This program overwrites a portion of the micromemory with a micromemory dump routine that generates a 16-bit checksum of the micromemory dump. The Dump Bootstrap program then copies the NPU file registers, writes the value 8 (decimal) into the NPU status register of the coupler (to indicate ready for dump), and halts.
- The host then reads the NPU main memory and formats the register dump record (Record 3).
- The dump is processed by the dump analyzer utility in the host and is printed in the format similar to that of figure 3-2. The dump is automatically formatted and routed to the host dump device.

Content of the file 1 registers as well as the installation main memory map will be found in the customized listing which accompanied the system delivery.

DUMP INTERPRETATION WITHOUT HALT MESSAGE

When a halt occurs while using the on-line diagnostic programs and when the NPU console is designated as the test control console, halt codes and diagnostic test responses are printed at the NPU console and dump interpretation is not needed. However, 1) if a halt occurs after loading but before completion of initialization, or 2) if the system becomes trapped in a looping condition during initialization (before the CCI header prints), dump interpretation may be necessary to determine which halt has occurred or in which subroutine of the initiation section the program is looping.

INTERPRETATION INSTRUCTIONS

See sheets 2 and 3 of table 3-1 for the DDLT sequence for dump interpretation.

When interpreting the upline dump printout to determine the cause of a halt or looping condition, first examine the contents of memory location 30_{16} as reflected in the dump printout. If non-zero, a halt has occurred and the halt code value is contained in that location. Refer to that value in table 3-1 and perform the suggested action for that halt.

If memory location 30_{16} is zero, examine the address of the NPINTAB entry in the address table which begins at fixed memory address 150_{16}. (This is the table which is displayed at initialization. NPINTAB has a fixed address.) Table 3-2 lists the contents of the address table. Entry NPINTAB gives the starting address for the NPINTAB table, the format of which is illustrated in figure 3-3. The NPISFL entry in the NPINTAB table contains the flags which mark the initialization subroutines that have completed running when the looping condition occurred. This information should be given to the system analyst along with the dump printouts.

NPU CONSOLE COMMANDS

The following commands can be entered through the NPU console.

Command	Function
/SUP	Puts console in supervisory mode
/ORD	Puts console in orderwire (diagnostic) mode
/OVL	Puts NPU in overlay mode
/REQ	Requeues console output message that was interrupted by a manual interrupt
/CAN	Cancels console output message that was interrupted by a manual interrupt
/MTQ	Flushes console queue
IN OUT LOC	Control routing of service messages (input, output, and locally generated messages)
MSNOP	Generates message to NOP

These commands should be used with caution except as specified in section 4 of this manual. The NPU console is not intended to be used to intercept systems messages in this version of CCI. Using it in this manner when the NPU is on-line and when possible malfunctions exist in the system could lead to regulation of network traffic and even to stopping the NPU.

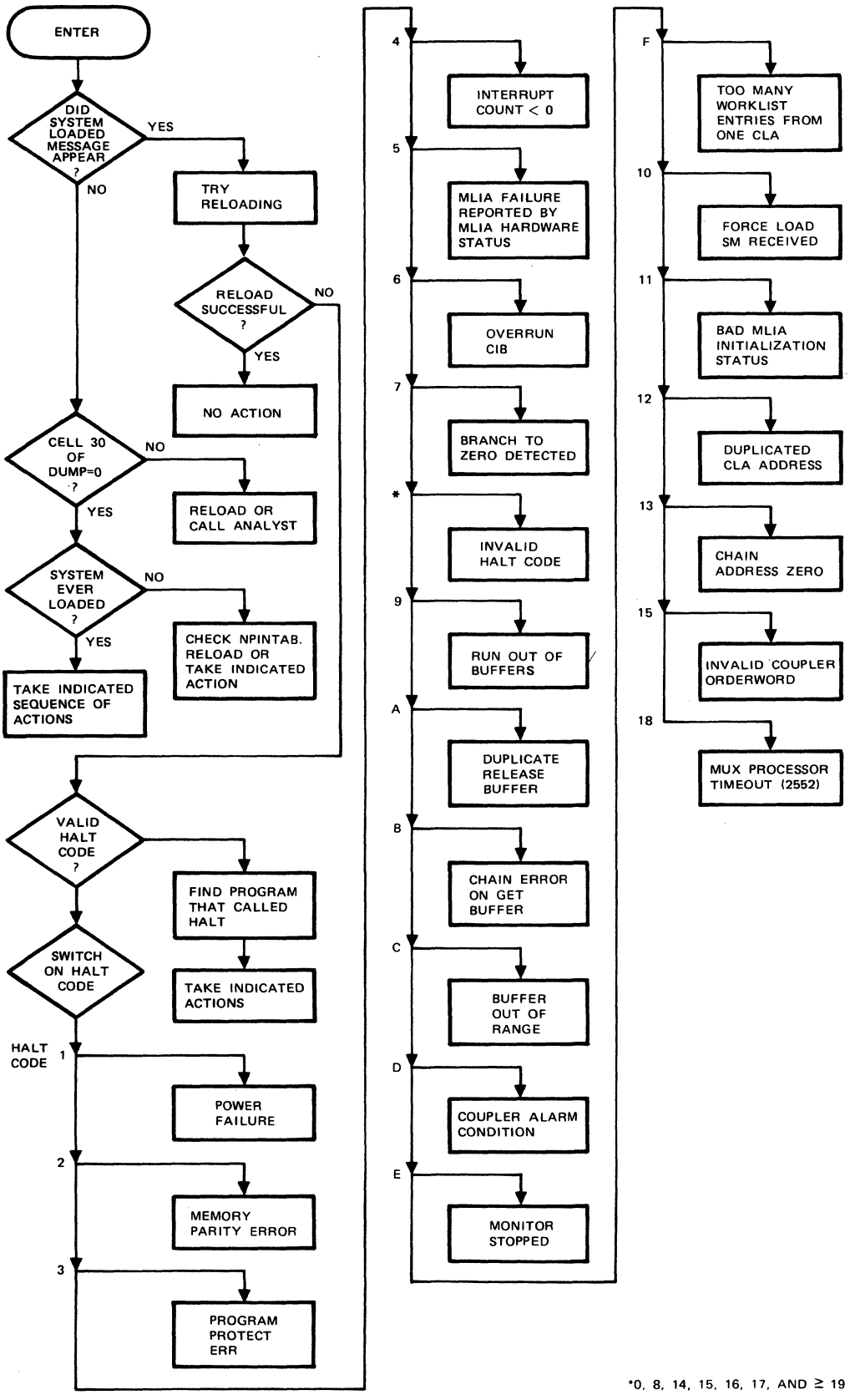


Figure 3-1. Flowchart for Halt Codes DDLT

TABLE 3-1. HALT CODES DDLT (Sheet 1 of 30)

ASSUME
1. The operator is familiar with the ODS DDLT format.
2. The system has halted or has not been successfully loaded.

TABLE 3-1. HALT CODES DDLT (Sheet 2 of 30)

Halt Codes - Entry

CONDITIONS	SITUATIONS 1	2	3	4
1. Has the system been successfully loaded and displayed the following: CCI 3.0 HOST ID : X NPU ID : Y LEVEL : --- VARIANT: ---	N	N	N	Y
2. Look at memory location 30 (halt code). Does this address have any bits set to ls?	N	N	Y	-
3. Is this a new build that has not loaded successfully before?	N	Y	-	-
ACTIONS	**SEQUENCE**			
1. Go to sheet 3.	X	-	-	-
2. Try reloading CCI.	-	1	1	1
3. Try loading previous good loadfile. If this file loads successfully, have the system analyst check the build time parameters and program changes since the last good build operation.	-	2	-	-
4. Run ODS load check and mainframe diagnostics.	-	3	-	-
5. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	4	-	-
6. Replace the coupler CYBER interface card (slot B for the 6000 Coupler, slot AB for the 6000 Expansion Coupler).	-	5	-	-
7. Call CE [illegible]vst as appropriate.	-	6	-	-
8. Go to sheet 5.	-	-	2	-
9. Go to sheet 4.	-	-	-	2

Halt Codes - No Halt Code Available

CONDITIONS	SITUATIONS
	1
1. The system failed during initialization but did not generate a halt code message. Look up the NPINTAB entry in the address table (address of table is at 150_{16}). The contents of this location is the start address of the NPINTAB table. (See dump interpretation subsection at end of section 3.) Look at the second entry in the NPINTAB table. This entry contains a group of flags that are set as each phase of initialization is completed.	X
Bit 0 is set at the completion of setting up program protect bits. Bit 1 is set at the completion of initializing buffers (assigning BCBs and releasing all buffers to buffer pools). Bit 2 is set at the completion of initializing worklist control blocks (WLCBs). Bit 3 is set at the completion of miscellaneous console initialization. Bit 4 is set at completion of applications initialization. Bit 5 is set at the completion of initializing the MLIA (stops NPU if two CLAs have duplicate addresses). Bit 6 is set at the completion of initializing the lines. Bit 7 is set when address table contents are printed at the console. Bit 15 is set at the completion of buffer and system initialization. Bits 8 thru 14 should be zeros. If not, none of the word is valid. The P-register (contained in location FF_{16} of the File 1 register dump area) shows the address where the NPU was looping at halt time.	

ACTIONS	SEQUENCE
1. Try reloading CCI.	1
2. Find whether loadfile has been modified.	2
3. Run ODS load check and mainframe diagnostics.	3
4. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	4
5. Replace the coupler CYBER interface card (slot B for the 6000 Coupler, slot AB for the 6000 Expansion Coupler).	5
6. Call CE or analyst as appropriate.	6

TABLE 3-1. HALT CODES DDLT (Sheet 4 of 30)

Halt Codes - Halt Code Available

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Was the last message displayed on the console a halt code message? Halt code messages are of the following format where xxxx equals the return address of the program in control and yyyy equals the halt type: *HALT xxxx yyyy.	Y	Y	N	-
2. Is the halt code non-zero?	Y	N	-	-
3. Check location 30_{16} of the dump. This contains the halt code. Is this a non-zero?	-	-	Y	N
ACTIONS	**SEQUENCE**			
1. Go to sheet 5.	X	-	X	-
2. Go to sheet 17.	-	X	-	-
3. The program was looping. File 1 register FF_{16} of the dump contains the P-register value. This value is the address of the program which was executing when the 255X stopped. A link edit listing contains the program that resides at this address. Go to sheet 17.	-	-	-	X

TABLE 3-1. HALT CODES DDLT (Sheet 5 of 30)

Halt Codes Index

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Does the halt code = 0001?	N	N	N	N	N	Y
2. Does the halt code = 0002?	N	N	N	N	Y	-
3. Does the halt code = 0003?	N	N	N	Y	-	-
4. Does the halt code = 0004?	N	N	Y	-	-	-
5. Does the halt code = 0005?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 6.	X	-	-	-	-	-
2. Go to sheet 14.	-	X	-	-	-	-
3. Go to sheet 13.	-	-	X	-	-	-
4. Go to sheet 12.	-	-	-	X	-	-
5. Go to sheet 11.	-	-	-	-	X	-
6. Go to sheet 10.	-	-	-	-	-	X

TABLE 3-1. HALT CODES DDLT (Sheet 6 of 30)

Halt Codes - Index

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Does the halt code = 0006?	N	N	N	N	N	Y
2. Does the halt code = 0007?	N	N	N	N	Y	-
3. Does the halt code = 0008?	N	N	N	Y	-	-
4. Does the halt code = 0009?	N	N	Y	-	-	-
5. Does the halt code = 000A?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 7.	X	-	-	-	-	-
2. Go to sheet 19.	-	X	-	-	-	-
3. Go to sheet 18.	-	-	X	-	-	-
4. Go to sheet 17.	-	-	-	X	-	-
5. Go to sheet 16.	-	-	-	-	X	-
6. Go to sheet 15.	-	-	-	-	-	X

TABLE 3-1. HALT CODES DDLT (Sheet 7 of 30)

Halt Codes - Index

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Does the halt code = 000B?	N	N	N	N	N	Y
2. Does the halt code = 000C?	N	N	N	N	Y	-
3. Does the halt code = 000D?	N	N	N	Y	-	-
4. Does the halt code = 000E?	N	N	Y	-	-	-
5. Does the halt code = 000F? N	Y	-	-	-	-	
ACTIONS	**SEQUENCE**					
1. Go to sheet 8.	X	-	-	-	-	-
2. Go to sheet 24.	-	X	-	-	-	-
3. Go to sheet 23.	-	-	X	-	-	-
4. Go to sheet 22.	-	-	-	X	-	-
5. Go to sheet 21.	-	-	-	-	X	-
6. Go to sheet 20.	-	-	-	-	-	X

TABLE 3-1. HALT CODES DDLT (Sheet 8 of 30)

Halt Codes - Index

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Does the halt code = 0010?	N	N	N	N	N	Y
2. Does the halt code = 0011?	N	N	N	N	Y	-
3. Does the halt code = 0012?	N	N	N	Y	-	-
4. Does the halt code = 0013?	N	N	Y	-	-	-
5. Does the halt code = 0014?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 9.	X	-	-	-	-	-
2. Go to sheet 25.	-	-	-	-	-	X
3. Go to sheet 26.	-	-	-	-	X	-
4. Go to sheet 27.	-	-	-	X	-	-
5. Go to sheet 28.	-	-	X	-	-	-
6. Go to sheet 17.	-	X	-	-	-	-

TABLE 3-1. HALT CODES DDLT (Sheet 9 of 30)

Halt Codes - Index

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Does the halt code = 0015?	N	N	N	Y
2. Does the halt code = 0018?	N	N	Y	-
3. Does the halt code = 0000, 0016, 0017, or is it $\geq$ 0019?	N	Y	-	-
ACTIONS	**SEQUENCE**			
1. You have misinterpreted an instruction, go back to sheet 1 and try again.	X	-	-	-
2. Go to sheet 29.	-	-	-	X
3. Go to sheet 17.	-	X	-	-
4. Go to sheet 30.	-	-	X	-

Halt Code 0001, Power Failure ASSUME

Power failure may be caused by a power supply turning off or by a momentary power fluctuation on the line.

CONDITIONS	SITUATIONS 1	2	3
1. Has one or more power supplies turned off?	N	N	Y
2. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBLN00 program? (The address of PBLN00 can be found in the CCI Link Edit listing - module memory memory map - sorted by module address.)	N	Y	-

ACTIONS	SEQUENCE		
1. Run ODS load check and mainframe diagnostics.	2	-	-
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	3	-	-
3. Replace coupler CYBER interface card (slot B for 6000 Coupler, slot AB for 6000 Expansion Coupler).	4	-	-
4. Call CE or analyst as appropriate.	5	-	-
5. Reload CCI (there was a momentary power fluctuation on the line).	1	X	-
6. Reapply power to the failed power supply or replace the power supply.	-	-	X

Halt Code 0002, Memory Parity Error ASSUME

The NPU detected a memory parity error while executing a memory cycle during a program instruction, or during a memory cycle-stealing operation of a DMA-using device such as the coupler or MLIA. Memory parity error logic is described in the hardware reference manual.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return addess of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBLN00 program? (The address of PBLN00 can be found in the CCI Link Edit listing module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Run MSMP MLIA diagnostics.	-	3
4. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the Expansion 6000 Coupler).	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have analyst check that the program calling PBHALT did not mistakenly use halt code 0002.	1	5

Halt Code 0003, Program Protect Error ASSUME

A program protect error detected by the NPU. This is a valid condition if the protect system is active (using software breakpoints). Unexpected occurrence of this halt may indicate a violation of restrictions on use of software breakpoint. Program protect error logic is described in the hardware reference manual. **Software breakpoint logic is described in the CCI 3 System Programmer's Reference Manual.**

CONDITIONS	SITUATIONS 1	2	3
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBBREAKPOINT program? (The address of PBBREAKPOINT can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N	-
2. Was someone making use of the software breakpoints?	Y	-	N
ACTIONS	**SEQUENCE**		
1. Assure that someone did not accidently leave a software breakpoint set (ask the operator, etc.). Remove any software breakpoints (maintenance panel J20).	1	-	-
2. Run ODS load check and mainframe diagnostic (including protect bit tests).	-	1	1
3. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics, and the MLIA diagnostics.	-	2	2
4. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3	3
5. Call CE or analyst as appropriate.	2	4	4

Halt Code 0004, Interrupt Count Less Than Zero

ASSUME

Either the PASCAL program has attempted to unlock interrupts more often than the interrupts were locked, or a program looped through instructions which included a lock interrupts instruction until the count overflowed (8000_{16}).

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the UNLOCK program? (The address of UNLOCK can be found in the CCI Link Edit listing module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. Have system analyst look at the entry point of UNLOCK to find who called UNLOCK. Check the calling program to find if it was looping.	1	-
2. Run ODS load check and mainframe diagnostics.	-	1
3. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
4. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
5. Run MSMP MLIA diagnostics.	-	4
6. Call CE or analyst as appropriate.	2	5

Halt Code 0005, MLIA Failure ASSUME

The multiplex loop interface adapter (MLIA) failed. Either a status was read from the MLIA with bit 00 equal to 1 (MLIA not ready), or more than 20 unprocessed MLIA error interrupts have accumulated. This condition can occur when the multiplex loop opens.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the upline dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBMLIA program? (The address of PBMLIA can be found in the CCI Link Edit listing - module memory map - sorted by module address).	Y	N
ACTIONS	**SEQUENCE**	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
4. Run MSMP MST041 diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it set the wrong halt code.	1	5

Halt Code 0006, MLIA Hardware Error ASSUME

The firmware pointer to read next loop cell from circular input buffer (CIB) exceeded present line frame pointer.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBMLIAOPS or PMMLEH program? (The address of PBMLIAOPS and PMMLEH can be found in the **CCI Link** Edit listing - module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. Run MSMP MLIA diagnostics.	-	1
2. Run ODS load check and mainframe diagnostics.	-	2
3. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	3
4. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it used the wrong halt code.	1	5

Halt Code 0007, Branch to Zero Detected ASSUME

Branch to zero (less than 000E) has been detected.

CONDITIONS	SITUATIONS	
	1	2
1. Has this build been successfully run before?	Y	N
ACTIONS	**SEQUENCE**	
1. Run ODS load check and mainframe diagnostics.	4	-
2. Run MSMP 6000 Coupler diagnostics.	5	-
3. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	6	-
4. Run MSMP MST041 diagnostics.	3	-
5. Call CE or analyst as appropriate.	2	-
6. Have system analyst check the MPLINK and MPEDIT listings for undefined externals or undefined LINKZAPs.	1	2
7. Look for errors in the CCI build.	-	1

Halt Codes - 0000, 0008, 0014, 0016, and $\geq$ 0019

ASSUME

The above-named halt codes are invalid. These codes can be caused by an erroneous call to halt routine (PBHALT) with a bad halt code or by a proper halt code being altered by a malfunction.

Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Use the CCI Link Edit listing - module memory map to identify the program.

CONDITIONS	SITUATIONS
	1
None.	–

ACTIONS	SEQUENCE
1. Run ODS load check and mainframe diagnostics.	3
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	4
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	6
4. Run MSMP MLIA diagnostics.	5
5. Have system analyst check the program calling PBHALT to find if it set the wrong halt code.	1
6. Call CE or analyst as appropriate.	2

Halt Code 0009, No Buffers Left ASSUME

One of the four buffer pools used its last buffer.

CONDITIONS	SITUATIONS 1	2	3	4
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBSTOP program? (PBSTOP is the firmware interface.)	Y	Y	Y	N
2. Find BECTLB in the CCI Link Edit listing - entry symbol list - sorted by entry name. Locate the entry point of BECTLB in the dump and check the contents of the 1st, 11th, 21st, and 31st word (decimal) of BECTLB. Were any of these words equal to zero?	Y	Y	N	-
3. Was the configuration changed recently?	N	Y	-	-
ACTIONS	**SEQUENCE**			
1. Run ODS load check and mainframe diagnostics.	2	2	1	1
2. Run MSMP17 6000 Coupler or 6000 Expansion Coupler diagnostics.	3	3	2	2
3. Replace Coupler CYBER Interface card (slot B for the 6000 Coupler and slot AB for the Expansion Coupler.)	4	4	3	3
4. Run MSMP17 MLIA diagnostics.	5	5	4	4
5. Call CE or analyst as appropriate.	1	6	5	5
6. Check the NOS/BE installation handbook to see if sufficient memory is available to handle the system configuration (based on terminal types, number of terminals, etc.).	-	1	-	-

Halt Code 000A, Duplicate Release ASSUME

The buffer to be released has already been released.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBSTOP program? (PBSTOP is the firmware interface.)	Y	N

ACTIONS	SEQUENCE	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
4. Run MSMP MLIA diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it used the wrong halt code.	1	5

Halt Code 000B, Buffer Chain Error — ASSUME

The program tried to get a buffer from the free buffer pool. The chaining address of the buffer obtained did not point to the end of another buffer of the same size.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBSTOP program? (The address of PBSTOP can be found in the CCI Link Edit listing - module memory map - sorted by module address. The buffer address is printed following halt code.)	Y	N

ACTIONS	SEQUENCE	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
4. Run MSMP MLIA diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it used the wrong halt code.	1	5

Halt Code 000C, Buffer out of Range ASSUME

The program tried to release a buffer. The address of the buffer was not within the range of the buffer area.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the BUFMAI program? (The address of BUFMAI can be found in the CCI Link Edit listing - module memory map - sorted by module address. The buffer address is printed following halt code.)	Y	N

ACTIONS	SEQUENCE	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
4. Run MSMP MLIA diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it used the wrong halt code.	1	5

Halt Code 0028, Coupler Alarm Condition ASSUME

The coupler detected a memory parity error or a program protect bit error during data transfer.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PTINIT program? (The address of PTINIT can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
4. Run MSMP MST041 diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it set the wrong halt code.	1	5

Halt Code 000E, Monitor Did Not Run for BZTIME/2 Seconds

ASSUME

The monitor stopped (OPS TIMEOUT) because a routine was running which did not reset the monitor timer often enough. Probably part of memory has become garbled or paging scheme fault.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBTIMER program? (The address of PBTIMER can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
4. Run MSMP MST041 diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check the program calling PBHALT to find if it used the wrong halt code.	1	5

Halt Code 000F, Too Many Worklist Entries From One CLA

ASSUME

Too many status messages were received from the CLA. Before PBHALT halts the system to avoid running out of buffers, PBHALT checks the worklist entry to see if a CLA is requesting too many worklists. If a CLA is detected to be bad, PBHALT sets halt code 000F and gives the CLA address at the end of the message.

CONDITIONS	SITUATIONS	
	1	2
1. Is there a CLA with port address (CLA address) given in the halt message?	Y	N
ACTIONS	**SEQUENCE**	
1. Replace the CLA having the address given at the end of the halt message.	-	-
2. Run ODS load check and mainframe diagnostics.	-	1
3. Run MSMP 6000 Coupler diagnostics.	-	2
4. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	-	3
5. Run MSMP MST041 diagnostics.	-	4
6. Call CE or analyst as appropriate.	2	5
7. Have system analyst check to find if the program calling PBHALT set some other halt code than 000F.	1	6

Halt Code 0010, Force Load Service Message Received

ASSUME

The force load service message is used to cause a remote NPU to halt so that the host can reload the NPU.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the upline dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PNFRCELD program? (The address of PNFRCELD can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. No action required, this halt is normal.	X	-
2. Run ODS load check and mainframe diagnostics.	-	2
3. Run MSMP 6000 Coupler diagnostics.	-	3
4. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	-	4
5. Run MSMP MST041 diagnostics.	-	5
6. Call CE or analyst as appropriate.	-	1
7. Have system analyst check to find if the program calling PBHALT set some other hald code than 0010_{16}.	-	5

Halt Code 0011, Bad MLIA Initialization Status

ASSUME

At the end of initializing the multiplex subsystem, the MLIA status was read and found to contain some value other than 0009_{16}.

CONDITIONS	SITUATIONS	
	1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PIMLIA program? (The address of PIMLIA can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	3
2. Run ODS load check and mainframe diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	4
4. Run MSMP MST041 diagnostics.	-	1
5. Call CE or analyst as appropriate.	2	5
6. Have system analyst check the program calling PBHALT to find if it set the wrong halt code.	1	6

Halt Code 0012, Duplicated CLA Address Detected

ASSUME

During initialization of the multiplex system, two responses were received in response to a command sent to a CLA address. The CLA address is displayed at the end of the halt message.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PIMLIA program? (The address of PIMLIA can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N

ACTIONS	SEQUENCE	
1. If there are two CLAs with the port address (CLA addess) given in the halt message, change one of the duplicated addresses to an unused address.	1	-
2. If two CLAs are not set to the duplicated address, check for a CLA address switch set between numbers. (This can give a value unrelated to the switch setting.) Set that switch to the proper number.	2	-
3. Replace the CLA which has the address that was reported to be duplicated.	3	-
4. Run the MSMP MST041 diagnostics.	4	4
5. Run ODS load check and mainframe diagnostics.	-	1
6. Run MSMP 6000 Coupler or 6000 Expansion Coupler diagnostics.	-	2
7. Replace coupler CYBER interface card (slot B for the 6000 Coupler and slot AB for the 6000 Expansion Coupler).	-	3
8. Call CE or analyst as appropriate.	-	6
9. Have system analyst check the program calling PBHALT to find if it set the wrong halt code.	-	5

Halt Code 0013, Chain Address Equal to Zero ASSUME

The host interface program (HIP) detected that the coupler chain address was zero. This error detection is done in procedure PTHIPINT. The error is reported only for upline transactions (traffic from the NPU to the host). The error occurs when the coupler has used up its current buffer, has not found the last buffer flag set, and has tried to chain to the next buffer but could not find that next buffer address.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the upline dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PTHIPINT program? (The address of PTHIPINT can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N
ACTIONS	**SEQUENCE**	
1. Run ODS load check and mainframe diagnostics.	-	1
2. Run MSMP 6000 Coupler diagnostics.	-	2
3. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	-	3
4. Run MSMP MST041 diagnostics.	-	4
5. Call CE or analyst as appropriate.	2	6
6. Have system analyst check that the program calling PBHALT set some other halt code than 0013_{16}.	1	5

Halt Code 0015, Invalid Coupler Orderword ASSUME

The illegal orderword condition is detected by the host interface package (HIP) software. This error detection is done in procedure PTHIPINT. PTHIPINT is in state 3 (BZSTATE = AOPT3) during detection of this error. If the orderword sent from the host to the NPU is less than 1, or equal to 4, or greater than 6, the orderword is invalid and the coupler is cleared. The orderword register on the coupler DMA card causes a coupler interrupt when loaded.

CONDITIONS	SITUATIONS 1	2
1. Check location 31_{16} of the upline dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PTHIPINT program? (The address of PTHIPINT can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N
ACTIONS	**SEQUENCE**	
1. Replace coupler DMA card (slot D for the 6000 Coupler).	-	-
2. Run ODS load check and mainframe diagnostics.	-	1
3. Run MSMP 6000 Coupler diagnostics.	-	2
4. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	-	3
5. Run MSMP MST041 diagnostics.	-	4
6. Call CE or analyst as appropriate.	2	6
7. Have system analyst check the program calling PBHALT to find if it set some halt code other than 0015_{16}.	1	5

TABLE 3-1. HALT CODES DDLT (Sheet 30 of 30)

Halt Code 0018, Mux Processor Timeout (2552) ASSUME

The mux processor timeout condition is detected by the base processor procedure PBTIMEOFDAY. PBTIMEOFDAY generates this halt when it detects that the mux processor has not set the JOMUXRUNNING flag for one second.

CONDITIONS	SITUATIONS	
	1	2
1. Check location 31_{16} of the base processor upline dump. This is the return address of the program calling PBHALT. Are the contents of location 31_{16} an address within the PBTIMEOFDAY program? (The address of PBTIMEOFDAY can be found in the CCI Link Edit listing - module memory map - sorted by module address.)	Y	N
ACTIONS	**SEQUENCE**	
1. Run MSMP MST041 diagnostics on mux processor.	2	1
2. Run ODS load check and mainframe diagnostics on mux processor.	3	2
3. Run ODS load check and mainframe diagnostics on base processor.	4	3
4. Run MSMP 6000 Coupler diagnostics (base processor).	5	4
5. Replace coupler CYBER interface card (slot B in MOS memory machines, slot A in core memory machines).	6	-
6. Call CE or analyst as appropriate.	7	6
7. Have system analyst check the program calling PBHALT to find if it set some other halt code than 0018_{16}.	-	5
8. Someone may have MASTER CLEARed the mux processor. Reload and try again.	1	-

```
NPU DMP, CH25, E007
10.40.20 04/03/78

HDR
 0006  0042  6221  0102  0031

LN
 0000  0000  0000  0000  0000
 1206  4000  0000  0000  2162
 1206  4260  0000  0000  2162
 1206  4360  0002  0001  2010
 1206  4440  0002  0001  0010
 0400  0000  0002  0001  0010
 1206  3760  0002  0001  0010
 0400  0000  0002  0001  0010
 0400  0000  0002  0001  0010
 0400  0000  0000  0000  0162
 0400  0000  0000  0000  0162
 0400  0000  0000  0000  0162
 1206  4200  0000  0000  2162
 0400  0000  0000  0000  0162
 1206  4140  0002  0001  2010
 3000  0577  0000  0005  2001
 1206  4040  0000  0005  0001
 1206  4240  0000  0003  2001
 1206  4020  0000  0003  2001
 1206  4160  0000  0003  2001
 0400  0000  0000  0003  0001
 0400  0000  0000  0003  0001
 0400  0000  0000  0003  0001
 0000  0000  0000  0000  0000
 0000  0000  0000  0000  0000

REASON=17

MACRO MEM
 ADDRESS  0     1     2     3          D     E     F
   0000   0B00  0B00  0B00  0B00       0B00  5400  9105
   0010   0011  0007  0000  0000       0000  0000  0000
   0020   0000  0000  0000  0000       0000  0000  0000
   0030   000E  4B35  0000  083E       FDD2  F497  F497
   0040   0000  004B  00FE  0000  ...  0002  0001  0001
   0050   0001  3A84  0001  FFFE       3006  0910  0796
   0060   0091  0116  0001  0002       001D  0001  001D
   0070   0001  0000  9310  0000       9320  0001  0001
   0080   9320  0976  0000  0075       9540  000D  0083
   0080   0000  0001  3006  0910       0001  FFFE  0091
   00A0   0001  0002  0019  0001       0000  0000  0000
   00B0   0000  0000  0000  0000       0000  0000  0000
                 :                              :
DMP COMPLETE

 GROUP 1
REGISTER
 NUMBER   0     1     2     3          D     E     F
   0000   0000  0508  0500  0000       1035  1039  9510
   0010   0560  0F00  0000  0D00       0004  00E0  9CBE
   0020   007F  00F4  00B4  0004       0007  000F  A3D8
   0030   03F2  1147  05F2  0000       EF00  0001  0000
   0040   0003  9500  0000  00FE       0085  0000  0801
   0050   0000  0000  0200  4000       0000  0592  0001
   0060   020D  0000  22B6  94F3  ...  0000  000F  2000
   0070   0836  0001  0005  0006       401F  0000  0008
   0080   03D5  0020  0000  0050       D7C0  D7FF  0131
   0090   071E  0001  0000  0000       A180  0000  871E
   00A0   175E  1CD8  000A  0000       00F0  26D6  00F8
   00B0   0040  0040  0000  0000       00F1  7D04  0000

 OTHER
REGISTER
 NUMBER   0     1     2     3     4     5     6
   0000   0000  003F  0000  0000  0000  0000
REGISTER
DMP COMPLETE
```

Header information

Mux sub table

Reason for stop (halt code)

Main memory dump. If lines have identical information, lines after first are omitted. The first such omitted line is flagged with an *. Sixteen words per line; code is hexadecimal.

Micromemory dump. File 1 registers in groups of 16 words per line; hexadecimal format

Saved coupler registers and micromemory checksum

Figure 3-2. Sample NPU Dump

TABLE 3-2. ADDRESS TABLE

Location	Address	Title/Routine	
150_{16} 0	BYWLCB	Worklist control block	Base
1	JSWLADDR	WL entry by LEVELNO	
2	B1TCB	Internal processing TCB	
3	B1BUFF	Internal processing block	
4	JKMASK	Interrupt masks	
5	JKTMASK	PBAMASK save area	
6	CBTIMTBL	TIMAL table	
7	JACT	PD controller table	
8	BECTLBK	Buffer control block (BCB)	
9	BYSTAMP	Buffer stamp area	
A	CLBFSPACE	Buffer space in number of small buffers	
B	0		
C	NAPORT	Port table	Mux sub-system
D	BQCIB	Circular input buffer (CIB)	
E	0		
F	CGLCBS	Line control blocks (LCB)	Lines and TIPs
10	CHSUBLCB	Sub line control blocks	
11	CGTCBS	Terminal control blocks (TBC)	
12	BJTIPTYPT	TIP type table	
13	NJTECT	Terminal characteristics table	
14	0		
15	NPINTAB	Initialization complete table	Initialization Information
16	0		
17	CCPVER	CCP version address	
18	CCPCYC	CCP cycle address	
19	CCPLEV	CCP level address	
1A	0		

NOTE: Fixed table begins at main memory location 150_{16}. Contents of table are displayed at end of a successful initialization.

M-234

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
WORD 0 (NPSODD)	0	0	0	0	0	0	0	0	X	X	X	X	X	X	X	X
WORD 1 (NPISFL)	B15	0	0	0	0	0	0	0	B7	B6	B5	B4	B3	B2	B1	B0
WORD 2 (NPBMLS)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

NPSODD - Duplicate CLA address, where XX...XX is the duplicated CLA address between 01_{16} and FE_{16}. 00_{16} indicates preset value (no duplicates), and FF_{16} indicates no response.

NPISFL - Initialization completion sequence flags, where B15 and B7 through B0 indicate start or completion of various tasks as follows:

B15 - All buffers initialized, system initialization completed

B7 - Second phase of buffer initialization started/completed

B6 - Initialization of fixed lines started/completed

B5 - Initialization of MLIA started/completed

B4 - Application initialization started/completed

B3 - Miscellaneous NPU console initialization started/completed

B2 - Initialization of worklist control blocks started/completed

B1 - Initialization of buffers started/completed

B0 - Set up program protect bits started/completed

NOTE

A function is completed if the next higher bit is set, otherwise it was started but not completed.

NPBMLS Bad MLIA initialization status, where any value for YY..YY other than 0009_{16} indicates bad status. Call a Customer Engineer to run MLIA diagnostics.

M-235

Figure 3-3. NPINTAB Table Starting Address Format

The CCI programs include on-line diagnostic tests that are controlled from the NPU console. These on-line diagnostics provide data and status tests on one or more communications lines. The lines being tested are disconnected during the tests; however, the NPU and the remaining lines remain on-line to the network and are not affected by the tests.

This section has three primary subsections:

- operating instructions
- DDLT interpretation of diagnostic response messages
- systematic method for using the commands to isolate faults on the communications lines

The on-line diagnostic test programs test communications in any of three different modes:

- CLA internal loopback mode (tests all CLA logic except modem drivers and receivers)
- external data loopback mode (isolates modem and transmission line problems); some of these tests require that the modem have loopback features; the loopback jumper plug must be installed during these tests
- CLA external loopback mode (tests modem drivers and receivers)

OPERATING INSTRUCTIONS

On-line diagnostics for the CCI must be operated from the NPU console. This can be done by entering commands at the NPU console to direct diagnostic service messages and responses to the NPU console. This operation is limited and must be done in the following sequence:

1. Have the NPU operator disable the lines to be tested by changing the CLA address to an unused value.
2. Type in the NPU console a command to accept overlay data messages and to display overlay responses at the NPU console.

   (G)/OVL (D)

   where ◯ indicates pressing the CONTROL key and the lettered key simultaneously.
3. Operate the on-line diagnostics by inputting overlay data messages at the NPU console.

   (G) {DATA / DA} = string (D)(G)

The ASCII string is:

[INT / I / EXT / E / MOD / M] ,ii,j,kk

where:

INT or I is CLA internal loopback test

EXT or E is external loopback test

MOD or M is modem loopback test

ii = port number - expressed as two hexadecimal digits: 01 – FE_{16}

j = CLA type:

00 - synchronous RS232 (2560-1)

01 - asynchronous (2561-1)

02 - synchronous non-RS232 (2560-2, 2560-3)

03 - synchronous SDLC (2563-1)

kk = modem class (see table 4-1)

RESPONSE FORMAT

Overlay Data Normal Response SM Header	ASCII String

The ASCII string is:

PORT ii STARTED
PORT ii INV PORT
PORT ii INV CLA TYPE
PORT ii INV TEST MODE
PORT ii LINE NOT DISABLED
PORT ii TEST IN PROCESS
PORT ii LOW BUFFERS
PORT ii INV MODEM CLASS

INTERNAL LOOPBACK TEST

This test is run in the following sequence:

Entry/Reply	Meaning
(G) {DATA / DA} = {INT / I},ii,j,kk (D)(G)	This command starts the test. Parameters are: ii = port number (CLA address)

TABLE 4-1. MODEM CLASSES

Test Mode	CLA Type	Maximum Modem Speed	Modem Class (hexadecimal)	Modems† (Data Sets)
Internal and External Loopback	All	Not Applicable	0	None
Modem Loopback	2560-1 2560-2 2560-3 2563-1	Not Applicable	1	201B, 201A, 201C, 201D 208A, 208B 358-2
	2561-1 Async	100	2	
		110	3	
		120	4	
		134.5	5	
		150	6	
		300	7	103 series, 113A, 113B, VA3405 A thru G
		600	8	VA 3405 A thru G
		800	9	
		1050	A	
		1200	B	
		1600	D	
		2400	F	
		4800	10	
		9600	12	358-1

†The modems listed constitute only a small fraction of all possible modems offered by a variety of manufacturers.

Entry/Reply	Meaning
	j = CLA type 00 - synchronous RS232 (2560-1) 01 - asynchronous (2561-1) 02 - synchronous non-RS232 (2560-2, 2560-3) 03 - synchronous SDLC (2563-1) kk = modem class (see table 4-1) Ⓓ terminates command. Ⓖ places console in write mode so it can receive the test reply.
Responses given in tables 4-2 and 4-3	The diagnostic continues to run until an error occurs (and the error message appears) or a terminate test or terminate overlay command is entered.
Ⓖ{DATA/DA} = {TERM/T},ii Ⓓ Ⓖ	This command terminates the test on line.
Response given in table 4-4	Operator is informed that test was completed successfully or command was in error.

Suggested modes for isolating line faults are discussed later in this section under the heading of Communications Line Fault Isolation.

EXTERNAL LOOPBACK TEST

First check that external loopback plug is proper for the device used, and is installed. See table 4-5. Then run the test in the following sequence:

Entry/Reply	Meaning
Ⓖ{DATA/DA} = {EXT/E},ii,j,kk Ⓓ Ⓖ	The command starts the tests. Parameters are given above for the internal loopback test.
Responses given in tables 4-2 and 4-3	Test continues to run until an error occurs (and an error message appears) or a terminate command is entered.
Ⓖ{DATA/DA} = {TERM/T},ii Ⓓ Ⓖ	This command terminates the test.
Response given in table 4-4	Test completed or error in command described.

Remove the external loopback plug.

TABLE 4-2. RESPONSES TO START ON-LINE DIAGNOSTIC TEST COMMANDS FROM NPU CONSOLE

Initial Response	Meaning
*WM PORT ii STARTED	Test started
*WM PORT ii INV PORT	No such port number
*WM PORT ii INV CLA TYPE	No such type of CLA
*WM PORT ii INV TEST MODE	Undefined test mode was entered (was not one of the following: INT, EXT, or MOD)
*WM PORT ii NOT DISABLED	That port was not taken out of service before starting diagnostics
*WM PORT ii TEST IN PROCESS	Some diagnostic test is already being run on this port
*WM PORT ii LOW BUFFERS	System is low on buffers
*WM PORT ii INV MODEM CLASS	Modem class parameter is outside the allowable range
Second Response - If Error Occurred	**Meaning**
PORT ii ERROR (error data)	Error responses are summarized in table 4-3. See also table 4-6, DDLTs

MODEM LOOPBACK TEST

This test is run in the following sequence:

Entry/Reply	Meaning
(G){DATA / DA} = {MOD / M},ii,j,kk (D)(G)	
	This command starts the tests. Parameters are given above for the internal loopback test.
Responses given in tables 4-2 and 4-3	Test continues to run until an error occurs (and the error message appears) or a terminate command is entered.
(G){DATA / DA} = {TERM / T},ii (D)(G)	
	This command terminates the test.
Response given in table 4-4	Test completed or error in command described.

DDLTs FOR ON-LINE DIAGNOSTIC TESTS

Figure 4-2 summarizes the on-line diagnostic DDLTs. Table 4-6 gives the DDLTs for the on-line diagnostics.

COMMUNICATIONS LINE FAULT ISOLATION

The on-line diagnostic test programs can be used to isolate suspected faulty communications line problems to a particular piece of equipment. Three basic program modes are available within the on-line diagnostic terminal interface program (TIP) to accomplish this testing.

Two of the available test modes (CLA internal loopback mode and CLA external loopback mode using an external test connector) test the CLAs. The third mode (external data loopback mode), used after CLA operation is verified by the CLA modes, tests the local and remote modems and the transmission line facilities. The external data loopback mode includes analog and digital loopback tests, remote tests, self tests, and transceiver analog loopback tests.

CLA INTERNAL AND EXTERNAL LOOPBACK TEST MODES

In the CLA internal loopback test mode, all CLA logic except the modem signal drivers and receivers are tested.

The CLA external loopback mode can be used only with CLA types 2560-1, 2561-1, and 2563-1. CLA type 2560-1 uses external test connector type 74715000, CLA type 2561-1 uses external connector type 74715600, and CLA type 2563-1 uses external test connector type 74870830. These connectors are installed at the CLA in place of the normal connector to the local modem.

TABLE 4-3. ON-LINE DIAGNOSTIC TEST ERROR CODES (Sheet 1 of 2)

PORT pp ERROR xx,yy,qqqq,rrrr

where: pp = port number
xx = error code (see below)
yy = number of subtests being performed at error time

DATA 1

qqqq = 1 - NA for N-type errors
2 - expected CLA status for S-type errors
3 - operator/default data for D-type errors

DATA 2

rrrr = 1 - NA for N-type errors
2 - received CLA status for S-type errors
3 - received data for D-type errors

xx = Error Code (Hexadecimal)

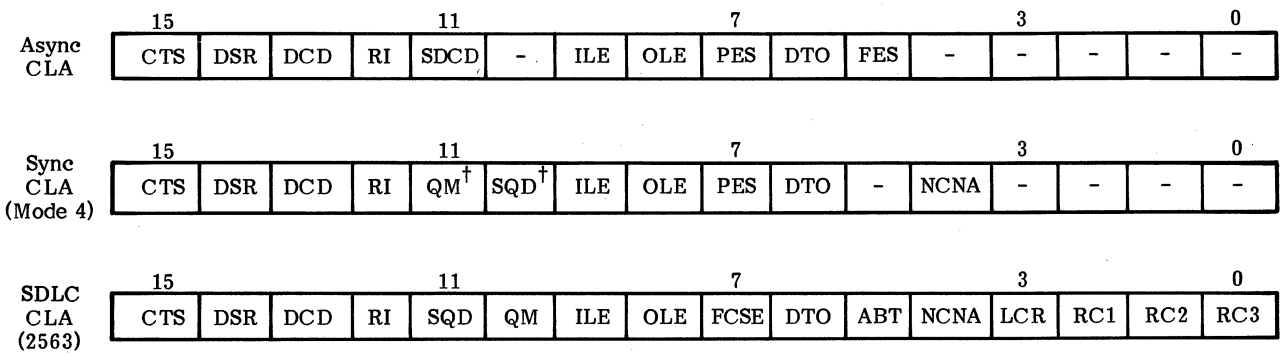
Error Code	Significance	Error Type†
00	Not legal in error message	
01	Unsolicited input detected	N
02	Unsolicited output data demand detected (ODD)	N
03	Input loop error (ILE)	S
04	Output loop error (OLE)	S
05	Parity error	S
06	Framing error	S
07	Data transfer overrun (DTO)	S
08	Next character not available (NCNA)	S
09	No CLA status after CLA status requested	S
0A	Unsolicited CLA status	S
0B	CLA status not cleared after input supervision ON (ISON)	S
0C	No status after request to send (RTS) or input status request (ISR)	S
0D	No clear to send (CTS) after RTS	S
0E	No status after data terminal ready (DTR)	S
0F	No data set ready (DSR) after DTR	S
10	No signal quality detect (SQD) after DTR	S
11	No ring indicator (RI) after DTR	S
12	No status after secondary request to send (SRTS)	S
13	No secondary received line signal detector (SRLSD) after SRTS	S
14	No CLA status after local mode (LM)	S
15	No data carrier detect (DCD) after LM	S
16	Unsolicited status after originate mode (OM)	S
17	No status or improper operation of RI after terminal busy (TB)	S
18	No status after new sync (NSYN)	S
19	Improper operation of DCD, RI, or quality monitor (QM) or unsolicited status after NSYN	S
1A	No RI after RTS	S
1B	Unsolicited status after LM	S

TABLE 4-3. ON-LINE DIAGNOSTIC TEST ERROR CODES (Sheet 2 of 2)

Error Code	Significance	Error Type†
1C	Input data timeout during data verification test (DVT)	N
1D	Unsolicited status during DVT	S
1E	No CRCs received during DVT of SDLC CLA	N
	Test Conditions	
1F	DVT failed (synchronous CLA even parity)	D
20	DVT failed (synchronous CLA odd parity)	D
21	DVT failed (synchronous CLA no parity)	D
22	DVT failed (SDLC CLA)	D
23	DVT failed (SDLC CLA)	D
24	DVT failed (SDLC CLA)	D
25	DVT failed (async CLA, 40 baud, even parity, 1 stop bit)	D
26	DVT failed (async CLA, 85.4 baud, odd parity, 2 stop bits)	D
27	DVT failed (async CLA, 100 baud, no parity, 1 stop bit)	D
28	DVT failed (async CLA, 110 baud, even parity, 2 stop bits)	D
29	DVT failed (async CLA, 120 baud, odd parity, 1 stop bit)	D
2A	DVT failed (async CLA, 134.5 baud, no parity, 2 stop bits)	D
2B	DVT failed (async CLA, 150 baud, even parity, 1 stop bit)	D
2C	DVT failed (async CLA, 300 baud, odd parity, 2 stop bits)	D
2D	DVT failed (async CLA, 600 baud, no parity, 1 stop bit)	D
2E	DVT failed (async CLA, 800 baud, even parity, 2 stop bits)	D
2F	DVT failed (async CLA, 1050 baud, odd parity, 1 stop bit)	D
30	DVT failed (async CLA, 1200 baud, no parity, 2 stop bits)	D
31	DVT failed (async CLA, 1600 baud, even parity, 1 stop bit)	D
32	DVT failed (async CLA, 1600 baud, odd parity, 2 stop bits)	D
33	DVT failed (async CLA, 2400 baud, no parity, 1 stop bit)	D
34	DVT failed (async CLA, 2400 baud, even parity, 2 stop bits)	D
35	DVT failed (async CLA, 4800 baud, odd parity, 1 stop bit)	D
36	DVT failed (async CLA, 9600 baud, no parity, 2 stop bits)	D
37	DVT failed (async CLA, 9600 baud, even parity, 1 stop bit)	D
38	Multiplex subsystem buffer threshold detected	N

† Error Types:

Code	Significance	Error Type
N	qqqq = not used (ignore values) rrrr = not used (ignore values)	- -
S	qqqq is expected CLA status (see figure 4-1) rrrr is received CLA status (see figure 4-1)	Status Status
D	qqqq is input data for verification rrrr is expected data for verification	Data Data



where:
- ABT - Abort
- CTS - Clear to send
- DCD - Data carrier detect
- DSR - Data set ready
- DTO - Data transfer overrun
- FCSE - Frame check sequence error
- FES - Framing error status
- ILE - Input loop error
- LCR - Last character received
- NCNA - Next character not available
- OLE - Output loop error
- PES - Parity error
- QM - Quality monitor
- RC1, RC2, RC3 - Reason codes
- RI - Ring indicator
- SDCD - Secondary data carrier detector
- SQD - Signal quality detector

†DU138-A only

Figure 4-1. CLA Status Word

TABLE 4-4. RESPONSES TO TERMINATE DIAGNOSTIC TEST COMMAND FROM NPU CONSOLE

Response	Meaning
*WM PORT ii TEST COMPL - NO ERROR	CLA line test completed without errors
*WM PORT ii INV PORT	No such CLA line number
*WM PORT ii NOT IN PROCESS	CLA line with that number was not doing diagnostics, or the diagnostics stopped because an error was detected and an error response was already given

TABLE 4-5. EXTERNAL LOOPBACK TEST

CLA Product Number	Connector Number
2560-1	74715000
2561-1	74715600
2563-1	74870830
2560-2 2560-3	None. Cannot run external loopback test

If external loopbacks are anticipated and the type of modem used lacks special test switches, the telephone company should be informed of any special connections to be made. See appendixes D, E, and F.

EXTERNAL DATA LOOPBACK MODE

The external data loopback mode is used after CLA operation is verified by running the CLA internal and external loopback mode tests.

PRELIMINARY INFORMATION REQUIRED

Before running the external data loopback tests, the following information must be known:

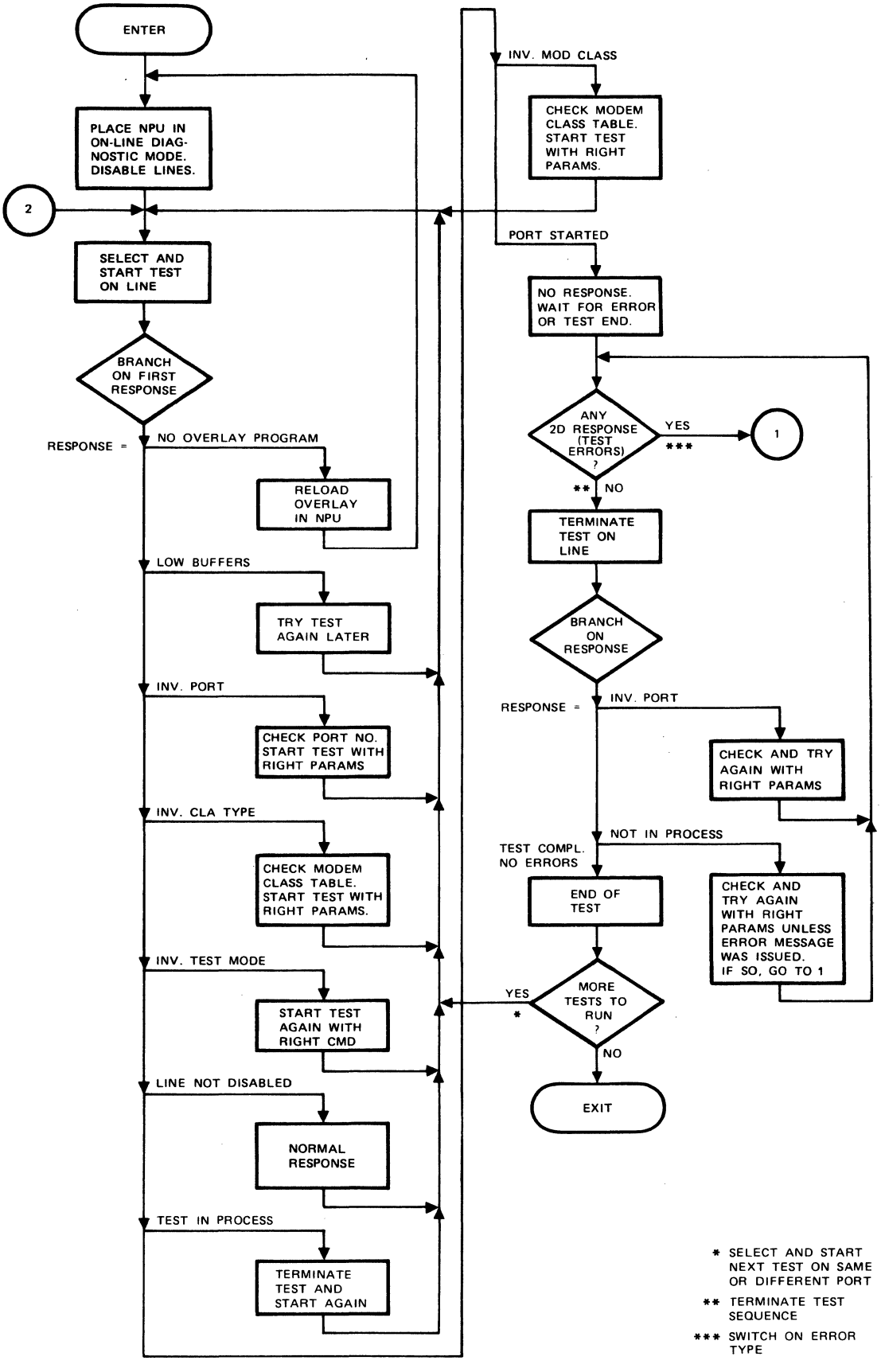


Figure 4-2. Flowchart for On-Line Diagnostic DDLTs (Sheet 1 of 2)

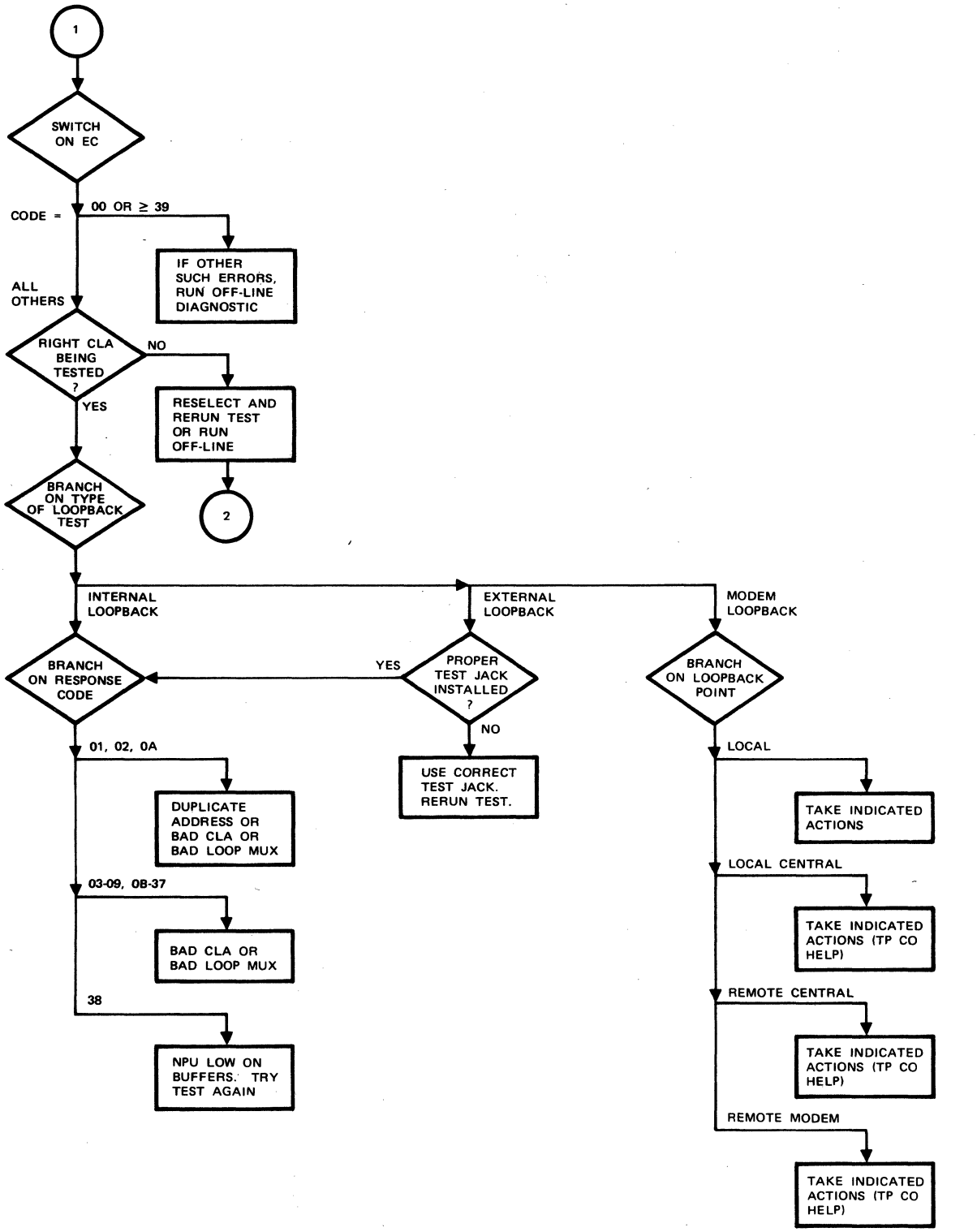


Figure 4-2. Flowchart for On-Line Diagnostic DDLTs (Sheet 2 of 2)

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 1 of 14)

ASSUME
1. The Communications Control INTERCOM (CCI) is loaded, initialized and operating at least to the idle state.
2. MLIA is working since the system has not halted.
3. After each corrective action, the test should be retried.
4. The operator is familiar with the DDLT format.
5. The operating instructions for the on-line diagnostics are given in text.

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 2 of 14)

Diagnostic Response - Index

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Does diagnostic response = NO OVERLAY PROGRAM?	N	N	N	N	N	Y
2. Does diagnostic response = PORT ii† STARTED?	N	N	N	N	Y	-
3. Does diagnostic response = PORT ii INV PORT?	N	N	N	Y	-	-
4. Does diagnostic response = PORT ii INV CLA TYPE?	N	N	Y	-	-	-
5. Does diagnostic response = PORT ii INV TEST MODE?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 3.	X	-	-	-	-	-
2. Overlay program is always loaded. Check operating procedures. If problem still persists, try off-line diagnostics.	-	-	-	-	-	X
3. Test has started, no action required. Wait for error message or wait for test complete message. Go to sheet 4 to continue DDLT on either of those messages.	-	-	-	-	X	-
4. Port number is outside the allowable range of port numbers. Check for proper port number and reissue command.	-	-	-	X	-	-
5. Not a valid CLA type. Check for proper CLA type and reissue command.	-	-	X	-	-	-
6. An undefined test mode was entered (was not one of the following: INT, EXT, or MOD). Check for proper test mode and reissue command.	-	X	-	-	-	-

†ii = CLA port number

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 3 of 14)

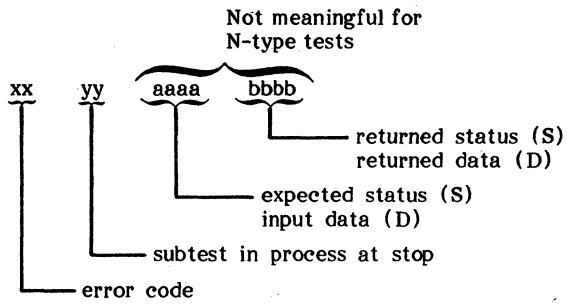
Diagnostic Response - Index

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Does diagnostic response = PORT ii LINE NOT DISABLED?	N	N	N	N	N	Y
2. Does diagnostic response = PORT ii TEST IN PROCESS?	N	N	N	N	Y	-
3. Does diagnostic response = PORT ii LOW BUFFERS?	N	N	N	Y	-	-
4. Does diagnostic response = PORT ii INV MODEM CLASS?	N	N	Y	-	-	-
5. Does diagnostic response = PORT ii NOT IN PROCESS?	N	Y	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Go to sheet 4.	X	-	-	-	-	-
2. Port was not taken out of service before starting diagnostics. This is normal.	-	-	-	-	-	X
3. Some diagnostic test is already being run on this port. Check for proper port number.	-	-	-	-	X	-
4. System is low on buffers. Reissue command later.	-	-	-	X	-	-
5. Modem class parameter is outside the allowable range. Check modem class and reissue command.	-	-	X	-	-	-
6. CLA line/trunk number was not doing diagnostics, or diagnostics stopped because an error response was already given. Check that the proper CLA port number was used in each message.	-	X	-	-	-	-

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 4 of 14)

Diagnostic Response - Index			
CONDITIONS	SITUATIONS		
	1	2	3
1. Does diagnostic response = PORT ii TEST COMPL - NO ERROR?	N	N	Y
2. Does first part of diagnostic response = PORT ii ERROR† ?	N	Y	-
ACTIONS	**SEQUENCE**		
1. Terminate test, start next test or terminate diagnostics.	X	-	-
2. **CLA line test found no errors. No action required.**	-	-	X
3. An error has been detected during CLA testing. Go to sheet 5.	-	X	-

†Test data follows in hexadecimal format:



The subtest is an index to the control parameters table (see Link Edit testing for diagnostics). An exception tion exists if the test has reached the data turnaround stage. In that case subtest is an entry in the compare data address table.

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 5 of 14)

Diagnostic Response - Index		
CONDITIONS	SITUATIONS	
	1	2
1. Does the next piece of the diagnostic response (error code) = 00 or $\geq$ 39?	N	Y
ACTIONS	**SEQUENCE**	
1. Go to sheet 6.	-	X
2. This is not a legal response number for on-line diagnostics. Check over previous console messages to see if the console is misinterpreting some characters. If so, run the NPU off-line console diagnostics.	1	-
3. Run the ODS off-line diagnostics on the mainframe.	2	-

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 6 of 14)

Checking CLA Type

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Look at the port number (CLA address) in the diagnostic test response. Is this CLA being tested?	Y	Y	N	N
2. Does the CLA (whose address is in the diagnostic test response at the console) product number match the type of CLA test being run? (Type 00 = 2560-1, type 01 = 2561-1, type 02 = 2560-2 or 2560-3, type 03 = 2563-1.)	Y	N	-	-
3. This is a system anomoly. Is this the second time down this path?	-	-	Y	N
ACTIONS	**SEQUENCE**			
1. Go to sheet 7.	X	-	-	-
2. Rerun test using the proper type of CLA test.	-	X	-	-
3. Rerun the diagnostics on all the lines that were being tested when this error occurred. Keep the commands in the same order as previously run.	-	-	-	X
4. Check over previous console messages to see if it appears that the console is misinterpreting some characters. If so, run off-line MSMP console diagnostics.	-	-	1	-
5. Run the ODS off-line diagnostics on the mainframe.	-	-	2	-

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 7 of 14)

CLA Test Mode Index

CONDITIONS	SITUATIONS		
	1	2	3
1. Look at test mode part of the start diagnostics command for this CLA. Is this CLA being tested in the internal loopback mode?	Y	N	N
2. Is this CLA being tested in the external loopback mode?	-	Y	N
3. Is this CLA being tested in the modem loopback mode?	-	-	Y
ACTIONS	**SEQUENCE**		
1. Go to sheet 8.	X	-	-
2. Go to sheet 9.	-	X	-
3. Go to sheet 10.	-	-	X

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 8 of 14)

CLA/Internal Loopback Test

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Look at the data following the word ERROR in the diagnostic test response at the console. This is the response code. Is the response code 01, 02, or 0A?	Y	N	N	N
2. Is the response code 03 thru 09, or 0B thru 37?	-	Y	N	N
3. Is the response code 38?	-	-	Y	N
ACTIONS	**SEQUENCE**			
1. Check to see if there is more than one CLA set to the address given in the port number in the diagnostic test response at the console. If there are duplicated addresses, change them to give each CLA a unique address.	1	-	-	-
2. Replace the CLA whose address is in the port number in the diagnostic test response at the console.	2	1	-	-
3. Replace the primary loop multiplex in the loop multiplexer card cage which contains the above CLA.	3	2	-	-
4. The multiplexer subsystem is low on buffers. Reissue the test command.	-	-	X	-
5. You have misinterpreted the directions. Return to sheet 2 and try DDLT again.	-	-	-	X

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 9 of 14)

CLA/External Loopback Test

CONDITIONS	SITUATIONS 1	2	3
1. Look at the port number in the diagnostic test response. This is the CLA address. Does this CLA have an external test connector on it?	Y	Y	N
2. Is it the proper external test connector for this CLA product number? 2560-1 uses connector 74715000, 2561-1 uses connector 74715600, 2563-1 uses connector 74870830. 2560-2 and 2560-3 cannot run an external loopback test.	Y	N	-
ACTIONS	**SEQUENCE**		
1. Go to sheet 8.	X	-	-
2. Rerun test with proper external test connector.	-	X	X

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 10 of 14)

CLA/Modem Loopback Test

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Is the communications line (address is in the port number of the diagnostic test response at the console) looped back towards the CLA at the local modem?	Y	N	N	N	N	N
2. Is the communications line looped back towards the CLA at the local telephone central office?	-	Y	N	N	N	N
3. Is the communications line looped back towards the CLA at the remote telephone central office?	-	-	Y	N	N	N
4. Is the communications line looped back towards the CLA at the remote modem?	-	-	-	Y	N	N
5. Are you sure there is a loopback condition in the communications line?	-	-	-	-	Y	N
ACTIONS	**SEQUENCE**					
1. Go to sheet 11.	X	-	-	-	-	-
2. Go to sheet 12.	-	X	-	-	-	-
3. Go to sheet 13.	-	-	X	-	-	-
4. Go to sheet 14.	-	-	-	X	-	-
5. Choose the one of the four above loopback point descriptions that is the closest match to your loopback point and follow its directions.	-	-	-	-	X	-
6. This mode of testing requires a loopback towards the CLA in the communications line between the CLA and the terminal. Place the loopback of your choice in the communications line and rerun the test.	-	-	-	-	-	X

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 11 of 14)

CLA/Local Modem Loop Test

CONDITIONS	SITUATIONS 1	2	3
1. Look at the data following the word ERROR in the diagnostic test response at the console. This is the error code. Is the error code 01 thru 38?	Y	Y	N
2. Have you already tested the CLA in the external loopback mode using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback mode successfully?	Y	N	-

ACTIONS	SEQUENCE		
1. Replace the modem cable.	1	-	-
2. Replace the CLA.	2	-	-
3. Replace the modem.	3	-	-
4. Run the CLA loopback external mode test.	-	X	-
5. You have misinterpreted the directions. Return to sheet 5 and run DDLT again.	-	-	X

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 12 of 14)

CLA/Loopback at Local Central Office Test

CONDITIONS	SITUATIONS			
	1	2	3	4
1. Look at the data following the word ERROR in the diagnostic test response at the console. This is the error code. Is the error code 01 thru 38?	Y	Y	Y	N
2. Have you already tested the CLA in the external loopback mode using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback mode successfully?	Y	Y	N	-
3. Have you already run the modem loopback mode test on this communications line with the local modem looped back towards the CLA successfully?	Y	N	-	-
ACTIONS	**SEQUENCE**			
1. Replace the local modem.	1	4	-	-
2. Have local telephone central office check the local telephone line.	2	5	-	-
3. Run the CLA loopback external mode test.	-	-	X	-
4. You have misinterpreted the directions. Return to sheet 5 and run DDLT again.	-	-	-	X
5. Run the modem loopback mode test on this communications line with the local modem looped back towards the CLA.	-	1	-	-
6. If the local modem has no loopback, replace the modem cable.	-	2	-	-
7. If the local modem has no loopback, replace the CLA.	-	3	-	-

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 13 of 14)

CLA/Loopback at Remote Telephone Central Office

CONDITIONS	SITUATIONS				
	1	2	3	4	5
1. Look at the data following the word ERROR in the diagnostic test response. This is the error code. Is the error code 01 thru 38?	Y	Y	Y	Y	N
2. Have you already tested the CLA in the external loopback mode using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback mode successfully?	Y	Y	Y	N	-
3. Have you already run the modem loopback mode test on this communications line with the local modem looped back towards the CLA successfully?	Y	Y	N	-	-
4. Have you already run the modem loopback mode test on this communications line with the local telephone central office looped back towards the CLA successfully?	Y	N	-	-	-
ACTIONS	**SEQUENCE**				
1. Have the telephone company check the line from the local central office to the remote central office.	X	-	-	-	-
2. Run the modem loopback mode test on this communications line with the local central telephone office looped back towards the CLA.	-	X	-	-	-
3. Run the modem loopback mode test on this communications line with the local modem looped back towards the CLA.	-	-	X	-	-
4. Run the CLA loopback external mode test.	-	-	-	X	-
5. You have misinterpreted the directions. Return to sheet 5 and run the DDLT again.	-	-	-	-	X

TABLE 4-6. ON-LINE DIAGNOSTICS DDLT (Sheet 14 of 14)

CLA/Loopback at Remote Modem

CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
1. Look at the data following the word ERROR in the diagnostic test response at the console. This is the error code. Is the error code 00 thru 38?	Y	Y	Y	Y	Y	N
2. Have you already tested the CLA in the external loopback mode using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback mode successfully?	Y	Y	Y	Y	N	-
3. Have you already run the modem loopback mode test on this communications line with the local modem looped back towards the CLA successfully?	Y	Y	Y	N	-	-
4. Have you already run the modem loopback mode test on this communications line with the local telephone central office looped back towards the CLA successfully?	Y	Y	N	-	-	-
5. Have you already run the modem loopback mode test on this communications line with the remote telephone central office looped back towards the CLA successfully?	Y	N	-	-	-	-
ACTIONS	**SEQUENCE**					
1. Replace the remote modem.	1	-	-	-	-	-
2. Have the remote telephone central office check the telephone line to the remote modem.	2	-	-	-	-	-
3. Run the modem loopback mode test on this communications line with the remote telephone central office looped back towards the CLA.	-	X	-	-	-	-
4. Run the modem loopback mode test on this communications line with the local telephone central office looped back towards the CLA.	-	-	X	-	-	-
5. Run the modem loopback mode test on this communications line with the local modem looped back towards the CLA.	-	-	-	X	-	-
6. Run the CLA loopback external mode test.	-	-	-	-	X	-
7. You have misinterpreted the directions. Return to sheet 5 and run the DDLT again.	-	-	-	-	-	X

1. The type of modem or Data Set (Bell 208A, Bell 207C, CDC 358-2, etc.) used on the line or lines to be tested.

2. The test modes (analog loopback, digital loopback, self test, etc.) available for use with the modem or modems to be tested.

NOTE

See the applicable modem manual or Bell System Data Set specifications for this information and/or step-by-step instructions for testing. Table 4-7 lists some of the more common modems and the test modes available for each.

3. The type of service (dial-up or dedicated). Dedicated lines have more loopback points than do dial-up lines.

4. The type of line operation used (simplex, half duplex, or full duplex). Simplex lines cannot be looped back past the analog loopback of the local modem. Half-duplex lines echo back transmitted data to the received data line at the modem interface. Full-duplex lines handle all types of loopback points.

After obtaining the foregoing information, refer to figure 4-3 to determine the possible loopback points available for the particular configuration to be tested. Thereafter, adapt the suggested loopback test sequence contained in this section for the configuration to be tested. The suggested procedure assumes a full-duplex line with modems that accept all test modes available. If a proper loopback test fails, replace the faulty equipment or call the maintenance personnel responsible for the indicated faulty equipment.

EXTERNAL DATA LOOPBACK TESTS

The external data loopback mode includes analog and digital loopback tests, remote tests, self tests, and transceiver analog loopback tests. Refer to table 4-7 for the test mode or modes that apply to each of the common types of modems or data sets.

TABLE 4-7. COMMON MODEMS AND LOOPBACK TESTS AVAILABLE

Modem Type	Loopback Tests Available
Bell 103	Remote test
Bell 103A	Analog test, remote test
Bell 113A	Remote test
Bell 201A	Remote test
Bell 201B	Remote test
Bell 201C	Analog test, digital test, self test
Bell 202	Remote test
Bell 202S	Analog test, remote test
Bell 202T	Analog test, remote test
Bell 208A	Analog test, digital test, self test
Bell 208B	Analog test, self test
CDC 358-2	Transceiver analog loopback test

In the analog loopback test (activated by the analog loopback test mode switch on the modem) either the local or remote modem can be caused to loop analog data back toward the terminal (with the CLA acting as a terminal for the local modem). The digital analog loopback test is activated by the digital loopback test switch on the modem and loops digital data from the modem back toward the communications lines (local or remote central office).

The remote test mode is used only when requested by the telephone company maintenance personnel for telephone company testing of the modem and telephone lines.

If the modem being tested includes word generator and word comparator facilities, activating the self-test mode switch at the modem enables the modem to test its own logic. Additionally, for the CDC type 358-2 modem, the transceiver analog loopback test mode connects transmit data by jumper wire back to the receive data side of the modem.

SUGGESTED LOOPBACK TEST SEQUENCE

When a communications line failure is suspected, run the following tests in the sequence indicated to isolate the problem to a particular piece of equipment or section of the transmission line or system cabling. If any test fails, replace the faulty equipment or call the maintenance personnel responsible for the indicated faulty equipment and report the test indications so that the trouble may be corrected.

1. Execute the CLA internal loopback test to test all CLA logic except the modem signal drivers and receivers.

    a. If the test fails, it indicates that the CLA is faulty. Replace the CLA.

    b. If the test does not fail, proceed to the next step.

2. If the CLA is type 2560-1, install external test connector type 74715000; if type 2561-1, install external test connector type 74715600; and if type 2563-1, install external test connector type 74870830. Execute the CLA external loopback test to test all logic of the CLA, including the modem signal drivers and receivers.

    a. If the test fails, it indicates that the CLA modem signal drivers or receivers are faulty. Replace the CLA.

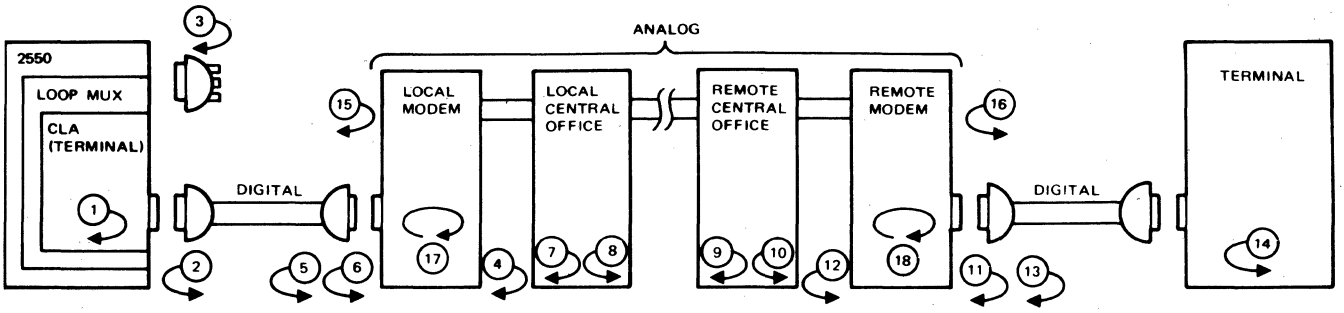
    b. If the test does not fail, proceed to the next step.

3. With the analog test button on the local modem depressed, execute the external data loopback test. This tests the data transmission capability of the local modem and the CLA-to-local modem cable.

    a. If the test fails, either the local modem or the CLA-to-local modem cable is faulty. Proceed to step 6.

    b. If the test does not fail, proceed to the next step.

4. Release the analog test button on the local modem and request that the digital test button on the remote modem be pressed. Again run the external data loopback test. This tests the transmission line and remote modem.



LOOPBACK POINTS

(1) CLA IN INTERNAL LOOPBACK MODE

(2) FOR CLA TYPE 2561-1, SET TO ECHOPLEX MODE (ECHO ON) AND RECEIVED DATA IS LOOPED BACK TO TRANSMIT DATA SO THAT THE DATA RECEIVED FROM THE TERMINAL IS SENT BACK TO THE TERMINAL.

(3) USING THE EXTERNAL LOOPBACK CONNECTOR AT THE RS-232 CONNECTOR ON CLA TYPES 2560-1, 2561-1, AND 2563-1 (2560-1 USES LOOPBACK CONNECTOR 74715000, 2561-1 USES LOOPBACK CONNECTOR 74715600, AND 2563-1 USES LOOPBACK CONNECTOR 74870830).

(4) & (12) ANALOG LOOPBACK TEST MODE SWITCH ON MODEM CAUSES ANALOG LOOPBACK TOWARD TERMINAL (CLA ACTS AS TERMINAL).

(5) & (11) DIGITAL LOOPBACK TEST MODE SWITCH ON MODEM CAUSES DIGITAL LOOPBACK TOWARD TELEPHONE LINES.

(6) & (13) REMOTE TEST MODE SWITCH ON TELEPHONE DATA SETS (MODEMS) CAUSES SPECIAL LOOPBACK TOWARD TELEPHONE LINES FOR TELEPHONE COMPANY TESTING ONLY. THIS IS HARDWARE TESTING AND IS NOT INCLUDED IN THIS MANUAL.

(7) THRU (10) ANALOG LOOPBACK ON TELEPHONE COMPANY TEST PANEL TOWARD EITHER TERMINAL (BY SPECIAL ARRANGEMENT WITH TELEPHONE COMPANY). THIS IS HARDWARE TESTING AND IS NOT DESCRIBED IN THIS MANUAL.

(14) LOCAL MODE SWITCH ON TERMINAL CAUSES LOCAL TESTING OF TERMINAL. THIS HARDWARE TEST IS DESCRIBED IN THE APPROPRIATE HARDWARE MANUAL.

(15) & (16) HALF-DUPLEX LINES WILL LOOP TRANSMIT DATA BACK TO RECEIVE DATA AT MODEM INTERFACE.

(17) & (18) SELF-TEST MODE SWITCH ON MODEM CAUSES WORD GENERATOR AND WORD COMPARATOR BUILT INTO MODEM TO TEST MODEM LOGIC. REFER TO REFERENCE MANUAL FOR MODEM OR DATA SET TYPE. THIS IS AN OFF-LINE TEST THAT IS NOT DESCRIBED IN THIS MANUAL.

M-183

Figure 4-3. Loopback Points

a. If the test fails, either the transmission line or remote modem is faulty. Proceed to step 8.

b. If the test does not fail, proceed to the next step.

5. Request release of the digital test button on the remote modem. If no errors were detected in steps 1 through 4, the CLA modems and transmission line may be assumed to be working properly. Request testing of the remote terminal and the remote terminal-to-remote modem cable using any available diagnostics. See steps 10 through 12.

6. Enter this step from step 3. Release the analog test button on the local modem. If the local modem has an analog loopback self-test mode (such as Bell 208A modem), run that test as described in the modem (Data Set) manual.

a. If the test fails, the local modem is bad. Request repair or replacement of the local modem.

b. If the test does not fail or if the modem does not have a self-test mode, proceed to the next step.

7. Replace the CLA-to-local modem cable and, with the analog test button on the local modem depressed, execute the external data loopback test.

    a. If the test fails and the modem is a telephone company modem without the self-test mode, read appendixes D, E, and F before calling the telephone company repair service and requesting assistance to test the modem and telephone line. Follow telephone company directions to test the modem and line.

    b. If the test does not fail, the trouble was in the CLA-to-local modem cable and has been corrected.

8. Enter this step from step 4. If the remote modem has an analog loopback self-test mode, run that test as described in the modem (Data Set) manual.

    a. If the test fails, the remote modem is bad. Request repair or replacement of the remote modem.

    b. If the test does not fail or if the modem does not have a self-test mode, proceed to the next step.

9. If the modem is a telephone company modem without self-test mode, read appendixes D, E, and F before calling the telephone company repair service and requesting assistance to test the modem and telephone line. Follow the telephone company directions to test the modem and line.

    a. If the test fails, request repair or replacement of the indicated faulty equipment.

    b. If the test does not fail or the modem is not a telephone company modem, proceed to the next step.

10. If the local and remote modem both tested properly, but step 4 continues to fail, a transmission line problem is indicated. Request the telephone company to loop back the telephone line at the voice frequency test panel in the local central office to return the signal toward the CLA. Execute the external data loopback test to verify that the telephone line is working properly to the local central office.

    a. If this test fails, the telephone line between the local central office is bad. Have the telephone company check that line.

    b. If this test does not fail, proceed to next step.

11. Request the telephone company to loop back the telephone line at the voice frequency test panel in the remote central office and again run the external data loopback test.

    a. If this test fails, have the telephone company check the telephone line.

    b. If this test does not fail, proceed to next step.

12. If the remote terminal is capable of self test, or if the remote terminal can send messages that the terminal can copy on a looped back line, request performance of those tests to indicate a fault in the remote terminal. Request repair or replacement of the terminal.

OPERATING SYSTEM CHARACTER SETS

Control Data operating systems offer the following variations of a basic character set:

- CDC 64-character set
- CDC 63-character set
- ASCII 64-character set
- ASCII 63-character set

The set in use at a particular installation is specified when the operating system is installed or deadstarted.

Depending on another installation option, the system assumes an input deck has been punched in either 026 or 029 mode (regardless of the character set in use).

Under NOS/BE, alternate keypunch modes can be specified by a 26 or 29 punched in columns 79 and 80 of any job card or 7/8/9 card. The specified mode remains in effect throughout the job unless it is reset by specification of the alternate mode on a subsequent 7/8/9 card. Mode 4A terminals do not recognize this specification. HASP and 2780/3780 terminals recognize the 26 or 29 when punched in columns 79 and 80 of any job card or /*EOR card.

Graphic character representation appearing at a terminal or printer depends on the installation character set and the terminal class. Characters shown in the CDC Graphic column of the standard character set table (table A-1) are applicable to BCD terminals; ASCII graphic characters are applicable to ASCII CRT and ASCII TTY terminals. Tables A-1 through A-4 are provided for the reader's use while coding a program to run under the operating system. These tables do not describe character transmissions between an application program and the network. The external BCD code given in table A-1 is a 7-track magnetic tape code without parity, and is not the external BCD code used by some Mode 4A terminals; the mode 4A external BCD code is a 7-bit code, plus odd parity.

128 - CHARACTER ASCII SET

Table A-5 contains the complete ASCII 7-bit (excluding parity) character set supported by CCI 3 for interactive terminal blocks. Binary designations are shown so that conversion of the leftmost two columns and rightmost two columns to octal or hexadecimal can be made; no octal display code equivalents appear for the characters of these four columns in table A-1.

During output operations to a terminal that does not support the full 128- or 96-character sets, conversion from the 96-character set to the 64-character set is accomplished by folding column 6 into column 4 and folding column 7 into column 5. Folding the 128-character set into the 96-character set consists of replacing the extra characters with blanks.

TABLE A-1. STANDARD CHARACTER SETS

Display Code (octal)	CDC			ASCII		
	Graphic	Hollerith Punch (026)	External BCD Code	Graphic Subset	Punch (029)	Code (octal)
00†	: (colon)††	8-2	00	: (colon)††	8-2	072
01	A	12-1	61	A	12-1	101
02	B	12-2	62	B	12-2	102
03	C	12-3	63	C	12-3	103
04	D	12-4	64	D	12-4	104
05	E	12-5	65	E	12-5	105
06	F	12-6	66	F	12-6	106
07	G	12-7	67	G	12-7	107
10	H	12-8	70	H	12-8	110
11	I	12-9	71	I	12-9	111
12	J	11-1	41	J	11-1	112
13	K	11-2	42	K	11-2	113
14	L	11-3	43	L	11-3	114
15	M	11-4	44	M	11-4	115
16	N	11-5	45	N	11-5	116
17	O	11-6	46	O	11-6	117
20	P	11-7	47	P	11-7	120
21	Q	11-8	50	Q	11-8	121
22	R	11-9	51	R	11-9	122
23	S	0-2	22	S	0-2	123
24	T	0-3	23	T	0-3	124
25	U	0-4	24	U	0-4	125
26	V	0-5	25	V	0-5	126
27	W	0-6	26	W	0-6	127
30	X	0-7	27	X	0-7	130
31	Y	0-8	30	Y	0-8	131
32	Z	0-9	31	Z	0-9	132
33	0	0	12	0	0	060
34	1	1	01	1	1	061
35	2	2	02	2	2	062
36	3	3	03	3	3	063
37	4	4	04	4	4	064
40	5	5	05	5	5	065
41	6	6	06	6	6	066
42	7	7	07	7	7	067
43	8	8	10	8	8	070
44	9	9	11	9	9	071
45	+	12	60	+	12-8-6	053
46	-	11	40	-	11	055
47	*	11-8-4	54	*	11-8-4	052
50	/	0-1	21	/	0-1	057
51	(	0-8-4	34	(	12-8-5	050
52	)	12-8-4	74	)	11-8-5	051
53	$	11-8-3	53	$	11-8-3	044
54	=	8-3	13	=	8-6	075
55	blank	no punch	20	blank	no punch	040
56	, (comma)	0-8-3	33	, (comma)	0-8-3	054
57	. (period)	12-8-3	73	. (period)	12-8-3	056
60	≡	0-8-6	36	#	8-3	043
61	[	8-7	17	[	12-8-2	133
62	]	0-8-2	32	]	11-8-2	135
63	%††	8-6	16	%††	0-8-4	045
64	≠	8-4	14	" (quote)	8-7	042
65	←	0-8-5	35	_ (underline)	0-8-5	137
66	∨	11-0 or 11-8-2†††	52	!	12-8-7 or 11-0†††	041
67	∧	0-8-7	37	&	12	046
70	↑	11-8-5	55	' (apostrophe)	8-5	047
71	↓	11-8-6	56	?	0-8-7	077
72	<	12-0 or 12-8-2†††	72	<	12-8-4 or 12-0†††	074
73	>	11-8-7	57	>	0-8-6	076
74	≤	8-5	15	@	8-4	100
75	≥	12-8-5	75	\	0-8-2	134
76	¬	12-8-6	76	~ (circumflex)	11-8-7	136
77	; (semicolon)	12-8-7	77	; (semicolon)	11-8-6	073

†Twelve zero bits at the end of a 60-bit word in a zero byte record are an end of record mark rather than two colons.

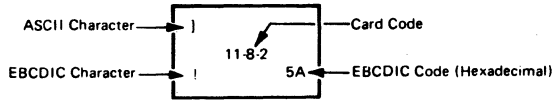
††In installations using a 63-graphic set, display code 00 has no associated graphic or card code; display code 63 is the colon (8-2 punch). The % graphic and related card codes do not exist and translations yield a blank (55_8).

†††The alternate Hollerith (026) and ASCII (029) punches are accepted for input only.

TABLE A-2. AMERICAN NATIONAL STANDARD CODE FOR INFORMATION INTERCHANGE (ASCII) WITH PUNCHED CARD CODES AND EBCDIC TRANSLATION

	b_8 b_7 b_6 b_5	0 0 0 0	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0	0 1 0 1	0 1 1 0	0 1 1 1	1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1
b_4 b_3 b_2 b_1	COL / ROW	0	1	2	3	4	5	6	7	8	9	10 (A)	11 (B)	12 (C)	13 (D)	14 (E)	15 (F)
0 0 0 0	0	NUL 12-0-9-8-1 NUL 00	DLE 12-11-9-8-1 DLE 10	SP no-punch SP 40	0 0 0 F0	@ 8-4 @ 7C	P 11-7 P D7	` 8-1 ` 79	p 12-11-7 p 97	11-0-9-8-1 DS 20	12-11-0-9-8-1 30	12-0-9-1 41	12-11-9-8 58	12-11-0-9-6 76	12-11-8-7 9F	12-11-0-8 B8	12-11-9-8-4 DC
0 0 0 1	1	SOH 12-9-1 SOH 01	DC1 11-9-1 DC1 11	! 12-8-7 | 4F	1 1 1 F1	A 12-1 A C1	Q 11-8 Q D8	a 12-0-1 a 81	q 12-11-8 q 98	0-9-1 SOS 21	9-1 31	12-0-9-2 42	11-8-1 59	12-11-0-9-7 77	11-0-8-1 A0	12-11-0-9 B9	12-11-9-8-5 DD
0 0 1 0	2	STX 12-9-2 STX 02	DC2 11-9-2 DC2 12	" 8-7 " 7F	2 2 2 F2	B 12-2 B C2	R 11-9 R D9	b 12-0-2 b 82	r 12-11-9 r 99	0-9-2 FS 22	11-9-8-2 CC 1A	12-0-9-3 43	11-0-9-2 62	12-11-0-9-8 78	11-0-8-2 AA	12-11-0-8-2 BA	12-11-9-8-6 DE
0 0 1 1	3	ETX 12-9-3 ETX 03	DC3 11-9-3 TM 13	# 8-3 # 7B	3 3 3 F3	C 12-3 C C3	S 0-2 S E2	c 12-0-3 c 83	s 11-0-2 s A2	0-9-3 23	9-3 33	12-0-9-4 44	11-0-9-3 63	12-0-8-1 80	11-0-8-3 AB	12-11-0-8-3 BB	12-11-9-8-7 DF
0 1 0 0	4	EOT 9-7 EOT 37	DC4 9-8-4 DC4 3C	$ 11-8-3 $ 5B	4 4 4 F4	D 12-4 D C4	T 0-3 T E3	d 12-0-4 d 84	t 11-0-3 t A3	0-9-4 BYP 24	9-4 PN 34	12-0-9-5 45	11-0-9-4 64	12-0-8-2 8A	11-0-8-4 AC	12-11-0-8-4 BC	11-0-9-8-2 EA
0 1 0 1	5	ENQ 0-9-8-5 ENQ 2D	NAK 9-8-5 NAK 3D	% 0-8-4 % 6C	5 5 5 F5	E 12-5 E C5	U 0-4 U E4	e 12-0-5 e 85	u 11-0-4 u A4	11-9-5 NL 15	9-5 RS 35	12-0-9-6 46	11-0-9-5 65	12-0-8-3 8B	11-0-8-5 AD	12-11-0-8-5 BD	11-0-9-8-3 EB
0 1 1 0	6	ACK 0-9-8-6 ACK 2E	SYN 9-2 SYN 32	& 12 & 50	6 6 6 F6	F 12-6 F C6	V 0-5 V E5	f 12-0-6 f 86	v 11-0-5 v A5	12-9-6 LC 06	9-6 UC 36	12-0-9-7 47	11-0-9-6 66	12-0-8-4 8C	11-0-8-6 AE	12-11-0-8-6 BE	11-0-9-8-4 EC
0 1 1 1	7	BEL 0-9-8-7 BEL 2F	ETB 0-9-6 ETB 26	' 8-5 ' 7D	7 7 7 F7	G 12-7 G C7	W 0-6 W E6	g 12-0-7 g 87	w 11-0-6 w A6	11-9-7 IL 17	12-9-8 GE 08	12-0-9-8 48	11-0-9-7 67	12-0-8-5 8D	11-0-8-7 AF	12-11-0-8-7 BF	11-0-9-8-5 ED
1 0 0 0	8	BS 11-9-6 BS 16	CAN 11-9-8 CAN 18	(12-8-5 (4D	8 8 8 F8	H 12-8 H C8	X 0-7 X E7	h 12-0-8 h 88	x 11-0-7 x A7	0-9-8 28	9-8 38	12-8-1 49	11-0-9-8 68	12-0-8-6 8E	12-11-0-8-1 B0	12-0-9-8-2 CA	11-0-9-8-6 EE
1 0 0 1	9	HT 12-9-5 HT 05	EM 11-9-8-1 EM 19	) 11-8-5) 5D	9 9 9 F9	I 12-9 I C9	Y 0-8 Y E8	i 12-0-9 i 89	y 11-0-8 y A8	0-9-8-1 29	9-8-1 39	12-11-9-1 51	0-8-1 69	12-0-8-7 8F	12-11-0-1 B1	12-0-9-8-3 CB	11-0-9-8-7 EF
1 0 1 0	10 (A)	LF 0-9-5 LF 25	SUB 9-8-7 SUB 3F	* 11-8-4 * 5C	: 8-2 : 7A	J 11-1 J D1	Z 0-9 Z E9	j 12-11-1 j 91	z 11-0-9 z A9	0-9-8-2 SM 2A	9-8-2 3A	12-11-9-2 52	12-11-0 70	12-11-8-1 90	12-11-0-2 B2	12-0-9-8-4 CC	12-11-0-9-8-2 (LVM) FA
1 0 1 1	11 (B)	VT 12-9-8-3 VT 0B	ESC 0-9-7 ESC 27	+ 12-8-6 + 4E	; 11-8-6 ; 5E	K 11-2 K D2	[12-8-2 ¢ 4A	k 12-11-2 k 92	{ 12-0 { C0	0-9-8-3 CU2 2B	9-8-3 CU3 3B	12-11-9-3 53	12-11-0-9-1 71	12-11-8-2 9A	12-11-0-3 B3	12-0-9-8-5 CD	12-11-0-9-8-3 FB
1 1 0 0	12 (C)	FF 12-9-8-4 FF 0C	FS 11-9-8-4 IFS 1C	, 0-8-3 , 6B	< 12-8-4 < 4C	L 11-3 L D3	\ 0-8-2 \ E0	l 12-11-3 l 93	¦ 12-11 ¦ 6A	0-9-8-4 2C	12-9-4 PF 04	12-11-9-4 54	12-11-0-9-2 72	12-11-8-3 9B	12-11-0-4 B4	12-0-9-8-6 CE	12-11-0-9-8-4 FC
1 1 0 1	13 (D)	CR 12-9-8-5 CR 0D	GS 11-9-8-5 IGS 1D	– 11 – 60	= 8-6 = 7E	M 11-4 MD4	] 11-8-2 ! 5A	m 12-11-4 m 94	} 11-0 } D0	12-9-8-1 RLF 09	11-9-4 RES 14	12-11-9-5 55	12-11-0-9-3 73	12-11-8-4 9C	12-11-0-5 B5	12-0-9-8-7 CF	12-11-0-9-8-5 FD
1 1 1 0	14 (E)	SO 12-9-8-6 SO 0E	RS 11-9-8-6 IRS 1E	. 12-8-3 . 4B	> 0-8-6 > 6E	N 11-5 N D5	^ 11-8-7 ¬ 5F	n 12-11-5 n 95	~ 11-0-1 ~ A1	12-9-8-2 SMM 0A	9-8-6 3E	12-11-9-6 56	12-11-0-9-4 74	12-11-8-5 9D	12-11-0-6 B6	12-11-9-8-2 DA	12-11-0-9-8-6 FE
1 1 1 1	15 (F)	SI 12-9-8-7 SI 0F	US 11-9-8-7 IUS 1F	/ 0-1 / 61	? 0-8-7 ? 6F	O 11-6 O D6	_ 0-8-5 _ 6D	o 12-11-6 o 96	DEL 12-9-7 DEL 07	11-9-8-3 CU1 1B	11-0-9-1 E1	12-11-9-7 57	12-11-0-9-5 75	12-11-8-6 9E	12-11-0-7 B7	12-11-9-8-3 DB	EO 12-11-0-9-8-7 FF

LEGEND

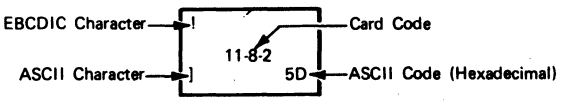


M-185

TABLE A-3. EXTENDED BINARY CODED DECIMAL INTERCHANGE CODE (EBCDIC) WITH PUNCHED CARD CODES AND ASCII TRANSLATION

BITS 0 1 2 3		0 0 0 0	0 0 0 1	0 0 1 0	0 0 1 1	0 1 0 0	0 1 0 1	0 1 1 0	0 1 1 1	1 0 0 0	1 0 0 1	1 0 1 0	1 0 1 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1
BITS 4 5 6 7	1ST HEX 2ND	0	1	2	3	4	5	6	7	8	9	A (10)	B (11)	C (12)	D (13)	E (14)	F (15)
0 0 0 0	0	NUL 12-0-9-8-1 NUL 00	DLE 12-11-9-8-1 DLE 10	DS 11-0-9-8-1 80	12-11-0-9-8-1 90	SP no punch SP 20	& 12 & 26	- 11 - 2D	12-11-0 BA	12-0-8-1 C3	12-11-8-1 CA	11-0-8-1 D1	12-11-0-8-1 D8	{ 12-0 { 7B	} 11-0 } 7D	\ 0-8-2 \ 5C	0 0 0 30
0 0 0 1	1	SOH 12-9-1 SOH 01	DC1 11-9-1 DC1 11	SOS 0-9-1 81	9-1 91	12-0-9-1 A0	12-11-9-1 A9	/ 0-1 / 2F	12-11-0-9-1 BB	a 12-0-1 a 61	j 12-11-1 j 6A	~ 11-0-1 ~ 7E	12-11-0-1 D9	A 12-1 A 41	J 11-1 J 4A	11-0-9-1 9F	1 1 1 31
0 0 1 0	2	STX 12-9-2 STX 02	DC2 11-9-2 DC2 12	FS 0-9-2 82	SYN 9-2 SYN 16	12-0-9-2 A1	12-11-9-2 AA	11-0-9-2 B2	12-11-0-9-2 BC	b 12-0-2 b 62	k 12-11-2 k 6B	s 11-0-2 s 73	12-11-0-2 DA	B 12-2 B 42	K 11-2 K 4B	S 0-2 S 53	2 2 2 32
0 0 1 1	3	ETX 12-9-3 ETX 03	TM 11-9-3 DC3 13	0-9-3 83	9-3 93	12-0-9-3 A2	12-11-9-3 AB	11-0-9-3 B3	12-11-0-9-3 BD	c 12-0-3 c 63	l 12-11-3 l 6C	t 11-0-3 t 74	12-11-0-3 DB	C 12-3 C 43	L 11-3 L 4C	T 0-3 T 54	3 3 3 33
0 1 0 0	4	PF 12-9-4 9C	RES 11-9-4 9D	BYP 0-9-4 84	PN 9-4 94	12-0-9-4 A3	12-11-9-4 AC	11-0-9-4 B4	12-11-0-9-4 BE	d 12-0-4 d 64	m 12-11-4 m 6D	u 11-0-4 u 75	12-11-0-4 DC	D 12-4 D 44	M 11-4 M 4D	U 0-4 U 55	4 4 4 34
0 1 0 1	5	HT 12-9-5 HT 09	NL 11-9-5 85	LF 0-9-5 LF 0A	RS 9-5 95	12-0-9-5 A4	12-11-9-5 AD	11-0-9-5 B5	12-11-0-9-5 BF	e 12-0-5 e 65	n 12-11-5 n 6E	v 11-0-5 v 76	12-11-0-5 DD	E 12-5 E 45	N 11-5 N 4E	V 0-5 V 56	5 5 5 35
0 1 1 0	6	LC 12-9-6 86	BS 11-9-6 BS 08	ETB 0-9-6 ETB 17	UC 9-6 96	12-0-9-6 A5	12-11-9-6 AE	11-0-9-6 B6	12-11-0-9-6 C0	f 12-0-6 f 66	o 12-11-6 o 6F	w 11-0-6 w 77	12-11-0-6 DE	F 12-6 F 46	O 11-6 O 4F	W 0-6 W 57	6 6 6 36
0 1 1 1	7	DEL 12-9-7 DEL 7F	IL 11-9-7 87	ESC 0-9-7 ESC 1B	EOT 9-7 EOT 04	12-0-9-7 A6	12-11-9-7 AF	11-0-9-7 B7	12-11-0-9-7 C1	g 12-0-7 g 67	p 12-11-7 p 70	x 11-0-7 x 78	12-11-0-7 DF	G 12-7 G 47	P 11-7 P 50	X 0-7 X 58	7 7 7 37
1 0 0 0	8	GE 12-9-8 97	CAN 11-9-8 CAN 18	0-9-8 88	9-8 98	12-0-9-8 A7	12-11-9-8 B0	11-0-9-8 B8	12-11-0-9-8 C2	h 12-0-8 h 68	q 12-11-8 q 71	y 11-0-8 y 79	12-11-0-8 E0	H 12-8 H 48	Q 11-8 Q 51	Y 0-8 Y 59	8 8 8 38
1 0 0 1	9	RLF 12-9-8-1 8D	EM 11-9-8-1 EM 19	0-9-8-1 89	9-8-1 99	12-8-1 A8	11-8-1 B1	0-8-1 B9	` 8-1 ` 60	i 12-0-9 i 69	r 12-11-9 r 72	z 11-0-9 z 7A	12-11-0-9 E1	I 12-9 I 49	R 11-9 R 52	Z 0-9 Z 5A	9 9 9 39
1 0 1 0	A (10)	SMM 12-9-8-2 8E	CC 11-9-8-2 92	SM 0-9-8-2 8A	9-8-2 9A	¢ 12-8-2 [5B	! 11-8-2] 5D	¦ 12-11 ¦ 7C	: 8-2 : 3A	12-0-8-2 C4	12-11-8-2 CB	11-0-8-2 D2	12-11-0-8-2 E2	12-0-9-8-2 E8	12-11-9-8-2 EE	11-0-9-8-2 F4	ǀ(LVM) 12-11-0-9-8-2 FA
1 0 1 1	B (11)	VT 12-9-8-3 VT 0B	CU1 11-9-8-3 8F	CU2 0-9-8-3 8B	CU3 9-8-3 9B	. 12-8-3 . 2E	$ 11-8-3 $ 24	, 0-8-3 , 2C	# 8-3 # 23	12-0-8-3 C5	12-11-8-3 CC	11-0-8-3 D3	12-11-0-8-3 E3	12-0-9-8-3 E9	12-11-9-8-3 EF	11-0-9-8-3 F5	12-11-0-9-8-3 FB
1 1 0 0	C (12)	FF 12-9-8-4 FF 0C	IFS 11-9-8-4 FS 1C	0-9-8-4 8C	DC4 9-8-4 DC4 14	< 12-8-4 < 3C	* 11-8-4 * 2A	% 0-8-4 % 25	@ 8-4 @ 40	12-0-8-4 C6	12-11-8-4 CD	11-0-8-4 D4	12-11-0-8-4 E4	₧ 12-0-9-8-4 EA	12-11-9-8-4 F0	┌ 11-0-9-8-4 F6	12-11-0-9-8-4 FC
1 1 0 1	D (13)	CR 12-9-8-5 CR 0D	IGS 11-9-8-5 GS 1D	ENQ 0-9-8-5 ENQ 05	NAK 9-8-5 NAK 15	(12-8-5 (28	) 11-8-5) 29	¯ 0-8-5 ¯ 5F	´ 8-5 ´ 27	12-0-8-5 C7	12-11-8-5 CE	11-0-8-5 D5	12-11-0-8-5 E5	12-0-9-8-5 EB	12-11-9-8-5 F1	11-0-9-8-5 F7	12-11-0-9-8-5 FD
1 1 1 0	E (14)	SO 12-9-8-6 SO 0E	IRS 11-9-8-6 RS 1E	ACK 0-9-8-6 ACK 06	9-8-6 9E	+ 12-8-6 + 2B	; 11-8-6 ; 3B	>> 0-8-6 > 3E	= 8-6 = 3D	12-0-8-6 C8	12-11-8-6 CF	11-0-8-6 D6	12-11-0-8-6 E6	₩ 12-0-9-8-6 EC	12-11-9-8-6 F2	11-0-9-8-6 F8	12-11-0-9-8-6 FE
1 1 1 1	F (15)	SI 12-9-8-7 SI 0F	IUS 11-9-8-7 US 1F	BEL 0-9-8-7 BEL 07	SUB 9-8-7 SUB 1A	| 12-8-7 ! 21	¬ 11-8-7 ^ 5E	? 0-8-7 ? 3F	" 8-7 " 22	12-0-8-7 C9	12-11-8-7 D0	11-0-8-7 D7	12-11-0-8-7 E7	12-0-9-8-7 ED	12-11-9-8-7 F3	11-0-9-8-7 F9	12-11-0-9-8-7 EO FF

LEGEND



M-186

TABLE A-4. CONTROL DATA CHARACTER SETS SHOWING TRANSLATIONS BETWEEN DISPLAY CODE AND ASCII/EBCDIC

DISPLAY CODE		ASCII				EBCDIC			
		UPPER CASE		LOWER CASE		UPPER CASE		LOWER CASE	
OCTAL	CH	CH	HEX	CH	HEX	CH	HEX	CH	HEX
00	:	:	3A	SUB	1A	:	7A	SUB	3F
01	A	A	41	a	61	A	C1	a	81
02	B	B	42	b	62	B	C2	b	82
03	C	C	43	c	63	C	C3	c	83
04	D	D	44	d	64	D	C4	d	84
05	E	E	45	e	65	E	C5	e	85
06	F	F	46	f	66	F	C6	f	86
07	G	G	47	g	67	G	C7	g	87
10	H	H	48	h	68	H	C8	h	88
11	I	I	49	i	69	I	C9	i	89
12	J	J	4A	j	6A	J	D1	j	91
13	K	K	4B	k	6B	K	D2	k	92
14	L	L	4C	l	6C	L	D3	l	93
15	M	M	4D	m	6D	M	D4	m	94
16	N	N	4E	n	6E	N	D5	n	95
17	O	O	4F	o	6F	O	D6	o	96
20	P	P	50	p	70	P	D7	p	97
21	Q	Q	51	q	71	Q	D8	q	98
22	R	R	52	r	72	R	D9	r	99
23	S	S	53	s	73	S	E2	s	A2
24	T	T	54	t	74	T	E3	t	A3
25	U	U	55	u	75	U	E4	u	A4
26	V	V	56	v	76	V	E5	v	A5
27	W	W	57	w	77	W	E6	w	A6
30	X	X	58	x	78	X	E7	x	A7
31	Y	Y	59	y	79	Y	E8	y	A8
32	Z	Z	5A	z	7A	Z	E9	z	A9
33	0	0	30	DLE	10	0	F0	DLE	10
34	1	1	31	DC1	11	1	F1	DC1	11
35	2	2	32	DC2	12	2	F2	DC2	12
36	3	3	33	DC3	13	3	F3	TM	13
37	4	4	34	DC4	14	4	F4	DC4	3C

DISPLAY CODE		ASCII				EBCDIC			
		UPPER CASE		LOWER CASE		UPPER CASE		LOWER CASE	
OCTAL	CH	CH	HEX	CH	HEX	CH	HEX	CH	HEX
40	5	5	35	NAK	15	5	F5	NAK	3D
41	6	6	36	SYN	16	6	F6	SYN	32
42	7	7	37	ETB	17	7	F7	ETB	26
43	8	8	38	CAN	18	8	F8	CAN	18
44	9	9	39	EM	19	9	F9	EM	19
45	+	+	2B	VT	0B	+	4E	VT	0B
46	-	-	2D	CR	0D	-	60	CR	0D
47	•	•	2A	LF	0A	•	5C	LF	25
50	/	/	2F	SI	0F	/	61	SI	0F
51	(	(	28	BS	08	(	4D	BS	16
52	)	)	29	HT	09	)	5D	HT	05
53	$	$	24	EOT	04	$	5B	EOT	37
54	=	=	3D	GS	1D	=	7E	IGS	1D
55	SP	SP	20	NUL	00	SP	40	NUL	00
56	,	,	2C	FF	0C	,	6B	FF	0C
57	.	.	2E	SO	0E	.	4B	SO	0E
60	≡ =	=	23	ETX	03	=	7B	ETX	03
61	[	[	5B	FS	1C	¢	4A	IFS	1C
62	]	]	5D	SOH	01	!	5A	SOH	01
63	%	%	25	ENQ	05	%	6C	ENQ	2D
64	≠ "	"	22	STX	02	"	7F	STX	02
65	→ _	_	5F	DEL	7F	_	6D	DEL	07
66	∨ !	!	21	}	7D	|	4F	¦	D0
67	∧ &	&	26	ACK	06	&	50	ACK	2E
70	↑ '	'	27	BEL	07	'	7D	BEL	2F
71	↓ ?	?	3F	US	1F	?	6F	IUS	1F
72	<	<	3C	{	7B	<	4C	¦	C0
73	>	>	3E	RS	1E	>	6E	IRS	1E
74	≤ @	@	40	`	60	@	7C	`	79
75	≥ \	\	5C	¦	7C	\	E0	¦	6A
76	¬ ^	^	5E	~	7E	¬	5F	~	A1
77	;	;	3B	ESC	1B	;	5E	ESC	27

NOTES:

1. The terms "upper case" and "lower case" apply only to the case conversions, and do not necessarily reflect any true "case".
2. When translating from Display Code to ASCII/EBCDIC, the "upper case" equivalent character is taken.
3. When translating from ASCII/EBCDIC to Display Code, the "upper case" and "lower case" characters fold together to a single Display Code equivalent character.
4. All ASCII and EBCDIC codes not listed are translated to Display Code 55 (SP).
5. Where two Display Code graphics are shown for a single octal code, the leftmost graphic corresponds to the CDC 64-character set (system assembled with IP.CSET set to C64.1), and the rightmost graphic corresponds to the CDC 64-character ASCII subset (system assembled with IP.CSET set to C64.2).
6. In a 63-character set system, the display code for the : graphic is 63. The % character does not exist, and translations from ASCII/EBCDIC % or ENQ yield blank (55_8).

M-187

TABLE A-5. FULL ASCII CHARACTER SET

128-Character Set

96-Character Subset

64-Character Subset

b_7 / b_6 / b_5					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
Bits	b_4	b_3	b_2	b_1	ROW \ COLUMN →	0	1	2	3	4	5	6	7
	0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
	0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
	0	0	1	0	2	STX	DC2	"	2	B	R	b	r
	0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
	0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
	0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
	0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
	0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
	1	0	0	0	8	BS	CAN	(	8	H	X	h	x
	1	0	0	1	9	HT	EM	)	9	I	Y	i	y
	1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
	1	0	1	1	11	VT	ESC	+	;	K	[	k	}
	1	1	0	0	12	FF	FS	,	<	L	\	l	¦
	1	1	0	1	13	CR	GS	-	=	M	]	m	{
	1	1	1	0	14	SO	RS	.	>	N	^	n	~
	1	1	1	1	15	SI	US	/	?	O	—	o	DEL

M-188

GLOSSARY

This glossary defines terms (both English language and mnemonic) unique to the descriptions contained in this manual or common terms whose definitions are different from, or more restricted than, definitions commonly held. A glossary of English language terms is presented first, followed by a glossary of mnemonic terms.

ENGLISH LANGUAGE TERMS

ALARM MESSAGE - A message generated by the NPU and sent to the host console. It informs the host that a network element (coupler, MLIA, or line) has suffered a large number of recent errors.

BLOCK - A unit of information used by the network. A message is divided into blocks to facilitate buffering, transmission, error detection, and correction of variable-length data streams. A transmission block includes the protocol envelope consisting of the transmission header and transmission trailer information. The envelope is used to delimit and control transmission of the block over the communications channel. A bad block is one which failed to be transmitted properly and was therefore rejected by the receiver or by the sender.

BLOCK TYPE - One of the nine standard formats for system blocks (that is, blocks used in the block protocol between host and NPU).

BREAKPOINT - A programming utility aid that allows the operator to stop the program and computer execution at predetermined instructions (breakpoints) and to examine the program and/or change program parameters while the program is stopped.

BUFFER - A collection of data in contiguous words. Buffers often hold a portion of a message. Chained buffers hold the entire message, regardless of size.

BYTE - A group of contiguous bits. Unless prefixed (e.g., 6-bit byte), the term implies 8-bit groups. When used for encoding character data, a byte represents a single character.

CE ERROR CODE - A code appearing in a CE error message which designates the cause of the error.

CE ERROR MESSAGE - An NPU-generated message reporting a hardware failure. The messages are sent to the host's engineering file where they can be processed by the Hardware Performance Analyzer (HPA) program.

CHAIN ADDRESS - The address held at the end of one buffer pointing to the next buffer. The next buffer holds successive data that could not fit in the first buffer. Many buffers can be chained together in this fashion.

CLA PRIORITY - The placement of CLA cards in the NPU card cage determines the order in which a CLA is serviced.

CLUSTER - A group consisting of a controller and all terminals which it supports. A cluster has its own address, known as a cluster address.

COMMAND - Information passed to a process which details the method of controlling the process in contrast to data destined for transmission by the process.

COMMUNICATIONS CONTROL INTERCOM (CCI) - The program which controls the NPU for network operations.

COMMUNICATIONS LINE - A communications circuit between a terminal and its network processing unit.

COMMUNICATIONS LINE ADAPTER (CLA) - A hardware unit that converts data between bit-serial and bit-parallel formats.

CONNECTION NUMBER (CN) - A number specifying the path (line) used to connect the terminal through the NPU to the host.

CONSOLE - A terminal devoted to network control processing.

CONTROL BLOCKS - (1) The types of blocks used to transmit control (as opposed to data) information; (2) Blocks assigned for special configuration/status purposes in the NPU. These blocks include terminal control blocks (TCB), line control blocks (LCB), buffer maintenance control blocks (BCB), mux line control blocks (MLCB), text processing control blocks (TPCB), worklist control blocks (WLCB), and diagnostic control blocks (DCB).

CONTROL KEY - a key on the NPU console keyboard (and on many other types of terminal keyboards) used in conjunction with other keys to give the combination of keys a special control function. For instance, control G, or (G), switches the NPU console between read and write modes.

CONTROLLER - A hardware device which interfaces multiple terminals to a single communications line, and performs some common functions for those terminals (such as protocol handling).

COUPLER - The hardware interface between the local NPU and the host. Transmissions across the coupler use block protocol.

DATA - Any portion of a message as created by the source, exclusive of any information used to accomplish the transmission of such message.

DATA SET - A hardware interface which transforms analog data to digital data and the converse. Synonymous with modem.

DESTINATION NODE (DN) - The node which directly interfaces to the destination.

DEVICE - A terminal or portion of a terminal.

DIAGNOSTIC DECISION LOGIC TABLE (DDLT) - Special diagnostic programs which use a highly structured table technique to aid the troubleshooter in isolating a problem.

DIAL-UP - A terminal that is switched; that is, it is connected to the network only when the phone connection is dialed to the computer's telephone number.

DIRECT MEMORY ACCESS (DMA) - The high-speed I/O channel to the NPU main memory. This channel is used for host/NPU buffered transfers.

DOWNLINE - The direction of output information flow from host to terminal or NPU.

DUMP - The process of transferring the contents of the NPU main memory, registers, and file 1 registers to the host. The dump can be processed by a dump analyzer in the host to produce a listing of the dumped hexadecimal information.

FILE 1 REGISTERS - A set of registers in the microprocessor portion of the NPU. They are dynamically set at NPU initialization time.

FULL DUPLEX (FDX) - Two-way simultaneous transmission, when applied to a communications line. Simultaneous, independent operation of the input and output devices, when applied to a terminal.

FUNCTION CODES - Codes used by the service module to designate the type of function (command or status) being transmitted. Two codes are defined: primary function code (PFC) and secondary function code (SFC).

HALF DUPLEX (HDX) - Two-way alternate transmission, when applied to a communications line. When applied to a terminal, it means that the terminal cannot simultaneously send one message while receiving another, usually because the output device locally copies the input while the terminal is in input mode.

HALT CODES - Codes generated by the NPU when it executes a soft-stop. These codes, which indicate the cause of the stoppage, are normally displayed at the NPU console in the form of a halt code service message.

HARDWARE PERFORMANCE ANALYZER (HPA) - A host program which processes the messages in the host's engineering file. The output contains information about network performance.

HOST - A digital computer which executes the programs of an application process.

HOST INTERFACE PACKAGE (HIP) - The collection of programs resident in an NPU (part of CCI) which controls the transfer of data between a host and a local NPU.

INFORMATION - A stream of bits which is communicated from one point to another, exclusive of synchronizing patterns which establish the sample point for the receiver.

IN-LINE DIAGNOSTICS - That part of CCI that generates diagnostic information about on-line network performance. In-line diagnostics include alarm messages, CE error messages, statistics messages, halt code messages, and NPU dumps.

INPUT - Information flowing upline from terminal to host.

LINE - The connection between the NPU and a terminal.

LINE CONTROL BLOCK (LCB) - A control block in the terminal node which records the status and operational parameters of the associated line.

LINE NUMBER - The identifier of a specific terminal line, consisting of a CLA hardware address (port) and, where necessary, a multiplexer subport.

LOGICAL CONNECTION - A logical message path established between two application programs or between a network terminal and an application program. Until terminated, the logical connection allows messages to pass between the two entities.

LOOP MULTIPLEXER (LM) - The hardware which interfaces the CLAs (which convert data between bit-serial-digital and bit-parallel-digital (character) format) and the input and output loops.

LOOPBACK TESTS - A group of three on-line diagnostic tests which loop the data back toward the test source. Together, the tests are called the on-line diagnostic program. Data is looped back to the NPU internally, at the modem, or externally.

MACROMEMORY - The main memory portion of the NPU. It is partly dedicated to resident programs and common areas; the remainder is a buffer area used for data and overlay programs. Word size is 16 data bits plus three additional bits for parity and program protection. Memory is packaged in 8K and 16K-word increments; 48K is the minimum memory size.

MESSAGE - A logical unit of information, as processed by an application program. When transmitted over a network, a message can consist of one or more physical blocks.

MICROMEMORY - The micro portion of the NPU memory. This consists of 3072 words of 32-bit length. 1024 words are read-only memory (ROM); the remaining 2048 words are random access memory (RAM) and are alterable. The ROM memory contains the emulator microprogram that allows use of 1700 assembly language.

MICROPROCESSOR - The portion of the NPU that processes programs.

MODEM - A hardware device for converting analog levels to digital signals and the converse. Long lines interface to digital equipment via modems. Modem is synonymous with Data Set.

MSMP/6000 DIAGNOSTICS - A set of hardware diagnostics described in the MSMP Diagnostic Reference Manual.

MULTIPLEX LOOP INTERFACE ADAPTER (MLIA) - The hardware portion of the multiplex subsystem that controls the multiplex loops (input and output) as well as the interface between the NPU and the multiplex subsystem.

NETWORK ADDRESS - A set of three 8-bit numbers, consisting of two node IDs followed by a connection number. The first node ID is the destination node. The second node ID is the source node.

NETWORK OPERATOR (NOP) - An administrative operator at the host console. The network operator manages the NPU hardware, linkages, and other network elements of the entire data communications network by communicating with the network supervisor in the network control center host computer.

NETWORK PROCESSOR UNIT (NPU) - The collection of hardware and software that supports a set of one or more directly connected 2550 Series Communications Control Processor macromemory modules. These programs buffer and transmit data between terminals and host computer.

NODE - A network element that creates, absorbs, switches, and/or buffers message blocks. Typical system nodes are the host, the coupler node of a local NPU, and a terminal node of a local NPU.

NODE ID - An 8-bit binary serial number which represents a node.

NPUMST041 DIAGNOSTICS - A set of off-line diagnostics described in the CYBER 18-20/30 Systems Maintenance Manual (MOS Cookbook - 3 volumes).

ODS LOADCHECK DIAGNOSTICS - A set of off-line diagnostics for the NPU.

OFF-LINE DIAGNOSTICS - Optional diagnostics for the NPU that require the NPU be disconnected from the network.

ON-LINE DIAGNOSTICS - Optional diagnostics for the NPU that can be executed while the NPU is connected to, and operating as a part of the network. Individual lines being tested must, however, be disconnected from the network.

ORDERWORD - A hardware register in the coupler used by the host to direct NPU operations.

OUTPUT - Information flowing downline from host to terminal.

OUTPUT BUFFER - Any buffer which is currently used to output information from the NPU to the host, to another NPU, to a peripheral device, or to a terminal via the multiplex subsystem.

OUTPUT DATA DEMAND (ODD) - A signal raised by a CLA indicating that the CLA is ready to receive the next character of an output message.

PARITY - A data assurance method. Parity in the NPU is word-oriented and is ordinarily not controlled by the operator. A parity bit is added when words are stored in main memory, and is discarded after checking when the word is ready from main memory. A parity error causes the highest priority interrupt in the system.

PASCAL - A high-level programming language used for CCI programs. Almost all CCI programs are written in PASCAL language.

PBHALT - The CCI program that brings the NPU to a soft stop with the registers ready for saving, and the memory ready for a dump. This program also generates the halt message to the NPU console.

PRIMARY FUNCTION CODE (PFC) - See function code.

PROTECT SYSTEM - A method of prohibiting one set of programs (unprotected) from accessing another set of programs (protected) and their associated data. The NPU uses a protect bit in the main memory word to implement the system. The protect fault is set when an unprotected program attempts to access a protected one.

PROTOCOL - The complete set of rules used to transmit data between two nodes. This includes format of the data and commands,. and the sequence of commands needed to prepare the devices to send and receive data.

READ MODE - The NPU console mode in which the NPU is ready to accept data/commands from the keyboard and echo the data (and some commands) on the CRT.

REAL-TIME CLOCK - The basic computer clock. The clock is stopped and restarted periodically by the base system monitor (part of CCI) during on-line operation.

REGULATION - The process of making an NPU or a host progressively less available to accept various classes of input data. The host has one regulation scheme, the host and multiplex interface of a local NPU have another scheme, and the multiplex interface to a neighboring NPU has a third regulation scheme. Some types of terminals (for instance, HASP workstations) may also regulate data. Regulation classifications are usually based on batch, interactive, and control message criteria.

SERVICE MESSAGE (SM) - The network method of transmitting most command and status information to/from the NPU. Service messages use CMD blocks in the block protocol.

SERVICE MODULE (SVM) - The set of NPU programs responsible for processing most service messages. SVM is a part of the network communications software.

SOURCE NODE (SN) - The network node originating a message or block of information.

STATISTICS SERVICE MESSAGE - A subclass of service messages that contain detailed information about the characteristics and history of a network element such as a line or a terminal.

STATUS - Information relating to the current state of a device, line, etc. Service messages are the principal carriers of status information. Statistics are a special subclass of status.

SUBFUNCTION CODE (SFC) - See function code.

TERMINAL - An element connected to a network by means of a communications line. Terminals supply input messages to, and/or accept output messages from, an application program. A terminal can be a separately-addressable device comprising a physical terminal or station, or the collection of all devices with a common address.

TERMINAL CLASS - A classification of terminals. It is used by the service module in processing service messages.

TERMINAL CONFIGURATION - That collection of information which identifies the addresses (if any), device types and characteristics, and operational mode of all terminals connected to a given communications line.

TERMINAL CONTROL BLOCK (TCB) - A control block containing configuration and status information for an active terminal. TCBs are dynamically assigned.

TERMINAL INTERFACE PROGRAMS (TIPs) - NPU programs which provide the interface between real terminal format and virtual terminal format. The standard TIPs are the TTY TIP, the Mode 4 TIP, and the HASP TIP. TIPs are responsible for some data conversion and for error processing.

TERMINAL NODE (TN) - Network processor unit which supports one or more terminal interface programs and to which terminals are directly connected via communications lines.

TIMEOUT - The process of setting a time for completion of an operation and entering an error processing condition if the operation has not finished in the allotted time.

UPLINE - The direction of message travel from a terminal through an NPU to the host.

WORD - The basic storage and processing element of a computer. The NPU uses 16-bit words (main memory) and 32-bit words (internal to the microprocessor only). All interfaces are 16-bit word (DMA and A/Q) or character format (multiplex loop interface); characters are stored in main memory two per word. Hosts (CYBER series) use 60-bit words but a 12-bit byte interface to the NPU. Data characters at the host side of the interface are stored in bits 19-12 and 7-0 of a dual 12-bit byte.

Interfacing terminals, such as a HASP workstation, may use any word size but must communicate to the NPU in character format. Therefore, workstation word size is immaterial to the NPU.

WORKLISTS - Packets of information containing the parameters for a task to be performed. Programs use worklists to request tasks of OPS level programs. Worklist entries are queued to the called program. Entries are one to six words long and a given program always has entries of the same size.

WORKLIST PROCESSOR - The base system programs responsible for creating and queuing worklist entries.

WRITE MODE - The NPU console mode in which the NPU can write to the CRT screen.

MNEMONICS

ASCII	American Standard Code for Information Interchange
BCB	Buffer maintenance control block
BCD	Binary coded decimal
BT	Block type
CA	Cluster addresses
CCI	Communications Control INTERCOM
CE	Customer engineer
CIB	Circular input buffer
CLA	Communications Line Adapter
CN	Connection number
CRT	Cathode ray tube
CTS	Clear to send
DA	Data
DCB	Diagnostic control blocks
DCD	Data carrier detect
DDLT	Diagnostic Decision Logic Table
DIS	Disable
DMA	Direct memory access
DN	Destination node
DSR	Data set ready
DT	Device type
DVT	Data Verification Test
E	External (loopback test)
EC	Error code
EN	Enable
EOP	End of operation
FDX	Full duplex
HASP	Houston Automatic Spooling Protocol
HDX	Half duplex
HIP	Host Interface Program
HO	Host ordinal
HPA	Hardware Performance Analyzer
I	Internal (loopback test)
ID	Identification number
IDC	Internal data channel
ILE	Input loop error
I/O	Input/output
LCB	Line control block
LI	Line
LM	Loop multiplexer
M	Modem (loopback test)
MLCB	Multiplex line control block
MLIA	Multiplex Loop Interface Adapter
MOD	Modem
MOS	Metal oxide semiconductor
NCNA	Next character not available
NOP	Network operator
NPINTAB	NPU Initialization Complete/Error Table

NPU	Network Processor Unit
ODD	Output data demand
ODS	Off-line diagnostic system
OLE	Output loop error
ORD	Orderword
P	Port
PFC	Primary function code
PM	Preventive maintenance
POI	Point of interface
PPU	Peripheral processing unit
QCB	Queue control block
RAM	Random access memory
RC	Reason code
ROM	Read only memory
RTC	Real-time clock
RTS	Request to send
SFC	Secondary function code
SM	Service message
SN	Source node
SOH	Start of header
SVM	Service module
T	Terminate
TA	Terminal address
TCB	Terminal control block
TERM	Terminate
TIP	Terminal Interface Program
TN	Terminal node
TTY	Teletype
UT	User terminal
WM	Write mode

Message	Significance
A. MESSAGES AT THE NPU CONSOLE (Automatically)	
NO PRINTED MESSAGE	System did not complete load and initialization. Indicates either: a. Initialization halt - check location 30_{16} and, if non-zero, interpret halt code according to table in section 3 of this manual. If zero, program did not halt. b. Program is looping in an initialization routine - look up NPINTAB entry in ADDRESS table to obtain address of NPINTAB table. Examine second entry of NPINTAB table according to section 3 to determine where program is looping.
CCI 3.0 NPU ID: 00xx LEVEL 00yy VARIANT: 00zz	Message indicating load and initialization has ended. Note x varies from one NPU to another.
mm/dd hh=mm=ss HALT aaaaa cccc 00ii jjjj	An unrecoverable error has caused the 255x to halt. aaaaa equals the return address of the program requesting the halt. cccc equals the halt code specifying the type of error causing halt (see table in section 3 of this manual). If the halt code is related to a CLA problem such as halt 0012, an additional line is printed in the halt message giving the CLA port number. If the halt code is related to a buffer problem such as halt 000B, an additional line is printed in the halt message giving the buffer address.
B. MESSAGES DELIVERED TO NPU CONSOLE WHEN DIAGNOSTICS ARE RUN FROM NPU CONSOLE (see section 4)	
*WM PORT ii (message)	Diagnostic first responses to starting a test message are: STARTED - test started INV PORT - port value out of range INV CLA TYPE - invalid CLA type INV TEST MODE - not INT, EXT, or MOD LINE NOT DISABLED - must disable line TEST IN PROCESS - only one test at a time allowed LOW BUFFERS - can't run test - too few buffers available INV MODEM CLASS - invalid modem class
PORT ii ERROR (data)	Diagnostic second response if an error occurs during the test.
*WM PORT ii (message)	Diagnostic responses to terminating a test; messages are: TEST COMPL - NO ERROR - test completed successfully INV PORT - port value out of range NOT IN PROCESS - no test started on that line (port), or test was stopped by an error.
xx xx xx xx xx xx xx xx xx...xx	Displayed only if LOC mode is engaged. Each xx is a byte of a service message displayed as two hexadecimal integers.

CIRCUIT NUMBER

This number identifies the line to the telephone company and should be kept at some location (besides the site log) where it is readily accessible. A good place is the demarcation strip.† Placement of the number on the modem is not recommended because it would be removed if the data set is replaced.

STRAPPING OPTIONS

If your data set becomes inoperable and has to be replaced, the replacement may not have the correct strapping options. Therefore, you should keep a list of strapping options for future reference. This list should be kept in the site log and a copy in the terminal cabinet if convenient.

When a problem develops on your data line, there is certain information that is necessary to help isolate the problem. Therefore, you should take time to find and record this information so that it is readily available when a problem arises.

Information required when requesting help from the telephone company:

LINE TYPE

a. Dedicated (sometimes called private or leased line)

b. Dial-up

EMERGENCY SERVICE PHONE NUMBER

An emergency service phone number should be available on your modem or near the demarcation strip.† If a number is not posted there, it will have to be obtained from your local sales representative. This number should be obtained and kept handy. This number will put you in contact with the Private Line Service Board. For Long Lines, this board is manned 24 hours a day, 7 days a week.

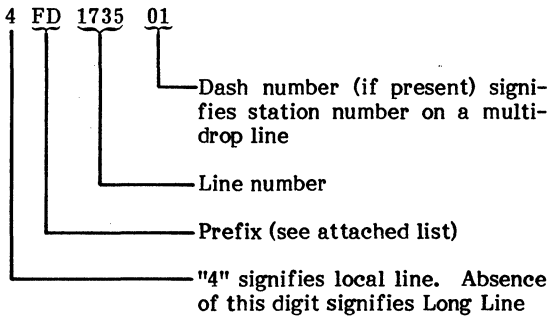
Now that you have all the necessary information, you can start checking your phone line problem.

If your phone line is a dial-up line, you can try hanging up and dialing again. This may give you a different line of better quality. If re-dialing does not solve your problem, or if re-dialing is necessary too often, your customer may have to work with his account representative to resolve the problem.

Dedicated lines present unique problems which may prove difficult to define and correct. After you are reasonably sure that the problem is in the phone line, you should proceed as follows:

1. Call the emergency service number.

2. Identify yourself and your line number. A typical line number would be:



The test board man will then check your line to see if it is properly terminated. If the problem cannot be resolved by talking to the test board man, it is advisable to call Regional Tech Support. They will have the test equipment and experience necessary to check further into the problem.

†A demarcation strip is the point at which the telephone line terminates. This point is then connected to the modem.

The 255X system hardware and software permits a communications line adapter (CLA) circuit card to be exchanged without impacting service to users connected to other CLAs within the system. The procedure used to exchange a CLA in a system that is on line are as follows:

1. Ensure that neither of the two lines connected to the CLA to be exchanged is operational by taking a status report on the host console and observing the condition of each line. If either line is being used (user logged on), send a service message to the user to notify that the line is to be deactivated at a certain time (e.g., in 10 minutes).

2. After determining that neither line is being used, take the lines out of service by typing in appropriately coded disable line commands at the local 255X console.

3. On the CLA circuit card to be exchanged, set the two switches to the OFF position.

4. Disconnect the modem cables and remove the CLA circuit card.

5. On the CLA circuit card to be installed, set the two switches to the OFF position before inserting the card into the card slot.

6. Insert the replacement CLA circuit card into the card slot, dial the ADDRESS thumb-wheel switches to the correct line number addresses, reconnect the modem cables, and set both switches to the ON position.

7. Restore the lines to service by typing in appropriately coded enable line commands at the local 255X console.

An alternate procedure that may be used if a spare CLA circuit card and spare card slot are available is as follows:

1. Remove the bad CLA circuit card from service as directed in steps 1, 2, and 3 above.

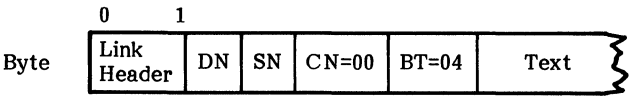
2. Disconnect the modem cable at the bad CLA, move to the spare CLA, and reconnect.

3. Dial the ADDRESS thumbwheels to the correct line number addresses and set the CLA enable switch to the ON position.

4. Restore the lines to service by typing in appropriately coded enable line commands at the local 255X console.

This appendix relates the commands and replies used to run the on-line diagnostics through the service messages (SMs) sent to the NPU.

The basic form of the message from/to the host is:



where:

DN Destination node
NPU ID (downline command), or
host ID (upline response)

SN Source node
host ID (downline), or
NPU ID (upline)

CN Connection number
00 for SMs

BT Block type
4 for CMD blocks

Text of each type of message and its reply is given in table F-1.

TABLE F-1. COMMANDS AND ASSOCIATED SERVICE MESSAGES

<table>
<tr><th>Command</th><th>Associated (Downline) and Response (Upline) Service Messages</th></tr>
<tr><td>START TEST</td><td>
MESSAGE
<table>
<tr><td>PFC =05</td><td>SFC =00</td><td>00</td><td>00</td><td>01</td><td>P</td><td>SP =00</td><td>DM</td><td>CLA Type</td><td>MC</td></tr>
</table>
DM Diagnostic mode:
00 - CLA internal loopback
01 - Modem loopback
02 - External loopback
CLA Type:
00 - 2560-1
01 - 2561-1
02 - 2560-2 or 2560-3
MC Modem class (see table 4-1)

RESPONSE
<table>
<tr><td>PFC =05</td><td>SFC $=40_{16}$</td><td>00</td><td>00</td><td>01</td><td>P</td><td>SP =00</td><td>RC</td></tr>
</table>
RC Reason code:
00 - Diagnostic test started
01 - Invalid line number
02 - Invalid CLA type
03 - Invalid test mode
04 - Line not out of service
05 -Test already in process
06 - System low on buffers
</td></tr>
<tr><td>TERMINATE DIAGNOSTIC TEST</td><td>
MESSAGE
<table>
<tr><td>PFC =05</td><td>SFC $=40_{16}$</td><td>00</td><td>00</td><td>02</td><td>P</td><td>SP =00</td></tr>
</table>
RESPONSE
<table>
<tr><td>PFC =05</td><td>SFC $=40_{16}$</td><td>00</td><td>00</td><td>02</td><td>P</td><td>SP =00</td><td>RC</td></tr>
</table>
RC Response code:
00 - Diagnostic test terminated
01 - Invalid line number
02 - Diagnostic not in progress
</td></tr>
<tr><td>DIAGNOSTIC TEST RESULTS</td><td>
<table>
<tr><td>PFC =05</td><td>SFC =00</td><td>00</td><td>00</td><td>03</td><td>P</td><td>SP =00</td><td>EC</td><td>CLA hdwe status word</td></tr>
</table>
EC Error code (see table 4-3)
</td></tr>
<tr><td>TERMINATE DIAGNOSTIC PROGRAM</td><td>
MESSAGE
<table>
<tr><td>PFC =05</td><td>SFC =00</td><td>Overlay ID</td><td>OC =03</td><td>P</td><td>00</td></tr>
</table>
RESPONSE
<table>
<tr><td>PFC =05</td><td>SFC $=40_{16}$</td><td>Overlay ID</td><td>OC =03</td><td>P</td><td>00</td></tr>
</table>
</td></tr>
</table>

TABLE F-2. LINE TYPES

Line Type (Value)	Transmission Facility	CLA Type	Modem Type	Answer Mode	Carrier Type	Circuit Type	Turn-Around Required	Turn-Around Delayed	Transmission Mode
(1)	HDX	2560-1	RS232-201A/208B-Compatible	Switched	Controlled	2-Wire	Yes	No	Synchronous
(2)	FDX†	2560-1	RS232-201B/208A-Compatible	Dedicated	Controlled	4-Wire	Yes	No	Synchronous
(3)	FDX	2560-1	RS232-201B/208A-Compatible	Dedicated	Constant	4-Wire	Yes	No	Synchronous
(4)	RESERVED								
(5)	RESERVED								
(6)	FDX	2561-1	RS232-103E/113-Compatible	Switched	Constant	2-Wire	No	No	Asynchronous
(7)	FDX	2561-1	RS232-103E-Compatible	Dedicated	Constant	2-Wire	No	No	Asynchronous
(8)	RESERVED								
(9)	RESERVED								
(X'A)	FDX	2563-1	RS232-201B-Compatible	Dedicated	Constant	4-Wire	No	No	HDLC
(X'B)	RESERVED								

†Operating with HDX Protocol

TABLE F-3. CONFIGURATION STATES

Value	Significance
00	LCB not configured
01	LCB configured, not enabled
02	Enable requested to TIP
03	Line operational, no TCBs
04	Line Operational, TCBs configured
05	Disabled requested to TIP
06	Line inoperative, no TCBs
07	Line inoperative, TCBs configured
08	Disconnect requested to TIP
09	Line inoperative, waiting for ring or auto recognition in process

COMMENT SHEET

MANUAL TITLE Communications Control INTERCOM Version 3 Diagnostic Handbook

PUBLICATION NO. 60471180 REVISION A

FROM: NAME: _____

BUSINESS ADDRESS: _____

COMMENTS:

This form is not intended to be used as an order blank. Your evaluation of this manual will be welcomed by Control Data Corporation. Any errors, suggested additions or deletions, or general comments may be made below. Please include page number references and fill in publication revision level as shown by the last entry on the Record of Revision page at the front of the manual. Customer engineers are urged to use the TAR.

CUT ALONG LINE

AA3419 REV. 11/69 PRINTED IN U.S.A.

NO POSTAGE STAMP NECESSARY IF MAILED IN U. S. A.

FOLD ON DOTTED LINES AND STAPLE

STAPLE

STAPLE

FOLD

FOLD

FIRST CLASS
PERMIT NO. 8241

MINNEAPOLIS, MINN.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN U.S.A.

POSTAGE WILL BE PAID BY

CONTROL DATA CORPORATION
Publications and Graphics Division
3519 West Warner Avenue
Santa Ana, CA 92704

CUT ALONG LINE

FOLD

FOLD