60471500

CONTROL DATA

NETWORK PRODUCTS

# COMMUNICATIONS CONTROL PROGRAM VERSION 3 DIAGNOSTIC HANDBOOK

**CDC® OPERATING SYSTEM:**
**NOS 2**

# REVISION RECORD

| Revision | Description |
|---|---|
| A (11/10/76) | Original release at PSR level 439 for CCP 3.0, which supports NOS Version 1. |
| B (04/28/78) | Revised to support CCP Version 3.1. |
| C (12/01/78) | Revised at PSR level 480 to include miscellaneous technical changes. |
| D (06/22/79) | Revised at PSR level 487 for CCP Version 3.2. |
| E (10/09/80) | Revised at PSR level 528 for CCP Version 3.3. |
| F (01/07/83) | Revised at PSR level 580 for CCP Version 3.5, which runs under NOS Version 2.1. Appendix A, Standard Character Sets, has been removed. Miscellaneous technical changes are included. This manual is no longer proprietary and no longer applies to NOS Version 1 systems. This is a complete reprint. |
| G (09/19/84) | Revised at PSR level 617 for CCP Version 3.7, which runs under NOS 2.3. Includes new error codes for the HASP TIP. Support of the CYBER 170 800 Series models and the CYBER 180 Computer Systems is documented. |
| H (09/30/85) | Revised at PSR level 642 for CCP Version 3.8, which runs under NOS 2.4. Includes redefinitions for halt codes and miscellaneous technical corrections. This is a complete reprint. |

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or use Comment Sheet in the back of this manual

# LIST OF EFFECTIVE PAGES

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# PREFACE

This handbook describes messages associated with Version 3.8 of the Communications Control Program (CCP 3.8) which is used with the CONTROL DATA 255x Series Network Processor Unit (NPU). The CCP is the operating software for the NPU and provides front-end and remote message distribution functions for a CDC 6000, CYBER 180, or CYBER 170 host computer system. The CYBER host system operates under control of the NOS 2 operating system.

Two types of diagnostics are described: the in-line diagnostics, which are an integral part of CCP; and the optional on-line diagnostics, which are used for testing network lines. Off-line diagnostics are discussed in the appropriate hardware reference manuals.

These descriptions are designed to assist system operators and customer engineers (CEs) in isolating 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, you will need a link edit listing of the CCP for this NPU.

Diagnostic information of the NPU includes:

- Service messages to the host computer that are unrelated to an NPU halt; these in-line 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, CYBER 18 Computer System Field Repair Guide, 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.

## RELATED MANUALS

Related material is contained in the publications listed below. Other manuals may be needed, such as the hardware, firmware, or emulator software reference manual for the devices serviced by a given program. Also, communication standards and device operating literature can be useful.

| Publication | Publication Number |
|---|---|
| AA132, AA133, AA153, DT120, FC402 CYBER 18 Computer Systems Central Processor Field Repair Guide | 60475001 |
| CYBER 170, CYBER 70 and 6000 Series Concurrent Maintenance Library Reference Manual | 60454740 |
| CYBER 18-25/30 Communication Multiplex Subsystem Hardware Reference/Maintenance Manual | 96768610 |
| Hardware Performance Analyzer (HPA) User Reference Manual | 60459460 |
| Host Communications Processor Reference Manual | 74375500 |
| MSMP Diagnostic Reference Manual | 96700000 |
| Network Processor Unit Hardware Maintenance Manual (for 2551-1, 2551-2, and 2552-2) | 60472000 |
| Network Processor Unit Hardware Reference Manual (for 2551-1, 2551-2, and 2552-2) | 60472800 |

| Publication | Publication Number |
|---|---|
| NOS 2 Installation Handbook | 60459320 |
| NOS 2 Analysis Handbook | 60459300 |
| NOS 2 Operations Handbook | 60459310 |
| Operational Diagnostic System (ODS) Version 2 Reference Manual | 96768410 |

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# CONTENTS

# NOTATIONS

Throughout this manual, the following conventions are used to present statement formats, operator type-ins, and diagnostic messages:

| | |
|---|---|
| UPPERCASE | Uppercase letters indicate acronyms, words, or mnemonics either required by the network software as input, or produced as output. |
| lowercase | Lowercase letters identify variables for which values are supplied by the network 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 hexadecimal values and all references to bytes are to 8-bit bytes and all references to characters are to 7-bit ASCII-coded characters. Fields defined as unused should not be assumed to contain zeros.

# INTRODUCTION 1

This handbook gives you, the customer engineer or systems operator, the procedures needed to interpret two types of diagnostics for the 255x Series Network Processing Unit (NPU):

- Automatic in-line diagnostics
  - Alarm messages sent to the network operator's console
  - CE error messages sent to the host computer
  - Halt codes interpreted with the associated 255x dump in postmortem dumps
- Operator-initiated on-line diagnostics

A third type of diagnostics, which is initiated off-line, is described in the NPU Hardware Maintenance Manual, the ODS 2 Reference Manual, and the MSMP Diagnostic Reference Manual.

Use the network processing unit operator's (NOP) terminal to help with diagnostic processing. A NOP uses the commands discussed in section 4 to help control trunks, logical links, lines, and terminals.

## AUTOMATIC IN-LINE DIAGNOSTICS

Alarm, CE error, and statistics service messages are types of in-line diagnostics. They are sometimes called service messages because they are sent directly to the host computer and are not related to an NPU halt.

### ALARM MESSAGES

Alarm messages are generated by the Communications Control Program (CCP) in response to detected hardware error conditions. If the number of failures for a class of CE error messages exceeds a predetermined threshold, CCP sends an alarm message to the NOP console.

### CE ERROR MESSAGES

CE error messages also are generated by CCP in response to detected hardware errors. If an individual failure occurs, CCP sends a CE error message to the host, where it is logged into the CE Error File.

### STATISTICS SERVICE MESSAGES

Statistics service messages are generated periodically for individual NPUs, trunks, and lines. Like CE error messages, statistics service messages are sent upline to the host computer's engineering file where they are later processed by the Hardware Performance Analyzer (HPA).

### HALT CODES AND DUMPS

The fourth type of in-line diagnostic, halt codes, is keyed to NPU hardware and software failures. If the NPU software detects a fatal error, an NPU subroutine saves the cause of the halt in a halt code field. The information in the NPU memory, the microprocessor file 1 registers, the page registers, and a micromemory checksum are dumped into a host computer file. This file is processed by the Network Dump Analyzer (NDA) utility program in the host. The output from the file processing is available at either a line printer or a terminal.

Analyzing the halt code and its associated dump helps you to determine the cause of the NPU malfunction. If the halt code field contains zero, you still can analyze the failure by using information saved from the dump.

Halt codes and associated NPU dump interpretation are discussed in section 3.

NOTE

Other actions, such as the failure of the NPU to respond within a specified amount of time, are detected by the host; therefore, this type of diagnostic is not part of the CCP diagnostic software package. See the NOS 2 Operations Handbook for a description of these messages, their delivery mode, and the actions you should take when the host receives such messages.

## OPERATOR-INITIATED ON-LINE DIAGNOSTICS

You can use on-line diagnostics to test network lines. You can request on-line diagnostics from the NOP console by entering commands that trigger individual tests. These tests are closed-loop tests for single network lines. The tests send and return eight characters of data on a closed-loop path. The returned characters are compared with those you sent to check for data quality along with other test functions.

Be sure either to disable or ask the Host Operator (HOP) or controlling NOP to disable the line you want to test. Then, in order of increasing complexity, you can test the line in several ways: by a CLA internal loop test, by a modem loop test, or by an external loop test. You will need a jumper plug to run the external loop test. For the first two tests, you will need the proper software commands. You may also need to position the test switches that are located on either remote or local equipment. The telephone company may ask you to do other line testing. You will find additional terminal tests described in the hardware manuals for the individual terminals.

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

# DIAGNOSTIC DECISION LOGIC TABLES

To help you in trouble-shooting problems, most of the diagnostics in this handbook are described through Diagnostic Decision Logic Tables (DDLTs).

Use DDLTs for:

Starting the diagnostic mode

Analyzing errors detected by CE error messages

Analyzing errors indicated by statistics service messages

Analyzing halt codes and associated dumps

Performing operator-initiated on-line diagnostics

DDLTs help you to identify and isolate equipment malfunctions in replaceable assemblies. A DDLT aids you in analyzing a situation for specific conditions and then directs you to those actions that should correct the situation. The most likely action is listed first. Each DDLT has five sections: assumptions, conditions, responses, actions, and sequence of actions, as shown in table 1-1.

TABLE 1-1. SAMPLE DDLT

ASSUME

1. The communications Control Program 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 operator is using the operating instructions given on the previous pages.

| CONDITIONS | RESPONSES | | | |
|---|---|---|---|---|
| | 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 | - | - |

## ASSUMPTIONS

The upper section of a DDLT contains the prerequisites for the specific tests you should do. A DDLT is valid only if all assumptions are true.

## CONDITIONS

The center left section of the DDLT contains the conditions or tests you should make. Each condition asks a question to which you can answer yes or no.

## RESPONSES, ACTIONS, AND SEQUENCE

The center right section of the DDLT contains the response to the question asked in the conditions section. Each condition, which is asked in question form, can be answered with a yes (Y) or a no (N). The example shown in table 1-1 has four unique responses, numbered 1 to 4, from left to right. The shaded area in the example shows the conditions that define response 3.

The first condition limits the range of the response. If the response is yes, go to the next condition. In table 1-1, the response is no, which indicates that the appropriate test has not been run. Note that the next condition cannot be checked. By reading down column 3, you can see that only one action (marked by an X) is appropriate. The operator in this example should run the CLA external loopback test. This 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 had been yes, the operator would have taken either the action in column 1 (third condition = yes) or column 2 (third condition = no). In either case, more than one action could have been taken. Each action would have been done in the indicated sequence until the appropriate action fixed the problem, or until all suggested actions were tried.

The DDLTs assume that your inputs are entered correctly. Any incorrect entry may cause the DDLT to direct you to an incorrect action. If you have any doubts about the accuracy of your entry, repeat the sequence of DDLT steps that led up to an action before going further.

Figure 1-1 is a flowchart that shows how diagnostic mode is entered.

Table 1-2 shows the information presented in figure 1-1 in DDLT format.

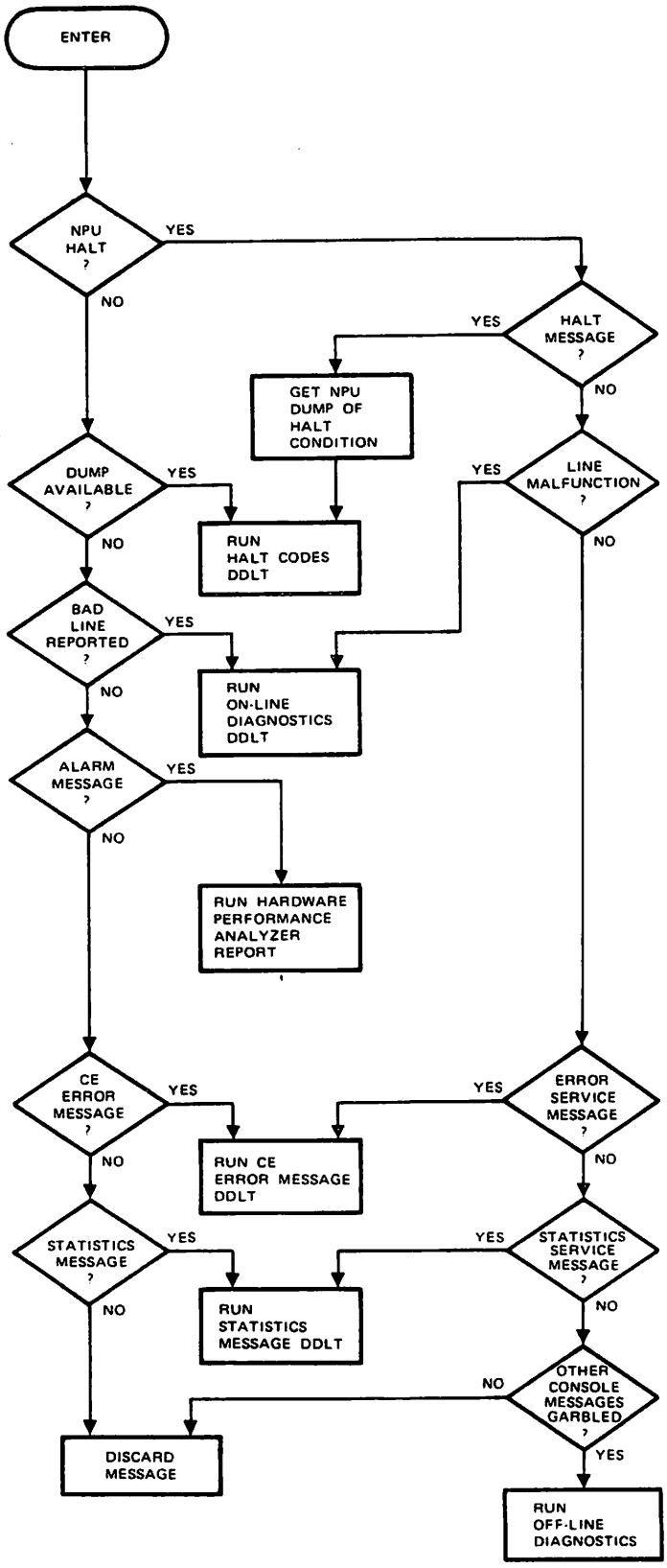



Figure 1-1. Flowchart Showing Entry to Diagnostics

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

**ASSUME**

1. Operator is familiar with DDLT format.

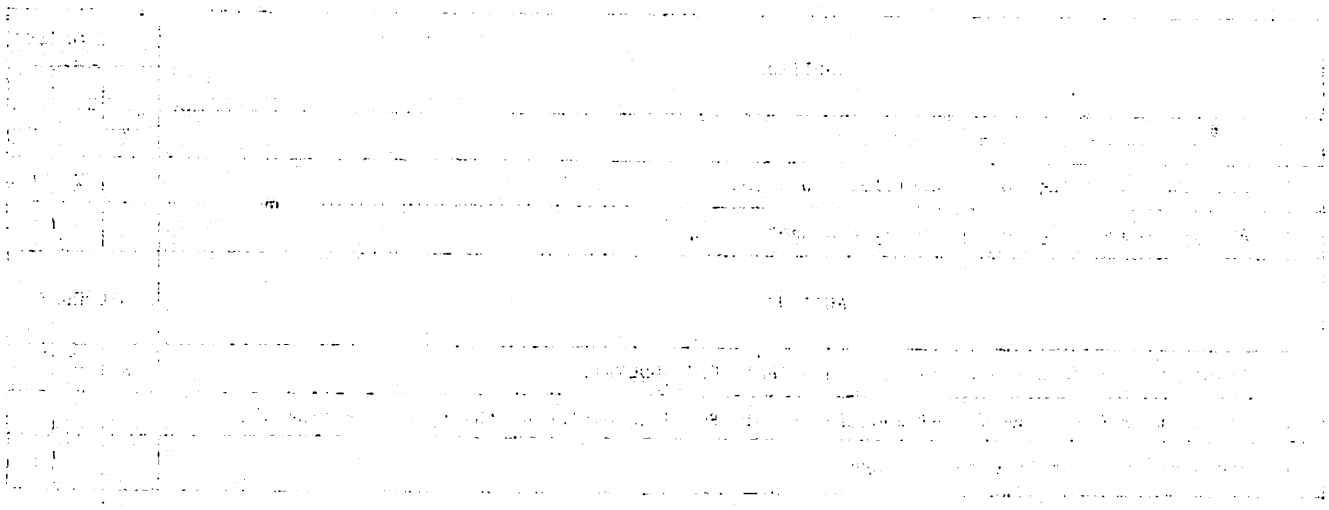
| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Are you responding to a halt message? | Y | N | N | N | N | N |
| 2. Are you responding to a dump? | - | Y | N | N | N | N |
| 3. Are you responding to a terminal user's telephone call stating that the 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 an HPA (Hardware Performance Analyzer) report? | - | - | - | Y | N | N |
| 5. Are you responding to an alarm message from the NPU? | - | - | - | - | - | Y |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 2. | X | - | - | - | - | - |
| 2. See section 3 for halt codes and dump interpretation. | - | X | - | - | - | - |
| 3. See section 4 for on-line diagnostic tests. 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 |

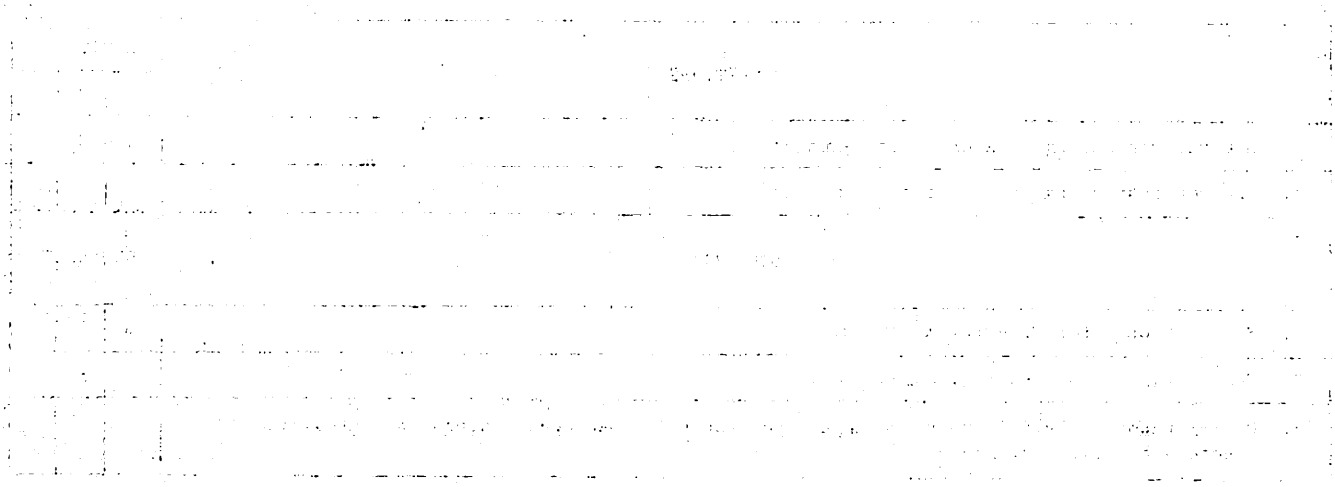
TABLE 1-2. DDLT FOR ENTERING DIAGNOSTIC MODE (Sheet 2 of 3)

| CONDITIONS | RESPONSES | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1. Are you responding to a CCP halt? | Y | N | N |
| 2. Are you responding to a line-related problem? | - | Y | N |
| 3. Are you responding to a CE error message? | - | - | Y |
| **ACTIONS** | **SEQUENCE** | | |
| 1. Print the NPU dump and go to section 3 (Halt Code DDLTs). | X | - | - |
| 2. See section 4 for on-line diagnostic tests. Run diagnostics on the specified line(s). | - | X | - |
| 3. See section 2 for CE error messages. | - | - | X |

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

| CONDITIONS | RESPONSES | | |
|---|---|---|---|
| | 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. See section 2 for CE error messages. | X | - | - |
| 2. See section 2 for statistics messages. | - | X | - |
| 3. On HPA reports, only CE error messages and statistics messages concern the CCP system. Ignore other types of message. | - | - | X |





# ALARM, CE ERROR, AND STATISTICS SERVICE MESSAGES 2

This section discusses how to interpret service messages and gives suggested Customer Engineering (CE) actions for:

Alarm messages, which indicate that a device has caused more CE error messages to be generated than is consistent with reliable operation. When this threshold number is exceeded, an alarm is sent to the network operator's (NOP) console.

CE error messages, which detail an equipment failure and are sent to the host's engineering file. A CE error message is created for every detected hardware-related abnormality, including all network processing unit-related hardware, such as the coupler, Multiplex Loop Interface Adapters (MLIAs), and Communication Line Adapters (CLAs); and all connected hardware, such as modems, lines, and terminals.

Statistics service messages, which give a history of Network Processing Unit (NPU) or line functioning. They are sent upline to the host's engineering file and account file if CCP is built with the performance statistics option defined. Statistics service messages are generated periodically, when a timer expires or the counter overflows. A line statistics service message is also generated when a line is disconnected or disabled.

## ALARM MESSAGES

An alarm message is sent to the NOP because the abnormality it reports is serious enough to degrade network performance. Do not ignore alarm messages. Follow the actions indicated, such as running the Hardware Performance Analyzer (HPA). Use the information displayed by the HPA to do the appropriate CE or diagnostic tests.

The HPA does not purge CE error and statistics information automatically from the host files when it is run. See the Concurrent Maintenance Library reference manual for a description of how the HPA works.

The format of the alarm message in the network (each numeric byte contains two hexadecimal digits) is:

| DN | SN | CN =00 | P/RES/ BT=04 | PFC =1D | SFC =07 | TEXT |
|---|---|---|---|---|---|---|

DN Destination node - Coupler of supervisory host

SN Source node - NPU

CN Connection number - 00 for service messages

P Priority bit

RES Unused

BT Block type - 4 is CMD block

PFC Primary function code - 1D

SFC Secondary function code - 07

(PFC and SFC together: alarm message)

TEXT One of three formats as described in appendix A.

```
MAINTENANCE ALARM PORT xx, ERROR=ec
MAINTENANCE ALARM MLIA, ERROR=ec
MAINTENANCE ALARM COUPLER hn,ERROR=ec
```

xx, ec, and hn are hexadecimal numbers

# CE ERROR MESSAGES

The creation of CE error report messages is separate from, and in addition to, statistics accumulated in the NPU and periodically suppplied to the host.

An error message counter is incremented each time an error message is generated. This prevents swamping the NPU or host with error messages when an oscillatory condition arises. When the counter reaches a pre-established threshold, the error is discarded rather than recorded. The counter is periodically reset to zero based on another counter whose threshold is also a pre-established parameter.

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

| DN | SN | CN =00 | P/RES/ BT=04 | PFC =1C | SFC =10 | EC | TEXT |
|---|---|---|---|---|---|---|---|

DN Destination node

SN Source node

CN Connection number - 00 for service messages

P Priority bit

RES Unused

BT Block type - 4 is CMD block

PFC Primary function code - 1C

SFC Secondary function code - 10

(PFC and SFC: CE error message)

EC Error codes (described in appendix A)

TEXT Error code dependent (1 to 8 bytes long as described in appendix A)

These CE error messages are divided into 6 categories:

1. Modem signal messages (error codes 02, 03, 0B, and 0C)
2. CLA and LM messages (error codes 05 through 09 and 0D through 10)
3. MLIA messages (error code 11)
4. Coupler messages (error codes 20 through 29)
5. TIP-detected terminal errors (error codes 2A through 2D, 30 through 32, and 37 through 3B)

Figure 2-1 is a flowchart that summarizes the DDLT procedure for CE error messages.

Table 2-1 lists the CE error messages in DDLT form. The DDLTs suggest actions you should take when a certain messages appears.

All references to the off-line diagnostics in the CE error messages DDLTs refer to diagnostics listed and described in the NPU Hardware maintenance manual, the ODS manual, and the MSMP Diagnostic reference manual. These books give you procedures for running those diagnostics and supply hints on using them to isolate equipment malfunctions.

CE error messages and text definitions are described in appendix A.

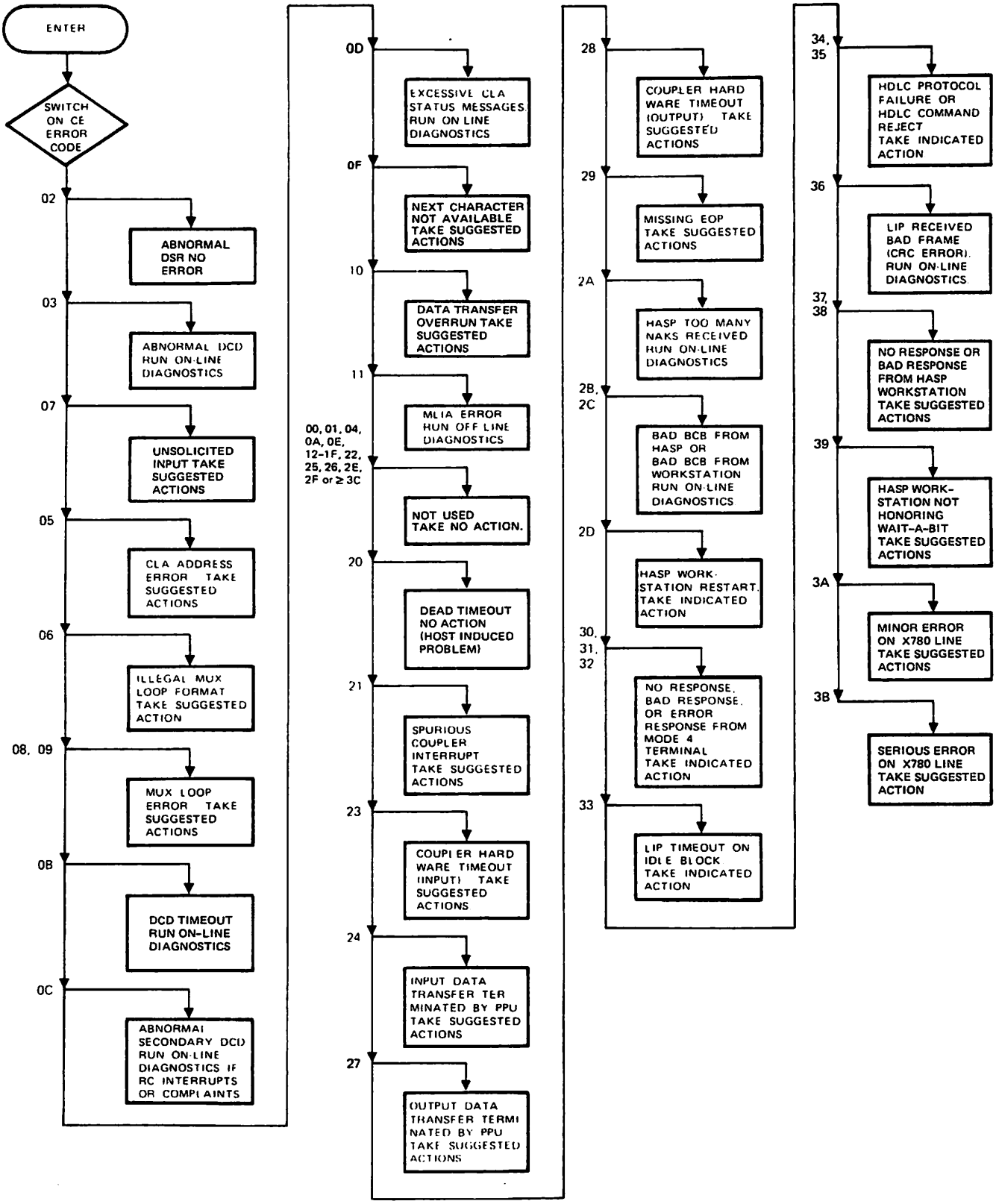



Figure 2-1. Flowchart for CE Error Code DDLT

TABLE 2-1. CE ERROR CODES DDLT (Sheet 1 of 39)

CE Error Codes Index

ASSUME

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

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Look at the error code 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 |
| 2. Is the error code = 02? | N | N | N | N | Y | - |
| 3. Is the error code = 03? | N | N | N | Y | - | - |
| 4. Is the error code = 04? | N | N | Y | - | - | - |
| 5. Is the error code = 05? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 2. | X | - | - | - | - | - |
| 2. Go to sheet 12. | - | X | - | - | - | - |
| 3. Go to sheet 21. | - | - | X | - | - | - |
| 4. Go to sheet 14. | - | - | - | X | - | - |
| 5. Go to sheet 15. | - | - | - | - | X | - |
| 6. Go to sheet 21. | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 2 of 39)

CE Error Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 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 21. | - | X | - | - | - | - |
| 3. Go to sheet 17. | - | - | X | - | - | - |
| 4. Go to sheet 17. | - | - | - | X | - | - |
| 5. Go to sheet 13. | - | - | - | - | X | - |
| 6. Go to sheet 18. | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 3 of 39)

CE Error Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 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 19. | - | X | - | - | - | - |
| 3. Go to sheet 21. | - | - | X | - | - | - |
| 4. Go to sheet 20. | - | - | - | X | - | - |
| 5. Go to sheet 30. | - | - | - | - | X | - |
| 6. Go to sheet 16. | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 4 of 39)

| CE Error Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 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 21. | - | X | X | X | - | - |
| 3. Go to sheet 22. | - | - | - | - | X | - |
| 4. Go to sheet 19. | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 5 of 39)

| CE Error Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 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 21. | - | X | X | X | X | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 6 of 39)

| CE Error Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 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 21. | - | X | X | X | X | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 7 of 39)

| CE Error Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 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 25. | - | X | - | - | - | - |
| 3. Go to sheet 24. | - | - | - | X | - | - |
| 4. Go to sheet 23. | - | - | - | - | X | - |
| 5. Go to sheet 21. | - | - | X | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 8 of 39)

CE Error Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 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 28. | - | X | - | - | - | - |
| 3. Go to sheet 27. | - | - | X | - | - | - |
| 4. Go to sheet 21. | - | - | - | X | X | - |
| 5. Go to sheet 26. | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 9 of 39)

CE Error Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the error code = 29? | N | N | N | N | N | Y |
| 2. Is the error code = 2A? | N | N | N | N | Y | - |
| 3. Is the error code = 2B or 2C? | N | N | N | Y | - | - |
| 4. Is the error code = 2D? | N | N | Y | - | - | - |
| 5. Is the error code = 2E? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 10. | X | - | - | - | - | - |
| 2. Go to sheet 21. | - | X | - | - | - | - |
| 3. Go to sheet 33. | - | - | X | - | - | - |
| 4. Go to sheet 32. | - | - | - | X | - | - |
| 5. Go to sheet 31. | - | - | - | - | X | - |
| 6. Go to sheet 29. | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 10 of 39)

CE Error Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. Is the error code = 2F? | N | N | N | N | N | N | Y |
| 2. Is the error code = 30, 31, or 32? | N | N | N | N | N | Y | - |
| 3. Is the error code = 33? | N | N | N | N | Y | - | - |
| 4. Is the error code = 34 or 35? | N | N | N | Y | - | - | - |
| 5. Is the error code = 36? | N | N | Y | - | - | - | - |
| 6. Is the error code = 37? | N | Y | - | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | | |
| 1. Go to sheet 11. | X | - | - | - | - | - | - |
| 2. Go to sheet 34. | - | X | - | - | - | - | - |
| 3. Go to sheet 37. | - | - | X | - | - | - | - |
| 4. Go to sheet 36. | - | - | - | X | - | - | - |
| 5. Go to sheet 35. | - | - | - | - | X | - | - |
| 6. Go to sheet 34. | - | - | - | - | - | X | - |
| 7. Go to sheet 21. | - | - | - | - | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 11 of 39)

CE Error Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the error code = 38? | N | N | N | N | N | Y |
| 2. Is the error code = 39? | N | N | N | N | Y | - |
| 3. Is the error code = 3A? | N | N | N | Y | - | - |
| 4. Is the error code = 3B? | N | N | Y | - | - | - |
| 5. Is the error code greater than or equal to 3C? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. You have misinterpreted an instruction. Go back to sheet 1 and try again. | X | - | - | - | - | - |
| 2. Go to sheet 21. | - | X | - | - | - | - |
| 3. Go to sheet 39. | - | - | X | - | - | - |
| 4. Go to sheet 39. | - | - | - | X | - | - |
| 5. Go to sheet 38. | - | - | - | - | X | - |
| 6. Go to sheet 34. | - | - | - | - | - | X |

CE Error Message 05 - CLA Address Error

ASSUME

The firmware found in the CIB a CLA address equal to zero, or greater than the maximum allowed address. Most likely a bit of the CLA address field is erroneous.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Has CE error message 05 occurred more than 12 times a day? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | - |
| 2. Run MSMP CYBER coupler diagnostics. Also run TFL and TFF. | 2 | - |
| 3. Replace the CYBER coupler interface card (slot B, and slot AB if running through a secondary coupler). | 3 | - |
| 4. Run MSMP MLIA diagnostics. | 4 | - |
| 5. If other CE error messages are outstanding, follow 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 05 should not be a matter for concern. However, you can perform the six steps listed above at your discretion. | - | X |

CE Error Message 07 - Unsolicited Input

ASSUME

An unsolicited input was detected by the firmware. This is usually caused 1) by connecting and activating a CLA with an address of another active CLA, or 2) by connecting and activating a CLA which happens to give an input before the system has enabled it, or 3) by a defective CLA.

| CONDITIONS | RESPONSES | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1. Has CE error message 07 been occurring more than 12 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 thumb wheel switches 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.) | - | 1 | - |
| 2. Run ODS load check and mainframe diagnostics. | - | 2 | - |
| 3. Run MSMP MLIA diagnostics. | - | 3 | - |
| 4. Run MSMP CYBER coupler diagnostics. Also run TFL and TFF. | - | 4 | - |
| 5. Replace the CYBER coupler interface card (slot B, and slot AB if running through a secondary coupler). | - | 5 | - |
| 6. If other CE error messages are outstanding, follow 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 07 should not be a matter for concern. However, you can perform the seven steps listed above at your discretion. | X | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 14 of 39)

CE Error Message 03 - Abnormal DCD

ASSUME

Abnormal operation of the data carrier detect (DCD) signal was detected by the CLA status handler. Failure of the DCD in the middle of input is abnormal. This error message can indicate noise on a transmission line.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. The byte of the CE error message following the error code contains the CLA address. Does one CLA have more than 12 CE error messages 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 that some serious fault exists, an occasional CE error message 03 should not be a matter of concern. However, you can perform the above step at your discretion. | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 15 of 39)

CE Error Message 02 - Abnormal DSR

ASSUME

Abnormal operation of the data set ready (DSR) modem signal 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, unless it occurs too frequently.

| CONDITIONS |
|---|
| None. |
| **ACTIONS** |
| None. |

CE Error Message 0B - DCD Timeout

ASSUME

CE error message 0B occurs when PTCLAS detects that the data carrier detect (DCD) signal was missing for a period of time longer than the threshold value (300 milliseconds). This error can be caused by a noisy transmission line, a bad modem, or a bad CLA.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 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 message 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 line. | X | - |
| 2. Some noise on a transmission line is to be expected. Unless the customer has reason to believe that some serious fault exists, an occasional CE error message 0B should not be a matter of concern. However, you can perform the above step at your 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 loose cables or noise on the multiplexer loop. CE error message 08 is an input loop error (ILE); CE error message 09 is an output loop error (OLE).

| CONDITIONS | RESPONSES 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 test. | 1 | - |
| 2. Replace the primary loop multiplexer card in the loop multiplexer cage containing the specified CLA. | 2 | - |
| 3. Replace MLIA card 1 (slot E). | 3 | - |
| 4. Replace MLIA card 2 (slot F). | 4 | - |
| 5. Replace MLIA card 3 (slot G). | 5 | - |
| 6. Reseat and/or 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, you can perform the seven steps listed above at your discretion. | - | X |

CE Error Message 06 - Illegal Mux Loop Format

ASSUME

The firmware 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).

| CONDITIONS | RESPONSES | | | |
|---|---|---|---|---|
| | 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 | Y | 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 in the loop multiplexer cage containing the CLAs whose addresses were in the error messages. | 2 | 1 | - | - |
| 2. Replace MLIA card 1 (slot E). | - | 2 | 1 | - |
| 3. Replace MLIA card 2 (slot F). | - | 3 | 2 | - |
| 4. Replace MLIA card 3 (slot G). | - | 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, you can perform the six steps listed above at your discretion. | - | - | - | X |

CE Error Messages OF and 10 - NCNA/Data Transfer Overrun Error

ASSUME

CE error message OF 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.

CE error message 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 mispositioned or bad CLAs.

| CONDITIONS | RESPONSES 1 | 2 | 3 |
|---|---|---|---|
| 1. Has CE error message OF 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 CLAs 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 OF or 10 should not be a matter for concern. However, you can perform the three steps listed above at your discretion. | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 20 of 39)

CE Error Message 0D - Excessive CLA Status Messages

ASSUME

The firmware detected more than 32 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 unterminated wires in a cable, incorrect cable pin connections, or 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 procedures in section 4, run on-line diagnostics on the intermittent CLA line.

TABLE 2-1. CE ERROR CODES DDLT (Sheet 21 of 39)

CE Error Messages 00, 01, 04, 0A, 0E, 12 thru 1F, 22, 25, 26, 2E, 2F, and 3C 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 messages should not appear on the Hardware Performance Analyzer reports. If CE error messages are being reported which are not defined in this manual, check the beginning of the CONST section in the CCP Pascal listing to see if new error codes have been added.

TABLE 2-1. CE ERROR CODES DDLT (Sheet 22 of 39)

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 | RESPONSES 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, you can perform the above step at your discretion. | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 23 of 39)

CE Error Message 20 - Dead Timeout

ASSUME

The host interface package (HIP) has detected a dead timeout condition. This occurs when the PP driver PIP does not function the NPU coupler within ADEADTO (10 seconds). This message can only be reported if a supervisory path to a host is available. When the condition is detected, CCP sends a HOST UNAVAILABLE message to all terminals that were connected over that coupler. The two bytes of the CE error message following the error code contain the previous and next coupler states for the HIP software.

| CONDITIONS |
|---|
| This will occur when NAM in the host servicing that coupler is dropped, or the host or NAM fails. |
| **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 PTHIPINT. 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 | RESPONSES | |
|---|---|---|
| | 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 TFF and TFL. | 1 | - |
| 2. Replace the coupler I/O card (slot C or slot AA). | 2 | - |
| 3. Replace the coupler DMA card (slot D or slot A). | 3 | - |
| 4. Replace the CYBER coupler interface card (slot B or slot AB). | 4 | - |
| 5. Replace the status mode interrupt card (slot L). | 5 | - |
| 6. Replace the I/O-TTY card (slot K). | 6 | - |
| 7. If other CE error messages are outstanding, follow 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, you can perform the eight steps listed above at your discretion. | - | X |

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 PTHIPINT. If the timeout occurs when the HIP is expecting input data (traffic from the 255x to the host). 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).

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Has CE error message 23 occurred more than three times within one-half hour? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. During the next PM period, run TFF and TFL. | 1 | - |
| 2. Replace the CYBER coupler interface card (slot B or slot AB). | 2 | - |
| 3. Replace the coupler I/O card (slot C or slot AA). | 3 | - |
| 4. Replace the coupler DMA card (slot D or slot A). | 4 | - |
| 5. If other CE error messages are outstanding, follow 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, you can perform the six steps listed above at your 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 PTHIPINT when the HIP is expecting input (traffic from the 255x to the host) and the PPU disconnects the channel prematurely. When 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 | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Has CE error message 24 occurred more than three times within one-half hour? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. During the next PM period, run TFF and TFL. | 1 | - |
| 2. Replace the CYBER coupler interface card (slot B or slot AB). | 2 | - |
| 3. Replace the coupler I/O card (slot C or slot AA). | 3 | - |
| 4. Replace the coupler DMA card (slot D or slot A). | 4 | - |
| 5. If other CE error messages are outstanding, follow 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, you can perform the six steps listed above at your 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 PTHIPINT when the HIP is expecting output (traffic from the host to the 255x) and the PPU disconnects the channel prematurely. When the host deactivates the data channel before a data transfer is complete, bit 7 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 | RESPONSES | |
|---|---|---|
| | 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 TFF and TFL. | 1 | - |
| 2. Replace the CYBER coupler interface card (slot B or slot AB). | 2 | - |
| 3. Replace the coupler I/O card (slot C or slot AA). | 3 | - |
| 4. Replace the coupler DMA card (slot D or slot A). | 4 | - |
| 5. If other CE error messages are outstanding, follow 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, you can perform the six steps listed above at your 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 occurs in procedure PTHIPINT when the HIP is expecting output data (traffic from the host to the 255x) and the channel remains active. When 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 | RESPONSES 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 TFF and TFL. | 1 | - |
| 2. Replace the CYBER coupler interface card (slot B or slot AB). | 2 | - |
| 3. Replace the coupler I/O card (slot C or slot AA). | 3 | - |
| 4. Replace the coupler DMA card (slot D or slot A). | 4 | - |
| 5. If other CE error messages are outstanding, follow 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 28 should not be a matter for concern. However, you can perform the six steps listed above at your discretion. | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 29 of 39)

CE Error Message 29 - Missing EOP

ASSUME

The host interface package (HIP) software detected a missing end of operation (EOP) flag.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Has CE error message 29 occurred more than three times within one-half hour? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run MSMP CYBER Coupler diagnostics. Also run TFF and TFL. | 1 | - |
| 2. Replace the CYBER coupler interface card (slot B or slot AB). | 2 | - |
| 3. Run ODS load check and mainframe diagnostics. | 3 | - |
| 4. If other CE error messages are outstanding, follow 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 29 should not be a matter for concern. However, you can perform the five steps listed above at your discretion. | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 30 of 39)

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 | RESPONSES | | |
|---|---|---|---|
| | 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 interrupt in its protocol? | N | Y | Y |
| 2. Are there any complaints about the reverse channel interrupt function? | - | 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 | X | - |
| 2. None. This is a normal message in response to a reverse channel interrupt. | - | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 31 of 39)

CE Error Message 2A - HASP Too Many NAKs Received

ASSUME

The HASP TIP has received more than 63 NAKs (negative acknowledge block) on a block and has declared the line to be inoperative. This condition can be caused by a noisy transmission line, a bad modem, a bad CLA, or a bad terminal.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. The byte of the CE error message following the error code contains the CLA address. Has the CLA received more than three CE error messages 2A during one hour? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing line. | X | - |
| 2. Some noise on a transmission line is to be expected. Unless the customer has reason to believe that some serious fault exists, an occasional CE error message 2A should not be a matter of concern. However, you can perform the above step at your discretion. | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 32 of 39)

CE Error Messages 2B and 2C - Bad BCB From HASP TIP or HASP Workstation

ASSUME

The protocol between the HASP TIP and the HASP terminal has detected two or more lost blocks. The HASP TIP has declared the condition unrecoverable and the line inoperative. This condition can be caused by a CCP HASP TIP software error or a bad terminal emulator. CE error messages 2B occurs when the HASP terminal detects lost blocks. CE error messages 2C occurs when the HASP TIP detects lost blocks.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Is the error code = 2B? | Y | N |
| 2. Is the error code = 2C? | - | Y |
| **ACTIONS** | **SEQUENCE** | |
| 1. This is a possible CCP software problem. Submit a PSR. | 1 | - |
| 2. This is a possible terminal emulator problem. Contact the terminal emulator vendor. | 2 | 1 |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 33 of 39)

CE Error Message 2D - HASP Workstation Restart

ASSUME

The HASP TIP has detected an unexpected HASP workstation restart. This condition can be caused by the HASP workstation operator doing a restart or a noisy transmission line.

| CONDITIONS | RESPONSES | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1. The byte of the CE error message following the error code contains the CLA address. Was the HASP workstation operating on this line restarted? | Y | N | N |
| 2. Has this CLA received three or more CE error messages 2D during one hour? | - | Y | N |
| **ACTIONS** | **SEQUENCE** | | |
| 1. This should not be treated as an error. | X | - | - |
| 2. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing line. | - | X | - |
| 3. Some noise on a transmission line is to be expected. Unless the customer has reason to believe that some serious fault exists, an occasional CE error message 2D should not be a matter of concern. However, you can perform the above step at your discretion. | - | - | X |

CE Error Messages 30, 31, 32, 37, and 38 - No Response, Bad Response, Error Response From MODE 4 or HASP Terminal

ASSUME

CE error message 30 occurs when a response timeout occurs after transmitting to a MODE 4 terminal. CE error message 31 occurs when a MODE 4 terminal response is not the expected response. CE error message 32 occurs when a MODE 4 terminal indicates it has received incorrect information. CE error message 37 occurs when either 63 consecutive timeouts occur after transmitting data to a HASP terminal, or the HASP workstation fails to send an ENQ within 2 minutes after a switched line has been enabled. CE error message 38 occurs when the HASP workstation's response is not a correct response. These five CE error messages can be caused by a bad terminal, a bad modem, or a noisy transmission line.

| CONDITIONS | RESPONSES 1 | RESPONSES 2 |
|---|---|---|
| 1. The byte of the CE error message following the error code contains the CLA address. Has the CLA received more than three CE error messages 30, 31, 32, 37, or 38 in the last half-hour? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Contact the terminal operator to verify that the terminal is correctly configured: all switches in normal positon, emulator loaded correctly, and power to modem and to terminal is on. | 1 | - |
| 2. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing line. | 2 | - |
| 3. Some noise on a transmission line is to be expected. Unless the customer has reason to believe that some serious fault exists, an occasional CE error message 30, 31, 32, 37, or 38 should not be a matter of concern. However, you can perform the two steps listed above at your discretion. | - | X |

CE Error Message 33 - LIP Timeout on Idle Block

**ASSUME**

The link interface program (LIP) in the local NPU has timed out waiting for an idle block from a remote NPU. This condition can be caused by a remote NPU failure or a noisy transmission line.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. The byte of the CE error message following the error code contains the CLA (trunk) address. The second byte of the message following the CLA address contains the node ID of the remote NPU. Has the NPU failed? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics on failed NPU. | 1 | - |
| 2. Run MSMP MLIA diagnostics on failed NPU. | 2 | - |
| 3. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing trunk. | 3 | 1 |
| 4. Call CE or analyst as appropriate. | 4 | 2 |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 36 of 39)

CE Error Messages 34 and 35 - HDLC Protocol Failure and Command Reject

ASSUME

CE error message 34 occurs when the local NPU link interface program (LIP) fails to receive a response to a block sent to the remote NPU. CE error message 35 occurs when the local NPU LIP sends a command to the remote NPU which is rejected. Both of these conditions can be caused by a remote NPU failure or a noisy transmission line.

| CONDITIONS | RESPONSES 1 | RESPONSES 2 |
|---|---|---|
| 1. The byte of the CE error message following the error code contains the CLA (trunk) address. The second byte of the message following the CLA address contains the node ID of the remote NPU. Has the remote NPU failed? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics on failed NPU. | 1 | - |
| 2. Run MSMP MLIA diagnostics on failed NPU. | 2 | - |
| 3. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing trunk. | 3 | 1 |
| 4. Call CE or analyst as appropriate. | 4 | 2 |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 37 of 39)

CE Error Message 36 - LIP Received Bad Frame (CRC Error)

ASSUME

This message occurs when the local NPU link interface program (LIP) detects a CRC error on data received from the remote NPU. The condition can be caused by a noisy transmission line or a bad CLA.

| CONDITIONS | RESPONSES 1 | RESPONSES 2 |
|---|---|---|
| 1. The byte of the CE error message following the error code contains the CLA (trunk) address. The second byte of the message following the CLA address contains the node ID of the remote NPU. Has CE error message 36 occurred more than three times in one hour? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing trunk. | X | - |
| 2. Some noise on a transmission line is to be expected. Unless the customer has reason to believe that some serious fault exists, an occasional CE error message 36 should not be a matter of concern. However, you can perform the above step at your discretion. | - | X |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 38 of 39)

CE Error Message 39 - HASP Workstation is Ignoring the Wait-a-Bit

ASSUME

The HASP TIP has received more than 7 transmission blocks from a workstation after it has sent the workstation a transmission block with the wait-a-bit set in the FCS. The HASP TIP has declared the condition unrecoverable and the line inoperative. This message is caused by a HASP workstation not obeying the HASP protocol.

| ACTIONS | SEQUENCE |
|---|---|
| 1. Contact the terminal operator to verify that the terminal is correctly configured: all switches in normal position and emulator is loaded correctly. | 1 |
| 2. This is a terminal emulator problem. Contact the terminal emulator vendor. | 2 |

TABLE 2-1. CE ERROR CODES DDLT (Sheet 39 of 39)

CE Error Messages 3A and 3B - Minor or Serious Error on 2780/3780 Line

ASSUME

The 2780/3780 TIP detected an error on an X780 line. CE error message 3A occurs when a minor error is detected. CE error message 3B occurs when a serious error is detected, or when the threshold for minor errors has been exceeded.

Refer to Appendix A for a detailed breakdown of the sub-codes contained in these messages.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Is the error code = 3A? | Y | N |
| 2. Is the error code = 3B? | - | Y |
| **ACTIONS** | **SEQUENCE** | |
| 1. The byte of the CE error message following the error code contains the CLA address. Refer to Appendix A for the location and meaning of the sub-codes in the message. | 1 | 1 |
| 2. Using the communications line fault isolation procedures in section 4, run on-line diagnostics on the failing line. | - | 2 |
| 3. Monitor the communications line and/or run diagnostics on the terminal to check for possible protocol error or terminal hardware or emulator error. | - | 3 |
| 4. Minor errors are reported to alert the operator of possible terminal or line problems. Unless the customer has reason to believe that some serious fault exists, CE error message 3A should not be a matter for concern. However, you can perform the three steps listed above at your discretion. | 2 | - |

# STATISTICS SERVICE MESSAGES

Each NPU running software with performance statistics defined, maintains statistics data and a timer that generate statistics at intervals selected during CCP program build. Statistics message counters are maintained for the NPU and for each trunk and line. Each type of counter is dumped and cleared at each timer timeout. Reports are also sent regardless of the timer if you disconnect or disable a line or if a statistics counter overflows. The statistics block is dumped and cleared and the counter is set to zero.

Statistics reports are sent as unsolicited service messages.

The first bytes of statistics messages are the same for NPUs and trunks and lines. The remaining bytes (text) are unique to each message type. The format of the common bytes is:

| DN | SN | CN =00 | P/RES/ BT=04 | PFC 1A | SFC 00/ 02/04 | TEXT |
|---|---|---|---|---|---|---|

DN Destination node - coupler of supervisory host

SN Source node - originating NPU

CN Connection number - 00 for statistics messages

P Priority

RES Unused

BT Block type - 4 is CMD block

PFC Primary function code - 1A is statistics message

SFC Secondary function code

00 is NPU statistics
02 is line statistics
04 is trunk statistics

TEXT See appendix A for explanation

The information in the statistics messages is stored in both the engineering file and the account file in the host. One way to access this information is to run the Host Performance Analyzer Program (HPA) as described in the CYBER 170, CYBER 70, and 6000 Series Concurrent Maintenance Library reference manual.

Appendix A shows the format of the text, whose byte assignment and byte meaning are unique for each of the statistics message types.

Figure 2-2 shows two flowcharts that summarize DDLT procedures for the two types of statistics messages: NPU and trunk/line. The DDLTs for these messages are shown in table 2-2.

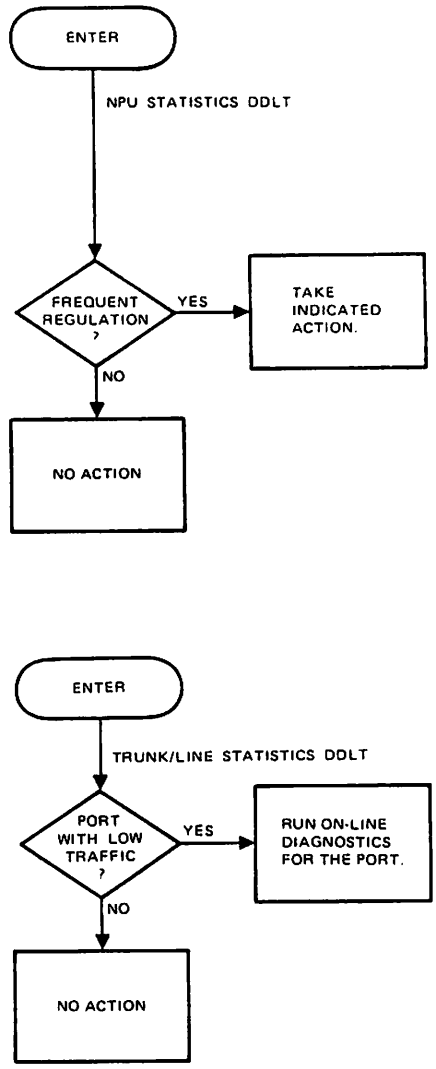



Figure 2-2. Flowcharts for Statistics Messages DDLTs

TABLE 2-2. STATISTICS SERVICE MESSAGES DDLT (Sheet 1 of 2)

Statistics Service Message 00 - 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. Statistics messages are generated periodically as well as when the statistics count for an individual equipment exceeds the threshold level.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Has NPU regulation occurred frequently? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Check the 255x Configurator to see if sufficient memory has been provided for the present load and configuration. | 1 | - |
| 2. Check the trunk/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. | 2 | - |
| 3. Take no action. | - | X |

TABLE 2-2. STATISTICS SERVICE MESSAGES DDLT (Sheet 2 of 2)

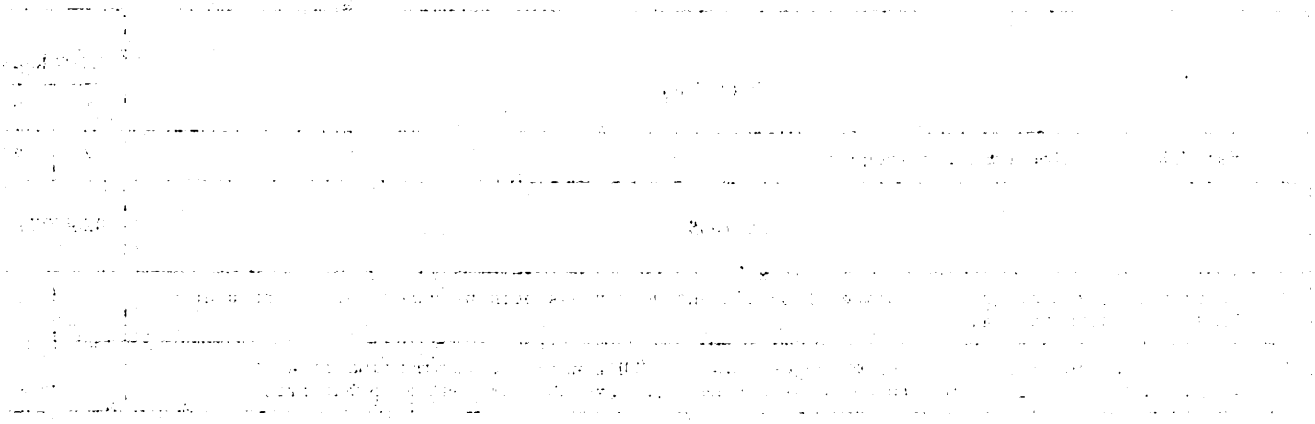
Statistics Service Messages 02 and 04 - Trunk/Line Statistics

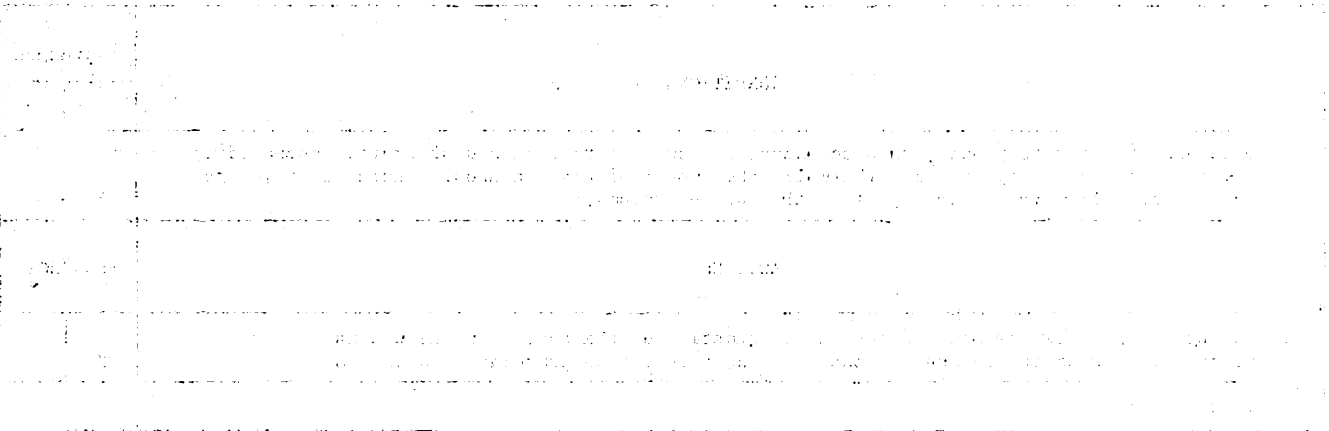
ASSUME

1. Operator is familiar with DDLT format.

The trunk/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 host to the terminal (word 1 of text); and 3) the count of the blocks received from the terminal by the host (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 | RESPONSES 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 in section 4. | X | - |
| 2. Take no action. | - | X |





# HALT CODES AND DUMP INTERPRETATION 3

When the Communications Control Program (CCP) stops the Network Processing Unit (NPU) because of an unrecoverable condition caused by either hardware or software errors, a halt message is displayed on the NPU console if you have selected the console option at CCP build time. When NS reloads the NPU, it displays the halt information in NAM's dayfile. The format of the halt message is:

```
HALT xxxx yyyy
wwww PORT
zzzz BUFFER ADDR
```

xxxx The four digit hexadecimal halt code

yyyy The address of the program in control when the halt occurred

wwww The port number. It appears only with halt code 000F (CLA status worklist flooding).

zzzz The buffer address. It appears only with these buffer halt codes:

0009, 000A, and 000B

Following a halt, the host will dump the NPU main memory, micromemory checksum, page registers, and file 1 registers if the default dump option has not been overridden. After a dump, the host attempts to reload the NPU. To prevent flooding the host disks with NPU dumps, NS will inhibit dumping of an NPU that has requested more than 2 loads within 8 minutes.

You can locally stop the NPU by pressing the MASTER CLEAR switch on the maintenance control panel.

If a halt code is not generated (halt code of zero), you must consult a dump listing generated from the host by the Network Dump Analyzer (NDA) program to find the cause of the failure. If you are a CE, you also may want to consult the dump listing whenever the cause of the halt is not apparent.

## HALT CODES

Halt codes are caused by:

Hardware malfunctions

Either hardware or software problems

### HARDWARE MALFUNCTIONS

These conditions are usually caused by some type of hardware failure:

Power failures (halt code 0001)

Memory parity error (halt code 0002)

Memory protect error (halt code 0003)

MLIA failure (halt code 0005)

Bad MLIA initialization status (halt code 0011)

If you are a host operator and one of these conditions occurs, it's best to allow the CE to repair the underlying hardware problem.

### HARDWARE OR SOFTWARE PROBLEMS

Halt codes other than those already specified are caused by either a hardware failure or a software error. If you are a host operator, you might want to call a systems analyst to correct any software problems and a CE to repair any hardware problems. Regardless of whom you consult, be sure to have any dumps that were taken by the host available for examination.

Figure 3-1 is a flowchart that summarizes the DDLT procedures for halt codes, and table 3-1 is a series of DDLTs you should consult to help you interpret halt codes.

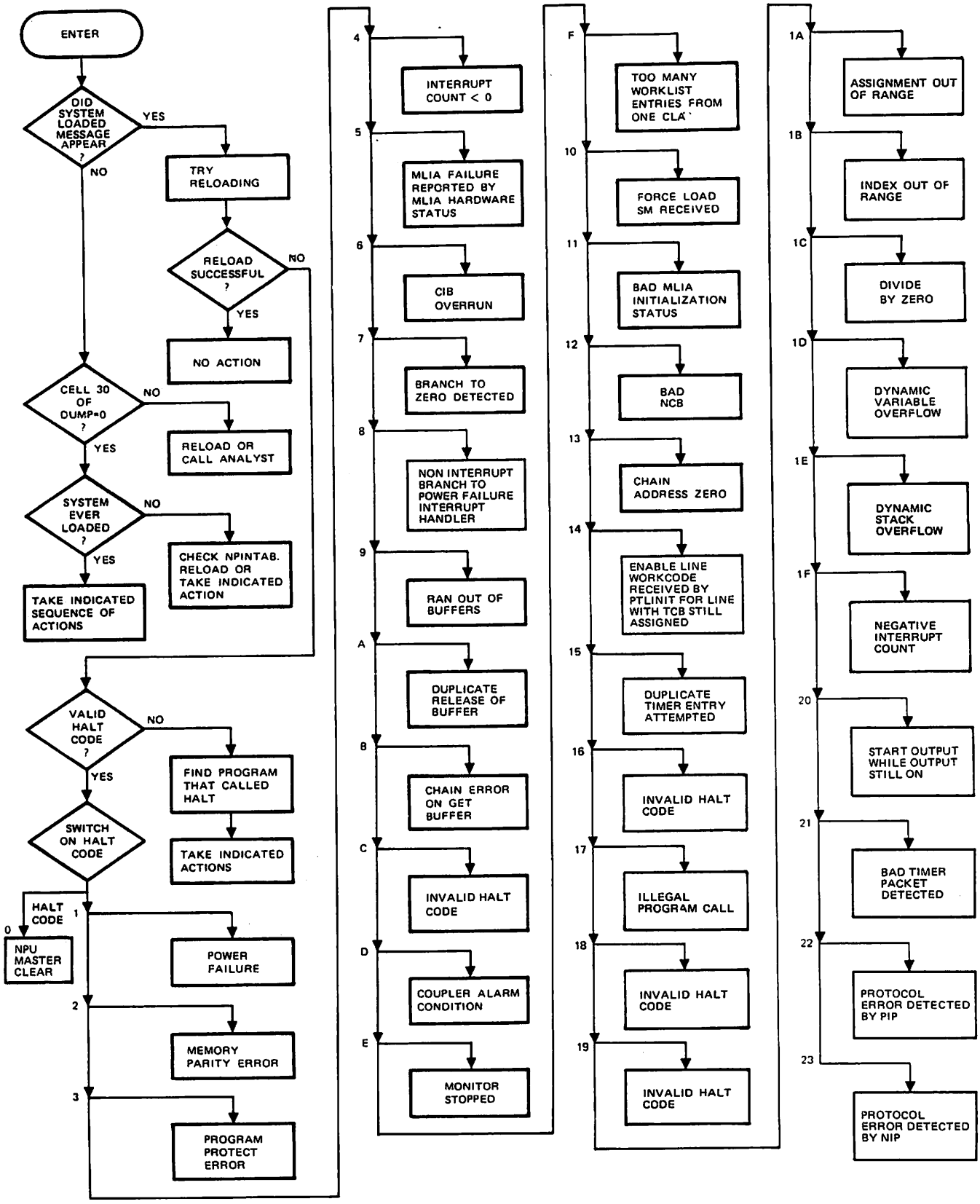



Figure 3-1. Flowchart for Halt Codes DDLT

TABLE 3-1. HALT CODES DDLT (Sheet 1 of 38)

Halt Codes Entry

**ASSUME**

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

| CONDITIONS | RESPONSES | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 1. Has the system been successfully loaded and displayed the following:<br><br>CCP 0038<br>NPU ID: 00xx<br>LEVEL: yyyy<br>VARIANT: zzzz | N | N | N | Y |
| 2. Check location $30_{16}$ (halt code) of the dump. Are the contents non-zero? | N | N | Y | - |
| 3. Is this a new build that has not loaded successfully before? | N | Y | - | - |
| **ACTIONS** | **SEQUENCE** | | | |
| 1. Go to sheet 2. | X | - | - | - |
| 2. Try reloading CCP. | - | 1 | 1 | 1 |
| 3. Try loading previous good load file. 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 CYBER coupler diagnostics. | - | 4 | - | - |
| 6. Replace the CYBER coupler interface card (slot B or slot AB). | - | 5 | - | - |
| 7. Call CE or analyst as appropriate. | - | 6 | - | - |
| 8. Go to sheet 4. | - | - | 2 | - |
| 9. Go to sheet 3. | - | - | - | 2 |

Halt Codes - No Halt Code Available

ASSUME

| CONDITIONS | RESPONSES |
|---|---|
| | 1 |
| 1. The system failed during initialization but did not generate a halt code message. Look up the NPINTAB entry in the address table (the address table starts at $150_{16}$). The contents of location $165_{16}$ gives 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 as follows:<br><br>Bit 0 is set at the completion of initializing the page registers.<br><br>Bit 1 is set at the completion of determining the NPU's memory size.<br><br>Bit 2 is set at the completion of setting up program protect bits.<br><br>Bit 3 is set at the completion of setting up the routing tables.<br><br>Bit 4 is set at the completion of initializing the MUX tables.<br><br>Bit 5 is set at the completion of initializing the OPS tables.<br><br>Bit 6 is set at the completion of initializing the line control blocks (LCBs).<br><br>Bit 7 is set at the completion of initializing the File 1 registers.<br><br>Bit 8 is set at the completion of the first phase of buffer initialization.<br><br>Bit 9 is set at the completion of initializing worklist control blocks (WLCBs).<br><br>Bit 10 is set at the completion of miscellaneous NPU initialization.<br><br>Bit 11 is set at the completion of applications initialization.<br><br>Bit 12 is set at the completion of initializing the MLIA.<br><br>Bit 13 is set at the completion of initializing the fixed configuration lines.<br><br>Bit 14 is set at the completion of initializing the timer services.<br><br>Bit 15 is set at the completion of the second phase of buffer initialization.<br><br>The P-register (contained in location $FF_{16}$ of the File 1 register dump area) shows the address where the NPU was executing at halt time. | X |

| ACTIONS | SEQUENCE |
|---|---|
| 1. Try reloading CCP. | 1 |
| 2. Find whether load file has been modified. | 2 |
| 3. Run ODS load check and mainframe diagnostics. | 3 |
| 4. Run MSMP CYBER coupler diagnostics. | 4 |
| 5. Replace the CYBER coupler interface card (slot B or slot AB). | 5 |
| 6. Call CE or analyst as appropriate. | 6 |

TABLE 3-1. HALT CODES DDLT (Sheet 3 of 38)

Halt Codes Index

ASSUME

1. Operator is familiar with the ODS DDLT format.
2. Halt code message has halt code.

| CONDITIONS | RESPONSES | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. Is the halt code = 0000? | N | N | N | N | N | N | Y |
| 2. Is the halt code = 0001? | N | N | N | N | N | Y | - |
| 3. Is the halt code = 0002? | N | N | N | N | Y | - | - |
| 4. Is the halt code = 0003? | N | N | N | Y | - | - | - |
| 5. Is the halt code = 0004? | N | N | Y | - | - | - | - |
| 6. Is the halt code = 0005? | N | Y | - | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | | |
| 1. Go to sheet 4. | X | - | - | - | - | - | - |
| 2. Go to sheet 16. | - | X | - | - | - | - | - |
| 3. Go to sheet 15. | - | - | X | - | - | - | - |
| 4. Go to sheet 14. | - | - | - | X | - | - | - |
| 5. Go to sheet 13. | - | - | - | - | X | - | - |
| 6. Go to sheet 12. | - | - | - | - | - | X | - |
| 7. Go to sheet 11. | - | - | - | - | - | - | X |

TABLE 3-1. HALT CODES DDLT (Sheet 4 of 38)

| Halt Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the halt code = 0006? | N | N | N | N | N | Y |
| 2. Is the halt code = 0007? | N | N | N | N | Y | - |
| 3. Is the halt code = 0008? | N | N | N | Y | - | - |
| 4. Is the halt code = 0009? | N | N | Y | - | - | - |
| 5. Is the halt code = 000A? | N | Y | - | - | - | - |
| ACTIONS | SEQUENCE | | | | | |
| 1. Go to sheet 5. | X | - | - | - | - | - |
| 2. Go to sheet 22. | - | X | - | - | - | - |
| 3. Go to sheet 21. | - | - | X | - | - | - |
| 4. Go to sheet 19. | - | - | - | X | - | - |
| 5. Go to sheet 18. | - | - | - | - | X | - |
| 6. Go to sheet 17. | - | - | - | - | - | X |

Halt Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the halt code = 000B? | N | N | N | N | N | Y |
| 2. Is the halt code = 000C? | N | N | N | N | Y | - |
| 3. Is the halt code = 000D? | N | N | N | Y | - | - |
| 4. Is the halt code = 000E? | N | N | Y | - | - | - |
| 5. Is the halt code = 000F? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 6. | X | - | - | - | - | - |
| 2. Go to sheet 26. | - | X | - | - | - | - |
| 3. Go to sheet 25. | - | - | X | - | - | - |
| 4. Go to sheet 24. | - | - | - | X | - | - |
| 5. Go to sheet 20. | - | - | - | - | X | - |
| 6. Go to sheet 23. | - | - | - | - | - | X |

TABLE 3-1. HALT CODES DDLT (Sheet 6 of 38)

| Halt Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the halt code = 0010? | N | N | N | N | N | Y |
| 2. Is the halt code = 0011? | N | N | N | N | Y | - |
| 3. Is the halt code = 0012? | N | N | N | Y | - | - |
| 4. Is the halt code = 0013? | N | N | Y | - | - | - |
| 5. Is the halt code = 0014? | N | Y | - | - | - | - |
| ACTIONS | SEQUENCE | | | | | |
| 1. Go to sheet 7. | X | - | - | - | - | - |
| 2. Go to sheet 31. | - | X | - | - | - | - |
| 3. Go to sheet 30. | - | - | X | - | - | - |
| 4. Go to sheet 29. | - | - | - | X | - | - |
| 5. Go to sheet 28. | - | - | - | - | X | - |
| 6. Go to sheet 27. | - | - | - | - | - | X |

| Halt Codes Index<br>ASSUME | | | | | | |
|---|---|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the halt code = 15? | N | N | N | N | N | Y |
| 2. Is the halt code = 16? | N | N | N | N | Y | - |
| 3. Is the halt code = 17? | N | N | N | Y | - | - |
| 4. Is the halt code = 18? | N | N | Y | - | - | - |
| 5. Is the halt code = 19? | N | Y | - | - | - | - |
| ACTIONS | SEQUENCE | | | | | |
| 1. Go to sheet 8. | X | - | - | - | - | - |
| 2. Go to sheet 20. | - | X | - | - | - | - |
| 3. Go to sheet 20. | - | - | X | - | - | - |
| 4. Go to sheet 33. | - | - | - | X | - | - |
| 5. Go to sheet 20. | - | - | - | - | X | - |
| 6. Go to sheet 32. | - | - | - | - | - | X |

Halt Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the halt code = 1A? | N | N | N | N | N | Y |
| 2. Is the halt code = 1B? | N | N | N | N | Y | - |
| 3. Is the halt code = 1C? | N | N | N | Y | - | - |
| 4. Is the halt code = 1D? | N | N | Y | - | - | - |
| 5. Is the halt code = 1E? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 9. | X | - | - | - | - | - |
| 2. Go to sheet 34. | - | X | - | - | - | - |
| 3. Go to sheet 20. | - | - | X | - | - | - |
| 4. Go to sheet 20. | - | - | - | X | - | - |
| 5. Go to sheet 20. | - | - | - | - | X | - |
| 6. Go to sheet 20. | - | - | - | - | - | X |

Halt Codes Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is the halt code = 1F? | N | N | N | N | N | Y |
| 2. Is the halt code = 20? | N | N | N | N | Y | - |
| 3. Is the halt code = 21? | N | N | N | Y | - | - |
| 4. Is the halt code = 22? | N | N | Y | - | - | - |
| 5. Is the halt code = 23? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 10. | X | - | - | - | - | - |
| 2. Go to sheet 38. | - | X | - | - | - | - |
| 3. Go to sheet 38. | - | - | X | - | - | - |
| 4. Go to sheet 37. | - | - | - | X | - | - |
| 5. Go to sheet 36. | - | - | - | - | X | - |
| 6. Go to sheet 35. | - | - | - | - | - | X |

TABLE 3-1. HALT CODES DDLT (Sheet 10 of 38)

| Halt Codes Index | | |
|---|---|---|
| ASSUME | | |
| CONDITIONS | RESPONSES | |
| | 1 | 2 |
| 1. Is the halt code greater than 23? | N | Y |
| ACTIONS | SEQUENCE | |
| 1. You have misinterpreted an instruction. Go to sheet 1 and try again. | X | - |
| 2. Go to sheet 20. | - | X |

TABLE 3-1. HALT CODES DDLT (Sheet 11 of 38)

| Halt Code 0000 - Master Clear or 255x Hang | | | |
|---|---|---|---|
| ASSUME | | | |
| CONDITIONS | RESPONSES | | |
| | 1 | 2 | 3 |
| 1. Has MASTER CLEAR switch been activated? | Y | N | N |
| 2. Did NAM halt the 255x? | N | Y | N |
| ACTIONS | SEQUENCE | | |
| 1. No action; normal use. | 1 | - | - |
| 2. Check NAM dayfile for possible PIP coupler error. PIP coupler errors are documented in Appendix A of the NOS Version 2 Operations Handbook. | - | 1 | - |
| 3. Possible firmware problem. Call an analyst. | - | - | 1 |

Halt Code 0001 - Power Failure

ASSUME

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

| CONDITIONS | RESPONSES 1 | 2 | 3 |
|---|---|---|---|
| 1. Has one or more power supplies been 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 CCP Link Edit listing - module memory map - sorted by module address.) | N | Y | - |
| **ACTIONS** | **SEQUENCE** | | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | - | - |
| 2. Run MSMP CYBER coupler diagnostics. | 2 | - | - |
| 3. Run TFF on-line under MALET. | 3 | - | - |
| 4. Call CE or analyst as appropriate. | 4 | - | - |
| 5. Reload CCP (there was a momentary power fluctuation on the line). | - | X | - |
| 6. Reapply power to the failed power supply or replace the power supply. | - | - | X |

Halt Code 0002 - Memory Parity Error

ASSUME

The NPU hardware detected memory parity error while fetching an instruction or data from memory, or writing data to memory when the memory protect system is enabled. Memory parity error logic is described in the hardware reference manual.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Check location $31_{16}$ of the dump. This is the address where CCP was executing at the time the memory parity interrupt was honored. Check the contents of PBHALT's entry point. This is the return address of the program calling PBHALT. Are the contents of the entry point an address within the PBLN00 program? (The address of PBHALT's entry point and the address of PBLN00 can be found in the CCP Link Edit listing - entry symbol list sorted by entry name and module memory map sorted by module address, respectively.) | Y | N |

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

TABLE 3-1. HALT CODES DDLT (Sheet 14 of 38)

Halt Code 0003 - Program Protect Error

ASSUME

A program protect error was detected by the NPU hardware. The memory protect system must be enabled for this to occur. It is caused by a write from a DMA device (MLIA or coupler), or a store from an unprotected instruction, to a protected location. Program protect logic is described in the hardware reference manual.

| CONDITIONS | RESPONSES 1 | RESPONSES 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 PBLN00 program? (The address of PBLN00 can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics (including protect bit tests). | 1 | 1 |
| 2. Run MSMP CYBER coupler diagnostics and the MLIA diagnostics. | 2 | 2 |
| 3. Replace the CYBER coupler interface card (slot B or slot AB) and the MLIA. | 3 | 3 |
| 4. Call CE or analyst as appropriate. | 4 | 4 |
| 5. Have analyst check that the program calling PBHALT did not mistakenly use halt code 0003. | - | 5 |

TABLE 3-1. HALT CODES DDLT (Sheet 15 of 38)

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 interrupt sequence until the count overflowed ($8000_{16}$).

| CONDITIONS | RESPONSES 1 | RESPONSES 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 CCP 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. | 2 | 1 |
| 3. Run MSMP MLIA diagnostics. | 3 | 3 |
| 4. Call CE or analyst as appropriate. | 4 | 4 |

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 | RESPONSES 1 | RESPONSES 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 PBMLIA or PMMLEH program? (The addresses of PBMLIA and PMMLEH can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |

| ACTIONS | SEQUENCE | |
|---|---|---|
| 1. Run ODS load check and mainframe diagnostics. | 1 | 1 |
| 2. Run MSMP MLIA diagnostics. | 2 | 2 |
| 3. Replace the MLIA. | 3 | 3 |
| 4. Run MSMP MST041 diagnostics. | 4 | 4 |
| 5. Call CE or analyst as appropriate. | 5 | 6 |
| 6. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 5 |

TABLE 3-1. HALT CODES DDLT (Sheet 17 of 38)

Halt Code 0006 - CIB Overrun

ASSUME

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

| CONDITIONS | RESPONSES 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 CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run MSMP MLIA diagnostics. | 1 | 1 |
| 2. Run ODS load check and mainframe diagnostics. | 2 | 2 |
| 3. Run MSMP MST041 diagnostics. | 3 | 3 |
| 4. Call CE or analyst as appropriate. | 4 | 5 |
| 5. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 4 |

TABLE 3-1. HALT CODES DDLT (Sheet 18 of 38)

Halt Code 0007 - Branch to Zero Detected

ASSUME

Branch to zero (less than $000E_{16}$) has been detected.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Has this build been successfully run before? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | - |
| 2. Run MSMP CYBER coupler or CYBER Expansion Coupler diagnostics. | 2 | - |
| 3. Replace the CYBER coupler interface card (slot B or slot AB). | 3 | - |
| 4. Run MSMP MST041 diagnostics. | 4 | - |
| 5. Call CE or analyst as appropriate. | 5 | - |

TABLE 3-1. HALT CODES DDLT (Sheet 19 of 38)

| Halt Code 0008 - Noninterrupt Branch to Power Failure Interrupt Handler | | | |
|---|---|---|---|
| ASSUME | | | |
| CONDITIONS | RESPONSES | | |
| | 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 PBLN00 program? (The address of PBLN00 can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | Y | N |
| 2. Check location $100_{16}$ of the dump. Is it zero? | Y | N | - |
| ACTIONS | SEQUENCE | | |
| 1. Have system analyst check that some program did not execute a return jump to location $100_{16}$ in error. | - | 1 | - |
| 2. Run ODS load check and mainfram diagnostics. | 1 | 2 | 1 |
| 3. Call CE or analyst as appropriate. | 2 | 3 | 2 |
| 4. Have analyst check the program calling PBHALT to find if it set the wrong halt code. | - | - | 3 |

TABLE 3-1. HALT CODES DDLT (Sheet 20 of 38)

| Halt Codes 000C, 0014, 0016, 0018 Through 1D, and Greater Than 23 |
|---|
| ASSUME |
| The above-named halt codes are not used. |
| CONDITIONS |
| None. |
| ACTIONS |
| None. |
| Note: If halt codes appear which are not defined in this manual, check the beginning of the CONST section in the CCP Pascal listing to see if new halt codes have been added. |

TABLE 3-1. HALT CODES DDLT (Sheet 21 of 38)

Halt Code 0009 - Ran Out of Buffers

ASSUME

| CONDITIONS | RESPONSES | | | |
|---|---|---|---|---|
| | 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? (The address of PBSTOP can be found in the CCP Link Edit listing - module memory map - sorted by module address. PBSTOP is the firmware interface to PBHALT.) | Y | Y | Y | N |
| 2. Check File 1 register C. Does it contain zero? | Y | Y | N | - |
| 3. Was the configuration changed recently? | N | Y | - | - |
| **ACTIONS** | **SEQUENCE** | | | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | 2 | 1 | 1 |
| 2. Call CE or analyst as appropriate. | 2 | 3 | 2 | 2 |
| 3. Check the 255x configurator to see if sufficient memory is available to handle the system configuration (based on terminal types, number of terminals, and so forth). | - | 1 | - | - |

TABLE 3-1. HALT CODES DDLT (Sheet 22 of 38)

Halt Code 000A - Duplicate Release of Buffer or Buffer Out-of-Range

ASSUME

The buffer to be released has already been released or the buffer address is outside the buffer area.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Check location $31_{16}$ of the dump. This is the address of the program that is attempting to release a buffer that has already been released or is not within the buffer area. Are the contents of location $31_{16}$ nonzero? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | 1 |
| 2. Call CE or analyst as appropriate. | 2 | 3 |
| 3. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 2 |

Halt Code 000B - Buffer Chain Error

ASSUME

The firmware tried to delink a buffer from the free buffer chain. The buffer management bit map maintained by the firmware indicated that the buffer was already in use.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Check location $31_{16}$ of the dump. This is the address of the program that is attempting to release a buffer that has already been released or is not within the buffer area. Are the contents of location $31_{16}$ nonzero? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | 1 |
| 2. Run MSMP CYBER coupler diagnostics. | 2 | 2 |
| 3. Replace the CYBER coupler interface card (slot B or slot AB). | 3 | 3 |
| 4. Run MSMP MLIA diagnostics. | 4 | 4 |
| 5. Call CE or analyst as appropriate. | 5 | 6 |
| 6. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 5 |

Halt Code 000D - Coupler Alarm Condition

**ASSUME**

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

| CONDITIONS | RESPONSES 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 PTHIPINT program? (The address of PTHIPINT can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | 1 |
| 2. Run MSMP CYBER coupler diagnostics. | 2 | 2 |
| 3. Replace the CYBER coupler interface card (slot B or slot AB). | 3 | 3 |
| 4. Call CE or analyst as appropriate. | 4 | 5 |
| 5. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 4 |

TABLE 3-1. HALT CODES DDLT (Sheet 25 of 38)

Halt Code 000E - Monitor Stopped

ASSUME

A task called by PBMON did not return control within 4 seconds. The clock interrupt handler, PBTICK, detected this and called PBHALT.

| CONDITIONS | RESPONSES 1 | 2 |
|---|---|---|
| 1. Check location $31_{16}$ of the dump. This is the address where CCP was executing when the interrupt to PBTICK was honored. Check the contents of PBHALT's entry point. This is the return address of the program calling PBHALT. Are the contents of the entry point an address within the PBTICK program? (The address of PBHALT's entry point and the address of PBTICK can be found in the CCP Link Edit listing - entry symbol list sorted by entry name and module memory map sorted by module address, respectively.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | 1 |
| 2. Call CE or analyst as appropriate. | 2 | 3 |
| 3. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 2 |

TABLE 3-1. HALT CODES DDLT (Sheet 26 of 38)

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

ASSUME

Too many status messages were received from one CLA. Before PBHALT halts the system after running out of buffers, PBHALT checks the worklist entries queued to PMWOLP to see if a CLA caused too many worklists to be generated. If more than QENTLIM (32) worklist entries are queued to PMWOLP for one CLA, PBHALT changes the halt code from $0009_{16}$ to $000F_{16}$ and gives the CLA address at the end of the message.

| CONDITIONS | RESPONSES 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. | 1 | - |
| 2. Run ODS load check and mainframe diagnostics. | 2 | 1 |
| 3. Run MSMP MST041 diagnostics. | 3 | 2 |
| 4. Call CE or analyst as appropriate. | 4 | 3 |
| 5. Have system analyst check the program calling PBHALT to find if it set some halt code other than 000F. | - | 4 |

Halt Code 0010 - Force Load Service Message Received

**ASSUME**

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

| CONDITIONS | RESPONSES 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 PNSMNPI program? (The address of PNSMNPI can be found in the CCP 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. | - | 1 |
| 3. Run MSMP MST041 diagnostics. | - | 2 |
| 4. Call CE or analyst as appropriate. | - | 3 |
| 5. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 4 |

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 $0009_{16}$. (The bad MLIA status can be found in the last word of the 3-word NPINTAB table. The address of NPINTAB is in location $165_{16}$. The format of the MLIA status can be found in the Host Communications Processor Reference Manual.

| CONDITIONS | RESPONSES 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 CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |

| ACTIONS | SEQUENCE | |
|---|---|---|
| 1. Run MSMP MLIA diagnostics. | 1 | 2 |
| 2. Run ODS load check and mainframe diagnostics. | 2 | 1 |
| 3. Replace the MLIA. | 3 | 3 |
| 4. Run MSMP MST041 diagnostics. | 4 | 4 |
| 5. Call CE or analyst as appropriate. | 5 | 6 |
| 6. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | 6 | 5 |

Halt Code 0012 - Bad NCB

ASSUME

CCP has received a bad NPU configure block.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Has a recent change been made to NDLP input? | Y | N |
| 2. Has this NPU previously been successfully loaded with current load file? | N | Y |
| **ACTIONS** | **SEQUENCE** | |
| 1. Using previous NDLP input, reload NPU with old load file. | 1 | - |
| 2. Run MSMP CYBER coupler diagnostics. | - | 1 |
| 3. Replace the CYBER coupler interface card (slot B or slot AB). | - | 2 |
| 4. Call CE or analyst as appropriate. | - | 3 |

TABLE 3-1. HALT CODES DDLT (Sheet 30 of 38)

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 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 the next buffer address was zero.

| CONDITIONS | RESPONSES 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 PTHIPINT program? (The address of PTHIPINT can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Run ODS load check and mainframe diagnostics. | 1 | 1 |
| 2. Run MSMP CYBER coupler diagnostics. | 2 | 2 |
| 3. Replace the CYBER coupler interface card (slot B or slot AB). | 3 | 3 |
| 4. Call CE or analyst as appropriate. | 4 | 5 |
| 5. Have system analyst check the program calling PBHALT to find if it set the wrong halt code. | - | 4 |

TABLE 3-1. HALT CODES DDLT (Sheet 31 of 38)

Halt Code 0014 - Enable Line Workcode Received by PTLINIT for a Line With a TCB Still Assigned

ASSUME

| CONDITIONS | RESPONSES 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 PTLINIT program? (The address of PTLINIT can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Call the analyst for problem analysis and resolution. | X | - |
| 2. Run ODS load check and mainframe diagnostics. | - | 1 |
| 3. Call CE or analyst as appropriate. | - | 2 |
| 4. Have system analyst check the program calling PBHALT to find out if it set the wrong halt code. | - | 3 |

Halt Code 0015 - Duplicate Timer Entry Attempted

ASSUME

A forced halt was generated by standard software to trap software that is trying to put a line in the timer chain when it is already in the chain.

| CONDITIONS | RESPONSES 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 PBLLENTR program? (The address of PBLLENTR can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Call analyst for problem analysis and resolution. | X | - |
| 2. Run ODS load check and mainframe diagnostics. | - | 1 |
| 3. Call CE or analyst as appropriate. | - | 2 |
| 4. Have system analyst check the program calling PBHALT to find out if it set the wrong halt code. | - | 3 |

TABLE 3-1. HALT CODES DDLT (Sheet 33 of 38)

Halt Code 0017 - Illegal Call to Unlinked Program

ASSUME

A call has been made to a module that is not present in the CCP variant.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Determine which routine called PBILL (see MPLINK output). | Y | - |
| 2. Check output from MPLINK. | Y | - |
| **ACTIONS** | **SEQUENCE** | |
| 1. This is probably a software problem. Call analyst who should change either the MPLINK input or CCP. | 1 | - |

TABLE 3-1. HALT CODES DDLT (Sheet 34 of 38)

Halt Code 001E - Dynamic Stack Overflow

ASSUME

The area where parameters are stored for recursive program calls has overflowed.

| CONDITIONS | RESPONSES | |
|---|---|---|
| | 1 | 2 |
| 1. Is contents of location $FF_{16}$ in main memory between $40_{16}$ and $FC_{16}$? | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Probably a software problem. Call CE or analyst for analysis of dump and resolution of problem. | - | X |
| 2. Run ODS load check and mainframe diagnostics. | 1 | - |
| 3. Replace the CYBER coupler interface card (slot B or slot AB). | 2 | - |
| 4. Run MSMP MST041 diagnostics. | 3 | - |

TABLE 3-1. HALT CODES DDLT (Sheet 35 of 38)

Halt Code 001F - Negative Interrupt Count

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 interrupt sequence until the count overflowed ($8000_{16}$).

| CONDITIONS | RESPONSES 1 | RESPONSES 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 CCP 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. | 2 | 1 |
| 3. Run MSMP MLIA diagnostics. | 3 | 3 |
| 4. Call CE or analyst as appropriate. | 4 | 4 |

TABLE 3-1. HALT CODES DDLT (Sheet 36 of 38)

Halt Code 0020 - Output Over Output

ASSUME

A forced halt was generated by standard software to trap software that is attempting to initiate an output operation on a line where output is currently active.

| CONDITIONS | RESPONSES 1 | RESPONSES 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 PGCDRV program? (The address of PGCDRV can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Call analyst for problem analysis and resolution. | 1 | - |
| 2. Examine last software call to determine which TIP issued the call. | 2 | - |

Halt Code 0021 - Bad Timer Packet

ASSUME

A bad timer packet was passed to the timer services.

| CONDITIONS | RESPONSES 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 PBTMRSRVS program? (The address of PBTMRSRVS can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Call analyst for problem analysis and resolution. | X | - |
| 2. Run ODS load check and mainframe diagnostics. | - | 1 |
| 3. Call CE or analyst as appropriate. | - | 2 |
| 4. Have system analyst check the program calling PBHALT to find out if it set the wrong halt code. | - | 3 |

Halt Code 0022 - Block Protocol Error Detected by PIP

Halt Code 0023 - Protocol Error Detected by NIP

ASSUME

A service message is sent by PIP or NIP to halt the NPU so that protocol errors can be trapped.

| CONDITIONS | RESPONSES 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 PNSMNPI program? (The address of PNSMNPI can be found in the CCP Link Edit listing - module memory map - sorted by module address.) | Y | N |
| **ACTIONS** | **SEQUENCE** | |
| 1. Call analyst for problem analysis and resolution. | X | - |
| 2. Run ODS load check and mainframe diagnostics. | - | 1 |
| 3. Call CE or analyst as appropriate. | - | 2 |
| 4. Have system analyst check the program calling PBHALT to find out if it set the wrong halt code. | - | 3 |

# 255X DUMPS

During normal operation, NPU failures are communicated to both the NOP and the HOP. After the NPU fails, the host automatically dumps and reloads the contents of NPU memory (Record 3).

The dump format is similar to the one shown in figure 3-2.

```
NPU DUMP FILE = NP00077      NDA(I=0)      NDA VER 1.8- 642

TIME        17.02.41
DATE        85/06/06
NPU NAME    NPUE
NPU NODE     A
HALT CODE      E
P REGISTER 339F
                    BASE FILE 1 REGISTERS

ADDRESS  0     1     2     3                    D     E     F
000000  0001  F77F  F77F  0D08               9B3F  A07F  7D08
000010  07A3  05AE  79C6  AD00               0000  8060  071C
000020  000F  071C  8EE3  0003               8180  0102  0184
000030  0185  0000  8180  6F2F               0026  0003  6D00
000040  6E2D  012D  6EFF  E00F               0000  06CC  0005
000050  0CF1  05E0  CD0F  1401               00F1  0000  0000
000060  0000  0000  0000  0000               0000  0C07  4B37
000070  0007  4B8D  0030  0030      ...      7AD3  47CD  7AD3
000080  0020  8023  0001  0720               0548  0000  0006
000090  0000  080D  0004  5018               0102  0300  3000
0000A0  0508  0500  CC00  0C00               0007  0008  000A
0000B0  000E  000F  001F  0037               0200  07E0  0C00
0000C0  0F00  2000  2180  4000               00E0  0006  7F00
0000D0  000D  000D  B440  0000               0000  0000  0000
0000E0  E4B5  001F  0D87  8121               170D  B44B  000D
0000F0  0000  6EFF  01B8  0040               1502  0617  3F85
000100   --

                    PAGE REGISTERS
ADDRESS  0     1     2     3                    D     E     F
000000  0000  0001  0002  0003               000D  000E  000F
000010  0010  0011  0012  0013               001D  001E  001F

                    MACRO MEMORY

ADDRESS  0     1     2     3                    D     E     F
000000  0BFD  5400  5400  4CD4               0B00  5400  69BA
000010  0011  0007  0000  0000               0000  0000  0000
000020  0000  0000  0000  0000               0B00  0B00  002C
000030  000E  339F  0000  07F8               27D4  337F  3381
000040  0002  0044  00FE  0000               0044  0000  0001
000050  223B  6F77  7310  3ABC               0023  002C  0056
000060  0000  0001  223B  6F2F               FFFF  FFFF  FFFF
000070  FFFF  FFFF  FFFF  FFFF               FFFF  FF00  00FF
000080  0000  0000  0000  0000      ...      0000  0000  0000
0000A0**FFFF  FFFF  FFFF  FFFF               FFFF  FFFF  FFFF
0000B0  FFFF  FFFF  FFFF  FFFF               FFFF  FFFF  FFFF
0000C0  0000  0000  0000  0000               0000  0000  0000
0000E0**FFFF  FFFF  FFFF  FFFF               FFFF  FFFF  FFFF
0000F0  FFFF  FFFF  FFFF  FFFF               FFFF  FFFF  0040
000100  0000  1400  1DD2  0000               1400  1E40  0000
000110  0000  5400  1EB2  0E10               5400  1EB2  0E1C
000120  339F  1400  1E7A  0000               5400  1EB2  0E2C
000130  0000  5400  1EB2  0E30               5400  1EB2  0E3C
000140  1400  0000  1400  699B               0000  0000  0000
```

Header Information

File 1 registers in groups of 16 words per line. Code is hexadecimal.

Micromemory checksum (should be zero)

Page registers in groups of 16 words per line. Code is hexadecimal.

Main memory dump. If lines have identical information, lines after the first are omitted. New line with unique information is flagged with **. Sixteen words per line. Code is hexadecimal.

Figure 3-2. Sample NPU Dump

## INTERPRETING A DUMP WITHOUT A HALT CODE

A halt can happen at any time, even before initialization is finished. For example, the system can become trapped in a loop before the CCP header prints. Because CCP is not in control (initialization hasn't completed), you will receive none of the previously mentioned halt codes. Without a halt code, you must interpret the dump to determine which halt occurred, or in which subroutine of the initiation section the program is looping.

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

First, examine the contents of memory location 30 (hexadecimal) as shown in the dump printout. If it's not zero, a halt has occurred and the halt code value is in that location. Note the value in table 3-1 and follow the suggested action for that halt.

If memory location 30 (hexadecimal) equals zero after a halt during initialization, find the address table which begins at fixed memory address 150 (hexadecimal). (Table 3-2 shows the contents of the address table.) The address of NPINTAB is in location 165. (The format of the NPINTAB table starting address is shown in figure 3-3.) The NPISFL entry in the NPINTAB table contains the flags which mark the initalization subroutines that have completed running when the looping condition occurred. Give this information to the systems analyst along with the printout of the dump.

| | 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 | B14 | B13 | B12 | B11 | B10 | B9 | B8 | 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 - $FF_{16}$ if MLIA initialization completed.

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

B15 - Set at the completion of the second phase of buffer initialization

B14 - Set at the completion of initializing the timer services

B13 - Set at the completion of initializing the fixed configuration lines

B12 - Set at the completion of initializing the MLIA

B11 - Set at the completion of applications initialization

B10 - Set at the completion of miscellaneous NPU initialization

B9 - Set at the completion of initializing worklist control blocks (WLCBs)

B8 - Set at the completion of the first phase of buffer initialization

B7 - Set at the completion of initializing the file 1 registers

B6 - Set at the completion of initializing the line control blocks (LCBs)

B5 - Set at the completion of initializing the OPS tables

B4 - Set at the completion of initializing the MUX tables

B3 - Set at the completion of setting up the routing tables

B2 - Set at the completion of setting up program protect bits

B1 - Set at the completion of determining the NPU's memory size

B0 - Set at the completion of initializing the page registers

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.

Figure 3-3. NPINTAB Table Starting Address Format

TABLE 3-2. ADDRESS TABLE

| Location (Hexadecimal) | Address | Title/Routine | |
|---|---|---|---|
| 150 | BYWLCB | Worklist control block | Base |
| 151 | BYCURWLP | Current active monitor WLCB pointer | |
| 152 | B1TCB | Internal processing TCB | |
| 153 | B1BUFF | Internal processing block | |
| 154 | JKMASK | Interrupt masks | |
| 155 | JKTMASK | PBAMASK save area | |
| 156 | CBTIMTBL | TIMAL table | |
| 157 | JACT | PD controller table | |
| 158 | PTHIPINT | HIP Interrupt handler | |
| 159 | PMWOLP | MUX level worklist processor | |
| 15A | PBMON | Address of monitor program | |
| 15B | PBLOST | BIP - lost block routine | |
| 15C | | Port table | MUX subsystem |
| 15D | | Circular input buffer (CIB) | |
| 15E | | Address of timer table | Lines and TIPs |
| 15F | | Line control blocks (LCB) | |
| 160 | | Sub line control blocks | |
| 161 | CGTCBS | Fixed Terminal control blocks (TCB) | |
| 162 | BJTIPTYPT | TIP type table | |
| 163 | NJTECT | Terminal characteristics table | |
| 164 | | Start address of table area | Initialization Information |
| 165 | NPINTAB | Initialization complete table | |
| 166 | | Start address of buffer area | |
| 167 | CCPVER | CCP version address (0037) | |
| 168 | CCPCYC | CCP cycle address (xxxx) | |
| 169 | CCPLEV | CCP level address (PSR level) | |
| 16A, 16B | VARID | CCP variant ID (2 words) | |
| 16C, 16D | CCLEV | Corrective code level (2 words) | |
| 16E | LEVELNO | Pointer to LEVELNO | |
| 16F | | Start address of routing table | |

NOTE: This table begins at main memory location $150_{16}$.

# ON-LINE DIAGNOSTIC TESTS 4

The Communications Control Program (CCP) includes on-line diagnostic tests that can be performed from a terminal or from the host console. These tests give you data and status information for one or more communications lines.

The topics discussed in this section are:

NOP operating instructions

DDLT interpretation of diagnostic response messages

Detailed information on using commands to isolate faults

## HOP CONSOLE OPERATING INSTRUCTIONS

If you are at the host console, assign the HOP to the K-display by entering:

```
    K,NAM.
    K.*
and
    K.AP=CS
```

Precede each command with K. For example:

```
K.TST,NPU=LOCA,MSG=INT=,20,0,00
```

In the following command examples, each command is shown first with its full spelling, followed by the acceptable abbreviated command format.

### DISABLE A TRUNK OR A LINE

Use this command to disable a trunk:

```
DISABLE,TRUNK   = trunk name
DI,TR
```

Use this command to disable a communications line:

```
DISABLE,LINE    = line name
DI,LI
```

The NPU at the other end of the disabled trunk will detect a trunk failure and will break the terminal connections of all affected logical links.

### REQUEST CONNECTION TO ON-LINE DIAGNOSTICS

Use this command to connect to the on-line diagnostic tests:

```
TST  , NPU   = npu-name,  REQUEST
TS     NP                 RE
```

The TST command must be accepted before you direct any other TST command to the NPU.

The message:

```
/OLD:  REQUEST INITIATED.
```

is returned if the OLD facility is not in use in the NPU. Otherwise:

```
/OLD:  IN USE.
```

is returned.

NOTE

A second request from the same HOP is responded to with IN USE.

After REQUEST INITIATED, the request is successfully accepted unless the OLD facility is not available in the specified NPU. If the OLD facility is not available, you will receive this message:

```
FROM NPU-name
NO ONLINE DIAGNOSTICS PRESENT.
```

The request has been processed when you receive this message:

```
READY..
```

If you send another TST command to an NPU before the REQUEST command is accepted, that command is not processed and you will receive this message:

```
/OLD:  NO PRIOR REQUEST CMD.
```

## ON-LINE TESTS FOR CLAS AND MODEMS

Three tests allow you to do basic data and line turn-around to determine whether all data and status are normal. You can test one or more CLAs concurrently without impacting services to other lines in the network.

You can use commands to test communication lines by using these three tests:

A Communications Line Adapter (CLA) internal loopback test, which tests all CLA logic except modem drivers and receivers.

An external loopback test, which isolates modem and transmission line problems. Some of the tests require that the modem have loopback features. Be sure to install the loopback jumper plug during these tests.

CLA modem loopback test, which tests modem drivers and receivers.

Table 4-1 shows modem classes.

### Start Testing of CLA Logic Using Internal Loopback Test

Use this command to test the CLA logic in the designated NPU:

$$\begin{Bmatrix}TST\\TS\end{Bmatrix}, \begin{Bmatrix}NPU\\NP\end{Bmatrix} =npu\text{-}name, \begin{Bmatrix}MSG\\MS\end{Bmatrix} = \begin{Bmatrix}INT\\I\end{Bmatrix} ,ii,j,kk$$

TST, NPU, and MSG — Test the CLA logic in the NPU

INT — Starts CLA internal loopback test

ii — Port number (CLA address, 01-FE)

j — CLA type
- 0 is synchronous RS-232 (2560-1)
- 1 is asynchronous (2561-1)
- 2 is synchronous non RS-232 (2560-2,)
- 3 is synchronous SDLC (2563-1)
- 4 is synchronous SDLC non RS-232 buffered (2563-2)

kk — Modem class (see table 4-1)

The ii,j, and kk parameters must appear exactly as shown. Insert leading zeros if necessary.

TABLE 4-1. MODEM CLASSES

| Test Mode | CLA Type | Maximum Modem Speed | Modem Class (Hexadecimal) | Modems† |
|---|---|---|---|---|
| Internal and External Loopback | All | Not Applicable | 00 | None |
| Modem Loopback Sync | 2560-1<br>2560-2<br>2560-3<br>2563-1<br>2563-2 | Not Applicable | 01 | 201B, 201A, 201C, 201D<br>208A, 208B, 209<br>358-2 |
| Modem Loopback Async | 2561-1 | 100<br>110<br>120<br>134.5<br>150<br>300<br>600<br>800<br>1050<br>1200<br>1600<br>2400<br>4800<br>9600 | 02<br>03<br>04<br>05<br>06<br>07<br>08<br>09<br>0A<br>0B<br>0D<br>0F<br>10<br>12 | 103 series, 113A, 113B, VA 3405 A thru G<br>VA 3405 A thru G<br><br>VA 3405 A thru G<br><br><br><br>358-1 |

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

Table 4-2 gives the responses you can expect to receive after starting this test.

This test continues either until you stop it or until an error code occurs followed by an associated error message. These error codes and their significance are shown in table 4-3.

Figure 4-1 shows the CLA status associated with the error codes in table 4-3.

## Stop Testing of CLA Logic Using Internal Loopback Test

Use this command to end testing of the line or trunk:

$$\begin{Bmatrix}TST\\TS\end{Bmatrix},\begin{Bmatrix}NPU\\NP\end{Bmatrix}=npu\text{-}name,\begin{Bmatrix}MSG\\MS\end{Bmatrix}=\begin{Bmatrix}TERM\\T\end{Bmatrix},ii$$

TERM Terminates the test

ii Port number (CLA address, 01-FE)

Table 4-4 gives you the responses generated by this command if the test completed successfully or if you entered the command incorrectly.

TABLE 4-2. RESPONSES TO START ON-LINE DIAGNOSTIC TEST COMMAND FROM NOP CONSOLE

| Initial Response | Meaning |
|---|---|
| From NPU-name<br>PORT ii STARTED | Test started |
| From NPU-name<br>PORT ii INV PORT | No such port number |
| From NPU-name<br>PORT ii INV CLA TYPE | No such type of CLA |
| From NPU-name<br>PORT ii INV TEST MODE | Undefined test mode was entered (was not one of the following: INT, EXT, or MOD) |
| From NPU-name<br>PORT ii NOT DISABLED | That port was not taken out of service before starting diagnostics |
| From NPU-name<br>PORT ii TEST IN PROC. | Some diagnostic test is already being run on this port |
| From NPU-name<br>PORT ii LOW BUFFERS | System is low on buffers |
| From NPU-name<br>PORT ii INV MODEM CLS | Modem class parameter is outside the allowable range |
| **Second Response - If Error Occurred** | **Meaning** |
| From NPU-name<br>PORT ii ERROR (error data) | Error responses are summarized in table 4-4. See also table 4-7, DDLTs. |

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 (HDLC CLA) | D |
| 23 | DVT failed (HDLC CLA) | D |
| 24 | DVT failed (HDLC 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 |

**LEGEND:**

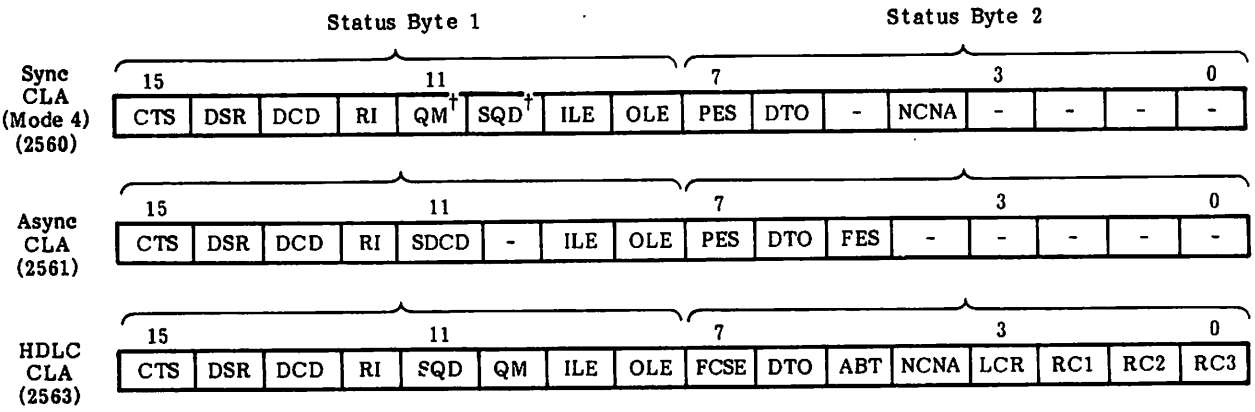
**N** qqqq = not used (ignore values)
rrrr = not used (ignore values)

**S** qqqq is expected CLA status (see figure 4-1)†
rrrr is received CLA status (see figure 4-1)

**D** qqqq is input data for verification†
rrrr is expected data for verification††

†qqqq will be X'FFFF' if no data or status is expected but is received.

††rrrr will be X'FFFF' if no data or status is received but is expected.




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 - Receive count
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 NOP CONSOLE

| Initial Response | Meaning |
|---|---|
| From NPU-name<br>PORT ii TEST CMPL - OK | CLA line/trunk test completed without errors |
| From NPU-name<br>PORT ii INV PORT | No such CLA port number |
| From NPU-name<br>PORT ii NOT IN PROC. | CLA line/trunk with that number was not doing diagnostics, or the diagnostics stopped because an error was detected and an error response was already given |

## Start Testing Lines Using External Loopback Test

First, make sure that the proper external loopback plug is installed. Table 4-5 shows the correct connector number for each type of CLA. Also, ensure that all CLA interface switches are open. Only those switches shown in table 4-6 should be closed.

TABLE 4-5. CONNECTORS NEEDED TO RUN EXTERNAL LOOPBACK TEST

| CLA Product Number | Connector Number |
|---|---|
| 2560-1 | 74715000 |
| 2561-1 | 74715600 |
| 2563-2 | 74877033 |
| 2560-2<br>2560-3 | None. Cannot run external loopback test |

TABLE 4-6. CLA INTERFACE SWITCH SETTINGS

| CLA Product Number | CLA Interface Switches Set to Closed Position† |
|---|---|
| 2560-1 | 2.4 kHz |
| 2561-1 | OM an SRTS 19 |
| 2563-1 | QM and 2.4 kHz |
| 2563-2 | 2.4 kHz |

† All other CLA interface switches should be in the open position.

Use this command to isolate modem and line problems:

$$\begin{Bmatrix}TST\\TS\end{Bmatrix}, \begin{Bmatrix}NPU\\NP\end{Bmatrix} = npu\text{-}name, \begin{Bmatrix}MSG\\MS\end{Bmatrix} = \begin{Bmatrix}EXT\\E\end{Bmatrix}, ii, j, kk$$

TST, NPU, and MSG — Test for modem and line problems

EXT — External loopback

ii — Port number (CLA address)

j — CLA type
- 0 is synchronous RS-232 (2560-1)
- 1 is asynchronous (2561-1)
- 2 is synchronous non RS-232 (2560-2)
- 3 is synchronous SDLC (2563-1)
- 4 is synchronous SDLC buffered (2563-2)

kk — Modem class (see table 4-1)

Enter the ii, j, and kk parameters exactly as shown. Insert leading zeros if necessary.

Table 4-2 gives the responses you can expect to receive after starting this test.

This test continues either until you stop it or until an error code occurs followed by an associated error message. These error codes and their significance are shown in table 4-3.

## Stop Testing Lines Using External Loopback Test

Use this command to end testing of a line or a trunk:

$$\begin{Bmatrix}TST\\TS\end{Bmatrix}, \begin{Bmatrix}NPU\\NP\end{Bmatrix} = npu\text{-}name, \begin{Bmatrix}MSG\\MS\end{Bmatrix} = \begin{Bmatrix}TERM\\T\end{Bmatrix}, ii$$

Except for EXT, j, and kk, this command is identical to that given for starting testing of a line or a trunk in external loopback mode.

This test continues either until you stop it or until an error code occurs followed by an associated error message. These error codes and their significance are shown in table 4-3.

Table 4-4 gives the responses generated by this command if the test completed sucessfully or if you entered the command incorrectly.

Remove the external loopback plug.

### Start Testing Modem Drivers Using Modem Loopback Test

Use this command to begin testing modem drivers and receivers:

```
{TST} , {NPU}  =npu-name, {MSG} = {MOD} ,ii,j,kk
{TS }  {NP }              {MS }   {M }
```

TST, NPU, MSG, and MOD — Start testing modem drivers and receivers

MOD — Modem loopback

ii — Port number (CLA address)

j — CLA type
- 0 is synchronous RS-232 (2560-1)
- 1 is asynchronous (2561-1)
- 2 is synchronous non RS-232 (2560-2)
- 3 is synchronous SDLC (2563-1)
- 4 is synchronous SDLC non RS-232 buffered (2563-2)

kk — Modem class (see table 4-1)

Enter the ii, j, and kk parameters exactly as shown. Insert leading zeros if necessary.

Table 4-2 gives the responses you can expect to receive after starting this test.

This test continues either until you stop it or until an error code occurs followed by an associated error message. These error codes and their significance are shown in table 4-3.

### Stop Testing Modem Drivers Using Modem Loopback Test

Use this command to end testing of modem drivers and receivers:

```
{TST} , {NPU}  =npu-name, {MSG} , {TERM} , ii
{TS }  {NP }              {MS }  {T    }
```

Except for TERM, j, and kk, this command is identical to the one for starting testing of modem drivers and receivers.

This test continues either until you stop it or until an error code occurs followed by an associated error message. These error codes and their significance are shown in table 4-3.

Table 4-4 gives you the responses generated by this command if you completed this test successfuly or if you entered this command incorrectly.

### DISCONNECT FROM ON-LINE TESTING

After completing on-line testing for the internal loopback test, the modem loopback test, or the CLA external loopback test, use this command to break the connection with on-line diagnostics:

```
{TST} , {NPU}  =npu-name, {DROP}
{TS }  {NP }              {DR  }
```

TST, NPU, and DROP — Disconnect from testing

This command ends all tasks currently being processed by the NPU.

### REENABLE A TRUNK OR A LINE

After you have tested a trunk or a line and found that it is operating properly, you must reenable that trunk or line.

Use this command to reenable a previously disabled trunk:

```
{ENABLE,TRUNK}  =trunk-name
{EN,TR       }
```

Use this command to reenable a previously disabled communications line:

```
{ENABLE,LINE} = line-name
{EN,LI      }
```

## DIAGNOSTIC DECISION LOGIC TABLES FOR ON-LINE DIAGNOSTICS

Figure 4-2 is a summary of the actions indicated in the on-line diagnostic DDLTs. Table 4-7 gives the individual DDLTs.

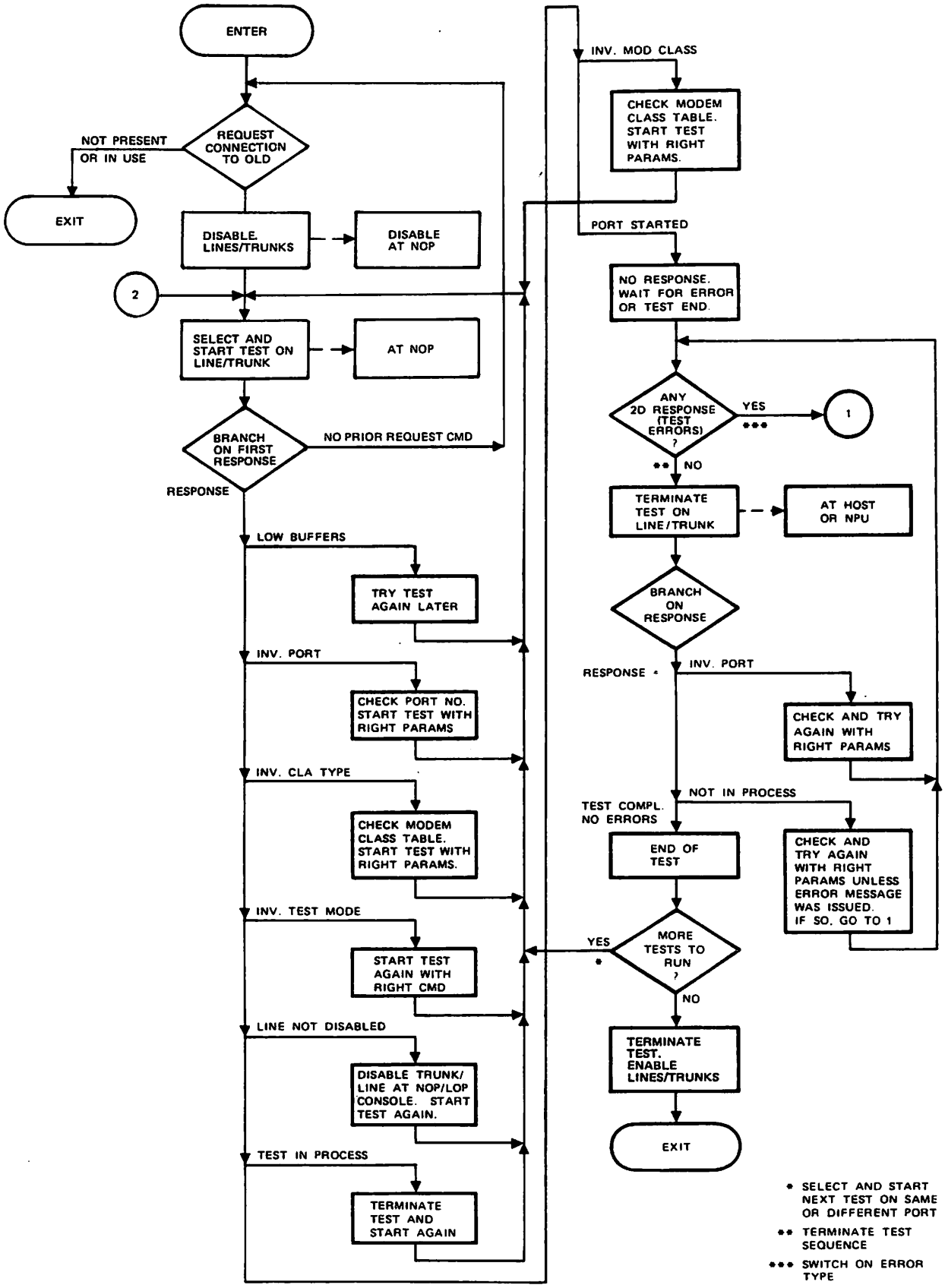



Figure 4-2. Flowchart for On-Line Diagnostic DDLT (Sheet 1 of 2)

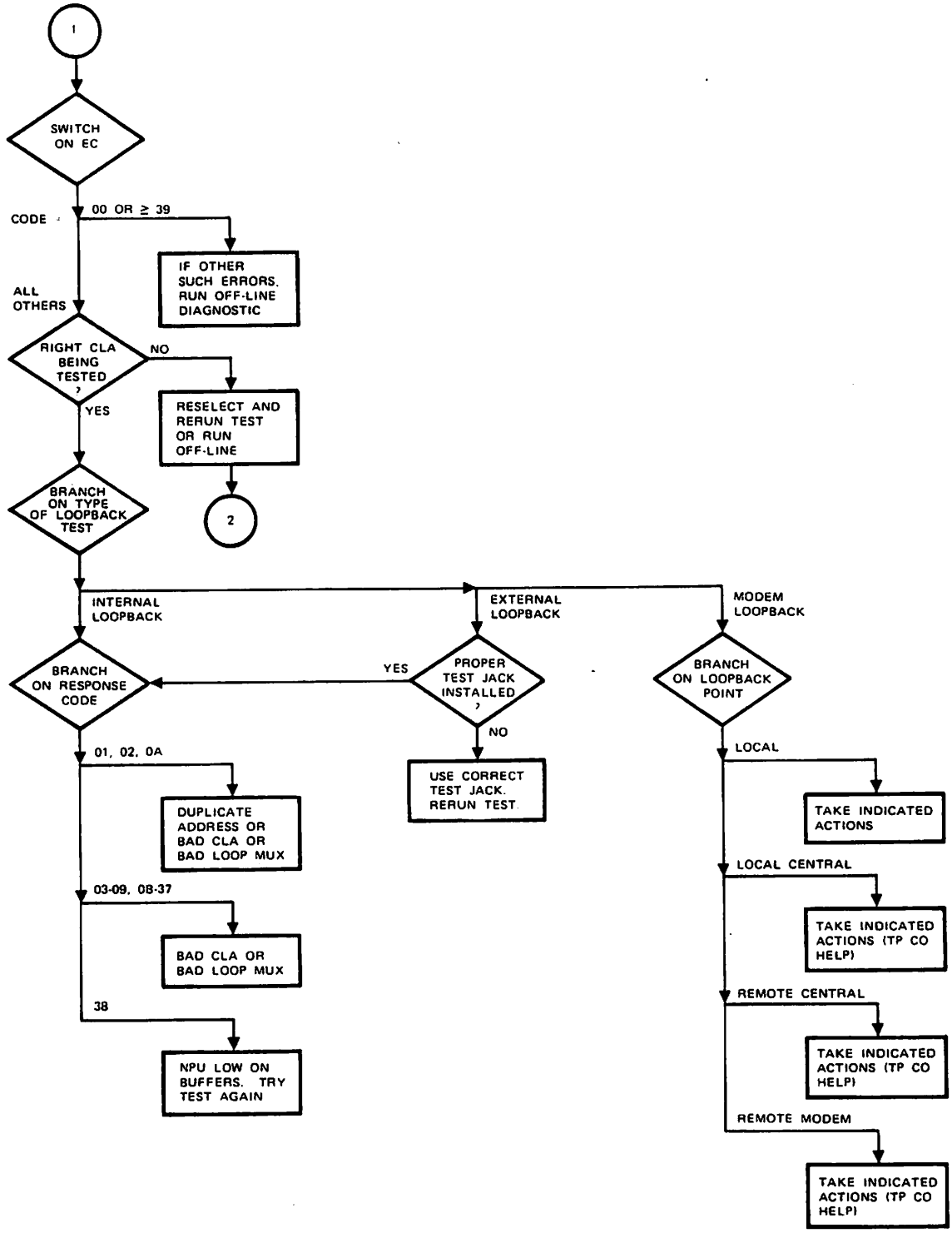



Figure 4-2. Flowchart for On-Line Diagnostic DDLT (Sheet 2 of 2)

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 1 of 13)

Diagnostic Index

ASSUME

1. The Communications Control Program (CCP) 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.

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is diagnostic response = NO ONLINE DIAGNOSTICS PRESENT? | N | N | N | N | N | Y |
| 2. Is diagnostic response = PORT ii† STARTED? | N | N | N | N | Y | - |
| 3. Is diagnostic response = PORT ii† INV PORT? | N | N | N | Y | - | - |
| 4. Is diagnostic response = PORT ii† INV CLA TYPE? | N | N | Y | - | - | - |
| 5. Is diagnostic response = PORT ii† INV TEST MODE? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 2. | X | - | - | - | - | - |
| 2. Contact analyst and have the CCP variant rebuilt with online diagnostics installed. | - | - | - | - | - | X |
| 3. Test has started; no action required. Wait for error message or wait for test complete message. Go to sheet 3 to continue DDLT on either of these 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 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 2 of 13)

Diagnostic Index

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Is diagnostic response = PORT ii† NOT DISABLED? | N | N | N | N | N | Y |
| 2. Is diagnostic response = PORT ii† TEST IN PROC.? | N | N | N | N | Y | - |
| 3. Is diagnostic response = PORT ii† LOW BUFFERS? | N | N | N | Y | - | - |
| 4. Is diagnostic response = PORT ii† INV MODEM CLS? | N | N | Y | - | - | - |
| 5. Is diagnostic response = PORT ii† NOT IN PROC.? | N | Y | - | - | - | - |
| **ACTIONS** | **SEQUENCE** | | | | | |
| 1. Go to sheet 3. | X | - | - | - | - | - |
| 2. Port was not taken out of service before starting diagnostics. Contact the NOP or HOP and have the desired line/trunk disabled. | - | - | - | - | - | 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 | - | - | - | - |

†ii = CLA port number

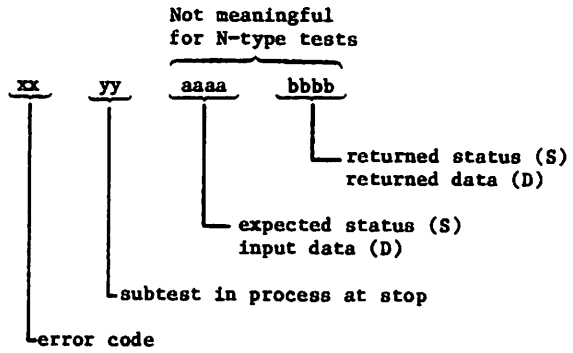
TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 3 of 13)

Diagnostic Index

ASSUME

| CONDITIONS | RESPONSES | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1. Is diagnostic response = PORT ii TEST CMPL - OK? | N | N | Y |
| 2. Is 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/trunk test found no errors. No action required. | - | - | X |
| 3. An error has been detected during CLA testing. Go to sheet 4. | - | 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 exists if the test has reached the data turnaround stage. In that case, subtest is an entry in the compare data address table.

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 4 of 13)

| Diagnostic Index<br>ASSUME | | |
|---|---|---|
| CONDITIONS | RESPONSES | |
| | 1 | 2 |
| 1. Is the next piece of the diagnostic response (error code) = 00 or ≥ 39? | N | Y |
| ACTIONS | SEQUENCE | |
| 1. Go to sheet 5. | - | 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 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 5 of 13)

| Checking CLA Type<br>ASSUME | | | | |
|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | |
| | 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 reponse 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, or type 04 = 2563-2) | Y | N | - | - |
| 3. This is a system anomaly. Is this the second time down this path? | - | - | Y | N |
| ACTIONS | SEQUENCE | | | |
| 1. Go to sheet 6. | 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 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 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 6 of 13)

| CLA Test Mode Index<br>ASSUME | | | |
|---|---|---|---|
| CONDITIONS | RESPONSES | | |
| | 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 7. | X | - | - |
| 2. Go to sheet 8. | - | X | - |
| 3. Go to sheet 9. | - | - | X |

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 7 of 13)

| CLA Internal Loopback Test<br>ASSUME | | | | |
|---|---|---|---|---|
| CONDITIONS | RESPONSES | | | |
| | 1 | 2 | 3 | 4 |
| 1. Look at the data following the word ERROR in the diagnostic test response at the console. Is this 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 addreses, 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 1 and run DDLT again. | - | - | - | X |

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 8 of 13)

CLA External Loopback Test

ASSUME

| CONDITIONS | RESPONSES 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 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, 2563-2 uses connector 74877033. 2560-2 and 2560-3 cannot run an external loopback test. | Y | N | - |
| **ACTIONS** | **SEQUENCE** | | |
| 1. Go to sheet 7. | X | - | - |
| 2. Rerun test with proper external test connector. | - | X | X |

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 9 of 13)

CLA Modem Loopback Test

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 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 10. | X | - | - | - | - | - |
| 2. Go to sheet 11. | - | X | - | - | - | - |
| 3. Go to sheet 12. | - | - | X | - | - | - |
| 4. Go to sheet 13. | - | - | - | 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 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 10 of 13)

CLA Local Modem Loopback Test

ASSUME

| CONDITIONS | RESPONSES | | |
|---|---|---|---|
| | 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 with the external loopback test using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback test 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 external loopback test. | - | X | - |
| 5. You have misinterpreted the directions. Return to sheet 4 and run DDLT again. | - | - | X |

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 11 of 13)

CLA Loopback at Local Central Office Test

ASSUME

| CONDITIONS | RESPONSES | | | |
|---|---|---|---|---|
| | 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 with the external loopback test using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback test successfully? | Y | Y | N | - |
| 3. Have you already run the modem loopback 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 external loopback test. | - | - | X | - |
| 4. You have misinterpreted the directions. Return to sheet 4 and run DDLT again. | - | - | - | X |
| 5. Run the modem loopback 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 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 12 of 13)

CLA Loopback at Remote Telephone Central Office

ASSUME

| CONDITIONS | RESPONSES | | | | |
|---|---|---|---|---|---|
| | 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 with the external loopback test using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback test successfully? | Y | Y | Y | N | - |
| 3. Have you already run the modem loopback 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 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 test on this communications line with the local central telephone office looped back towards the CLA. | - | X | - | - | - |
| 3. Run the modem loopback test on this communications line with the local modem looped back towards the CLA. | - | - | X | - | - |
| 4. Run the CLA external loopback test. | - | - | - | X | - |
| 5. You have misinterpreted the directions. Return to sheet 4 and run DDLT again. | - | - | - | - | X |

TABLE 4-7. ON-LINE DIAGNOSTICS DDLT (Sheet 13 of 13)

CLA Loopback at Remote Modem

ASSUME

| CONDITIONS | RESPONSES | | | | | |
|---|---|---|---|---|---|---|
| | 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 with the external loopback test using an external test connector successfully? If the CLA type does not allow an external loopback test, have you run the internal loopback test successfully? | Y | Y | Y | Y | N | - |
| 3. Have you already run the modem loopback 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 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 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 test on this communications line with the remote telephone central office looped back towards the CLA. | - | X | - | - | - | - |
| 4. Run the modem loopback test on this communications line with the local telephone central office looped back towards the CLA. | - | - | X | - | - | - |
| 5. Run the modem loopback test on this communications line with the local modem looped back towards the CLA. | - | - | - | X | - | - |
| 6. Run the CLA external loopback test. | - | - | - | - | X | - |
| 7. You have misinterpreted the directions. Return to sheet 4 and run DDLT again. | - | - | - | - | - | X |

# COMMUNICATIONS LINE FAULT ISOLATION

Use the on-line diagnostic test programs 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.

You can use the CLA external loopback mode only with CLA types 2560-1, 2561-1, 2563-1, and 2563-2. CLA type 2560-1 uses external test connector type 74715000, CLA type 2561-1 uses external test connector type 74715600, CLA type 2563-1 uses external test connector type 74870830, and CLA type 2563-2 uses external test connector type 74877033. These connectors are installed at the CLA in place of the normal connector to the local modem.

If you anticipate external loopback and you use a modem that lacks special test switches, inform the telephone company of any special connections to be made. See appendix C.

## EXTERNAL DATA LOOPBACK MODE

Use the external data loopback mode after you verify CLA operation by running the CLA internal and external loopback mode tests.

## PRELIMINARY INFORMATION REQUIRED

Before running the external data loopback tests, you should know:

The type of modem or Data Set (Bell 207C, CDC 358-2, and so forth) used on the line or lines to be tested.

The test modes (analog loopback, digital loopback, self test, and so forth) available for use with the modem or modems to be tested. See the applicable modem manual or Bell Telephone Data Set specifications for this information and/or step-by-step instructions for testing. Table 4-8 lists some of the more common modems and the test modes available for each.

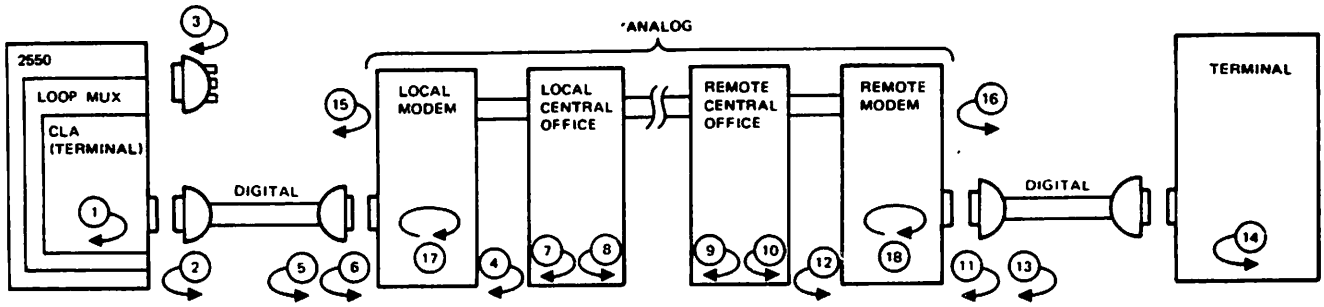
The type of service (dial-up or dedicated). Dedicated lines have more loopback points than do dial-up lines.

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.

TABLE 4-8. 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 |

After obtaining this 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.




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, 2563-1, AND 2563-2 (2560-1 USES LOOPBACK CONNECTOR 74715000, 2561-1 USES LOOP BACK CONNECTOR 74715600, 2563-1 USES LOOPBACK CONNECTOR 74870830, AND 2563-2 USES LOOPBACK CONNECTOR 74877033).

(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.

Figure 4-3. Loopback Points for Test Selection

## 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 4-8 for the test mode or modes that apply to each of the common types of modems or data sets.

In the analog loopback test (activated by the analog loopback test mode switch on the modem) you can use either the local or remote modem 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).

Use the remote test mode 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, if type 2563-1, install external test connector type 74870830, and if type 2563-2, install external test connector 74877033. 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 trnasmission 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.

   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 C, D, and E 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 C, D, and E 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 telepone 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 the next step.

11. Request the telepone 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 the 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 terinal.

# MESSAGES

# A

This appendix contains tables for alarm messages, CE error codes, CE message text definitions, statistics message text definitions, and halt codes.

TABLE A-1. ALARM MESSAGES

| Message | Significance | Action |
|---|---|---|
| From NPU-name<br>MAINTENANCE ALARM COUPLER hn,ERROR=ee | Too many recent errors at host/NPU interface | Find coupler error codes in host dayfile. |
| From NPU-name<br>MAINTENANCE ALARM MLIA, ERROR=ee | Too many recent errors in mux subsystem | Find MLIA error codes in host dayfile. |
| From NPU-name<br>MAINTENANCE ALARM PORT pp,ERROR=ee | Too many recent errors on this line (port) | Find CLA and modem messages in host dayfile. |

Entries in the system error log have the following format:

```
hh.mm.ss.  jsn .  NW01,  nn,eeppssaaaaaaaa.
```

hn - Coupler node number in hexadecimal.
nn - NPU node number in hexadecimal.
ee - CE error code in hexadecimal.
pp - Port number in hexadecimal.
ss - Subport - always zero.
aaaaaaaa - Four status bytes.

In all of these entries, leading zeros are not printed.

Example:

```
10.12.27.  AAALN.  NW01,  33,  2 1 080 0 0 0.
```

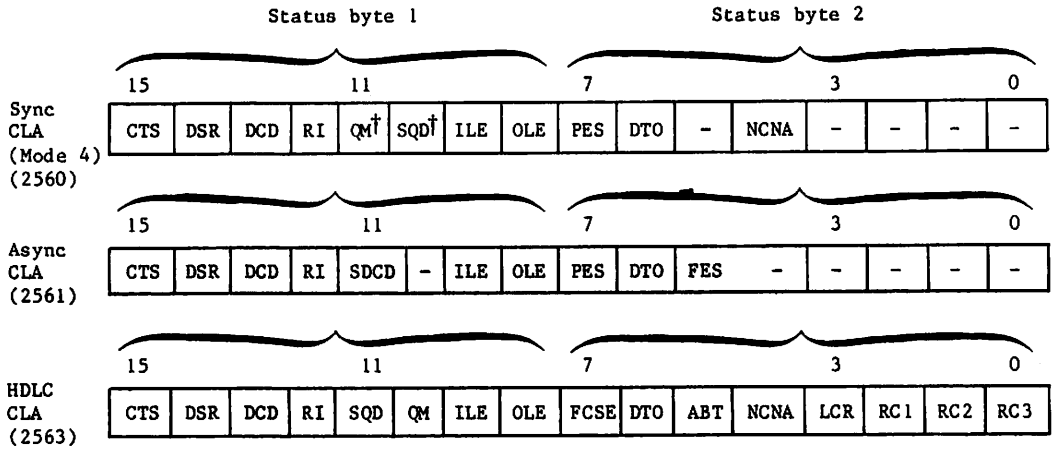
TABLE A-2. CE ERROR CODES

| Code (Hexadecimal) | Significance | Action |
|---|---|---|
| 00 | Not used | None. |
| 01 | Not used | None. |
| 02 | Abnormal data set ready (DSR) | None. This is not an error. It occurs as part of the normal disconnect sequence on some lines. |
| 03 | Abnormal data carrier detect (DCD) | If this occurs occasionally, ignore it. Otherwise, call CE or analyst. |
| 04 | Not used | None. |
| 05 | CLA address out of range | Same as code 03. |
| 06 | Illegal MUX loop cell format | Same as code 03. |
| 07 | Unsolicited input | Same as code 03. |
| 08 | Input MUX loop error | Same as code 03. |
| 09 | Output MUX loop error | Same as code 03. |
| 0A | Not used | None. |
| 0B | DCD Timeout | Same as code 03. |
| 0C | Abnormal secondary data carrier detect (SDCD) | This is normal for channels using reverse channel interrupts. For other channels, call CE or analyst. |
| 0D | Excessive CLA status messages | If this occurs frequenctly, call CE or analyst. |
| 0E | Not used | None. |
| 0F | Next character not available (output) | Put CLAs in proper priority positions so higher speed or high-use channels are serviced first. If this does not solve problem, call CE or analyst. |
| 10 | Data transfer overrun (input) | Same as code 0F. |
| 11 | MLIA error status | Same as code 03. |
| 12 thru 1F | Not used | None. |
| 20 | Dead timeout | None. NAM was dropped on the host connected to the coupler or the EST entry for that coupler was turned off by the host operator. |
| 21 | Spurious coupler interrupt | This should never occur. If it does, call CE or analyst. |
| 22 | Not used | None. |
| 23 | Coupler hardware timeout on input | Same as code 03. |
| 24 | Input data transfer terminated by PPU | Same as code 03. |
| 25 | Not used | None. |
| 26 | Not used | None. |
| 27 | Output data transfer terminated by PPU | Same as code 03. |
| 28 | Hardware timeout on output | Same as code 03. |

TABLE A-2. CE ERROR CODES (Contd)

| Code (Hexadecimal) | Significance | Action |
|---|---|---|
| 29 | End of operation (EOP) missing | Same as code 03. |
| 2A | HASP TIP: Too many NAKs received | Same as code 03. |
| 2B | HASP TIP: Bad BCB from HASP TIP | Same as code 03. |
| 2C | HASP TIP: Bad BCB from HASP workstation | Same as code 03. |
| 2D | HASP TIP: Workstation restart | Not an error if workstation is restarting. Otherwise, call CE or analyst. |
| 2E | Not used | None. |
| 2F | Not used | None. |
| 30 | Mode 4 TIP: No response from terminal | Contact terminal operator to verify that the terminal is properly configured with all switches set correctly. Then call CE or analyst. |
| 31 | Mode 4 TIP: Bad response (unexpected response) | Same as code 30. |
| 32 | Mode 4 TIP: Error response from terminal | Same as code 30. |
| 33 | LIP: Timeout on idle block | Same as code 03. |
| 34 | LIP: Protocol failure (no response to frame) | Same as code 03. |
| 35 | LIP: Remote NPU rejected command from local NPU | Same as code 03. |
| 36 | LIP: Bad frame detected by CRC | An occasional bad frame is normal. If bad frames occur frequently, call CE or analyst. |
| 37 | HASP TIP: No response from terminal | Same as code 30. |
| 38 | HASP TIP: Bad response (unexpected response) | Same as code 30. |
| 39 | HASP TIP: Workstation ignoring wait-a-bit | Same as code 30. |
| 3A | X780 TIP: Minor error | Same as code 30. (A breakdown of the subcodes present in the message can be found in table A-3.) |
| 3B | X780 TIP: Serious error | Same as code 30. (A breakdown of the subcodes present in the message can be found in table A-3.) |

TABLE A-3. CE ERROR MESSAGE TEXT DEFINITIONS

<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>
<br>where: P Port number (CLA address)<br>S1 CLA status byte 1 (logical format) S1 and S2 not used for ECs 05<br>S2 CLA status byte 2 (logical format) through 07, 0B, 10<br><br>


<br>where: ABT - Abort<br>CTS - Clear to send<br>DCD - Data carrier detect<br>DSR - Data set ready<br>DTO - Data transfer overrun<br>FCSE- Frame check sequence error<br>FES - Framing error status<br>ILE - Input loop error<br>LCR - Last character received<br>NCNA- Next character not available<br>OLE - Output loop error<br>PES - Parity error<br>QM - Quality monitor<br>RC1, RC2, RC3 } Receive count<br>RI - Ring indicator<br>SDCD- Secondary data carrier detector<br>SQD - Signal quality detector<br><br>†DU138-A only
</td></tr>
<tr><td>11</td><td>
<table>
<tr><td>ET</td><td>ILE</td><td>LD</td><td>AL</td></tr>
</table>
<br>where: ET Error type (00 = Error condition restored<br>01 = Error counts given<br>02 = MLIA failure)<br>ILE Input loop error count<br>LD Lost data count only listed if ET = 01 (2 bytes each)<br>AL Alarm count
</td></tr>
<tr><td>20</td><td>
<table>
<tr><td>LS</td><td>NS</td></tr>
</table>
<br>where: LS Last state<br>NS Current state
</td></tr>
</table>

TABLE A-3. CE ERROR MESSAGE TEXT DEFINITIONS (Contd)

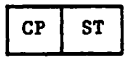
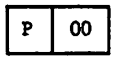
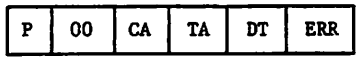
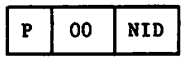
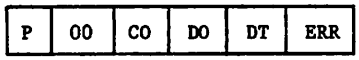
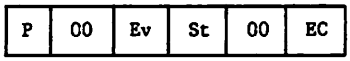
| Error Codes (Hexadecimal) | Text Definition |
|---|---|
| 21 thru 24 |  <br>where: CP and ST Coupler status word |
| 27 thru 29 |  <br>where: CP and ST Coupler status word |
| 2A thru 2D |  <br>where: P Port number (CLA address) |
| 30 thru 32 |  <br>where: P Port number (CLA address)<br>CA Cluster address<br>TA Terminal address<br>DT Device type<br>ERR Error count |
| 33 thru 36 |  <br>where: P Port number (CLA address)<br>NID Node ID of remote NPU |
| 37 thru 39 |  <br>where: P Port number (CLA address)<br>CO Configuration ordinal<br>DO Device ordinal<br>DT Device type<br>ERR Error count |
| 3A thru 3B |  <br>where: P Port number (CLA address)<br>Ev Event<br>2B ENQ received<br>2C ACK0 received<br>2D ACK1 received<br>2E WACK received<br>2F DATA ETB received<br>30 DATA ETX received<br>31 BAD DATA received<br>32 TTD received |

TABLE A-3. CE ERROR MESSAGE TEXT DEFINITIONS (Contd)

| Error Codes (Hexadecimal) | Text Definition |
|---|---|
| 3A thru 3B (Cont) | P \| 00 \| Ev \| St \| 00 \| EC |

| | | |
|---|---|---|
| | 33 | NAK received |
| | 34 | RVI received |
| | 35 | Buffer threshold reached |
| | 36 | EOT received |
| | 37 | DLE EOT received |
| | 38 | Timeout - delay after sending EOT |
| | 39 | Timeout - input |
| | 3A | Timeout - input end |
| | 3B | Timeout - WACK |
| | 3C | Timeout - output delay |
| | 3D | Timeout - output reset |
| | 3E | Timeout - ENQ |
| | 40 | Timeout from input states |
| | 41 | Timeout while idle |
| St | State of line | |
| | 0 | Down |
| | 1 | Down disabled |
| | 2 | Down hard |
| | 3 | Idle |
| | 4 | Input active |
| | 5 | Input delay |
| | 6 | Input end |
| | 7 | Input mode |
| | 8 | Input request |
| | 9 | Input stop |
| | A | Input abort 1 |
| | B | Output bid |
| | C | Output delay |
| | D | Output hold |
| | E | Output mode |
| | F | Output response |
| | 10 | Output transmit |
| | 11 | Output abort |
| | 12 | Output stopped |
| EC | Error Count | |

Coupler Status Word (CP and ST)

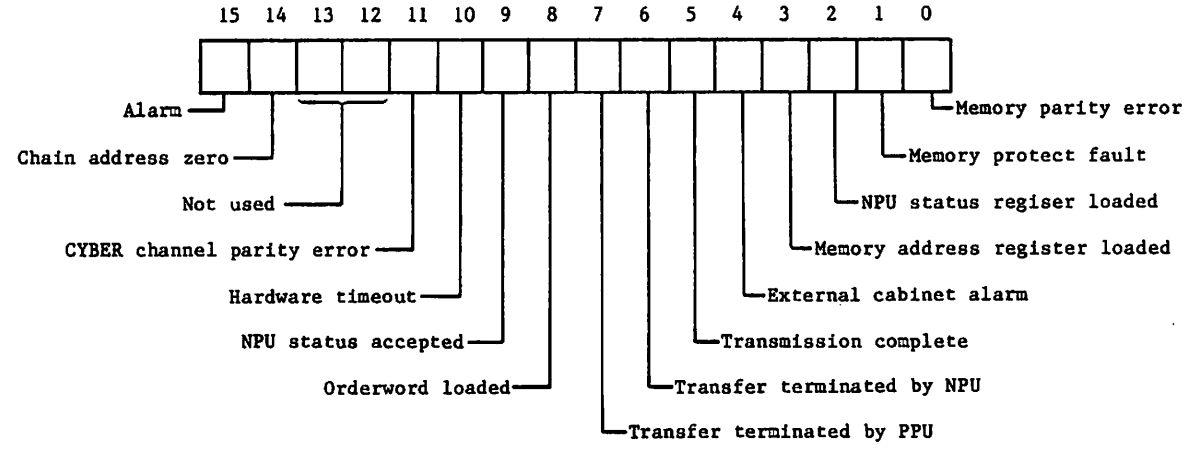


TABLE A-4. STATISTICS MESSAGE TEXT DEFINITIONS

<table>
<tr><th>Secondary Function Code</th><th>Text Definition</th></tr>
<tr><td>00</td><td>
NPU STATISTICS<br><br>
<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></tr>
</table>
Statistics Words<br><br>
Where: Word 1 CPU utilization %<br>
Word 2 Average number of data buffers<br>
Word 3 Lowest regulation level reached<br>
Word 4 Number of inputs rejected due to NPU regulation<br>
Word 5 Average characters per second received from host<br>
Word 6 Average characters per second sent to host<br>
Word 7 Average number of worklists processed per second<br>
Word 8 Number of active batch output devices<br>
Word 9 Number of active batch input devices<br>
Word 10 Number of console devices connected<br><br>
NOTE: Each word is composed of two bytes.
</td></tr>
<tr><td>02 or 04</td><td>
TRUNK OR LINE STATISTICS<br><br>
<table>
<tr><td>P</td><td>00</td><td>LRN</td><td>Word 1</td><td>Word 2</td><td>Word 3</td><td>Word 4</td><td>Word 5</td></tr>
</table>
Where: P Port<br>
LRN Link remote node - ID of NPU at opposite end of trunk (always 0 for lines)<br><br>
Trunk/line statistics words (2 bytes each)<br><br>
Word 1 Number of blocks transmitted<br>
Word 2 Number of blocks received<br>
Word 3 Number of characters transmitted in good blocks/32<br>
Word 4 Number of characters received in good blocks/32<br>
Word 5 Number of bad blocks retransmitted
</td></tr>
</table>

TABLE A-5. HALT CODES

| Code (Hexadecimal) | Significance | Action |
|---|---|---|
| 0000 | NPU master clear or hang | Check the NAM dayfile for coupler errors reported by PIP. If the halt did not occur at network startup, call CE or analyst. |
| 0001 | Power failure | Reapply power, reload CCP (for momentary failure). Call CE or analyst. |
| 0002 | Memory parity error | Call CE or analyst. |
| 0003 | Program protect bit error | Call CE or analyst. |
| 0004 | Interrupt count < 0 | Call CE or analyst. |
| 0005 | MLIA failure (reported by MLIA hardware status) | Call CE or analyst. |
| 0006 | Overran CIB | Call CE or analyst. |
| 0007 | Branch to zero detected | Call CE or analyst. |
| 0008 | Non-interrupt branch to power failure interrupt handler | Call CE or analyst. |
| 0009 | Ran out of buffers | Check NOS 2 Installation Handbook to find if sufficient memory available to handle system configuration. Call CE or analyst. |
| 000A | Duplicate release of buffer | Call CE or analyst. |
| 000B | Buffer chain error during buffer get | Call CE or analyst. |
| 000C | Not used | None. |
| 000D | Coupler alarm condition | Call CE or analyst. |
| 000E | Monitor stopped | Call CE or analyst. |
| 000F | Too many worklists from one CLA | Call CE or analyst. |
| 0010 | Force load service message received | This is normal if a force load message was entered. Otherwise, call CE or analyst. |
| 0011 | Bad MLIA initialization status | Call CE or analyst. |
| 0012 | Bad NCB | Call CE or analyst. |
| 0013 | Chain address = 0 | Call CE or analyst. |
| 0014 | Enable line workcode received by PTLINIT for line with TCB still assigned | Call CE or analyst. |
| 0015 | Duplicate timer entry attempt | Call CE or analyst. |
| 0016 | Not used | None. |
| 0017 | Illegal call to unlinked program | Call CE or analyst. |
| 0018 | Not used | |
| 0019 | Not used | |
| 001A | Assignment out of range | Call CE or analyst. |
| 001B | Index out of range | Call CE or analyst. |

TABLE A-5. HALT CODES (Contd)

| Code (Hexadecimal) | Significance | Action |
|---|---|---|
| 001C | Divide by zero | Call CE or analyst. |
| 001D | Dynamic variable overflow | Call CE or analyst. |
| 001E | Dynamic stack overflow | Call CE or analyst. |
| 001F | Negative interrupt count | Call CE or analyst. |
| 0020 | Output over output | Call CE or analyst. |
| 0021 | Bad timer packet detected | Call CE or analyst. |
| 0022 | Block protocol error detected by PIP | Call CE or analyst. |
| 0023 | Block protocol error detected by NIP | Call CE or analyst. |

# GLOSSARY B

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 NOP console. It informs the NOP 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 (for example, 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 that designates the type 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 255X card slots determines the order in which a CLA is serviced.

Cluster -
A group consisting of a controller and all terminals that 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 Program (CCP) -
The program that 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 used to connect the terminal through the NPU to the host.

Console -
A terminal devoted to network control processing. There are two such terminals concerned with diagnostics for CCP: the Network Operator's (NOP) terminal, and the Diagnostic Operator's (DOP) terminal.

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), logical link control blocks (LLCB), buffer maintenance control blocks (BCB), mux line control blocks (MLCB), text processing control blocks (TPCB), worklist control blocks (WLCB), and diagnostic control blocks (DCB).

Controller -
A hardware device that 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 that 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 that use a highly structured table technique to aid the troubleshooter in isolating a problem.

Diagnostic Operator (DOP)
A network operator residing at the system console or terminal. The DOP executes diagnostics only.

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 and registers to the host. The dump can be processed by the Network 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 set at NPU initialization time, and used dynamically during CCP execution.

Frame -
(1) The basic communication unit used in trunk (NPU-to-NPU) communications. Frames are composed of control bytes, a CRC sum, and (in some cases) data bytes in sub-block sequence. A sub-block may be a block protocol block or a part of a block. Frames are transmitted as a sequence of bytes through the multiplex subsystem. (2) A frame is also a unit of data on the multiplexer input and output loops. It consists of one character of data to/from a line, surrounded by control information.

Front-End NPU -
See Local NPU.

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 indicate the cause of the stoppage.

Hardware Performance Analyzer (HPA) -
A host program that processes the messages in the host's engineering file. The output contains information about network performance.

Host -
A digital computer that executes the programs of an application process. In this CCP release, a network has only one host; the host is directly connected to at least one NPU.

Host Interface Package (HIP) -
The collection of programs resident in an NPU (part of CCP) that controls the transfer of data between a host and a local NPU.

Host Operator (HOP) -
A network operator residing at the system console. The HOP monitors and controls activities of the network and application program. Contrast with network processing unit operator.

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

In-line Diagnostics -
That part of CCP 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 that 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.

Link -
A point-to-point communications connection between two nodes consisting of one or more trunks. In this CCP release, also called a logical link and a trunk.

Link Interface Program (LIP) -
The collection of programs resident in the NPU that controls the transfer of blocks over one or more links.

Local NPU -
An NPU that is attached by a coupler directly to the host. Also called front-end NPU.

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.

Logical Link Control Block (LLCB) -
A control block that maintains the operational parameters and status of a particular link.

Loop Multiplexer (LM) -
The hardware that 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 that 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 16K-word increments; 64K 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 words of 32-bit length. 1024 words are read-only memory (ROM); the remaining 8192 words are random access memory (RAM) and are alterable. The ROM memory contains the emulator microprogram that allows use of 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 Dump Analyzer (NDA) -
An application program to the host that processes the NPU dump into an output listing of the dump contents together with appropriate heading information.

Network Processing Unit Operator (NOP)
An operator who resides at a terminal and controls network elements such as NPUs, trunks, logical links, lines, terminals, and so forth. Contrast with host operator.

Network Processor Unit (NPU) -
The collection of hardware and software that supports a set of one or more directly-connected 255x 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. A host is addressed by the node numbers of the couplers that it is connected to. An NPU has a node number to which all traffic for terminals connected to it is addressed.

Node ID -
An 8-bit number that designates a node.

ODS Loadcheck Diagnostics -
A set of off-line diagnostics for the NPU described in the ODS 2 Reference Manual.

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 PPU to direct NPU operations.

Output -
Information flowing downline from host to terminal.

Output Buffer -
Any buffer that 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 read from main memory. A parity error causes the highest priority interrupt in the system.

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

PBHALT -
The CCP 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.

Peripheral Processing Unit (PPU) -
The part of the host dedicated to performing I/O transfers. The coupler connects the PPU directly to an NPU.

PIP -
PPU program that interfaces via a CYBER channel to the 255x.

Primary Function Code (PFC) -
See function code.

Protect System -
A method of prohibiting one set of programs or DMA devices (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 the protect switch is enabled and an unprotected program or a DMA device attempts to write into a protected location.

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 periodiacally by the base system monitor (part of CCP) 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 classificatons are usually based on batch, interactive, and control message criteria.

Remote NPU -
From the perspective of a given host, an NPU that can only be accessed via a trunk line connecting it to an NPU local to that host.

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, and so forth. Service messages are the principal carriers of status information. Statistics are a special subclass of status.

Subfunction Code (SFC) -
See function code.

Subport -
One of several multiplexed addresses in a port. In this CCP configuration, subport is always equal to zero for all CLA ports.

Terminal -
An element connected to a netwrk 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 to set default characteristics used by CCP to interface to the terminal's data formatting requirements.

Terminal Configuration -
That collection of information that 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 that provide the interface between real terminal format and virtual terminal format. TIPs are responsible for some data conversion and for error processing.

Terminal Node (TN) -
Network processing unit that 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.

Trunk -
A line connecting two NPUs. The CDCCP protocol is used to transfer data between the two NPUs.

Trunk Protocol -
The protocol used for communicating between neighboring NPUs. It is the CDCCP protocol that uses the frame as the basic communiations element.

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 in 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 through 12 and 7 through 0 of a dual 12-bit byte.

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.

# MNEMONICS

| | |
|---|---|
| ASCII | American Standard Code for Information Interchange |
| BCD | Binary coded decimal |
| BCB | Buffer maintenance control block |
| BT | Block type |
| CA | Cluster addresses |
| CCP | Communications Control Program |
| CE | Customer engineer |
| CIB | Circular input buffer |
| CLA | Communications Line Adapter |
| CN | Connection number |
| CRC | Cyclic redundancy check |
| 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 |
| EC | Error code |
| EN | Enable |
| EOP | End of operation |
| FDX | Full duplex |
| HASP | Houston Automatic Spooling Protocol |
| HDX | Half duplex |
| HIP | Host Interface Program |
| HOP | Host Operator |
| 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 |
| LIP | Link interface package |
| LLCB | Logical link control block |
| LM | Loop multiplexer |
| LRN | Link remote node |
| MLCB | Multiplex line control block |
| MLIA | Multiplex Loop Interface Adapter |
| MOD | Modem |
| MOS | Metal oxide semiconductor |
| NAK | Negative acknowledgement |
| NCB | NPU configure block |
| NCNA | Next character not available |
| NDA | Network Dump Analyzer |
| NOP | Network processing unit 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 |
| P | Priority bit |
| PFC | Primary function code |
| PM | Preventive maintenance |
| PPU | Peripheral processing unit |
| RAM | Random access memory |
| RC | Reason code |
| ROM | Read only memory |
| RTC | Real-time clock |
| RTS | Request to send |
| SDCD | Secondary Data Carrier Detect |
| SFC | Secondary function code |
| SM | Service message |
| SN | Source node |
| SOH | Start of header |
| SP | Subport |
| SVM | Service module |
| T | Terminate |
| TA | Terminal address |
| TCB | Terminal control block |
| TERM | Terminate |
| TIP | Terminal Interface Program |
| TN | Terminal node |
| TTY | Teletype |
| TUP | Test Utility Program |
| UT | User terminal |
| WLCB | Worklist control block |
| WM | Write mode |

## CIRCUIT NUMBER

This number identifies the line to the telephone company. Keep it someplace (besides the site log) where it is readily accessible. A good place is the demarcation strip. A demarcation strip is the point where the telephone line terminates. This point is then connected to the modem. If you put the circuit number on the modem, you risk having it 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. Keep this list in the site log and a copy in the terminal cabinet, if convenient.

When a problem develops on your data line, certain information 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.

## LINE TYPE

When requesting help from the telephone company, you need to know certain information about the line type.

Dedicated (sometimes called private or leased line)

Dial-up

## EMERGENCY SERVICE PHONE NUMBER

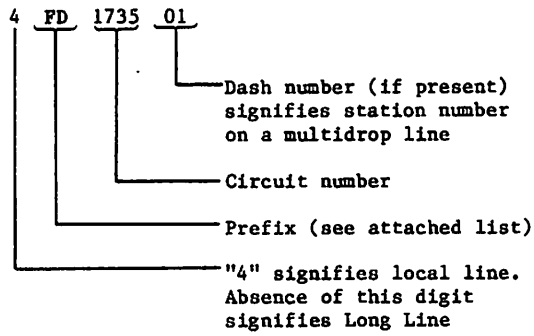
An emergency service phone number should be available on your modem or near the demarcation stip. If a number is not posted there, you will have to get it from your local sales representative. After you get the emergency phone number, keep it handy. This number will put you in contact with the Private Line Service Board. For Long Lines, this board is open 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 redialing does not solve your problem, or if redialing is necessary too often, you may have to work with the telephone account representative to resolve the problem.

Dedicated lines present unique problems that 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 circuit number. A typical line number would be:




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

# CLA REPLACEMENT



The 255x system hardware and software permit a communications line adapter (CLA) circuit card to be exchanged without impacting service to users connected to other CLAs within the system. To exchange a CLA in a system that is on line:

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 (for example, 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 NPU operator (NOP) 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 cirucit 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 thumbwheel 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 NOP console.

Here is an alternate procedure that you may use if a spare CLA circuit card and spare card slot are available:

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 NOP console.

# NOP COMMANDS

E

This appendix shows the relationship between the NOP commands and the responses used to run the on-line diagnostics through the service messages (SMs) sent to the NPU.

The format of statistics service messages sent to and from the host is:

| DN | SN | CN=00 | BT=04 | Text |
|---|---|---|---|---|

where:

DN Destiation 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

Table E-1 gives the text of each type of message and its response.

TABLE E-1. NOP COMMANDS AND ASSOCIATED SERVICE MESSAGES

| NOP Command | Downline and Upline Service Messages |
|---|---|
| Disable Trunk | This message is sent to the NPU by CS:<br><br>PFC \| SFC \| P \| SP<br><br>PFC Primary function code = $11_{16}$<br>SFC Secondary function code = $04_{16}$<br>P Port number<br>SP Subport - always zero<br><br>The NPU responds with the following message:<br><br>PFC \| SFC \| P \| SP \| LT \| ST \| RC<br><br>PFC Primary function code = $19_{16}$<br>SFC Secondary function code = $04_{16}$<br>P Port number<br>SP Subport - always zero<br>LT Line type<br>ST Status<br>RC Reason code<br>4 = Cannot disable last path to CS<br>5 = LIP not present<br>7 = On-line diagnostic in progress<br>8 = Trunk already in desired state |
| | |

TABLE E-1. NOP COMMANDS AND ASSOCIATED SERVICE MESSAGES (Contd)

<table>
<tr><th>NOP Command</th><th>Downline and Upline Service Messages</th></tr>
<tr><td>Disable Line</td><td>This message is sent to the NPU by CS:<br><br><table><tr><td>PFC</td><td>SFC</td><td>P</td><td>SP</td></tr></table><br>PFC Primary function code = $11_{16}$<br>SFC Secondary function code = $02_{16}$<br>P Port number<br>SP Subport - always zero<br><br>The NPU responds with the following message:<br><br><table><tr><td>PFC</td><td>SFC</td><td>P</td><td>SP</td><td>LT</td><td>ST</td><td>PSN</td><td>RE</td><td>RC</td></tr></table><br>PFC Primary function code = $19_{16}$<br>SFC Secondary function code = $02_{16}$<br>P Port number<br>SP Subport - always zero<br>LT Line type<br>ST Status<br>PSN Packet switch network transport type<br>RE Reserved<br>RC Reason code<br>7 = On-line diagnostic in progress<br>8 = Line already in desired state</td></tr>
<tr><td>Diagnostic Test Request</td><td>Message<br><br><table><tr><td>PFC<br>$=20_{16}$</td><td>SFC<br>$=0A_{16}$</td></tr></table><br>Response<br><br><table><tr><td>PFC<br>$=20_{16}$</td><td>SFC</td></tr></table><br>SFC Secondary function code<br>$4A_{16}$ if accepted<br>$8A_{16}$ if rejected</td></tr>
<tr><td></td><td></td></tr>
</table>

TABLE E-1. NOP COMMANDS AND ASSOCIATED SERVICE MESSAGES (Contd)

| NOP Command | Downline and Upline Service Messages |
|---|---|
| Start Test Command | Message<br><br>PFC =$20_{16}$ \| SFC =$0D_{16}$ \| Data<br><br>Data 1-22 ASCII words<br><br>ASCII is: test,ii,y,kk<br><br>Test INT or I - CLA internal loopback<br>EXT or E - CLA external loopback<br>MOD or M - Modem loopback<br><br>ii Port number $01 \leq ii \leq FE_{16}$<br><br>y CLA type<br>00 - Synchronous RS-232 (2560-1, -101)<br>01 - Asynchronous (2561-1, -101)<br>02 - Synchronous non-RS-232 (2560-2, 3, -102, -103)<br>03 - Synchronous SDLC (2563-1, -101)<br>04 - Synchronous SDLC non-RS-232 buffered (2563-2)<br><br>kk Modem class (see table 4-1) |
| Terminate Diagnostic Program | Message<br><br>PFC =$20_{16}$ \| SFC =$0E_{16}$<br><br>No response |
| Enable Trunk | This message is sent to the NPU by CS:<br><br>PFC \| SFC \| P \| SP<br><br>PFC Primary function code = $10_{16}$<br>SFC Secondary function code = $04_{16}$<br>P Port number<br>SP Subport - always zero<br><br>The NPU responds with the following message:<br><br>PFC \| SFC \| P \| SP \| LT \| ST \| RC<br><br>PFC Primary function code = $19_{16}$<br>SFC Secondary function code = $04_{16}$<br>P Port number<br>SP Subport - always zero<br>LT Line type<br>ST Status<br>RC Reason code<br>5 = LIP not present<br>6 = Duplicate CLA detected<br>7 = On-line diagnostics in progress<br>8 = Trunk already in desired state |

TABLE E-1. NOP COMMANDS AND ASSOCIATED SERVICE MESSAGES (Contd)

<table>
<tr><th>NOP Command</th><th>Downline and Upline Service Messages</th></tr>
<tr><td>Enable Line</td><td>
This message is sent to the NPU by CS:
<table>
<tr><td>PFC</td><td>SFC</td><td>P</td><td>SP</td></tr>
</table>
PFC Primary function code = $10_{16}$<br>
SFC Secondary function code = $04_{16}$<br>
P Port number<br>
SP Subport - always zero<br><br>
The NPU responds with the following message:
<table>
<tr><td>PFC</td><td>SFC</td><td>P</td><td>SP</td><td>LT</td><td>ST</td><td>PSN</td><td>RE</td><td>RC</td></tr>
</table>
PFC Primary function code = $19_{16}$<br>
SFC Secondary function code = $02_{16}$<br>
P Port number<br>
SP Subport - always zero<br>
LT Line type<br>
ST Status<br>
PSN Packet switch network transport type<br>
RE Reserved<br>
RC Reason code<br>
5 = Required TIP not present<br>
6 = Duplicate CLA detected<br>
7 = On-line diagnostics in progress<br>
8 = Line already in desired state
</td></tr>
<tr><td>Start Test Response<br>(Unsolicited Message)</td><td>
Response to Start Test
<table>
<tr><td>PFC<br>=$20_{16}$</td><td>SFC<br>=$0D_{16}$</td><td>Data</td></tr>
</table>
<u>ASCII Data</u> — <u>Operator Action on Error Response</u><br><br>
PORT ii STARTED — Wait for other messages<br>
PORT ii INV PORT — Check port/subport numbers<br>
PORT ii INV CLA TYPE — Check CLA type<br>
PORT ii INV TEST MODE — Check test mode<br>
PORT ii NOT DISABLED — Disable line or trunk and restart test<br>
PORT ii TEST IN PROC. — Wait until current test is over<br>
PORT ii LOW BUFFERS — Try later, more buffers may be available<br>
PORT ii INV MODEM CLS — Check modem class<br>
Then reenter correct command (see section 4)<br><br>
Error Response (During Test)<br><br>
Same as start test response except for ASCII data<br><br>
<u>ASCII Data</u><br><br>
Port ii ERROR yy,pp,qqqq,rrrr<br><br>
ii — Port number expressed as two hexadecimal digits $01 \leq ii \leq FE_{16}$<br><br>
yy — error code (see table 4-3)<br><br>
pp — Subsection number of test being performed by diagnostic program at the time of error detection<br><br>
qqqq and rrrr — Additional data relative to the type of error received (see DDLTs in section 4); each field represents a 16-bit word output as 4 hexadecimal digits
</td></tr>
</table>

TABLE E-1. NOP COMMANDS AND ASSOCIATED SERVICE MESSAGES (Contd)

| NOP Command | Downline and Upline Service Messages |
|---|---|
| Terminate Diagnostic Test | Message<br>Same as start test except for ASCII data<br><br>ASCII Data<br>TERM or T,,ii<br>ii Port number, $01 \leq ii \leq FE_{16}$<br><br>Response<br>Same as start test response except for ASCII data<br><br>ASCII Data — Operator Action<br>PORT ii TEST CMPL - OK — Start next test or end diagnostic<br>PORT ii INV PORT — Check port number and reenter command<br>PORT ii NOT IN PROC. |

TABLE E-2. LINE TYPES

| Line Type | CLA Type | Modem Type | Answer Mode | Carrier Type | Circuit Type |
|---|---|---|---|---|---|
| 1 | 2560-1 Synchronous | 201A/208B Compatible[1] | Switched | Controlled[2] | 2-Wire HDX |
| 2 | 2560-1 Synchronous | 201B/208A Compatible[1] | Dedicated | Controlled[2] | 4-Wire FDX[3] |
| 3 | 2560-1 Synchronous | 201B/208A Compatible[1] | Dedicated | Constant | 4-Wire FDX |
| | 2560-2 Synchronous | Bell 301/303 Compatible | Dedicated | Constant | 4-Wire FDX |
| | 2560-3 Synchronous | V.35 Interface | Dedicated | Constant | 4-Wire FDX |
| 4-5 | Reserved for CDC | | | | |
| 6 | 2561-1 Asynchronous | 103F/113/212A Compatible[1] | Switched | Constant[4] | 2-Wire FDX |
| 7 | 2561-1 Asynchronous | 103F/113/212A Compatible[1] | Dedicated | Constant[4] | 2-Wire FDX |
| 8-9 | Reserved for CDC | | | | |
| 10 | 2563-1 HDLC | 201B Compatible[1] | Dedicated | Constant[4] | 4-Wire FDX |
| | 2563-2 HDLC | V.35 Modem | Dedicated | Constant[4] | 4-Wire FDX |
| 11-127 | Reserved for CDC | | | | |
| 128-255 | Reserved for installations | | | | |

Legend:

1 RS232

2 Turnaround required. Turnaround not delayed.

3 Operating with HDX protocol.

4 Turnaround not required. Turnaround not delayed.

TABLE E-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 |

# INDEX