GA27-2871-2
File No. S360/S370/S3/4300/8100-09

Systems

IBM 3270 Information Display System Problem Determination

IBM 3274 Control Units and Attached Terminals

IBM

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IBM 3270 Information Display System Problem Determination

IBM 3274 Control Units and Attached Terminals

Third Edition (March 1980)

This edition (GA27-2871-2) obsoletes GA27-2871-1. Information concerning the IBM 3279 Color Display Station, the IBM 3274 Model 51C, and the Network Problem Determination Application (NPDA) has been added, and the Error Codes in Appendix B have been updated.

Copies of this and other IBM publications can be obtained through IBM branch offices.

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Preface

The information contained in this publication is intended to assist customer personnel who are responsible for coordinating problem determination activities on the IBM 3270 Information Display System.

Scope

For the purposes of this publication, the IBM 3270 Information Display System consists of an IBM 3274 Control Unit with its attached IBM 3278 Display Stations, 3279 Color Display Stations, IBM 3287 Printers, and/or 3289 Line Printers.

Problem determination procedures for an IBM 3270 Information Display System that consists of an IBM 3276 Control Unit Display Station with its attached terminals are described in the *IBM 3270 Information Display System: System Problem Determination for 3276 Control Unit Display Stations*, GA18-2042.

Problem determination procedures for the IBM 3271 and 3272 Control Units, IBM 3275 and 3277 Display Stations, and IBM 3284, 3286, and 3288 Printers are described in the *IBM 3270 Information Display System: Problem Determination Guide*, GA27-2750, and are purposely omitted from this publication.

This publication is not intended to replace the problem determination guides (PDGs) supplied with each unit of the 3270 Information Display System, but is intended to supplement them by listing and coordinating the use of the problem determination facilities provided for the 3270 Information Display System.

Related Publications

When appropriate, this publication refers to the unit PDGs, as well as other publications. The publications that may be required (depending upon your system configuration) are:

IBM 3274 Control Unit Problem Determination Guide, GA27-2850

IBM 3270 Information Display System: System Problem Determination for 3276 Control Unit Display Stations, GA18-2042

IBM 3278 Display Station Problem Determination Guide, GA27-2839

IBM 3279 Color Display Station Problem Determination Guide, GA33-3051

IBM 3287 Printer Problem Determination Guide, GA27-3151

IBM 3289 Printer Problem Determination Guide, GA27-3141

IBM 3270 Information Display System: Component Description, GA27-2749

IBM 3270 Information Display System: 3274 Control Unit Planning and Setup Guide, GA27-2827

3270 Facility Error Recognition System (FERS) Service Aid Description, G229-7031

OS/VS Display Exception Monitoring Facility (DEMF) User's Guide, GC34-2003

Network Problem Determination Application Error Messages Manual, SC34-2012

Network Problem Determination Application Terminal Use Guide, SC34-2013

DOS/CICS User's Guide, G229-7030

OS/CICS User's Guide, G229-7029

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Chapter 1. Introduction

Problem determination procedures are performed by customer personnel to determine the probable location and cause of any problem that may appear on the IBM 3270 Information Display System. When the probable location and cause of the problem have been determined, the customer can then decide the following:

- Is assistance required to resolve the problem?
- Of whom should assistance be requested?
- Where is assistance required?
- Can useful work be accomplished while awaiting assistance?
- Should assistance be scheduled on a deferred basis?

Problem Determination Coordination

Although the individual problem determination guides (PDGs) supplied with each unit of the 3270 Information Display System are useful for isolating a problem to those units or for eliminating those units as the probable source of the problem, the problem determination activities should be coordinated on a system basis. A System Problem Determination Guide is provided in Chapter 3 of this publication to assist in this coordination.

It is recommended that problem determination procedures performed on the 3270 Information Display System be coordinated by designated personnel who are familiar with the problem determination concepts contained in this publication, with the problem determination facilities available on your system, and with the configuration of your system.

Problem Determination Facilities

To assist the customer in performing problem determination procedures on the 3270 Information Display System and its associated communication facilities, certain facilities have been provided. These facilities are briefly described in Chapter 4 of this publication, with a reference to the appropriate publication for further details.

Among the problem determination facilities that may be available at the host system are the Display Exception Monitoring Facility (DEMF), the Facility Error Recognition System (FERS), and the Network Problem Determination Application (NPDA). DEMF, FERS, and NPDA are network problem determination facilities, which are also briefly described in Chapter 4.

Chapter 2. Problem Determination Overview

Although a problem can occur at any point within the system, it is most likely to become apparent at one or more of the IBM 3270 terminals (3278, 3279, 3287, or 3289). To determine the probable location of the problem within the system, you must be familiar with the configuration of your system.

Figure 2-1 shows possible system configurations and defines system levels at which problem determination may be performed. These levels are listed below in ascending sequence, starting with the lowest level:

1. The 3270 terminal level.
2. The 3270 Information Display System level, which, for problem determination purposes, amounts to the control unit level.
3. The communication facility level. Although some tests may be initiated from the control unit or the host system, problem determination at this level should be coordinated at the host system.
4. The host system level, which may have problem determination facilities that are applicable to all lower levels.

To expedite problem determination, when a problem is detected at one level of the system, the problem should be reported to the coordinator at the next higher level. To minimize the impact on the system, problem determination should be done at the lowest level consistent with the symptoms.

If DEMF, FERS, or NPDA is available on your host system, it might be advantageous to use that facility to determine the level at which to address the problem before attempting local problem determination procedures. The following procedure, however, is designed for most cases and starts at the terminal level.

Typical Approach

Determine which terminal types are affected by the problem. If 3278 or 3279 Display Stations are affected, determine the following:

1. Do the affected display stations work properly when in offline mode? For a quick check, see if a cursor and a horizontal line across the screen are displayed.
2. Can the affected display stations be made ready with respect to the control unit? For a quick check, see if a 4 is displayed in the Operator Information Area.
3. Are the display stations experiencing Machine Checks (X nnn displayed in the Operator Information Area)?
4. Are the display stations logically connected to the host system (A or B displayed in the Operator Information Area)?
5. Are the display stations experiencing Program Checks (X PROGnnn displayed in the Operator Information Area)?
6. Are the display stations experiencing Communications Checks (X →z←nnn) or Communication Reminders (→z←nnn displayed in the Operator Information Area)?

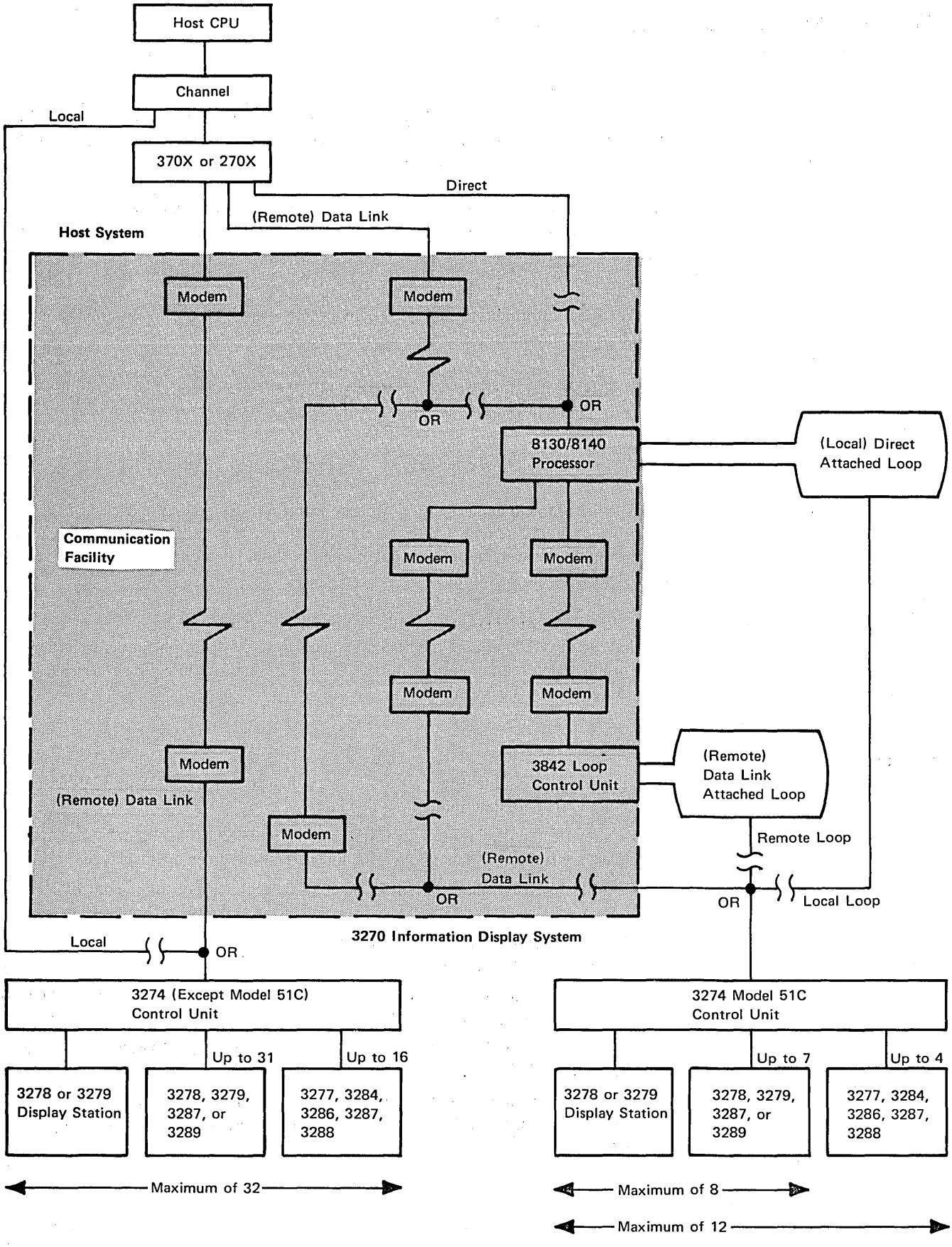

Figure 2-1. Possible System Configurations

If printers (3287 or 3289) are affected, determine the following:

1. Have the printers been enabled by the control unit?
2. Have the printers received an initial message from the control unit?
3. Are the printers being polled by the control unit?

In each of the preceding cases, it may be necessary to determine if more than one terminal attached to the same control unit is affected by the problem. If only one terminal is affected, it may be necessary to exchange device cables to determine if the control unit, device cable, or terminal is at fault.

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

If the problem is not determined by the procedures in Chapter 3, the control unit problem determination procedure should be performed before assistance is requested.

Actions

While performing problem determination procedures at any system level, you may be asked to perform some of the following actions:

- Observe the symptoms
- Retry the operation
- Initiate and run tests, as requested
- Record symptoms and test results
- Report the results of problem determination, as prescribed by your management
- Request assistance, as required

In addition to the preceding actions, at certain system levels you may be asked to perform other actions, unique to that level. At the terminal or control unit level, you may be asked to swap device cables (see Figure 2-1).

At the control unit level, you may be asked to test modems and to check cable connections at the modems. At the host system level, actions may be required to support problem determination on any part of the system, including the 3270 Information Display System and its communication facilities. As regards the 3270 Information Display System, host-system action may be required when a program check or communication check is detected at a 3270 terminal.

Chapter 3. System Problem Determination Guide

Start here

Was the problem reported at a 3278 or 3279 Display Station?

YES — NO

NO:

Was the problem reported at a 3287 Printer?

YES — NO

NO:

The problem was reported at a 3289 Printer.

Go to (L), page 3-12.

YES:

Go to (H), page 3-9.

Is a cursor displayed at the failing display station?

YES — NO

NO:

Go to (C), page 3-4.

Is a horizontal line displayed across the screen at the failing display station?

YES — NO

NO:

Go to (C), page 3-4.

Press the upshift (⇧) key at a failing display station (if possible).

Is ⇧ displayed in the Operator Information Area?

YES — NO

NO:

Set the Normal/Test switch to the Test position, then to the Normal position.

Is 4 displayed in the left portion of the Operator Information Area?

YES — NO

NO:

The display station is apparently not ready with respect to the control unit. Verify the symptoms on other failing display stations by operating the Normal/Test switch to the Test position, then back to the Normal position.

- **Is more than one display station (attached to the same control unit) failing with the same symptom?**

YES — NO

NO:

Go to (C), page 3-4.

YES:

Go to (B) page 3-3.

YES:

Go to (A), page 3-2.

Check Display Station Operation with Control Unit

(A)

- **Is X ⊵ nnn displayed in the Operator Information Area?**

YES — NO

NO: Go to (E), page 3-6.

YES:

Set the Normal/Test switch to the Test position, then to the Normal position.

Press the Reset key, record the symptoms on the appropriate Problem Report Form, and retry the failing operation. (See Note 2, page 3-3.)

- **Does the same failure occur?**

YES — NO

NO: End problem determination, and resume operation.

YES:

- **Is more than one display station (attached to the same control unit) failing?**

YES — NO

NO: Go to (C), page 3-4.

YES: Go to (B), page 3-3.

B

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

If device cables have been exchanged at the control unit ports and/or at the terminals, return them to their original connections.

- If display stations were reconnected, set the Normal/Test switch to the Test position, then to the Normal position, at all reconnected display stations.
- If the terminals affected were printers, press Reset and Test at 3287 Printers or press Reset at 3289 Printers.

Perform problem determination on the control unit, using the *3274 Problem Determination Guide.*

Notes:

1. *Turning the 3274 Control Unit off and then on or initializing the 3274 affects all terminals attached to that 3274.*
2. *Turning any terminal or control unit off and then on or initializing a control unit may affect its connection to the host system. It may be necessary to re-establish the connection to the host system or to log on to the host system when performing a reset, retry, and recovery operation. To prevent a system "hang" condition, the proper sequence must be used when turning a locally attached 3274 off or on. A locally attached 3274 has a Power/Interface rotary switch on its control panel. See the* 3274 Control Unit Problem Determination Guide, *GA27-2850.*

Ⓒ

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

If device cables have been exchanged at the control unit ports and/or at the terminals, return them to their original connections.

If display stations were reconnected, set the Normal/Test switch to the Test position, then to the Normal position, at all reconnected display stations.

Perform problem determination on the failing display station, using the *3278 or the 3279 Problem Determination Guide.*

Press the Reset key, and retry the failing operation. (See Note 2, page 3-3.)

- **Has the problem been determined to be in the display station?**

YES — NO

Exchange the device cable from the failing display station with the device cable from a known working display station *at the control unit ports.*

Set the Normal/Test switch to the Test position, then to the Normal position, at both display stations.

Press the Reset key, and retry the failing operation. (See Note 2, page 3-3.)

- **Does the same display station fail?**

YES — NO

Go to Ⓑ, page 3-3.

Go to Ⓓ, page 3-5.

Report the problem and resume operation.

(D)

Probable device cable or display station problem.

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

Return the device cables to their original control unit ports.

Set the Normal/Test switch to the Test position, then to the Normal position, at both display stations.

- **Is it possible to exchange the device cable at the failing display station with the device cable at a known working display station** *at the terminal end* **of the cables?**

YES — NO

NO:

Probable device cable or display station problem.

Ensure that all device cables are connected to their original connectors at both ends.

Report the problem.

YES:

Exchange device cables *at the terminal ends.*

Set the Normal/Test switch to the Test position, then to the Normal position, at both display stations.

Press the Reset key, and retry the failing operation. (See Note 2, page 3-3.)

- **Does the same display station fail?**

YES — NO

NO:

Probable device cable failure.

Return the device cables to their original connections.

Set the Normal/Test switch to the Test position, then to the Normal position, at both display stations.

Request assistance from the personnel responsible for device cables.

YES:

Probable display station failure.

Return the device cables to their original connections.

Set the Normal/Test switch to the Test position, then to the Normal position, at both display stations.

Report the problem.

Check Logical Connection between Display Station and Host System

(E)

- **Is A or B displayed to the right of the 4 in the Operator Information Area?**

YES NO

Inform the host system operator of the problem.

- **Is the host system operating without error and communicating with the failing 3270 Information Display System?**

YES NO

When the host problem has been resolved, resume operation.

- **Is X PROGnnn displayed in the Operator Information Area?**

YES NO

Go to (F), page 3-7.

Press the Reset key, record the symptoms on the appropriate Problem Report Form, and retry the failing operation. (See Note 2, page 3-3.)

- **Does the operation still fail?**

YES NO

End problem determination, and resume operation.

Probable data stream problem from the host system.

Record the sequences of the last keystrokes before the problem, if applicable.

Report the problem to the host system support programmer for additional problem determination and recovery.

(F)

- **Is ✕ →z← nnn displayed in the Operator Information Area?**

YES NO

- **Is more than one display station (attached to the same control unit) failing?**

YES NO

Go to (C), page 3-4.

Go to (B), page 3-3.

Press the Reset key, record the symptoms on the appropriate Problem Report Form, and retry the failing operation. (See Note 2, page 3-3.)

- **Does the operation still fail?**

YES NO

End problem determination, and resume operation.

Perform problem determination in the control unit PDG that relates to communication check (✕ →z←) problems. Refer to the page in the *3274 PDG* entitled "Wrap Test". (See Notes 1 and 2, page 3-3.)

- **Is the problem determined to be in the control unit?**

YES NO

Probable communication facility problem.

- **Is the host system on and operating without error?**

YES NO

When the host system problem is resolved, resume operation.

Go to (G), page 3-8.

Go to (B), page 3-3.

G

- **Is the Facility Error Recognition System (FERS), the Display Exception Monitoring Facility (DEMF), or the Network Problem Determination Application (NPDA) available? See Note.**

YES NO

NO:

Ensure that problem determination has been performed at the 3270 Information Display System (control unit, display station, and printer).

- **Was the problem isolated to the 3270 Display System?**

YES NO

NO:

Report the problem to the host system operator or to the Network Control Center for additional problem determination.

Record the problem on the proper report form.

Analyze the problem, using the following FERS, DEMF, or NPDA facilities:

- Configuration data
- Communication link statistics
- Communication line statistics
- Sense data
- Status data

For details, see the *3270 Facility Error Recognition System (FERS) Service Aid Description,* G229-7031, the *OS/VS Display Exception Monitoring Facility (DEMF) User's Guide,* GC34-2003, or the *Network Problem Determination Application (NPDA) Error Messages Manual,* SC34-2012, and the *Network Problem Determination Application (NPDA) Terminal Use Guide,* SC34-2013.

Note:

To determine if FERS, DEMF, or NPDA is available on your host system, perform the following procedure:

1. *Clear the display screen, type in FERS, and press the ENTER key. The FERS menu will be displayed, if FERS is available.*
2. *Clear the display screen, type in DEMF, and press the ENTER key. The DEMF menu will be displayed, if DEMF is available.*
3. *If neither FERS nor DEMF is available, inquire from the Network Control Center or the host system operator if the Network Communications Control Facility (NCCF) and NPDA are available. If NPDA is available, request that it be invoked to perform problem determination for your terminal.*

(H)

- **Is the CHECK light on?**

YES NO

Ensure that the control unit is on and the device cable is connected to the control unit and to the printer.

- **Is the CU SIGNAL light on?**

YES NO

Either the control unit is not polling the printer or there is a device cable problem.

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

If there is a known working printer attached to the control unit, exchange the device cable to the working printer with the device cable to the failing printer *at the control unit ports.*

Note: *At the 3274 Control Unit, do not exchange a device cable from an A port with one from a B port.*

At the failing printer:
1. Press and hold the Test switch.
2. Press and release the Reset switch.
3. Release the Test switch.

- **Is the CU SIGNAL light on after the internal tests run?**

YES NO

Go to (K), page 3-11.

Go to (B), page 3-3.

At the failing printer:
1. Press and hold the Test switch.
2. Press and release the Reset switch.
3. Release the Test switch.

- **Is the READY light on after the internal tests run?**

YES NO

Go to (J), page 3-10.

Go to (I), page 3-10.

Perform problem determination on the failing printer, using the *3287 Problem Determination Guide.*

(J) (M) (I)

To print out the PC1A storage area:

1. Press and hold the Test switch.
2. Press and release the Form Feed switch.
3. Release the Test switch.

- **Does AA3274AA print out for storage addresses 004A through 004D?**

YES NO

Go to (J), this page.

The printer is connected to, is enabled by, and has received a message from the control unit.

- **Is a printer failing during a host-initiated print operation?**

YES NO

The printer is failing during a local copy operation.
Request assistance at the control unit location.

Report the problem to the host system operator.

Perform problem determination on the failing printer, using the *3289* or *3287 Problem Determination Guide.*

- **Was the problem determined?**

YES NO

Perform problem determination on the control unit, using the *3274 Problem Determination Guide.*

- **Was the problem determined?**

YES NO

Request assistance.

Resume operation.

Request assistance if required.

(K)

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

Return device cables to their original control unit ports.

At the reconnected printers:
1. Press and hold the Test switch.
2. Press and release the Reset switch.
3. Release the Test switch.

- **Is it possible to exchange the device cable at the failing printer with the device cable at a known working printer *at the printer end* of the cable?**

YES NO

Probable cable or printer problem.

Report the problem.

Exchange the device cable from the failing printer with the device cable from a known working printer *at the printer end* of the cable.

At the failing printer:
1. Press and hold the Test switch.
2. Press and release the Reset switch.
3. Release the Test switch.

- **Is the CU SIGNAL light on after the internal tests run?**

YES NO

Probable 3287 Printer problem.

Return the device cables to their original connections.

At the reconnected printers:
1. Press and hold the Test switch.
2. Press and release the Reset switch.
3. Release the Test switch.

Report the problem, and request assistance.

Probable device cable problem.

Return the device cables to their original connections.

At the reconnected printers:
1. Press and hold the Test switch.
2. Press and release the Reset switch.
3. Release the Test switch.

Request assistance from the personnel responsible for device cables.

(L)

- **Is the CHECK light on?**

YES NO

- **Is the READY light on?**

YES NO

Press the Enable Print switch.

Press the Reset switch.

- **Is the READY light on after the internal tests have run?**

YES NO

- **Is there another 3289 Printer, attached to the same control unit, that is working properly?**

YES NO

Go to (J), page 3-10.

Go to (N), page 3-13.

Print "Short Memory" via the Print Dump Routine, as follows:

1. Press the Hold Print switch.
2. Set Selector switch to 70.
3. Press the Code switch.

- **Does AA3274AA print out for storage addresses 004A through 004D?**

YES NO

- **Is there another 3289 Printer, attached to the same control unit, that is working properly?**

YES NO

Go to (J), page 3-10.

Go to (N), page 3-13.

Go to (M), page 3-10.

Perform problem determination on the failing printer, using the *3289 Problem Determination Guide.*

(N)

Caution: Do not connect or disconnect device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

Exchange the device cable from the failing printer with the device cable from a known working printer *at the control unit ports.*

Note: *At the 3274 Control Unit, do not exchange a device cable from an A port with one from a B port.*

At the failing printer:
1. Press the Enable Print switch.
2. Press the Reset switch.

- **Is the READY light on after the internal tests run?**

YES

NO

Device cable or printer problem.

Return the device cables to their original control unit ports.

At both reconnected printers:
1. Press the Enable Print switch.
2. Press the Reset switch.

- **Is it possible to exchange the device cable at the failing printer with the device cable at a known working printer** ***at the terminal end*** **of the cables?**

YES

NO

Probable device cable or printer problem.

Report the problem, and request assistance.

Go to (O), page 3-14.

Go to (B), page 3-3.

(O)

Exchange the device cable at the failing printer with the device cable from a known working printer *at the printer end* of the cable.

Note: *Do not exchange device cables between a 3289 and a B type printer (3284, 3286, and 3288).*

At the failing printer:
1. Press the Enable Print switch.
2. Press the Reset switch.

- **Is the READY light on after the internal tests have run?**

YES

Probable device cable problem.

Return the device cables to their original connections.

At both reconnected printers:
1. Press the Enable Print switch.
2. Press the Reset switch.

Request assistance from the personnel responsible for device cables.

NO

Probable printer problem.

Return the device cables to their original connections.

At both reconnected printers:
1. Press the Enable Print switch.
2. Press the Reset switch.

Report the problem, and request assistance.

Chapter 4. Problem Determination Facilities Overview

Each level of the system has associated problem determination facilities that are used to isolate 3270 type failures within the system. Some of these facilities are used concurrently with the operation of other system elements at that level and require only the dedicated resource being tested. An example of these facilities is the concurrent test contained in the 3270 control units, which is required to test the features of the 3278 Display Station. Other facilities are used offline and require dedicated use of all the resources affected. An example of these facilities is the basic assurance test contained in the 3270 control units. The facilities are listed by the 3270 unit and system level to which they apply.

IBM 3278 Display Station and IBM 3279 Color Display Station

The IBM 3278 Display Station and the IBM 3279 Color Display Station and their keyboards can be tested offline from the control unit. The facilities are:

- A display character check of the character set. Analysis of this test can determine if the proper characters are interpreted in the display station and if every character position on the display screen is usable.
- A keyboard check that displays a character representative of each keyboard key, except the RESET (control) key, that is pressed.
- Lights that indicate the readiness status of the display station.
- Controls that determine if the status is on/off or test and that control the display screen brightness of the display station. The selector light-pen, color, programmed symbols, and other features can be tested via concurrent tests resident in the control unit.

See the *IBM 3278 Display Station Problem Determination Guide*, GA27-2839, and the *IBM 3279 Color Display Station Problem Determination Guide*, GA33-3051, for details on the use of these facilities.

IBM 3287 Printer and IBM 3289 Line Printer

The problem determination facilities in the IBM 3287 Printer and the IBM 3289 Line Printer are basically the same. The details concerning the operation of these facilities are contained in the *IBM 3287 Printer Problem Determination Guide*, GA27-3151, and *IBM 3289 Printer Problem Determination Guide*, GA27-3141.

The facilities are:

- Lights that indicate the readiness status, error check status, test status, and control unit connection status of the printer.
- Lights that define the conditions causing the error status, and the operational status of the printer.
- Switches that control the on/off status, test status, and buffer print status of the printer.
- Tests that automatically test the printer and initialize it for operation.

IBM 3274 Control Unit

The IBM 3274 Control Unit is the nucleus of the 3270 Information Display System, of which it is a part. Its problem determination facilities are used to test and isolate the control unit within the 3270 Information Display System and to isolate the 3270 Information Display System from the remainder of the system. The use of these facilities normally

affects the entire 3270 Information Display System; therefore, they should be used only when the 3274 Control Unit is suspected of failing.

The facilities are:

- A basic test that verifies that the base control unit is functioning properly. This test is run automatically when power is turned on; or it can be initiated by pressing the IML pushbutton (without pressing the Alt IML Address switch).
- A remote interface test that is run as part of the basic test, or separately, by pressing the IML pushbutton while holding the Alt IML Address switch in the 2 position. This applies only to remotely attached 3274 Control Units.
- Lights that indicate test-failure status during the IML process or retry status during the operational state.
- A light that indicates the local/remote power status of the control unit.
- A Power/Interface switch that selects the online/offline status of the power. This switch is present only on locally attached 3274 Control Units.

See the *IBM 3274 Control Unit Problem Determination Guide*, GA27-2850, for details on the use of these facilities.

IBM 3270 Information Display System

For the purposes of this publication, the IBM 3270 Information Display System consists of the IBM 3274 Control Unit and its attached IBM 3278 and 3279 Display Stations, 3287 Printers, and 3289 Printers.

Facilities exist in the control unit to determine if the problem is internal or external to the 3270 Information Display System. If the problem appears to be internal to the 3270 Information Display System, these facilities are also used to determine which unit, within the 3270 Information Display System, is the probable cause of the problem.

The facilities are as follows:

- Concurrent tests are available that test the path from the control unit to the attached terminals and provide a test pattern which allows testing the 3278 and 3279 Display Station features.

  These tests can be initiated from any display station with a keyboard, to itself or to any other display station within the 3270 Information Display System, concurrently with the normal operation of the 3270 Information Display System. Caution should be exercised when testing another terminal to ensure that the terminal to be tested is available for test.
- A test is available that displays the trouble status of all attached terminals within the 3270 Information Display System. (See Appendix A.) This test can be initiated from a 3278 or 3279 keyboard and is run concurrently with other 3270 Information Display System operations.
- A test message is available at the 3287 or 3289 Printer immediately after the printer is turned on (provided the control unit is on). To minimize the overprinting of usable information when the printer is functioning online, this message can be printed only when the printer is in test status.
- The physical locations for attaching the device cables to the control unit are readily accessible. The connectors contained in this area do not require the use of tools or special equipment to connect or disconnect. See the *IBM 3270 Information Display System: 3274 Control Unit Planning and Setup Guide*, GA27-2827. This permits the interchanging of device cables at the ports to determine if the problem exists in the terminal or in the control unit.

Caution: Do not connect or disconnect the device cables during an electrical storm. Before cables are connected or disconnected, verify that the attached terminals are not being used.

- Interface wrap tests are available for testing the link when the 3274 is remotely attached. This test interrupts the operation of all attached terminals; therefore, it should be performed only when the entire 3270 Information Display System is apparently failing or when symptoms indicate that the problem is in the communication facility, external to the 3270 Information Display System.
- Three check condition symbols (⌧ —⌥— , and PROG) and their respective numeric codes are displayed in the Operator Information Area of the 3278 or 3279 Display Station. The symbol is used to define the major problem category, and the numeric code is used to further define the problem. See Appendix B for the significance of the —⌥— and PROG symbols and codes.
- There are also functional symbols that indicate the readiness status, the host attachment status, and operator activity, displayed in the Operator Information Area of the 3278 or 3279 Display Station.
- The 3274 Control Unit has lights that indicate if the problem is probably internal or external to the control unit.

The Host System

The host system consists of the central processing unit (CPU), the channel, and the communication controller or transmission control unit. Communication facilities connect the host system to attached terminals or subsystems, including the 3270 Information Display System. An example of possible system configurations is illustrated in Figure 2-1.

A facility may reside in the host system that can be used for problem determination to the suspected 3270 Information Display System. This facility can be initiated from the suspected 3270 Information Display System or from other elements of the same system.

- The 3270 Information Display System error statistics and transmission line error statistics are logged at the host system through the Facility Error Recognition System (FERS) facility. The retrieval of this data through the FERS facility permits problem determination to the suspected 3270 Information Display System.

  When a nonrecoverable error occurs, it is logged at the host system. The data is retrieved through the display stations and can be displayed in various formats, as follows:

  - A summary of errors by nonswitched line or line groups
  - A summary of errors by 3270 control unit on the specified line
  - A summary of errors by attached terminal on the specified 3270 control unit and a count of 3270 control unit errors, not related to any terminal
  - A summary of errors on a specified terminal in chronological order
  - Additional data describing an error
  - Channel status word (CSW) and/or sense bit combinations

  See the *3270 Facility Error Recognition System (FERS) Service Aid Description,* G229-7031, the *DOS/CICS User's Guide,* G229-7030, and the *OS/CICS User's Guide,* G229-7029, for configuration, implementation, and operation information.

- Display Exception Monitoring Facility (DEMF) is a problem determination tool that is used in isolating problems within a communications network. The process progressively points to each most probable failing component (a line, a control unit, or a terminal). User-oriented images of permanent error counts for all lines, selected lines, control units, and terminals are helpful in determining the location of the problem. Exceptional status conditions, and their interpretations, are provided at the terminal level to aid in determining the most probable cause of the problem.

  This data is presented as:

  - Error counts for remote or local 3270 control units
  - Error counts for all 3270 control units for the specified line, and/or all line errors for the specified line
  - Error counts, by attached terminal, for the specified 3270 control unit
  - A status description, in chronological order, of specific line or terminal errors
  - An explanation of the selected error for the terminal
  - A list of possible causes for various combinations of 3270 sense and status conditions

  Refer to the *OS/VS Display Exception Monitoring Facility User's Guide*, GC34-2003, for details concerning the required software configuration, communication facility, and operating procedures.

- Network Problem Determination Application (NPDA) facilities permit recording, retrieval, and display of statistical data from the 3274 Control Unit. The data is presented as:

  - Communication link test statistics
  - Statistical counts of communication errors, machine errors, and SNA protocol errors
  - Engineering change information relative to the 3274 Control Unit

  Refer to the *Network Problem Determination Application Terminal Use Guide*, SC34-2013, and the *Network Problem Determination Application Error Messages Manual*, SC34-2012, for software configuration, communication, and operating procedures.

If DEMF, FERS, or NPDA is available in your system, it can be accessed by any 3270 terminal. An operator can request data about his own terminal or about any other terminal in the network. An operator can ask for a specific terminal's error data or step through the higher levels (for example, line, control unit) of error information before narrowing the search to a suspected terminal. DEMF, FERS, or NPDA could be all that is required for problem determination.

Appendix A. Status Summary Display

Status Summary Display is a concurrent-test facility that displays the availability status of each terminal relative to a specific control unit.

The test is invoked from any IBM 3278 or 3279 Display Station with keyboard by the following sequence:

1. Depress the ALT and TEST keys.
2. Type in /3.
3. Press the ENTER key.

If the requesting terminal is a 3278 or 3279 Display Station attached to a 3274 Control Unit, the response image displayed is:

Line 1: 0 1 2 3 4 5 6 7 8 9 0 1 . . . N
Line 2: 1, 0, or a – (under each position in line 1)
Line 3: Subsystem statistics (not applicable for problem determination)

Where:

Line 1 = digits representing the low-order digit of the port address per the configuration for that control unit. (Example: 16 ports appear as 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5). Blanks may appear, separating A type ports from B type ports.

Line 2 = terminal status, where:
- 1 = terminal powered on with no control-unit-detected errors
- 0 = terminal powered off or device cable detached
- – = terminal disabled because of errors detected by the control unit.

Appendix B. Status Indicator Codes

Described in this appendix are two categories of check condition symbols (and a reminder symbol) that are followed by a numeric code and displayed in the Operator Information Area on the 3278 or 3279 display screen. The symbol defines a major problem category, and the numeric code further defines the problem. The symbols are:

- ✕ PROG — Program Check. This symbol is displayed when a programming error is detected in the data received by the control unit.
- ✕ —↯— — Communication Check. This symbol is displayed when a communication link error is detected, indicating that data cannot be sent. The communication reminder symbol (—↯—) is displayed as long as the condition that caused the problem exists.

The numeric codes, which follow these symbols, consist of three digits. (The 3274 Control Unit is identified by the ⊡ symbol, displayed in the Readiness location of the Operator Information Area.)

The numeric codes are defined in Figures B-1 and B-2. These codes and their meanings are subject to change from time to time. This information, therefore, may not always be up to date. If there is any doubt, the corresponding material in the latest version of the *3270 Information Display System: Component Description,* GA27-2749, should be considered the final authority.

Error Code	Indicator	Probable Cause	Effect	Recovery
401 (All 3274 Models)	Prog Chk	Invalid command received.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: CR SNA: 1003	Press RESET to reset the program check indicator, and retry the operation. Call host-support programmer if the problem persists, because it is probably a data stream error.
402 (Model 1A) (Model 1C) (Model 51C) (Model 1D)	Prog Chk	Invalid (out-of-range) address has been received following an SBA, RA, or EUA order.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 1005	
403 (Model 1A) (Model 1C) (Model 51C) (Model 1D)	Prog Chk	Data stream containing data following a Rd, Rd Mod, or EAU command was received.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 1003	
404 (Model 1A) (Model 1C) (Model 51C) (Model 1D)	Prog Chk	Data stream ended before all required bytes of an SBA, RA, EUA, or SF order sequence were received.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 1005	
405 (Model 1C-BSC) (Model 51C-BSC)	Prog Chk	Invalid Copy command was received.	Display error indicator on affected 3278/3279. Set sense: OC	
406 (Model 1C-BSC) (Model 51C-BSC) (Model 1D)	Prog Chk	Invalid command sequence received.		
407 (Model 1B)	Prog Chk	Valid command or order received that cannot be executed because: a. SBA, RA, or EUA order specifies an invalid address, or b. Write data stream ends before all required bytes of SBA, RA, EUA, or SF order sequence are received, or c. Write, E/W, or EWA with Start Print bit set in WCC is chained to the next command; the print operation is suppressed.		
408 (Model 1C-BSC) (Model 51C-BSC)	Prog Chk	Line buffer overflow.		
410 (Model 1A)	Prog Chk	RU greater than 1536 bytes received.	Display error indicator on affected 3278/3279. Set sense: 1002	

Figure B-1 (Part 1 of 4). 3274 Program Checks

Error Code	Indicator	Probable Cause	Effect	Recovery
411 (SNA)	Prog Chk	LU1 RU received with greater length than in BIND specification.	Display error indicator on affected 3278/3279. Set sense: 1002	Press RESET to reset the program check indicator, and retry the operation. Call host-support programmer if the problem persists, because it is probably a data stream error.
413 (SNA)	Prog Chk	The attempted function is not supported.	Display error indicator on affected 3278/3279. Set sense: 1003	
414 (Encrypt/Decrypt)	Prog Chk	A bad pool count or a non-module-8 RU has been received during a cryptographic session.		
420 (SNA)	Prog Chk	LIC carried exception response when BIND specified definite response.	Display error indicator on affected 3278/3279. Set sense: 4006	
421 (SNA)	Prog Chk	LIC carried definite response when BIND specified exception response.	Display error indicator on affected 3278/3279. Set sense: 4007	
422 (SNA)	Prog Chk	No Response is not allowed.	Display error indicator on affected 3278/3279. Set sense: 400A	
423 (SNA)	Prog Chk	Format indicator (F) bit is not allowed.	Display error indicator on affected 3278/3279. Set sense: 400F	
430 (SNA)	Prog Chk	Sequence number error.	Display error indicator on affected 3278/3279. Set sense: 2001	
431 (SNA)	Prog Chk	Chaining error.	Display error indicator on affected 3278/3279. Set sense: 2002	
432 (SNA)	Prog Chk	Bracket error.	Display error indicator on affected 3278/3279. Set sense: 2003	
433 (SNA)	Prog Chk	Data Traffic Reset.	Display error indicator on affected 3278/3279. Set sense: 2005	
434 (SNA)	Prog Chk	Direction error.	Display error indicator on affected 3278/3279. Set sense: 2004	
439 (Encrypt/Decrypt)	Prog Chk	FM data received prior to a valid CRV.	Display error indicator on affected 3278/3279. Set sense: 1001	
442 (SNA)	Prog Chk	Request not executable.	Display error indicator on affected 3278/3279. Set sense: 081C	
443 (SNA)	Prog Chk	Change Direction required.	Display error indicator on affected 3278/3279. Set sense: 0829	

Figure B-1 (Part 2 of 4). 3274 Program Checks

Error Code	Indicator	Probable Cause	Effect	Recovery
445 (SNA)	Prog Chk	ACTLU not valid.	Display error indicator on affected 3278/3279. Set sense: 0821	Press RESET to reset the program check indicator, and retry the operation. Call host-support programmer if the problem persists, because it is probably a data stream error.
450-458 (SNA)	Prog Chk	BIND Reject: BIND parameters do not match BIND checks: a. 450=Profile error b. 451=Primary protocol error c. 452=Secondary protocol error d. 453=Common protocol error e. 454=Screen Size specification error f. 455=LU profile error g. 456=LU1 error h. 457=BIND Spec for crypto was specified when feature not present or a CRV was received in CRV-invalid state i. 458=Crypto Master Key mismatch between the host and the control unit. See *Planning and Setup Guide*		
460	Prog Chk	Control unit detected an invalid printer authorization matrix.	Display error indicator on the 3278/3279 on port 0.	
470 (Extended 3270 Data Stream)	Prog Chk	An unsupported order was detected in the data stream.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 1003	
471 (Extended 3270 Data Stream)	Prog Chk	Extended 3270 data stream function cannot be executed because of: a. Unsupported structured field type. b. Device without ECSA feature. c. Invalid load format addressed to PS buffer. d. Invalid X or Y value for Load PS structured field. e. Specified color plane outside of supported range.		

Figure B-1 (Part 3 of 4). 3274 Program Checks

Error Code	Indicator	Probable Cause	Effect	Recovery
471 (continued)	Prog Chk	f. Specified PS Buffer outside of supported range. g. Section ID not supported (Byte H not = 0). h. Invalid length structured field. i. Invalid partition ID. j. Invalid Mode in Set Reply Mode. k. Invalid operation in Read Partition (not Query). l. Alias out of valid range. m. Invalid EBCDIC code point. n. Invalid reserved bits were received in the data stream.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 1005	Press RESET to reset the program check indicator, and retry the operation. Call host-support programmer if the problem persists, because it is probably a data stream error.
472 (Extended 3270 Data Stream)	Prog Chk	Improper command sequence from host, caused by a Read Structured Field state error.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 0871	
473 (Extended 3270 Data Stream)	Prog Chk	a. ECSA adapter present but a PS buffer was addressed that was not physically present. b. A color plane operation was attempted to a buffer with no color plane.	Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 084C	
474 (Extended 3270 Data Stream)	Prog Chk	No extended DCB customized for this device.	The device cannot be used for execution of extended data stream functions. Display error indicator on affected 3278/3279. Set sense: Non-SNA: OC SNA: 1003	Logon for an application that does not require extended data stream function, or; Perform the customizing procedure for the extended DCB for this device and re-IML.
498 (SNA)	Prog Chk	Negative response received.	Display error indicator on affected 3278/3279.	Press RESET to reset the program check indicator, and retry the operation. Call host-support programmer if the problem persists, because it is probably a data stream error.
499 (SNA)	Prog Chk	Exception request.		

Figure B-1 (Part 4 of 4). 3274 Program Checks

Error Code	Indicator	Probable Cause	Effect	Recovery
501 (Model 1C) (Model 51C)	Comm Chk or Reminder	Data Set Ready (DSR) signal from modem has dropped.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Check modem. Press RESET, and retry the operation.
501 (Model 1A) (Model 1B) (Model 1D)	Comm Chk or Reminder	Manual OFFLINE switch in the OFFLINE position.		At the control unit, place switch in the ONLINE position.
501 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	Local/Comm switch set to Local.	Host communication is inhibited.	At the CU, switch the Local/Comm switch to Comm.
502 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	Clear to Send (CTS) signal from the modem is missing.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Check modem. Press RESET, and retry the operation.
503 (Model 1B) (Model 1D)	Comm Chk or Reminder	A selective reset sequence was received.		Press RESET, and retry the operation.
504 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	On a switched network, a DISC has been received.	Display error indicator on all affected 3278s/3279s. The station is closed and disconnected.	A new call sequence is required.
505 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	Initial state of CU, or a Disconnect command was received.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Host recovery. (An SNRM command is required.) Press RESET, and retry the operation.
505 (Model 1A)	Comm Chk or Reminder	Initial state of CU, a Disconnect command, or a System Reset was received.		Host recovery. (A connect sequence is required.) Press RESET, and retry the operation.
505 (Model 1B) (Model 1D)	Comm Chk or Reminder	System Reset was received.	Display error indicator on all 3278s/3279s.	Host recovery. (The first I/O operation, other than TIO or Sense, will clear the Communication Reminder.) Press RESET, and retry the operation.
505 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	Initial state of control unit; a DISC command has been received, or beaconning has been completed.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Host recovery. (An SNRM command is required.) Press RESET and retry the operation.
507 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	No carrier for a 4-second period.	Display error indicator on all 3278s/3279s. The station is closed and wrap tests are performed. If the wrap tests are successful, beaconning is initiated and —\z— 515 is broadcast.	Host recovery. If —\z— 507 remains in the reminder area, check for an X\ 3nn indicator and refer to the description of that error condition.
508 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	A CNFG command was received that specified Set Monitor Mode.	Display error indicator on all 3278s/3279s. Monitor Mode is entered.	A CNFG command that specifies CLEAR or RESET is required from the host.
509 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	A CNFG command was received that specified Suppress Loop Carrier Mode.	Display error indicator on all 3278s/3279s. The controller suppresses the carrier after responding to the CNFG command.	

Figure B-2 (Part 1 of 4). 3274 Communication Checks or Reminders

Error Code	Indicator	Probable Cause	Effect	Recovery
510 (SNA)	Comm Chk or Reminder	The PU is not active.	Display error indicator on all 3278s/3279s.	Host recovery. (ACTPU is required.)
511 (Model 1A)	Comm Chk or Reminder	Disconnect command was received when PU was active.		Host recovery. (Connect is required.)
512 (Model 1A)	Comm Chk or Reminder	Connect command was received when PU was already connected.		Host recovery. (ACTPU is required.)
514 (Model 1A)	Comm Chk or Reminder	Connect error caused by: a. Odd number buffer length was specified, or b. Insufficient length buffer was specified.		Host recovery. (Valid Connect is required.)
515 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	While monitoring carrier, a No-carrier condition was detected and wrap tests were successfully run.	Beaconning mode is entered and carrier is sampled.	Receipt of more than 50% carrier samples will cause the station to stop beaconning. Carrier is required (see 505).
518 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	A segment was received with improper sequencing in the TH MPF bits.	Display error indicator on all 3278s/3279s; all PUs and LUs are deactivated.	Host recovery. (SNRM is required.)
519 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	A message was received that is larger than the CU buffer.	CCA: SDLC Command Reject response is sent to host. HPCA: NR/NS mismatch	Host recovery. (Check NCP Sysgen parameters if the condition persists.)
520 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	Nonproductive timeout caused by: a. A valid frame not received in the past 20-25 seconds, or b. The communication line is hung at space or a valid data character.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Verify the operational status of the communication network. Reset by receipt of a valid frame or a frame containing a poll.
521 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	No Flag characters on the line in the past 20-25 seconds. On a switched network, two successive occurrences of an idle timeout will cause the station to disconnect.		
522 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	The control unit Read Control Block overflowed. The line may be hung at a space or valid data character.		

Figure B-2 (Part 2 of 4). 3274 Communication Checks or Reminders

Error Code	Indicator	Probable Cause	Effect	Recovery
525 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	A connection problem exists on the communications link that prevents establishing or reestablishing host communication (set by receipt of 20 Write retries, 20 ROLs, 20 CRs, 20 XIDs, or 20 NSAs).	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Verify the operational status of the communication network.
525 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder		Display error indicator on all 3278s/3279s. Host communication is inhibited. The station is closed and wrap tests are performed. If the wrap tests fail, X'332', 333, or 336 is broadcast.	Verify the operational status of the network. If the wrap tests failed, an IML is required. If the wrap tests were successful, an SNRM is required.
527 (Model 51C; Multi-Use Comm Loop)	Comm Chk or Reminder	Write timeout caused by a clocking problem or a missing CTS.		Verify the operational status of the network and re-IML.
528 (Model 1C-SDLC) (Model 51C-SDLC)	Comm Chk or Reminder	Command Reject caused by: a. Detection of an NR sequence error, or b. Receipt of a command that has no data field defined, or c. Receipt of an invalid command.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Host recovery (SNRM required). Verify proper 370X parameters, if condition persists.
529	Comm Chk or Reminder	Abnormal response from the modem.	Display error indicator on all 3278s/3279s. Host communication is inhibited. All PUs and LUs are deactivated.	Check modem; Host recovery (SNRM required).
530 (Model 1C) (Model 51C)	Comm Chk or Reminder	Write timeout caused by: a. Modem clocking missing, or b. CTS has dropped.	Display error indicator on all 3278s/3279s. Host communication is inhibited. In SDLC, all PUs and LUs are deactivated.	Check modem; Host recovery. (In SDLC, SNRM is required.)
531 (Model 1C-BSC) (Model 51C-BSC)	Comm Chk or Reminder	CU has sent an NAK response because: a. A BCC error was detected, or b. Three seconds elapsed during a Read operation without receiving Syn, ETX, or ETB, or c. A forward abort (ENQ in text) was received, or d. A Temporary Text Delay sequence (STX ENQ) was received.	Display error indicator on the affected 3278s/3279s. The terminal buffer affected is restored to its state before the error occurred.	Host recovery. (Host should retransmit the last transmission.)

Figure B-2 (Part 3 of 4). 3274 Communication Checks or Reminders

Error Code	Indicator	Probable Cause	Effect	Recovery
532 (Modél 1C-BSC) (Model 51C-BSC)	Comm Chk or Reminder	Approximately 20 seconds have elapsed without detecting SYN characters on the line.	Display error indicator on all 3278s/3279s. Host communication is inhibited.	Verify the operational status of the communication network. Host recovery. (A valid Poll or Selection Addressing sequence is required.)
533 (Model 1C-BSC) (Model 51C-BSC)	Comm Chk or Reminder	The CU did not receive ETX or ETB with the last block of text transmitted by the host system. The host system has sent ENQ to the CU.	Display error indicator on the 3278s/3279s. The terminal buffer affected is restored to its state before the error occurred. The CU will transmit its last ACK (1/0).	Host recovery. (Host should retransmit the last transmission sent that preceded ENQ.)
534 (Model 1C-BSC) (Model 51C-BSC)	Comm Chk or Reminder	a. The CU did not receive a response to its last block sent, and has sent ENQ 15 times. b. The CU has acknowledged a Selection Addressing sequence or a Text block received from the host system and has waited 45 seconds without detecting synchronization (PADs and SYNs).	Display error indicator on the affected 3278s/3279s. Host communication is inhibited. The CU transmits EOT.	Host recovery. (A valid Poll or Selection Addressing is required.)
535 (Model 1C-BSC) (Model 51C-BSC)	Comm Chk or Reminder	The CU received 15 consecutive NAKs to its last transmission.		
536 (Model 1C-BSC) (Model 51C-BSC)	Comm Chk or Reminder	The CU received 15 consecutive ACK0s instead of ACK1s, or vice versa.		
551 (Model 1B) (Model 1D)	Comm Chk or Reminder	CU detected bad parity on any command or data byte received.	Display error indicator on affected 3278/3279. Set sense: BOC	Host recovery.

Figure B-2 (Part 4 of 4). 3274 Communication Checks or Reminders

Glossary of Terms and Abbreviations

A

A-port. A 3274 device cable connection point for a category A terminal.

A-type terminals. See *category A terminals.*

ACK. A positive acknowledgment.

ACTLU. Activate Logical Unit.

ACTPU. Activate Physical Unit.

alias. Alternate label.

B

B-port. A 3274 device cable connection point for a category B terminal.

B-type terminals. See *category B terminals.*

BB. Begin bracket.

BCC. Block check character.

BETB. Between bracket.

BOC. Bus out check.

BSC. Binary Synchronous Communications.

C

category A terminals. Terminals that attach to a type A terminal adapter: 3278 Display Station, 3279 Color Display Station, 3287 Printer (120 characters per second), 3289 Line Printer.

category B terminals. Terminals that attach to a type B terminal adapter: 3277 Display Station; 3284, 3286, 3287 Printer; 3288 Line Printer.

CCA. Common communication adapter.

CD. Change direction.

channel. A hardware device that connects the CPU and main storage with the I/O control units.

CNFG. Configure.

communication facilities. Anything used or available for use in furnishing data communication service.

communication line. Any medium, such as a wire or a telephone circuit, that connects a remote station with a computer.

communication link. The physical means of connecting one location to another for the purpose of transmitting and receiving data.

communication controller. A type of communication control unit whose operations are controlled by a program stored and executed in the unit.

concurrent test. A test that can be run within the same time interval that is used for other work.

control unit (CU). A device without programmable storage that controls input/output operations at one or more devices.

control unit port. As used in this publication, the device cable connection point at a control unit.

CPU. Central processing unit.

CR. Command reject.

CRV. Cryptography Verification.

crypto. Encrypt/Decrypt.

CS. Current state.

CSW. Channel status word.

CTS. Clear to send.

CU. Control unit.

D

DAF. Destination address field.

DCB. Device control block.

DEMF. Display Exception Monitoring Facility.

DFC. Data flow control.

DISC. Disconnect.

DSR. Data set ready.

E

EAU. Erase all unprotected.

EB. End brackets.

ECSA. Extended character set adapter.

EIA. Electronic Industries Association.

ENQ. Enquiry.

EOT. End of transmission.

ETB. End of transmission block.

ETX. End of text.

E/W. Erase/write.

EWA. Erase write alternate.

EXR. Exception response.

F

FERS. Facility Error Recognition System.

FI. Format indicator.

FM. Field mark.

H

HPCA. High-Performance Communication Adapter.

I

INC. In chain (state).

I/O. Input/output.

L

LIC. Last in chain.

local copy operation. An operation that copies the contents of the buffer from one display station or printer to another display station or printer attached to the same control unit.

logged. Recorded.

LOGON. A request by or on behalf of a terminal to be connected to an application program.

LU. Logical unit.

M

modem. A modulator-demodulator.

modulator-demodulator (modem). A device that modulates and demodulates signals transmitted over communication facilities (sometimes called a *data set*).

MPF. Mapping field.

N

NAK. A negative acknowledgment.

NCP. Network control program.

No RTR. Not ready to receive.

nonswitched line. A connection between a remote terminal and a computer that does not have to be established by dialing.

NPDA. Network Problem Determination Application.

NR/NS. A receive sequence count/send sequence count.

NSA. Nonsequenced acknowledgment.

O

OAF. Origin address field.

OC. Operation check.

Operator Information Area. The area on a display screen, below the horizontal line, used to display operator information.

P

PAD. Pad characters, generated to ensure complete transmission or reception of the first and last significant characters of each transmission.

PDG. Problem Determination Guide.

PIU. Path information unit.

PLU. Primary logical unit.

port, control unit. As used in this publication, the device cable connection point at a control unit.

PU. Physical unit.

R

RA. Repeat to address.

Rd. Read.

Rd Mod. Read modified.

RH. Request/response header.

ROL. Request online.

RTR. Ready to receive.

RU. Request/response unit.

S

SBA. Set buffer address.

SDLC. Synchronous Data Link Control.

SF. Start field.

SLU. Secondary logical unit.

SNA. Systems Network Architecture.

SNBU. Switched network backup.

SNRM. Set normal response mode.

STX. Start of text.

SYN. Synchronous idle.

T

TCU. Transmission control unit.

TH. Transmission header.

TIO. Test I/O.

transmission control unit (TCU). An input/output control unit that addresses messages to and receives messages from a number of remote terminals.

W

WCC. Write control character.

X

XID. Exchange station identification.

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Problem Determination

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