

Systems

IBM 3274 Control Unit User's Guide

Section 1. Operator Information

Section 2. Problem Determination



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User's Guide**

Section 1. Operator Information

Section 2. Problem Determination

IBM

Eighth Edition (August 1985)

This major revision obsoletes GA27-2850-6. Much of this guide has been reorganized and rewritten.

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Preface

This manual contains 3274 operator reference information and 3274 subsystem problem determination procedures. It is intended for the operator of the IBM 3274 Control Unit and for the person who does problem determination.

For the purposes of this manual, the 3274 subsystem consists of a 3274 Control Unit, attached 3299 Terminal Multiplexer units, and attached printers and display stations.

Organization of Manual

This manual has two sections:

- Section 1, “Operator Information,” briefly describes the various models of the 3274 Control Unit, discusses the care and use of diskettes, and identifies and describes the functions of the various switches and indicators (lights) on the 3274 operator panel. The switches and indicators on a 3274 operator panel are model- and feature-dependent; therefore, you must select the appropriate figure in the guide when reviewing this type of data about your 3274.

In addition, this section explains:

- The Encrypt/Decrypt feature, which can be installed in the 3274 Model 1C, 21C, 31C, 41C, 51C, or 61C
 - The 3274 Dial-Up telephone facilities
 - The /3 Test (status summary display test), which you use to obtain statistical information about the various elements of your 3274 subsystem.
- Section 2, “Problem Determination,” contains an overview of problem determination from a subsystem perspective,

followed by a symptom index chart that will sometimes isolate your problem directly and, at other times, lead you to strategic points in detailed problem determination procedures. The problem determination strategy starts at the attached devices and progresses toward the 3274 Control Unit.

How to Do Problem Determination

The person responsible for problem determination should become familiar with the concepts and facilities described in this manual and, once familiar with them, be able to use Section 2 for problem determination when a problem occurs.

The problem determination procedures ask you specific questions and instruct you to take certain actions and to record the results on the *3274 Control Unit Problem Report Form*, GX23-0203. A sample of this form is given in Figure 2-2 on page 2-52. In some cases, the procedures tell you to perform problem determination on one of the devices attached to your 3274 directly, or on devices attached to your 3274 via a 3299. Be sure you have a copy of the problem determination guide for each type of device attached to your 3274 Control Unit (see “Related Publications” for publication order numbers).

Related Publications

- **Following is a list of problem determination guides that you may need:**

IBM 3178 Display Station Operator Reference Guide,
GA18-2128

IBM 3179 Color Display Station Operator Guide,
GA18-2180

IBM 3180 Display Station Model 1 User's Guide,
GA21-9468

IBM 3230 Printer Model 2 Operator's Guide, GA24-3767
(includes problem determination procedures)

*IBM 3262 Printer Models 3 and 13 Operator Instruction
and Status Codes,* GA24-3752

IBM 3268 Printer Model 2 Operator's Guide, GA27-3270

IBM 3270 Personal Computer Maintenance Information,
SY27-2567 (PN 1837436)

*IBM 3270 Personal Computer Hardware Problem
Determination,* GA23-0233

IBM 3270 Personal Computer Attachment User's Guide,
SA23-0169

*IBM 3278 Display Station Problem Determination
Guide,* GA27-2839

*IBM Personal Computer 3278/3279 Emulation Adapter
Installation/ Problem Determination Guide,* PN 6936421

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

*IBM 3287 Printer Models 1 and 2 Problem
Determination Guide,* GA27-3151

*IBM 3287 Printer Models 1C and 2C Problem
Determination Guide,* GA27-3231

*IBM 3289 Line Printer Models 1 and 2 Error Recovery
and Problem Determination Guide,* GA27-3141

*IBM 3290 Information Panel Customer Problem
Analysis and Resolution,* GA23-0125 (U.S. and Canada)

IBM 3290 Information Panel Problem Determination Guide, GA23-0126 (WT except Canada)

IBM 3299 Terminal Multiplexer Customer Problem Analysis and Resolution, GA23-0142 (U.S. and Canada)

Note: *You should also have a copy of the IBM 3270 Information Display System: Reference Summary, GX20-1878-5 or higher. This document contains abbreviated problem determination procedures in regard to 3274 status and nnn codes. The primary source of information for the Reference Summary is the 3274 Control Unit Description and Programmer's Guide, GA23-0061.*

- **Besides the 3274 Problem Report Form, GX23-0203, you may also need:**

IBM Repair Authorization Form, GX24-3762

IBM 3262 Printer Models 3 and 13 Trouble Report Form, GX24-3749

IBM 3268 Printer Models 1 and 2 Operator's Trouble Report Form, GX27-2937

IBM 3275/3277 Trouble Report Form, GX23-0202

IBM 3276/3278/3279 Problem Report Form, GX23-0201

IBM 3284/3286/3288 Trouble Report Form, GX23-0204

IBM 3287 Printer Models 1 and 2 Operator's Trouble Report, GX27-2923

IBM 3287 Printer Models 1C and 2C Operator's Trouble Report Form, GX27-2931

*IBM 3289 Line Printer Models 1 and 2 Operator's
Trouble Report Form, GX27-2922*

IBM 4250 Printer Trouble Report Form, GX33-1503

- **Other publications you may need are:**

*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.

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 not included in this publication.

Problem determination procedures for an IBM 3276 Control Unit Display Station with its attached devices are described in the *IBM 3270 Information Display System: System Problem Determination for 3276 Control Unit Display Stations*, GA18-2042, and are purposely not included in this publication.

Contents

Section 1. Operator Information	1-1
Introduction	1-1
3274 Diskettes	1-3
Care of Diskettes	1-4
Diskette Shipping and Receiving	1-6
Diskette Long-Term Storage	1-6
Inserting a Diskette into a 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D	1-6
Removing a Diskette from a 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D	1-11
Inserting a Diskette into a 3274 Model 41A, 41C, or 41D	1-12
Removing a Diskette from a 3274 Model 41A, 41C, or 41D	1-14
Inserting a Diskette into a 3274 Model 51C or 61C	1-15
Removing a Diskette from a 3274 Model 51C or 61C	1-17
3274 Operator Panels (Figures 1-7 through 1-15)	1-18
3274 Encrypt/Decrypt Feature	1-35
Battery Replacement – Models 1C, 21C, 31C, 41C, 51C, and 61C	1-36
Entering a Master Key Code	1-38
Verifying the Master Key Code	1-41
Encrypt/Decrypt Feature Test	1-43
3274 Dial-Up Telephone Facilities	1-47
Dial Operation	1-47
Dial Operating Procedures	1-49
Sending Message Data to the Host System	1-49
Receiving Message Data from the Host System	1-53
/3 Test (Status Summary Display Test)	1-57
Section 2. Problem Determination	2-1
Introduction	2-1
Overview of Subsystem Problem Determination	2-2
Problem Determination Levels	2-2
Problem Determination Facilities	2-3
Start Here to Isolate Your Subsystem Problem	2-4
Preliminary Checks	2-4
Symptom Table	2-5
3299 Service/Replacement Procedure	2-6
Problem Determination Procedures	2-7

Figures

- 1-1. IBM 3274 Control Unit Model 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D, 41A, or 41D 1-2
- 1-2. IBM 3274 Control Unit Model 51C or 61C 1-2
- 1-3. Diskette in Its Gray Protective Envelope 1-5
- 1-4. 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D Diskette Reader Enclosure and Diskette Storage Compartment 1-7
- 1-5. 3274 Model 41A, 41C, or 41D Diskette Reader Enclosure and Diskette Storage Compartment 1-12
- 1-6. 3274 Model 51C or 61C Diskette Reader Enclosure and Diskette Storage Compartment 1-15
- 1-7. 3274 Model 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D, 41A, or 41D Operator Panel 1-18
- 1-8. 3274 Model 1C, 21C, 31C, or 41C Operator Panel without the Integrated Modem Feature 1-19
- 1-9. 3274 Model 31C Operator Panel with the Integrated Modem Feature 1-20
- 1-10. 3274 Model 51C or 61C Operator Panel with the Digital Data Service (DDS) Adapter or X.21 Feature and with the Encrypt/Decrypt Feature 1-22
- 1-11. 3274 Model 51C or 61C Operator Panel with the Loop Attachment Feature 1-24
- 1-12. 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature or External Modem Feature and with the Encrypt/Decrypt Feature 1-26
- 1-13. 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature and with either (1) the Switched Line with Auto Answer Feature; and with the Encrypt/Decrypt Feature 1-28
- 1-14. 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature and with either (1) the Switched Line with Manual Answer Feature or (2) the Nonswitched Line with SNBU and Manual Answer Feature; and with the Encrypt/Decrypt Feature 1-30
- 1-15. 3274 Model 51C Operator Panel with the 2400-, 4800-, or 9600-bps Integrated Modem Feature; and with the Encrypt/Decrypt Feature 1-32
- 2-1. IBM 3299 Terminal Multiplexer Configurations 2-51
- 2-2. Sample of an IBM 3274 Control Unit Problem Report Form 2-52

Section 1. Operator Information

Introduction

The function of your 3274 Control Unit is to direct all communication between your organization's host system and its associated display stations and printers. The 3274 and the attached display stations and printers form a cluster of devices used to execute your organization's applications.

The 3274 is available in the following models:

- Models 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D, 41A, and 41D are attached directly to a host system and can control up to 32 devices.
- Models 1C, 21C, 31C, and 41C are attached to a host system through a communication facility and can control up to 32 devices.
- Models 51C and 61C are attached to a host system through a communication facility, an 8100 Information System loop, or a 4331 Processor loop. The Model 51C can control up to 12 devices; the Model 61C can control up to 16 devices.

Figure 1-1 on page 1-2 shows a 3274 Model 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D, 41A, or 41D. Models 1C, 21C, 31C, and 41C are similar, but do not have the Power/Interface rotary switch and the Local/Offline indicator installed on the operator panel. (See Figure 1-7 on page 1-18 and Figure 1-8 on page 1-19.) A 3274 Model 51C or 61C is shown in Figure 1-2 on page 1-2.

After the 3274 is set up or installed and customized (configured for your installation), you will normally only have to turn on the 3274 (with the correct 3274 system or load diskette loaded into the diskette reader) to prepare it for operation. Depending upon your organization's applications, however, you may be required to load different diskettes for different system applications.



Figure 1-1. IBM 3274 Control Unit Model 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D, 41A, or 41D

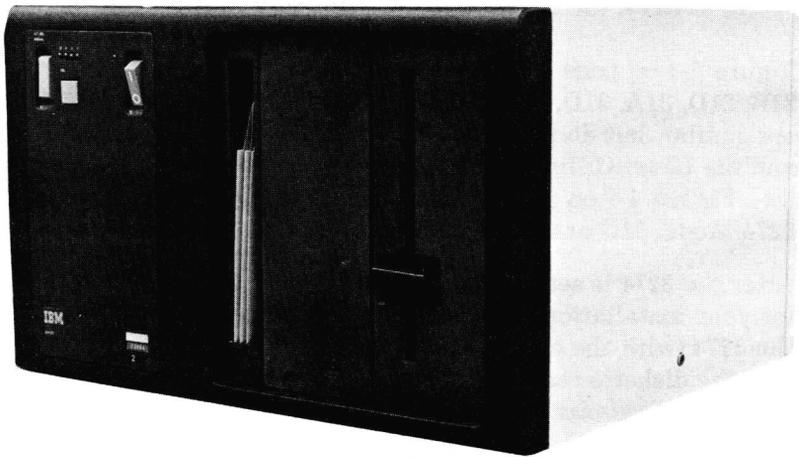
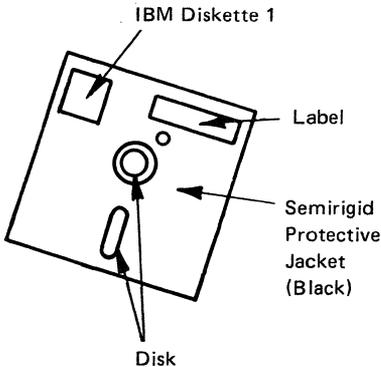


Figure 1-2. IBM 3274 Control Unit Model 51C or 61C

This section describes the handling and loading of the 3274 diskettes, the 3274 operating controls, and the basic 3274 operating procedures. Details that are special to your organization, however, are not included. Operating procedures that are unique to your organization are provided by the appropriate person in your organization and are found in your organization's user's guide.

3274 Diskettes

A diskette (shown below) is a thin, flexible magnetic disk and a semirigid protective jacket in which the disk is permanently enclosed.



Warning: Do NOT try to remove the flexible magnetic disk from its semirigid protective jacket (black).

The function of the diskette is to store information that the 3274 (and attached 3179G or 3290 display) needs for operation. The types of diskettes associated with the 3274 are the system diskette, the load diskette, the feature diskette, the language diskette, the RPQ diskette, and the Encrypt/Decrypt diskette.

The system diskette is the diskette that you will use in the daily operation of the 3274 if you do not have a 3179G or 3290

display attached. This diskette contains test and configuration information that is unique to your organization. For example, the system diskette contains information that describes all devices attached to the 3274.

The load diskette is the diskette that you will use in the daily operation of the 3274 if you have a 3179G or 3290 display attached. This diskette contains test and configuration information that is unique to your organization.

The feature diskette and the language diskette are used to customize the 3274's system diskette after the 3274 is installed or set up. These diskettes are not generally used in the daily operation of the 3274.

The RPQ diskette contains the alterations or additions to the functional capabilities of the 3274 to fulfill your unique data processing requirements.

The Encrypt/Decrypt diskette is used to install the Encrypt/Decrypt feature, including the terminal master key, in 3274 Models 1C, 21C, 31C, 51C, and 61C.

Care of Diskettes

When not loaded in the 3274 diskette reader enclosure, a diskette should be stored inside the diskette storage compartment (Figure 1-3 on page 1-5 and Figure 1-4 on page 1-7). Though not very fragile, diskettes can be damaged. When handling the diskette, grasp it only by the top edge. See Figure 1-3 on page 1-5.

You can prevent possible damage to diskettes if you observe the following precautions:

- Do not fold the diskette or its gray protective envelope when storing it in the diskette storage compartment.
- Do not try to clean the surface of a diskette. If it is contaminated (by eraser dust, finger prints, spills, or

cleaning fluid), discard it. Failure to do so can cause the 3274 to fail and to require service before your operations can continue.

- Never write on a diskette. Pencil lead or ink can contaminate the surface and cause errors. The pressure of a pencil or pen point can also damage the surface, even through the protective paper envelope.
- Never use paper clips or staples on a diskette.
- Never place heavy objects on a diskette. Warped, torn, or creased diskettes will not work properly.
- Never expose a diskette to direct sunlight or to excessive heat.
- Always keep diskettes away from magnetic fields or magnetic materials.
- Always place each of your diskettes in its gray protective envelope before storing it. (See Figure 1-3.)

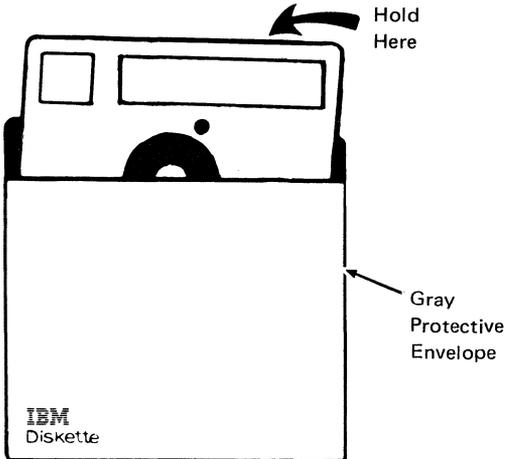


Figure 1-3. Diskette in Its Gray Protective Envelope

Diskette Shipping and Receiving

Diskettes should always be shipped inside the original shipping container; an ordinary envelope does not provide enough protection. Also, be sure to label the package: **DO NOT EXPOSE TO EXCESSIVE HEAT** (temperatures above 51.5° C or 125° F) **OR DIRECT SUNLIGHT**.

Upon receiving diskettes, check for damage to the shipping container or to the diskette. Save the shipping container for storing the diskette and for later shipment.

Diskette Long-Term Storage

Place diskettes in their protective envelopes, and store them in the following environment:

- Temperature: 10° to 51.5° C (50° to 125° F)
- Relative humidity: 8% to 80%

Before using a diskette that has been exposed to temperatures outside the above environment range, allow the diskette to adjust to room temperature for 5 minutes. The diskette can be removed from its shipping container while adjusting to room temperature, but should be kept in its gray protective envelope.

Inserting a Diskette into a 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D

1. Open the customer access door (Figure 1-4 on page 1-7).
2. Open the diskette reader enclosure door by pressing the latch to the right.

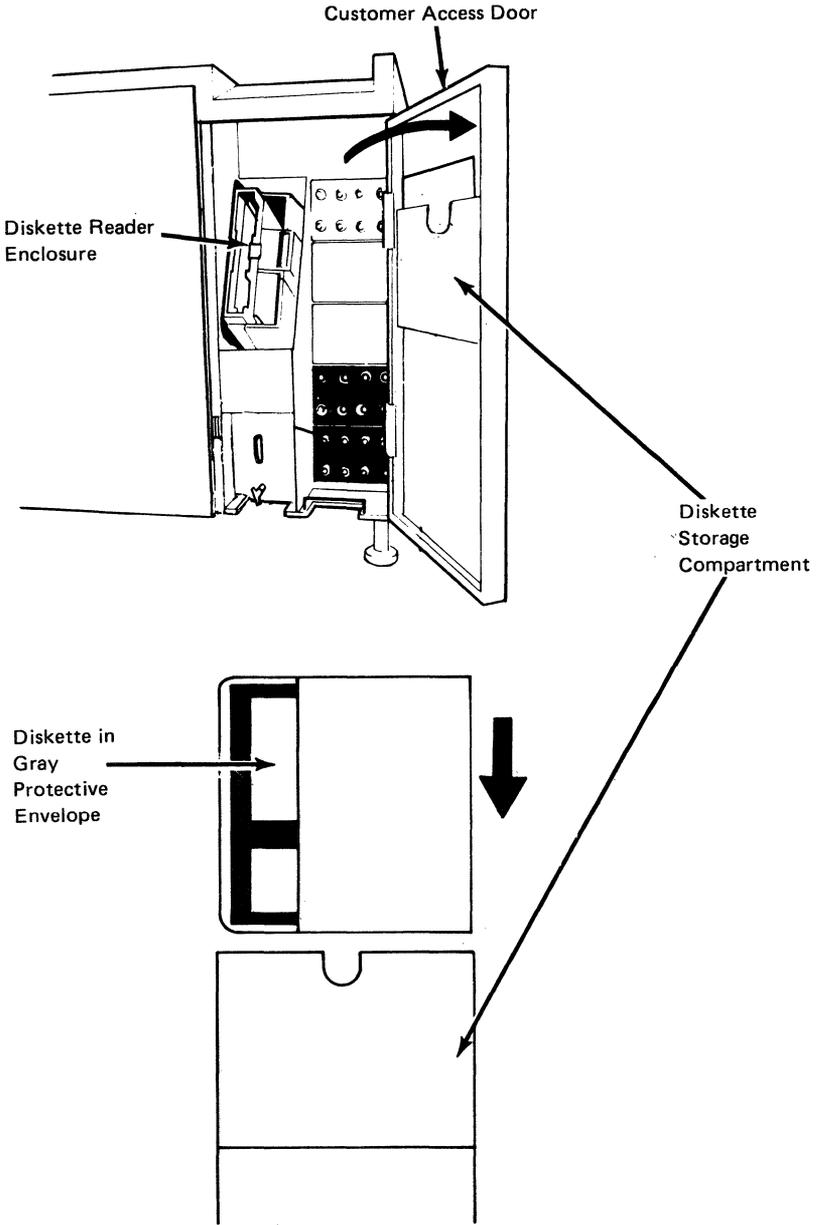
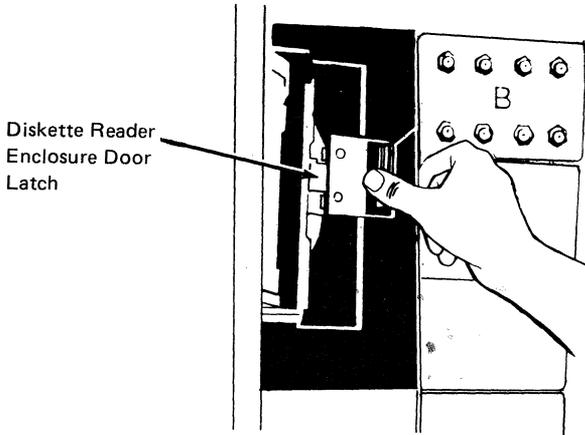
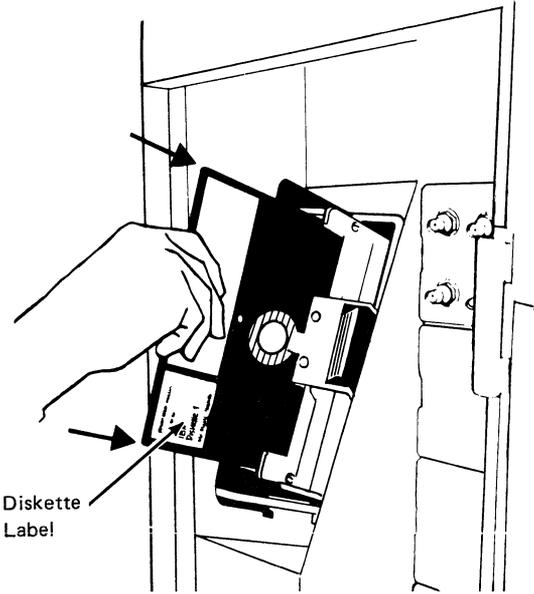


Figure 1-4. 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D Diskette Reader Enclosure and Diskette Storage Compartment

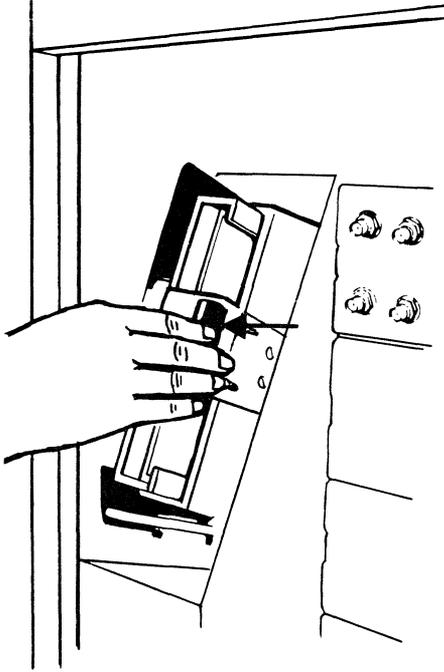
3. Remove the diskette from its gray protective envelope. Place the diskette protective envelope in the diskette storage compartment.



4. Insert the diskette squarely into the diskette reader enclosure, with the label facing right as shown.



5. Close the diskette reader enclosure by pushing the enclosure latch to the left until it fastens with a noticeable snap.



6. Close the customer access door.

The diskette is now loaded, and the 3274 is ready to be used.

Removing a Diskette from a 3274 Model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D

1. Open the customer access door (Figure 1-4 on page 1-7).
2. Open the diskette reader enclosure by pressing the enclosure door latch to the right.
3. Remove the diskette from the diskette reader enclosure.
4. Place the diskette in its gray protective envelope, and store it in the diskette storage compartment in the customer access door (Figure 1-4 on page 1-7).

Inserting a Diskette into a 3274 Model 41A, 41C, or 41D

1. Open the customer access door (Figure 1-5).

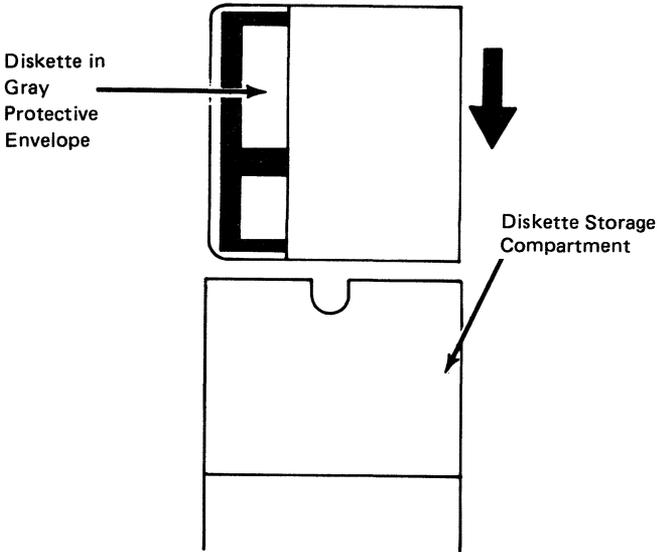
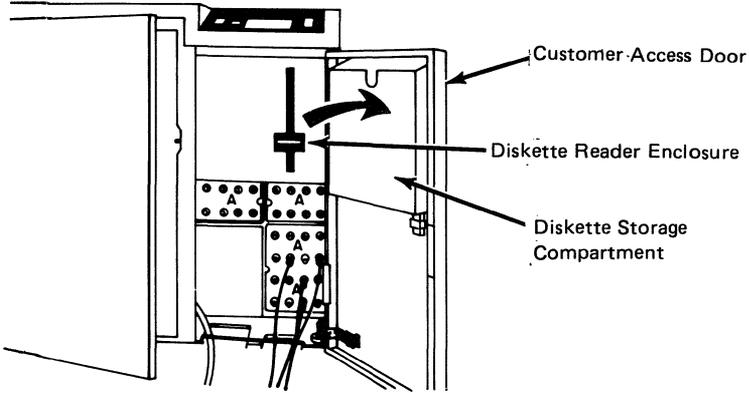
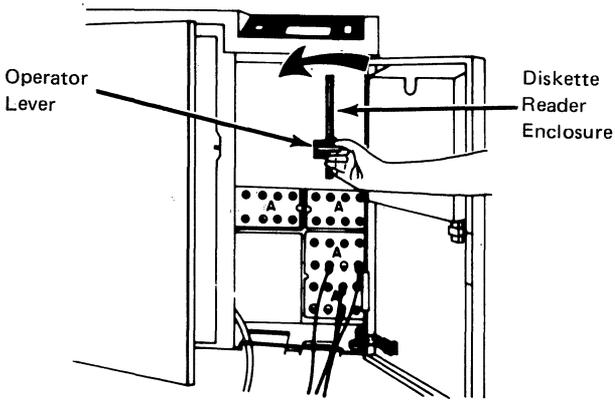
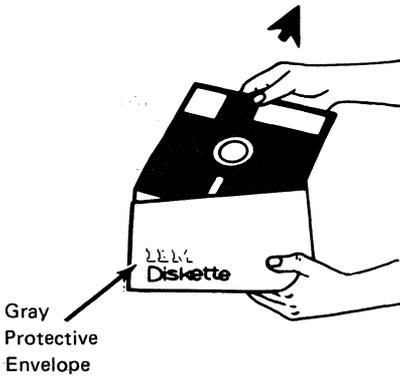


Figure 1-5. 3274 Model 41A, 41C, or 41D Diskette Reader Enclosure and Diskette Storage Compartment

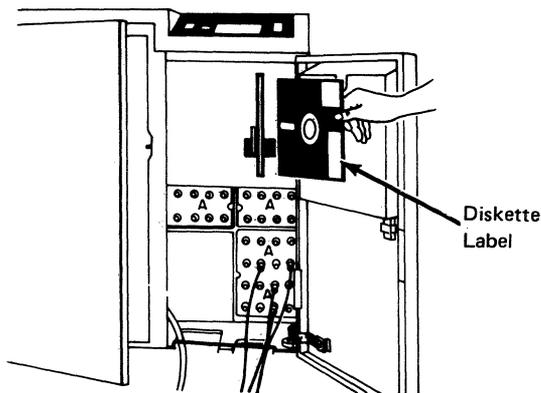
2. Open the diskette reader enclosure by turning the operator lever counterclockwise to the vertical position.



3. Remove the diskette from its gray protective envelope. Place the diskette protective envelope in the diskette storage compartment.



4. Insert the diskette squarely into the diskette reader enclosure, with the label facing left as shown.



5. Close the diskette reader enclosure by turning the operator lever clockwise to the horizontal position.
6. Close the customer access door. The diskette is now loaded, and the 3274 is ready to be used.

Removing a Diskette from a 3274 Model 41A, 41C, or 41D

1. Open the customer access door (Figure 1-5 on page 1-12).
2. Open the diskette reader enclosure by turning the operator lever counterclockwise to the vertical position.
3. Remove the diskette from the diskette reader enclosure.
4. Place the diskette in its gray protective envelope, and store it in the diskette storage compartment in the customer access door (Figure 1-5 on page 1-12).

Inserting a Diskette into a 3274 Model 51C or 61C

1. Open the diskette reader enclosure by turning the operator lever counterclockwise to the vertical position (Figure 1-6).

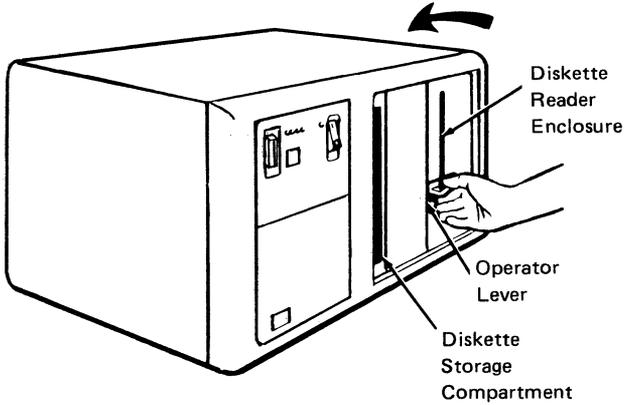
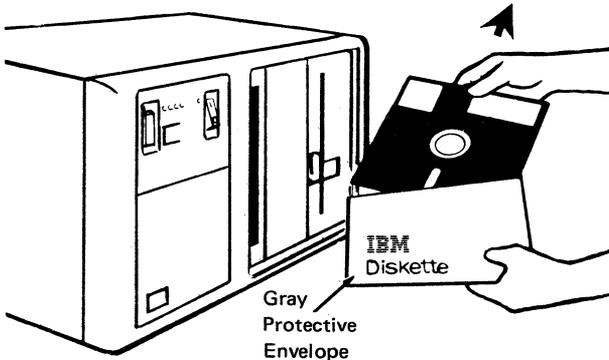
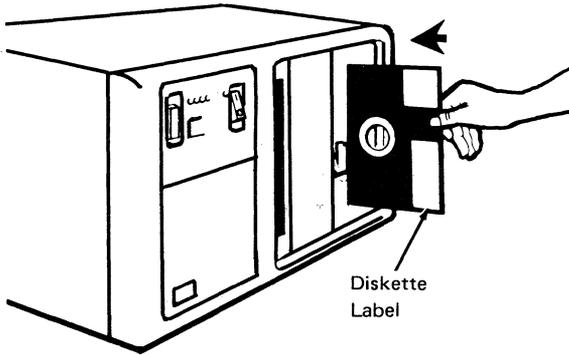


Figure 1-6. 3274 Model 51C or 61C Diskette Reader Enclosure and Diskette Storage Compartment

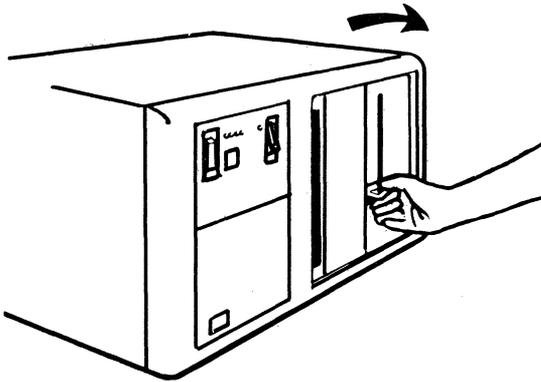
2. Remove the diskette from its gray protective envelope. Place the protective envelope in the diskette storage compartment.



3. Insert the diskette squarely into the diskette reader enclosure, with the label facing left as shown.



4. Close the diskette reader enclosure by turning the operator lever clockwise to the horizontal position.

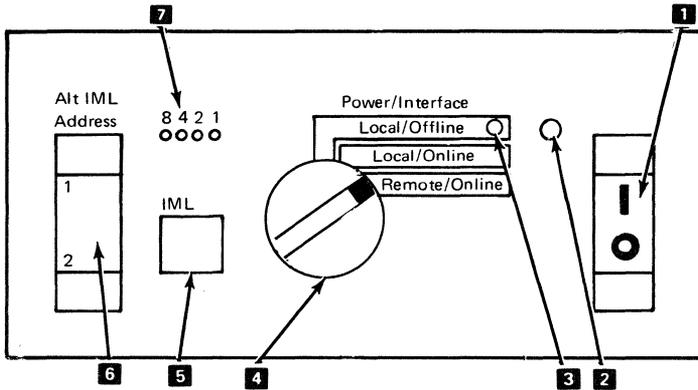


5. The diskette is now loaded, and the 3274 is ready to be used.

Removing a Diskette from a 3274 Model 51C or 61C

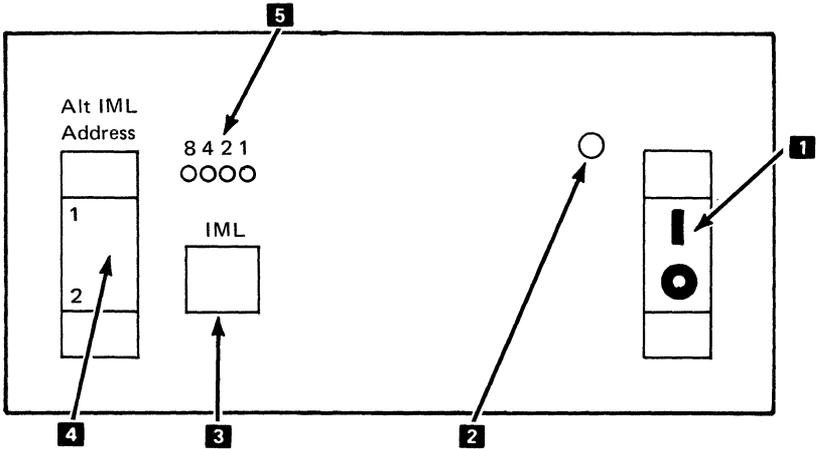
1. Open the diskette reader enclosure by turning the operator lever counterclockwise to the vertical position.
2. Remove the diskette from the diskette reader enclosure.
3. Place the diskette in its gray protective envelope, and store it in the diskette storage compartment.

3274 Operator Panels (Figures 1-7 through 1-15)



- | Ref | Description |
|-----|--|
| 1 | On/Off switch: = On; ○ = Off. |
| 2 | On indicator: Indicates the 3274 is powered on. |
| 3 | Local/Offline indicator: Indicates that the 3274 is in Offline mode. |
| 4 | Power/Interface switch: <ul style="list-style-type: none"> Local/Offline: Set to this position, and wait for the Local/Offline indicator to light before turning off the 3274 or performing a manual IML. Local/Online: Permits turning on the 3274 regardless of the host system power state. Remote/Online: 3274 power is controlled by the host system power state. |
| 5 | IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. |
| 6 | Alt IML Address switch: <ul style="list-style-type: none"> Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Can sometimes be used after normal IML fails. Also used to allow a microcode dump in any 3274 Model A or D.
Warning: Butting the 3274 directly online with the Local/Offline indicator off and the Power/Interface switch in the Local/Offline position will cause channel/host errors. Position 2: Not operational for locally attached 3274s. |
| 7 | 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status. |

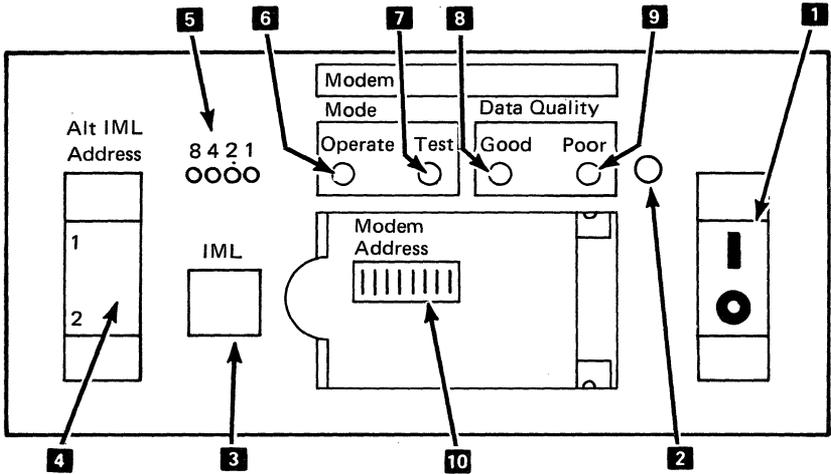
Figure 1-7. 3274 Model 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D, 41A, or 41D Operator Panel



Ref Description

- 1** On/Off switch: **I** = On; **○** = Off.
- 2** On indicator: Indicates the 3274 is powered on.
- 3** IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded.
- 4** Alt IML Address switch:
- Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails.
 - Position 2: Holding, while pressing the IML pushbutton, causes extended remote interface tests to run (not operational if locally attached).
- 5** 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.

Figure 1-8. 3274 Model 1C, 21C, 31C, or 41C Operator Panel without the Integrated Modem Feature



Ref Description

- 1** On/Off switch: = On; = Off.
- 2** On indicator: Indicates the 3274 is powered on.
- 3** IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. With the Integrated Modem feature, the integrated modem self-test requires a power-on reset to run.
- 4** Alt IML Address switch:
 - Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails.
 - Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run.

Pressing and holding causes the integrated modem self-test to run and to repeat approximately every 4 seconds until the switch is released.
- 5** 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.

Figure 1-9 (Part 1 of 2). 3274 Model 31C Operator Panel with the Integrated Modem Feature

Ref **Description**

- 6** Operate indicator: Indicates the integrated modem is ready to exchange data with the attached communication network.
- 7** Test indicator: Indicates the integrated modem is in test mode.
- 8 9** Good/Poor data-quality indicators: Indicate the quality of received data as follows:

Good	Poor¹	Meaning
On	Off	Good signal quality (no errors)
Flashing	Off or flashing	Marginal signal quality (about three bit errors per second)
Off	On or flashing	Poor signal quality (about six bit errors per second)
Off	Off	No signal being received
On	On	Temporary condition (1 second or less) – ignore

¹When the integrated modem self-test is run with the Alt IML address switch pressed in the 2 position, the Poor indicator should light if the self-test is failing. The indicator turns off when the switch is released.

- 10** Modem Address switches (8): These eight switches should provide the address for host-invoked link problem determination aid (LPDA) diagnostic tests. The address switches should correspond to the 3274 address that was customized.

Figure 1-9 (Part 2 of 2). 3274 Model 31C Operator Panel with the Integrated Modem Feature

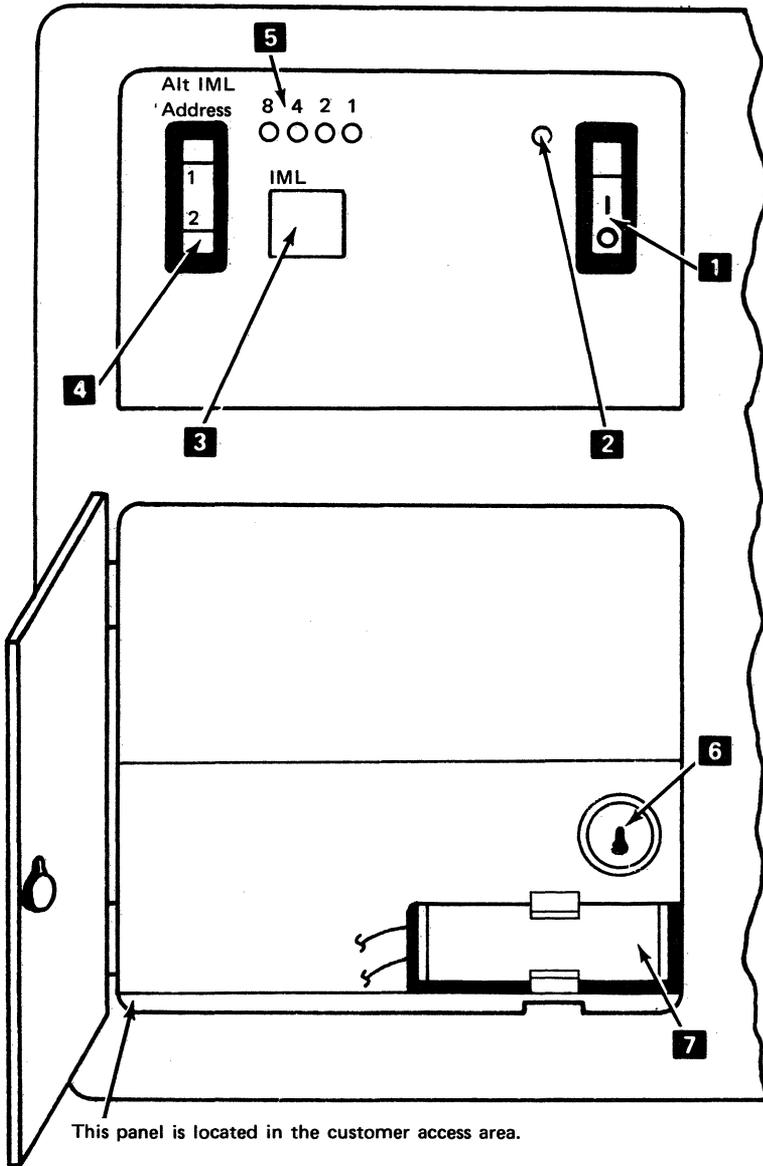
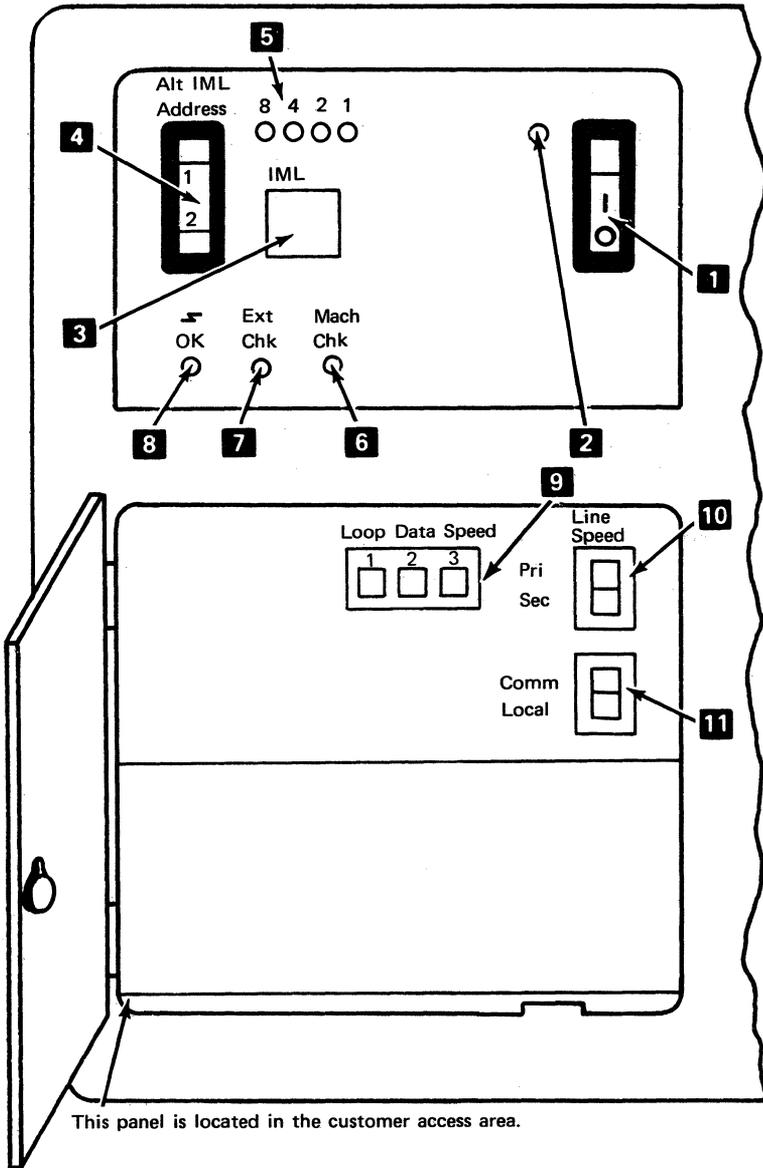


Figure 1-10 (Part 1 of 2). 3274 Model 51C or 61C Operator Panel with the Digital Data Service (DDS) Adapter or X.21 Feature and with the Encrypt/Decrypt Feature

Ref	Description
1	On/Off switch:  = On;  = Off.
2	On indicator: Indicates the 3274 is powered on.
3	IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded.
4	Alt IML Address switch: <ul style="list-style-type: none"> • Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails. • Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run.
5	8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.
6	Encrypt/Decrypt key switch: In the horizontal position, allows a new master key code to be entered.
7	Encrypt/Decrypt battery: Maintains the master key code in the 3274 when power is off.

Figure 1-10 (Part 2 of 2). 3274 Model 51C or 61C Operator Panel with the Digital Data Service (DDS) Adapter or X.21 Feature and with the Encrypt/Decrypt Feature



This panel is located in the customer access area.

Figure 1-11 (Part 1 of 2). 3274 Model 51C or 61C Operator Panel with the Loop Attachment Feature

- Ref** **Description**
- 1** On/Off switch:  = On;  = Off.
- 2** On indicator: Indicates the 3274 is powered on.
- 3** IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded.
- 4** Alt IML Address switch:
- Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails.
- Note:** The operational code may not be loaded unless the IML tests have been sequenced to the start of IML test 0010 at least once.
- Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run.
- 5** 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.
- 6** Machine Check indicator: Indicates problems internal to the 3274.
- Note:** If the 3274 communication cable is not attached to the LSC connector, the machine check indicator will be turned on after the IML op code is loaded. This is not a machine problem.
- 7** External Check indicator: Indicates errors external to the 3274.
- 8** OK (Line Ready) indicator: Indicates that a valid message was received within the last 8 seconds.
- 9** Loop Data Speed switches: Used to assign the primary and secondary line speeds (up is *on*, down is *off*).
- | Loop Carrier Speed
(bps) | Line Speed
(bps) | | Loop Data Speed
Switch Settings | | |
|-----------------------------|---------------------|----------|------------------------------------|-----|-----|
| | Pri | Sec | 1 | 2 | 3 |
| 9600 ¹ | 9600 | 4800 | Off | Off | Off |
| 9600 ¹ | 9600 | 2400 | Off | Off | On |
| 9600 ¹ | 4800 | 2400 | Off | On | Off |
| 9600 ¹ | 2400 | 1200 | On | Off | Off |
| 38,400 ² | 38,400 | Not used | Off | Off | Off |
| 38,400 ² | 9600 | Not used | On | Off | Off |
- ¹Data-link-attached loop
²Directly attached loop
- 10** Line Speed switch: Used to select the primary or secondary speed as shown in the table above under "Line Speed (bps)."
- 11** Communicate/Local switch: Used to isolate problems on the loop. In the Comm position, the 3274 is connected to the loop; in the Local position, the 3274 is disconnected from the loop.

Figure 1-11 (Part 2 of 2). 3274 Model 51C or 61C Operator Panel with the Loop Attachment Feature

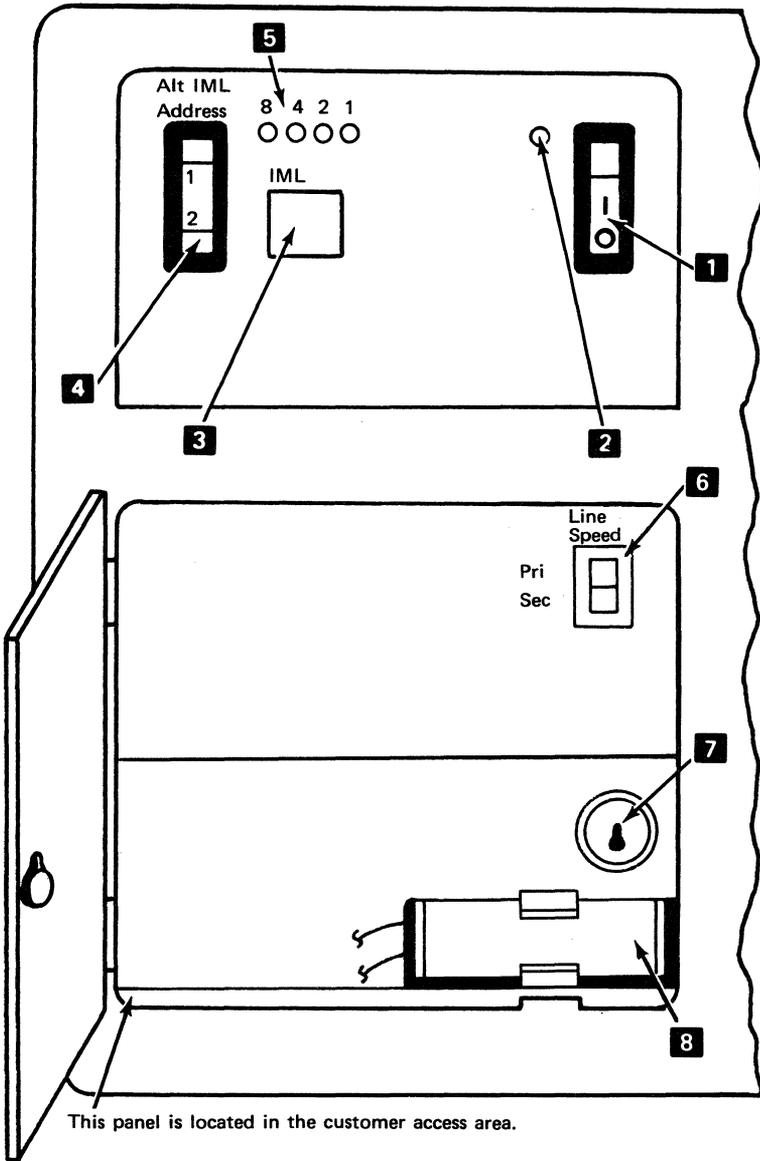


Figure 1-12 (Part 1 of 2). 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature or External Modem Feature and with the Encrypt/Decrypt Feature

Ref	Description
1	On/Off switch: <input type="checkbox"/> = On; <input type="radio"/> = Off.
2	On indicator: Indicates the 3274 is powered on.
3	IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. With the Integrated Modem feature, the integrated modem self-test requires a power-on reset to run.
4	Alt IML Address switch: <ul style="list-style-type: none"> • Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails. • Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run.
5	8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.
6	Line Speed switch: In the Pri position, the modem operates at normal speed; in the Sec position, the modem operates at half-speed.
7	Encrypt/Decrypt key switch: In the horizontal position, allows a new master key code to be entered.
8	Encrypt/Decrypt battery: Maintains the master key code in the 3274 when power is off.

Figure 1-12 (Part 2 of 2). 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature or External Modem Feature and with the Encrypt/Decrypt Feature

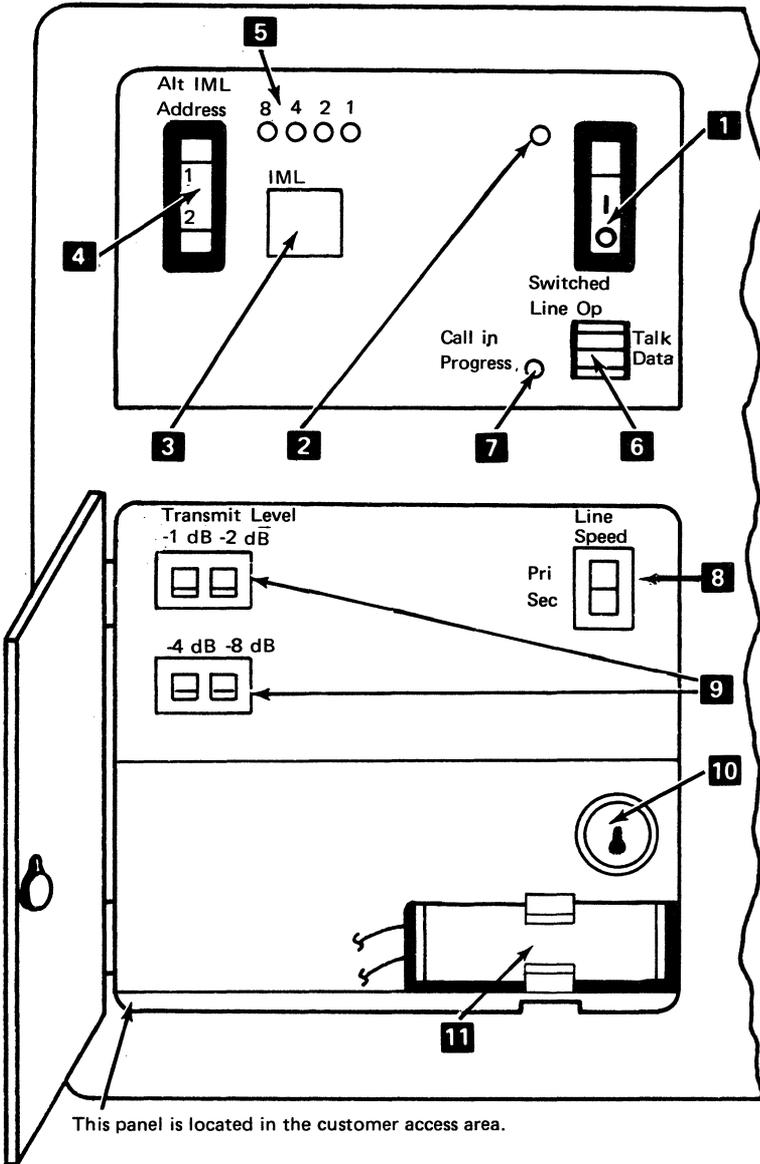


Figure 1-13 (Part 1 of 2). 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature and with either (1) the Switched Line with Auto Answer Feature or (2) the Nonswitched Line with SNBU and Auto Answer Feature; and with the Encrypt/Decrypt Feature

- Ref** **Description**
- 1** On/Off switch: = On; = Off.
- 2** On indicator: Indicates the 3274 is powered on.
- 3** IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. With the Integrated Modem feature, the integrated modem self-test requires a power-on reset to run.
- 4** Alt IML Address switch:
- Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails.
 - Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run.
- 5** 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.
- 6** Talk/Data switch
- Talk position – The operator may use the handset for voice communication.
 - Data position – The handset is bypassed; only machine data is allowed on the communication line (switched network only).
- 7** Call in Progress indicator: Indicates that a connection has been established (switched network only).
- 8** Line Speed switch: In the Pri position, the modem operates at normal speed; in the Sec position, the modem operates at half-speed.
- 9** Transmit Level Attenuation switches (Switched Network – U.S. and Canada only): These four switches provide 0 to –15 dB attenuation of the transmit level in 1-dB increments. See the chart below for the various switch settings

dBm Level	Transmit Level Switches			
	–1dB	–2dB	–4dB	–8dB
0	Off	Off	Off	Off
– 1	On	Off	Off	Off
– 2	Off	On	Off	Off
– 3	On	On	Off	Off
– 4	Off	Off	On	Off
– 5	On	Off	On	Off
– 6	Off	On	On	Off
– 7	On	On	On	Off
– 8	Off	Off	Off	On
– 9	On	Off	Off	On
– 10	Off	On	Off	On
– 11	On	On	Off	On
– 12	Off	Off	On	On
– 13	On	Off	On	On
– 14	Off	On	On	On
– 15	On	On	On	On

- 10** Encrypt/Decrypt key switch: In the horizontal position, allows a new master key code to be entered.
- 11** Encrypt/Decrypt battery: Maintains the master key code in the 3274 when power is off.

Figure 1-13 (Part 2 of 2). 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature and with either (1) the Switched Line with Auto Answer Feature or (2) the Nonswitched Line with SNBU and Auto Answer Feature; and with the Encrypt/Decrypt Feature

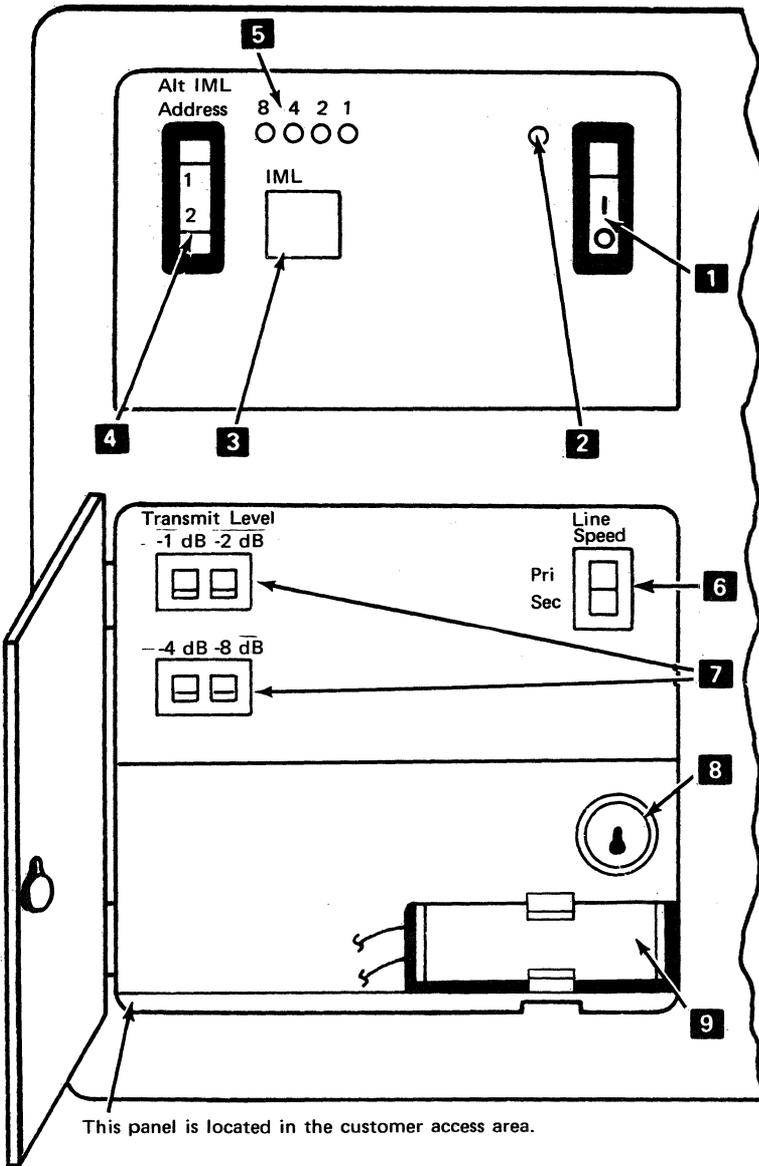


Figure 1-14 (Part 1 of 2). 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature and with either (1) the Switched Line with Manual Answer Feature or (2) the Nonswitched Line with SNBU and Manual Answer Feature; and with the Encrypt/Decrypt Feature

Ref**Description**

- 1** On/Off switch: $\boxed{\text{I}}$ = On; $\boxed{\text{O}}$ = Off.
- 2** On indicator: Indicates the 3274 is powered on.
- 3** IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. With the Integrated Modem feature, the integrated modem self-test requires a power-on reset to run.
- 4** Alt IML Address switch:
- Position 1: Holding, while momentarily pressing the IML push-button, bypasses the IML tests and loads the machine directly. Use only after normal IML fails.
 - Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run.
- 5** 8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.
- 6** Line Speed switch: In the Pri position, the modem operates at normal speed; in the Sec position, the modem operates at half-speed.
- 7** Transmit Level Attenuation switches (Switched Network – U.S. and Canada only): These four switches provide 0 to –15 dB attenuation of the transmit level in 1-dB increments. See the chart below for the various switch settings.

dBm Level	Transmit Level Switches			
	–1dB	–2dB	–4dB	–8dB
0	Off	Off	Off	Off
– 1	On	Off	Off	Off
– 2	Off	On	Off	Off
– 3	On	On	Off	Off
– 4	Off	Off	On	Off
– 5	On	Off	On	Off
– 6	Off	On	On	Off
– 7	On	On	On	Off
– 8	Off	Off	Off	On
– 9	On	Off	Off	On
– 10	Off	On	Off	On
– 11	On	On	Off	On
– 12	Off	Off	On	On
– 13	On	Off	On	On
– 14	Off	On	On	On
– 15	On	On	On	On

- 8** Encrypt/Decrypt key switch: In the horizontal position, allows a new master key code to be entered.
- 9** Encrypt/Decrypt battery: Maintains the master key code in the 3274 when power is off.

Figure 1-14 (Part 2 of 2). 3274 Model 51C Operator Panel with the 1200-bps Integrated Modem Feature and with either (1) the Switched Line with Manual Answer Feature or (2) the Nonswitched Line with SNBU and Manual Answer Feature; and with the Encrypt/Decrypt Feature

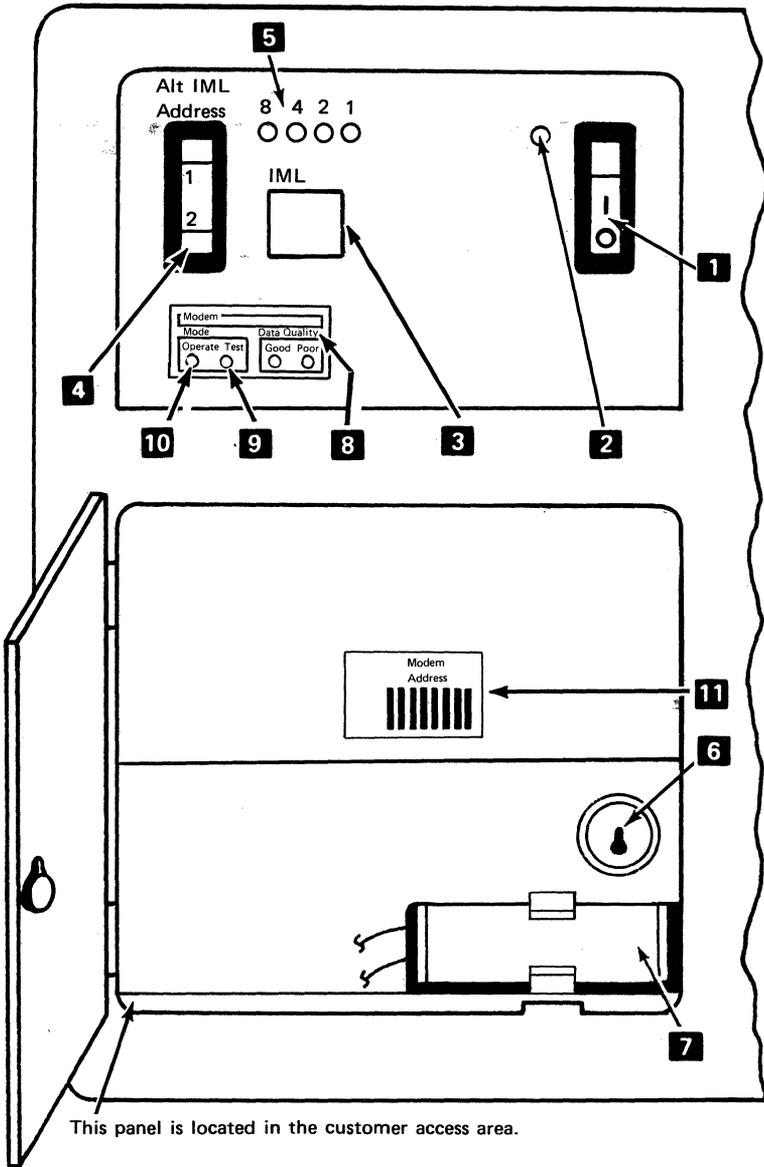


Figure 1-15 (Part 1 of 2). 3274 Model 51C Operator Panel with the 2400-, 4800-, or 9600-bps Integrated Modem Feature; and with the Encrypt/Decrypt Feature

Ref	Description																		
1	On/Off switch:  = On;  = Off.																		
2	On indicator: Indicates the 3274 is powered on.																		
3	IML (Initial Machine Load) pushbutton: Pressing and holding causes a basic assurance test to run. When the pushbutton is released, IML tests start. At completion, the machine is loaded. With the Integrated Modem feature, the integrated modem self-test requires a power-on reset to run.																		
4	Alt IML Address switch: <ul style="list-style-type: none"> • Position 1: Holding, while momentarily pressing the IML pushbutton, bypasses the IML tests and loads the machine directly. Use only after normal IML fails. • Position 2: Holding, while pressing the IML pushbutton, causes remote interface tests to run. <p>Pressing and holding causes the integrated modem self-test to run and to repeat approximately every 4 seconds, until the switch is released.</p>																		
5	8 4 2 1 indicators: These light while the IML pushbutton is held. During IML, they follow the test sequence. At completion, they all go out. During operation, they indicate operational status.																		
6	Encrypt/Decrypt key switch: In the horizontal position, allows a new master key code to be entered.																		
7	Encrypt/Decrypt battery: Maintains the master key code in the 3274 when power is off.																		
8	Good/Poor data-quality indicators: Indicate the quality of received data as follows: <table border="0" style="margin-left: 20px;"> <thead> <tr> <th style="text-align: left;">Good</th> <th style="text-align: left;">Poor¹</th> <th style="text-align: left;">Meaning</th> </tr> </thead> <tbody> <tr> <td>On</td> <td>Off</td> <td>Good signal quality (no errors).</td> </tr> <tr> <td>Flashing</td> <td>Off or flashing</td> <td>Marginal signal quality (about three bit errors per second).</td> </tr> <tr> <td>Off</td> <td>On or flashing</td> <td>Poor signal quality (about six bit errors per second).</td> </tr> <tr> <td>Off</td> <td>Off</td> <td>No signal being received.</td> </tr> <tr> <td>On</td> <td>On</td> <td>Temporary condition (1 second or less) – ignore.</td> </tr> </tbody> </table>	Good	Poor ¹	Meaning	On	Off	Good signal quality (no errors).	Flashing	Off or flashing	Marginal signal quality (about three bit errors per second).	Off	On or flashing	Poor signal quality (about six bit errors per second).	Off	Off	No signal being received.	On	On	Temporary condition (1 second or less) – ignore.
Good	Poor ¹	Meaning																	
On	Off	Good signal quality (no errors).																	
Flashing	Off or flashing	Marginal signal quality (about three bit errors per second).																	
Off	On or flashing	Poor signal quality (about six bit errors per second).																	
Off	Off	No signal being received.																	
On	On	Temporary condition (1 second or less) – ignore.																	
	¹ When the integrated modem self-test is run by use of the ALT 2 switch, the Poor indicator should light if the self-test is failing. The indicator turns off when the switch is released.																		
9	Test: This indicator is on when the integrated modem is in test mode. Test mode is entered when the self-test is running, when a test function is being run from the central site modem, or when the link problem determination aid (LPDA) host-invoked diagnostics are running.																		
10	Operate: This indicator shows that the integrated modem is ready to exchange data with the attached TP network.																		
11	Modem Address switches (8): These eight switches provide the address for host-invoked LPDA diagnostic tests. The address switches should correspond to the 3274 address that was customized.																		

Figure 1-15 (Part 2 of 2). 3274 Model 51C Operator Panel with the 2400-, 4800-, or 9600-bps Integrated Modem Feature; and with the Encrypt/Decrypt Feature

3274 Encrypt/Decrypt Feature

The 3274 Encrypt/Decrypt feature can be installed in 3274 Models 1C, 21C, 31C, 41C, 51C, and 61C and used in conjunction with a compatible host Encrypt/Decrypt feature. This feature provides the using organization with protection of its confidential information from unauthorized disclosure, when it is transmitted and received through a common carrier communication network. The Encrypt/Decrypt feature accomplishes this data protection by encrypting (encoding) messages sent from the 3274 to the host system and decrypting (decoding) similarly encrypted messages received from the host system. Messages transmitted between the 3274 and its attached devices are not involved in the Encryption-Decryption process.

Installing the Encrypt/Decrypt feature involves using a special Encrypt/Decrypt diskette and entering a 16-character master key code and an 8-character control unit identification (CID) code into the 3274, with a 3178, 3278, 3279, or equivalent display attached to port A0 of the 3274. Once entered, the master key code is stored in the 3274 indefinitely, until it is purposely changed. When the 3274 is powered off, storage of the master key code is maintained by a special battery installed in the 3274.

Following are the procedures for replacing the battery, for entering a master key code, for verifying the master key code, and for testing the Encrypt/Decrypt feature.

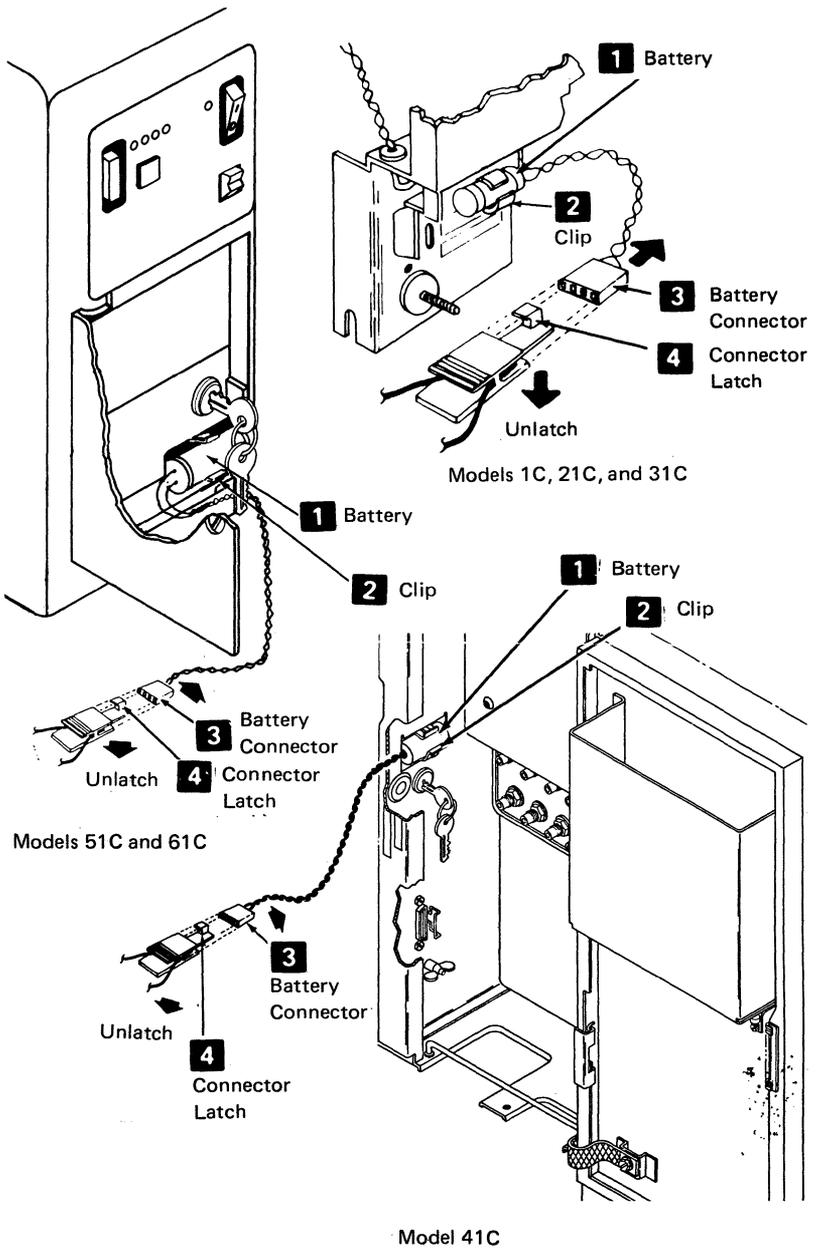
Battery Replacement – Models 1C, 21C, 31C, 41C, 51C, and 61C

DANGER

When disposing of the replaced battery, observe the disposal instructions on the label attached to the 3274, near the battery location, and the battery manufacturer's instructions.

1. If any devices attached to the 3274 are in use, notify all terminal operators that the 3274 operation is going to be temporarily interrupted; then wait until all operations are completed. If the 3274 is not in use, turn on the 3274.
2. Open the customer access door.
3. Remove the old battery **1** from the retaining clip **2**.
4. Unlatch the connector latch **4**, and disconnect the battery connector **3**.
5. Connect the battery connector **3** to the new battery **1**, and reinsert the connector latch.
6. Insert the new battery into the retaining clip **2**.
7. Close the customer access door.
8. If the 3274 attached devices were previously in use, notify all terminal operators that the 3274 is again operational.

Note: *If the battery was replaced because of the loss of 3274 Encrypt/Decrypt master key code, or with 3274 power off, you will have to reenter the code by performing the "Entering a Master Key Code" procedure.*



Entering a Master Key Code

You should perform this procedure only if you are authorized to enter the 3274 Encrypt/Decrypt master key code. Contact the appropriate person in your organization to obtain the Encrypt/Decrypt key switch security key, the Encrypt/Decrypt diskette, the master key code to be entered, the master key verification value, if one has already been derived for the master key code, and the control unit identification (CID) code.

Note: *A new 3274 Encrypt/Decrypt master key code should be installed at the same time that the identical master key code is installed in the host system.*

Warning: The Encrypt/Decrypt key switch must never be turned clockwise to the horizontal position unless the 3274 is turned on.

1. If any devices attached to the 3274 are in use, notify all terminal operators that the 3274 operation is going to be interrupted; then wait until all operations are ended. If the 3274 is not in use, turn it on.
2. Use a 3178, 3278, 3279, or equivalent display station attached to the 3274 port A0 to execute this procedure. Locate this station; then make sure it has a keyboard and is turned on.
3. Load the Encrypt/Decrypt diskette.
4. Press the IML pushbutton on the 3274 control panel. The IML has been completed when the 8 4 2 1 indicators have sequenced and are all off.
5. Insert the security key into the Encrypt/Decrypt key switch, and turn the switch clockwise to the horizontal position.

6. Go to the display station that is attached to 3274 port A0. The top two rows of the screen should contain the following information:

```
001  
XXXXXXXXXXXXXXXXXX
```

7. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the Xs. If you miskey any characters, use the cursor move keys (← and →) on the right side of the keyboard to move the cursor to the character position(s) to be corrected.
8. Press the ENTER key. The top rows of the display screen should change to:

```
EMKV  
-----
```

Note: *If a 1 (numeric error code) or a 2 (alphabetic error code) appears in the top center of the screen, either you did not enter the 1 through F characters correctly in step 7, or the attached keyboard is nonstandard and cannot be used. To recover, enter the 1 through F characters correctly and press the ENTER key again. If the error still occurs, replace the display/keyboard with a standard unit and retry step 7.*

9. The EMKV characters are a prompt message meaning "Enter master key value." Use the keyboard to enter (without spaces) the 16 characters of the new master key code into the positions occupied by the hyphens. The valid characters that can be entered are the numbers 0 through 9 and the letters A through F. The characters entered for the master key code are hexadecimal characters. Each byte of the 8-byte master key code consisting of consecutive pairs of these hexadecimal characters must have odd parity. This means that the number of 1 bits in that byte of the

master key code must be odd. As each character is entered, the corresponding hyphen will be replaced by an asterisk (*). If you miskey a character, press the RESET key and enter all 16 characters of the master key code again.

10. Press the ENTER key. The top two rows of the display screen should change to:

```
CID                      33  
-----
```

Note: *If the CID characters are not displayed and a **Do Not Enter** symbol (X) is displayed in the operator information area, you did not enter a valid master key code in step 9. To recover, press the RESET key, enter a valid master key code, and press the ENTER key.*

11. Use the keyboard to enter the CID code into the positions occupied by the underscores. If the CID is less than 8 characters, enter only as many characters as you have; the remainder of the field will be filled with 0's when stored in the 3274 and on the Encrypt/Decrypt diskette. As each character is entered, the corresponding underscore will be replaced by an asterisk (*). If you miskey a character, press the RESET key and enter the CID again.
12. Press the ENTER key. The top two rows of the display screen should change to:

```
VP                      99  
YYYYYYYYYYYYYYYYYY
```

13. The characters VP mean *verification pattern*, and the Y characters represent the master key verification value. If you received the verification value for the master key code just entered, make sure the verification value displayed agrees with it; if it does not, press the RESET key, return to step 4, and try to enter the master key code again.

14. Press the ENTER key. When the ENTER key is pressed, the verification value is stored on the Encrypt/Decrypt diskette, and the top two rows of the display screen change to:

```
VP                               99
XXXXXXXXXXXXXXXXXXXX
```

The keyboard is now disabled and cannot be reset until an IML operation is performed. To continue your normal operation, turn the 3274 Encrypt/Decrypt key switch counterclockwise to the vertical position, remove the security key from the key switch, replace the Encrypt/Decrypt diskette with an operational diskette, and press the IML pushbutton. After the IML operation is completed, notify all terminal operators that the 3274 is again operational.

Note: *Operator information area symbols and codes that may be displayed during the execution of this procedure are explained in the 3270 Information Display System: Reference Summary, GX20-1878-5 or higher, and in the applicable display station problem determination guide. (See "Related Publications" on page iv of this guide for publication order numbers.)*

Verifying the Master Key Code

This procedure will indicate whether the master key verification value stored on the associated Encrypt/Decrypt diskette matches the verification value of the master key code currently stored in the 3274. If the values match, a 99 will be displayed; if the values do not match, a 44 will be displayed. To execute this procedure, first contact the appropriate person in your organization to obtain the associated Encrypt/Decrypt diskette.

1. If any devices attached to the 3274 are in use, notify all terminal operators that the 3274 operation is going to be interrupted; then wait until all operations are ended. If the 3274 is not in use, turn it on.

2. Use a 3178, 3278, 3279, or equivalent display station attached to 3274 port A0 to execute this procedure. Locate this display station; then make sure it has a keyboard and is turned on.
3. Load the Encrypt/Decrypt diskette.
4. Press the IML pushbutton on the 3274 control panel. The IML has been completed when the 8 4 2 1 indicators have sequenced and are all off.
5. Go to the display station that is attached to 3274 port A0. The top two rows of the screen should contain the following information:

```
001
XXXXXXXXXXXXXXXXXX
```

6. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the Xs. If you miskey any characters, use the cursor move keys (← and →) on the right side of the keyboard to move the cursor to the character position(s) to be corrected.
7. Press the ENTER key. The top two rows of the display screen should change to:

```
EMKV
-----
```

Note: *If a 1 (numeric error code) or 2 (alphabetic error code) appears in the top center of the screen, either you did not enter the 1 through F characters correctly in step 6 or the attached keyboard is nonstandard and cannot be used. To recover, enter the 1 through F characters correctly and press the ENTER key again. If the error still occurs, replace the display/keyboard with a standard unit and retry step 6.*

8. Press the ENTER key. A 99 will appear in the top center of the screen if the master key verification value of the master key code stored in the 3274 matches the master key verification value previously stored on the Encrypt/Decrypt diskette. A 99 code indicates that the master key code is as expected. If the two verification values do not agree, then a 44 will be displayed in the top center of the screen, indicating that the 3274 master key code has been changed with another Encrypt/Decrypt diskette. Contact the appropriate person in your organization to resolve the problem.
9. To resume your operation, replace the Encrypt/Decrypt diskette with an operational diskette and press the IML pushbutton. After the IML operation is completed, notify all terminal operators that the 3274 is again operational.

Note: *Operator information area symbols and codes that may be displayed during the execution of this procedure are explained in the 3270 Information Display System: Reference Summary, GX20-1878-5 or higher, and in the applicable display station problem determination guide. (See "Related Publications" on page iv of this guide for publication order numbers.)*

Encrypt/Decrypt Feature Test

Note: *Since this test changes the master key code stored in the 3274, the desired master key code will have to be reentered at the end of this test.*

This test involves entering a master key code of 0123456789ABCDEF. If the derived master key verification value is equal to F188D8504894139E, then the Encrypt/Decrypt feature is operating satisfactorily.

You should perform this procedure only if you are authorized to enter the 3274 Encrypt/Decrypt master key code. Contact the appropriate person in your organization to obtain the Encrypt/Decrypt key switch security key, the Encrypt/Decrypt diskette, the master key code to be entered at the end of this test, the master key verification value if one has already been derived for the master key code, and the control unit identification (CID) code.

Warning: The Encrypt/Decrypt key switch must never be turned clockwise to the horizontal position unless the 3274 is turned on.

1. If any devices attached to the 3274 are in use, notify all terminal operators that the 3274 operation is going to be interrupted; then wait until all operations are ended. If the 3274 is not in use, turn it on.
2. Use a 3178, 3278, 3279, or equivalent display station attached to 3274 port A0 to execute this procedure. Locate this display station; then make sure it has a keyboard and is turned on.
3. Load the Encrypt/Decrypt diskette.
4. Press the IML pushbutton on the 3274 control panel. The IML has been completed when the 8 4 2 1 indicators are all off.
5. Insert the security key into the Encrypt/Decrypt key switch, and turn the switch clockwise to the horizontal position.
6. Go to the display station that is attached to 3274 port A0. The top two rows of the screen should contain the following information:

```
001  
XXXXXXXXXXXXXXXXXXXX
```

7. Use the keyboard to enter the characters 1234567890ABCDEF into the character positions occupied by the Xs. If you miskey any characters, use the cursor move keys (← and →) on the right side of the keyboard to move the cursor to the character position(s) to be corrected.
8. Press the ENTER key. The top two rows of the display screen should change to:

```
EMKV
-----
```

Note: *If a 1 (numeric error code) or 2 (alphabetic error code) appears in the top center of the screen, either you did not enter the 1 through F characters correctly in step 7 or the attached keyboard is nonstandard and cannot be used. To recover, enter the 1 through F characters correctly and press the ENTER key again. If the error still occurs, replace the display/keyboard with a standard unit and retry step 7.*

9. Use the keyboard to enter (without spaces) the characters 0123456789ABCDEF into the positions occupied by the hyphens. As each character is entered, the corresponding hyphen will be replaced by an asterisk (*). An ✕ †*? symbol in the operator information area or a locked keyboard is an indication of a miskeyed character. If you miskey a character, press the RESET key and enter the 0 through F characters again.

10. Press the ENTER key. The top rows of the display screen should change to:

```
CID  
-----
```

Note: *If the CID characters and dashes are not displayed and a **Do Not Enter** symbol (X) is displayed in the operator information area, you did not enter the correct master key code in step 9. To recover, press the RESET key, enter the correct master key code, and press the ENTER key.*

11. Press the ENTER key. The top two rows of the display screen should change to:

```
VP                               99  
F188D8504894139E
```

If the above characters are displayed, the Encrypt/Decrypt feature is operating correctly. If the master key verification value is not as indicated, the Encrypt/Decrypt feature is not operating correctly. Request appropriate service.

12. If the Encrypt/Decrypt feature is operating correctly and you wish to resume normal operation, you must now enter your organization's master key code into the 3274 by executing the "Entering a Master Key Code" procedure on page 1-38, beginning at step 4.

Note: *Operator information area symbols and codes that may be displayed during the execution of this procedure are explained in the 3270 Information Display System: Reference Summary, GX20-1878-5 or higher, and in the applicable display station problem determination guide. (See "Related Publications" on page iv of this guide for publication order numbers.)*

3274 Dial-Up Telephone Facilities

Dial Operation

The 3274 Model 51C and 61C cluster (3274 and its attached display stations and printers) is connected to its host system by telephone lines. Telephone equipment can be attached to your 3274 that allows you to communicate with the host system by dialing the host system's telephone number. The host system can also communicate with your cluster by dialing the telephone attached to the 3274. With the dial equipment installed, the telephone lines can be used for transmission of data processing information and, at other times, for normal telephone conversations.

Either the control unit or the host system can initiate a telephone dial-up operation. The operator performs the following main steps when sending information to the host system by the dial method:

1. Dials the host system telephone number and establishes a telephone line connection.
2. Performs the logon procedure when directed by the host system operator.
3. Enters the message data and sends it to the host system.
4. Disconnects the control unit from the host system and from the telephone line by terminating the telephone call.

When the host system initiates a telephone dial-up operation, it:

1. Dials the control unit telephone number.
2. Asks for control unit operator identification.

3. Sends the message data.
4. Disconnects the host from the control unit and from the telephone line by terminating the telephone call.

To reduce operating time, an automatic answering feature, called *Auto Answer*, can be added to the dial communication equipment. This means that, when you dial the host system telephone number, you need not speak to the host system operator to establish the telephone connection; instead, you listen for an answer tone. The telephone at your control unit may also respond automatically to calls from the host system.

3274 dial-up telephone operation is possible if the 3274 has one of the following features installed:

- Integrated Modem, Switched Line with Auto Answer facility
- Integrated Modem, Switched Line without Auto Answer facility (U.S. and Canada only)
- Integrated Modem, Nonswitched Line with Switched Network Backup (SNBU) and Auto Answer facility
- Integrated Modem, Nonswitched Line with SNBU and without Auto Answer facility (U.S. and Canada only)
- External Modem Interface (the modem attached to the 3274 should have switched network operation capability).

The SNBU capability is used only when the nonswitched line (used for normal operation) has a transmission problem. When there is a problem with the nonswitched line, you may be instructed by the appropriate person in your organization or by your organization's operating procedures to use a switched line (with SNBU) to continue operating.

Dial Operating Procedures

Step-by-step dial operating procedures for 3274-attached display stations are described in the following paragraphs. Details that are special to your location, however, are not contained in the procedures. For example, operator identification codes or operating instructions for non-IBM equipment attached to the 3274 are provided by the appropriate person in your organization or are found in the user's program guide.

Note: *In the following procedures, the term exclusion key is used to describe the switch, knob, key, and so on, used by your organization's communication equipment to connect the 3274 to the telephone line.*

Sending Message Data to the Host System

When an Integrated Modem with the Auto Answer Feature Is Installed at the 3274

1. The Ready (**4**) symbol should be displayed in the display station's operator information area, indicating that the 3274 is ready.
2. Set the Data/Talk switch on the control panel to the Talk position. If necessary, set the Pri/Sec (Primary/Secondary) Line Speed switch to the appropriate position.
3. Perform step *a* or *b* (depending on the country):

- a. (U.S. and Canada only)

Pick up the telephone handset, pull up the exclusion key, and dial the host system's telephone number. If the host system is equipped with an Auto Answer feature, you should hear the answer tone; if it is not equipped with an Auto Answer feature, the host system operator should answer the call, verify when the host system is ready for data transmission, and set the host system's modem to data mode. In either case, you set the Data/Talk switch on the control panel to the Data

position and then hang up the telephone handset. The Call in Progress indicator should turn on.

b. (All countries except U.S. and Canada)

Pick up the telephone handset, and dial the host system's telephone number. If the host system is equipped with an Auto Answer feature, you should hear the answer tone; if it is not equipped with an Auto Answer feature, the host system operator should answer the call, verify when the host system is ready for data transmission, and set the host's system modem to data mode. In either case, you set the Data/Talk switch on the control panel to the Data position and then hang up the telephone handset. The Call in Progress indicator should turn on.

4. If your application requires that you perform a logon procedure before you can enter data, do so.
5. Key in the message data, and press the ENTER key or the PF key specified for your application.
6. Note the formatted display or host system response on your screen. If required, press RESET and continue keying message data and pressing the ENTER or PF key until you have finished your message.
7. When the data transmission is finished, disconnect the telephone line by (1) setting the Data/Talk switch to the Talk position, or (2) receiving a Disconnect command from the host system (SDLC mode operation only), or (3) receiving the automatic time-out of the 3274. When the telephone line is disconnected, the Call in Progress light should turn off.
8. You are now free to send a new message to, or to receive a message from, the host system.

When an Integrated Modem without Auto Answer Is Installed at the 3274 (U.S. and Canada only)

1. The Ready (**A**) symbol should be displayed in the display station operator information area, indicating that the 3274 is ready.
2. If necessary, set the Pri/Sec (Primary/Secondary) Line Speed switch to the appropriate position.
3. Pick up the telephone handset, dial the host system's telephone number, and wait for the answer tone to end. Pull up the exclusion key, and put the telephone handset aside. Do not hang up the telephone handset.
4. If your application requires that you perform a logon procedure before you can enter data, do so.
5. Key in the message data, and press the ENTER key or the PF key specified for your application.
6. Note the formatted display or host system response on your screen. If required, press RESET and continue keying message data and pressing the ENTER or PF key until you have finished your message.
7. When the data transmission is finished, hang up the telephone handset to disconnect the 3274 from the telephone line.
8. You are now free to send a new message to, or to receive a message from, the host system.

When an External Modem Interface Feature Is Installed at the 3274

When the 3274 has the External Modem Interface feature, the telephone connection procedure depends upon the modem attached to the 3274. To determine your organization's unique operating procedures, ask the appropriate person in your

organization for instructions or refer to the appropriate user's program guide. The following procedure is a typical operating procedure for an IBM 3872 Modem that has an Auto Answer feature.

1. The Ready (**4**) symbol should be displayed in the display station operator information area, indicating that the 3274 is ready.
2. Set the Mode Select switch on the 3872 modem to the EXTERNAL position. Set the Data/Talk switch on the 3872 modem to the Talk position. If necessary, set the 3274's Pri/Sec (Primary/Secondary) Line Speed switch to the appropriate position.
3. Pick up the telephone handset, pull up the exclusion key, and dial the host system's telephone number. If the host system is equipped with an Auto Answer feature, you should hear the answer tone; if it is not equipped with an Auto Answer feature, the host system operator should answer the call, verify when the host system is ready for data transmission, and set the host system's modem to data mode. In either case, you set the Data/Talk switch on the 3872 modem to the Data position and then hang up the telephone handset. The Ready light on the 3872 modem should turn on.
4. If your application requires that you perform a logon procedure before you can enter data, do so.
5. Key in the message data, and press the ENTER key or the PF key specified for your application.
6. Note the formatted display or host system response on your screen. If required, press RESET and continue keying message data and pressing the ENTER or PF key until you have finished your message.
7. When the data transmission is finished, disconnect the telephone line by (1) setting the 3872's Data/Talk switch to

the Talk position, or (2) receiving a Disconnect command from the host system (SDLC mode operation only), or (3) receiving the automatic time-out of the 3274. When the telephone line is disconnected, the 3872's Ready light should turn off.

8. You are now free to send a new message to, or to receive a message from, the host system.

Receiving Message Data from the Host System

At a 3274 with an Integrated Modem and with the Auto Answer Feature Installed

1. When a 3274 has the Auto Answer feature installed and the host system operator wishes to send a message to one of the attached display stations or printers, the message is received automatically. You do not have to be present if the Data/Talk switch is set to the Data position. If necessary, set the Pri/Sec ((Primary/Secondary) Line Speed switch to the appropriate position.

Notes:

- a. If the Data/Talk switch is set to Talk and the telephone rings, pick up the telephone handset, pull up the exclusion key (U.S. and Canada only), and, when instructed by the host system operator, (1) set the Data/Talk switch to the Data position and (2) hang up the telephone handset. The Call in Progress light (located next to the Data/Talk switch) should turn on.
- b. If a call has been answered and data or control information is not received or transmitted by the 3274 within approximately 60 to 75 seconds, the 3274 will automatically disconnect from the telephone line. This time-out function prevents the 3274 from tying up the telephone line when it receives an erroneous telephone call.

2. If the message from the host system is a request to log on and send a message, key in the required information and press the ENTER key. You must press ENTER after the telephone connection has been made, or the host system will disconnect from the telephone line in some applications.
3. When the data transmission is finished, disconnect the telephone line by (1) setting the Data/Talk switch to the Talk position, or (2) receiving a Disconnect command from the host system (SDLC mode operation only), or (3) receiving the automatic time-out of the 3274. When the telephone line is disconnected, the Call in Progress light should turn off.
4. Your 3274 is now free to receive a new message from, or to send a message to, the host system.

At a 3274 with an Integrated Modem and without the Auto Answer Feature Installed (U.S. and Canada only)

1. If the telephone rings, answer it, pull up the exclusion key when instructed by the host system operator, and place the telephone handset aside. If necessary, set the Pri/Sec (Primary/Secondary) Line Speed switch to the appropriate position.
2. You may now key in the logon information (if required), or, if you are to respond to the host system (as directed by the user's guide), key in your message and press ENTER.

When the host system has received your identification code or message, it responds by (1) sending a message to your display or attached printer, (2) sending a formatted display if you are to respond with message data, or (3) some other acknowledgment as specified in the user's program guide.

3. When the host system has finished sending messages, instructions will appear on your screen telling you to hang up the telephone handset.
4. Your 3274 is now free to receive a new message from, or to send a message to, the host system.

At a 3274 with the External Modem Interface Feature Installed

When the 3274 has the External Modem Interface feature, the telephone connection procedure depends upon the modem attached to the 3274. To determine your organization's unique operating procedures, ask the appropriate person in your organization for instructions or refer to the appropriate user's guide. The following procedure is a typical operating procedure for an IBM 3872 Modem that has an Auto Answer feature.

1. When the host system operator wishes to send a message to one of the display stations or printers attached to the 3274, the message is received automatically. You do not have to be present if (1) the Data/Talk switch on the 3872 is set to the Data position, (2) the 3274 is powered on, and (3) the 3274's Pri/Sec (Primary/Secondary) Line Speed switch is set to the appropriate position.

Notes:

- a. If the 3872's Data/Talk switch is set to Talk and the telephone rings, pick up the telephone handset, pull up the exclusion key (U.S. and Canada only), and, when instructed by the host system operator, (1) set the 3872's Data/Talk switch to Data and (2) hang up the telephone handset. The Ready light on the 3872 modem should turn on.
- b. If a call has been answered and data or control information is not received or transmitted by the 3274 within approximately 60 to 75 seconds, the 3274 will

automatically disconnect from the telephone line. This time-out function prevents the 3274 from tying up the telephone line when it receives an erroneous telephone call.

2. If the message from the host system is a request to log on and send a message, key in the required information and press the ENTER key. You must press ENTER after the telephone connection has been made, or the host system will disconnect from the telephone line in some applications.
3. When the data transmission is finished, disconnect the telephone line by (1) setting the 3872's Data/Talk switch to the Talk position, or (2) receiving a Disconnect command from the host system (SDLC mode operation only), or (3) receiving the automatic time-out of the 3274. When the telephone line is disconnected, the 3872's Ready light should turn off.
4. Your 3274 is now free to receive a new message from, or to send a message to, the host system.

/3 Test (Status Summary Display Test)

This test is used to obtain statistics and configuration information about your control unit and its attached devices.

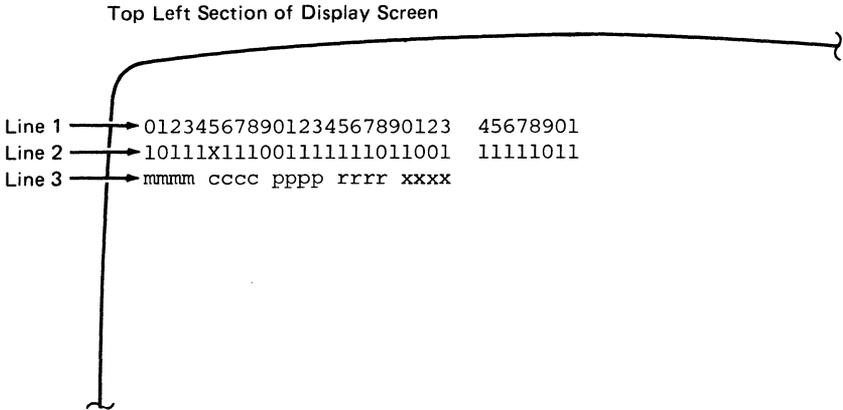
You can request this test from the keyboard of any known good 3178, 3278, 3279, or equivalent display station attached to your 3274 Control Unit. To start the test:

1. Press and hold the ALT key while pressing the TEST key.
2. Release the ALT and TEST keys.
3. Type in /3.
4. Press and release the ENTER key.

The resulting display will vary, depending on the level of configuration support (A, B, C, D, T, or P) installed in the control unit and on whether the control unit is customized for X.25 packet switched network operation.

Example 1 shows the display when configuration support A is installed; Example 2 shows the display when configuration support B, C, D, or T is installed; Example 3 shows the display when configuration support P or configuration support D customized for X.25 operation is installed. The information is displayed in the upper left area of the screen.

Example 1: Configuration Support A



Where:

Line 1 = Last digit of the port addresses configured on the 3274. When a Type B adapter is attached, the last (highest) Type A port and the first (lowest) Type B port are separated by two spaces on lines 1 and 2. The above example shows 24 Type A terminals and 8 Type B terminals.

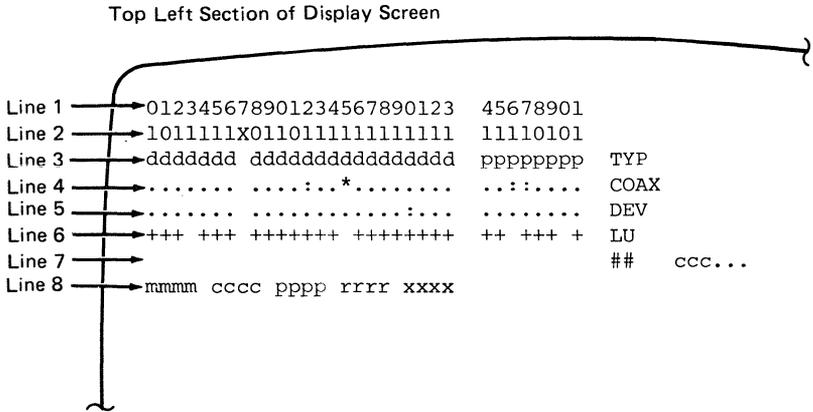
Line 2 = Status of each terminal by port address, where:

- 1 = terminal powered on
- 0 = terminal recognized as powered off (by 3274)
- x = unconfigured port
- _ = terminal disabled because of error

Line 3 = Ten bytes of summarized statistical information, as follows:

mmmm = summary count of 3274-detected machine checks
 cccc = summary count of communication checks
 pppp = summary count of program checks
 rrrr = summary count of SDLC Test commands received
 xxxx = summary count of SDLC Test commands successfully transmitted

Example 2: Configuration Support B, C, D, or T



Where:

Line 1 = Last digit of the port addresses configured on the 3274. When a Type B adapter is attached, the last (highest) Type A port and the first (lowest) Type B port are separated by two spaces on lines 1 and 2. The above example shows 24 Type A terminals and 8 Type B terminals.

Line 2 = Status of each terminal by port address, where:

- 1 = terminal powered on
- 0 = terminal recognized as powered off (by 3274)
- x = unconfigured port
- _ = terminal disabled because of error

Line 3 = Type of terminal attached, where:

- d = display
- p = printer
- i = distributed function terminal
- _ = terminal was not initialized

Line 4 = Summary of possible signal cable errors by port address, where:

- . = no errors
- :
- | = 10 to 19 errors
- * = 20 or more errors

Line 5 = Summary of terminal errors by port address, where:

- . = no errors
- :
- | = 10 to 19 errors
- * = 20 or more errors

Line 6 = Terminals that have sessions bound, where:

- + = session bound
- blank = no session bound

Note: *This entire line, including the label LU, is blank when the system is operating in a non-SNA mode.*

Line 7 = Display of X.21 connection, where:

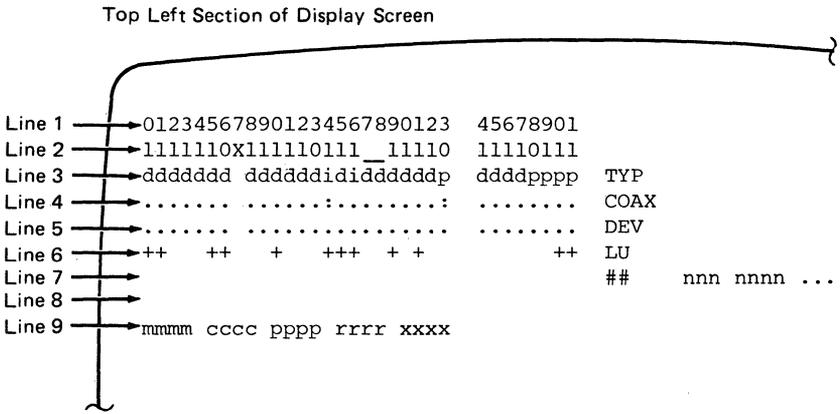
0000 = direct call
--- = incoming call
ccc... = number dialed by operator
(up to 32 characters)

Note: *This entire line, including the label ##, is blank when the X.21 Switched communication feature is not installed.*

Line 8 = Ten bytes of summarized statistical information, as follows:

m m m m = summary count of 3274-detected
machine checks
c c c c = summary count of communication checks
p p p p = summary count of program checks
r r r r = summary count of SDLC Test commands
received
x x x x = summary count of SDLC Test commands
successfully transmitted

Example 3: Configuration Support P or Configuration Support D with the X.25 Packet Switched Network Function Installed



Where:

Line 1 = Last digit of the port addresses configured on the 3274. When a Type B adapter is attached, the last (highest) Type A port and the first (lowest) Type B port are separated by two spaces on lines 1 and 2. The above example shows 24 Type A terminals and 8 Type B terminals.

Line 2 = Status of each terminal by port address, where:

- 1 = terminal powered on
- 0 = terminal recognized as powered off (by 3274)
- x = unconfigured port
- _ = terminal disabled because of error

Line 3 = Type of terminal attached, where:

- d = display
- i = distributed function terminal
- _ = terminal was not initialized
- p = printer

Line 4 = Summary of possible signal cable errors by port address, where:

- . = no errors
- : = 1 to 9 errors
- | = 10 to 19 errors
- * = 20 or more errors

Line 5 = Summary of terminal errors by port address, where:

- . = no errors
- : = 1 to 9 errors
- | = 10 to 19 errors
- * = 20 or more errors

Line 6 = Terminals that have sessions bound, where:

- + = session bound
- blank = no session bound

Line 7 = --> nnn nnnn...(15 characters). Indicates an outgoing call operation is performed. The 15 characters are the host DTE address (X.25 switched virtual circuit).

<-- nnn nnnn...(15 characters). Indicates an incoming call in session. The 15 characters are the host DTE address (X.25 switched virtual circuit).

<-- (blank) (no characters). Indicates an incoming call performed. No calling address (host DTE address) was provided in the Call Request packet.

Note: *The intent of line 7 is to allow the user to tell what host the control unit is connected to (if Call Ready is displayed) or was connected to (if Call Ready was not displayed).*

Line 8 = Blank.

Line 9 = Ten bytes of summarized statistical information, as follows:

mmmm = summary count of 3274-detected
machine checks
cccc = summary count of communication checks
pppp = summary count of program checks
rrrr = summary count of XTEST packets
received
xxxx = summary count of XTEST packets
transmitted

Section 2. Problem Determination

Introduction

The first part of Section 2 is an overview of 3274 subsystem problem determination. If this is the first time you are using these procedures, you should familiarize yourself with this information.

If you are already familiar with this information, proceed directly to page 2-4.

Following the overview are a table of preliminary checks and a table of problem symptoms. Before performing any problem determination, you should first do the preliminary checks listed in the "Preliminary Checks" table and then, if the problem you are experiencing persists, find the general symptom of the problem in the "Symptom Table." The "Symptom Table" will direct you to the appropriate procedure from a group of detailed problem determination procedures. These procedures, which follow the "Symptom Table," consist of questions that you answer Yes (Y) or No (N) and the corresponding actions you take. The series of questions and procedural steps are designed to lead you to the cause of your problem. If you need to request service, you fill out the *3274 Problem Report Form*, GX23-0203. A sample is given in Figure 2-2 on page 2-52.

If this is an installation problem or if the subsystem has been recently reconfigured and/or recustomized, you should review the Port Assignment Table, especially for any new signal cable routings, the customization data and process, and host programming, in addition to using this section.

Overview of Subsystem Problem Determination

Although a problem can occur at any point within the system, it is most likely to become apparent at one or more of the 3274 attached devices. To determine the probable location of the problem within your system, you *must* be familiar with the physical configuration and customized status of your system.

The physical configuration of your 3274 subsystem should be available to you in the form of a customer-developed and -maintained Port Assignment Table compiled by your installation planners prior to equipment installation. This table should include all pertinent data about all the units (control unit, terminal multiplexers, displays, and printers) within your 3274 subsystem, as well as detailed information on signal cable routings and cable identification. A copy of this table should be stored in the customer access area of your 3274 Control Unit.

The customization status of your 3274 subsystem is available to you in the form of a completed Configuration Data Card stored in the customer access area of your 3274 control unit. The Configuration Data Card identifies the responses that were made to various customizing questions during the last customizing process.

Problem Determination Levels

Problem determination can be performed at various levels. These levels are listed below in ascending sequence, starting with the lowest level:

1. The device level.
2. 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 available to all lower levels. These are briefly described below, with a reference to the appropriate publication for further details.

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.

Problem Determination Facilities

Each level of the system has associated problem determination facilities that are used to isolate 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 device being tested. An example of these facilities is the concurrent test contained in the 3274 Control Unit, which is used to test the features of attached display stations and printers. Other facilities are used offline and require dedicated use of all the system elements affected. An example of these facilities is the basic assurance tests contained in the 3274 Control Unit.

The network problem determination facilities that may be available at the host system are the following:

- Display Exception Monitoring Facility (DEMF)
- Facility Error Recognition System (FERS)
- Network Problem Determination Application (NPDA).

These facilities are described in the appropriate manuals listed under "Related Publications," on page iv of this guide.

Start Here to Isolate Your Subsystem Problem

Note: *Before leaving this page, match your problem to one of the checks or conditions; then go directly to the page referred to or take the action suggested.*

Preliminary Checks

Check That:	If Not, Refer To:
The 3274 Control Unit is powered on.	Procedure 2 on page 2-11.
The 3299 Terminal Multiplexer is powered on (3299 Power Indicator light on).	Step 003 of Procedure 1 on page 2-9.
<p>All devices and device cables are properly connected.</p> <p>Note: <i>A thorough check is important.</i></p>	<p>Figure 2-1 A on page 2-51. Remember, at a 3299, device signal cables attach to the <i>out</i> connectors and the signal cable that runs from a 3274 to a 3299 connects to the <i>in</i> connector.</p>
<p>At the 3274 device panel, the switch is in the down position or the shorting cap is not connected, whichever is appropriate.</p> <p>Note: <i>This applies to 3299 installations only.</i></p>	<p>Figure 2-1 C on page 2-51.</p>
The 3274 IMLs successfully (the 8 4 2 1 indicators are not lit).	<p>Procedure 11 on page 2-28.</p> <p>Note: <i>If the 8 4 2 1 indicators will not light in sequence, check to be sure that the diskette is installed correctly before proceeding to Procedure 11 on page 2-28.</i></p>

If the problem still exists after the preliminary checks, find the failing condition in the Symptom Table and take the action recommended.

Symptom Table

Symptom	Action
3274 displays operational error codes.	Go to Procedure 21 on page 2-49.
All attached devices fail.	If the 3274 is powered on and successfully IMLed, the problem is unlikely to be 3274 hardware. Factors such as cabling, host programming, modem operation, and customization should be considered.
All devices attached to a 3299 fail.	Go to Procedure 1 on page 2-9.
A single display attached to a 3299 Terminal Multiplexer fails.	Go to Procedure 16 on page 2-39.
A single display or multiple displays attached directly to a 3274 (without 3299) fail.	Go to Procedure 4 on page 2-14.
An attached printer fails.	Go to Procedure 15 on page 2-37.

Note: *You can confirm the status of attached devices and associated signal cables by running the /3 Test (Status Summary Display Test) described on page 1-57 of this guide.*

3299 Service/Replacement Procedure

U.S.A. and Canada

Call the IBM Service/Exchange Communications Center (toll-free) at 800-428-2569. IBM will need some product data from you to verify your warranty and/or service contract and to have the proper service action started. Please include the power cord when returning a 3299 to IBM.

World Trade except Canada

Contact your IBM Repair Center or IBM Branch Office for specific instructions.

Problem Determination Procedures

No.	Title	Page
1	Check for 3299 Failure If All Its Attached Devices Fail	2-9
2	3274 Power Check	2-11
3	3274, 3299, and 3274-to-3299 Link Check	2-12
4	Operator Information Area (OIA) Line Check without a 3299 in the Network	2-14
5	4 Symbol Check without a 3299 in the Network	2-15
6	Display-to-Host Link Check without a 3299 in the Network	2-17
7	Display-to-Host Communication Check without a 3299 in the Network	2-19
8	Internal Modem <i>Wrap</i> Test	2-21
9	External Modem <i>Wrap</i> Test	2-23
10	3274, Attached Display, and 3274-to-Attached-Displays Link Test	2-25
11	IML Check	2-28
12	Encrypt/Decrypt Check	2-32
13	Check for Host System and Loop Problems	2-34
14	Check of Network Error/Operational Statistics	2-35
15	Printer Problem Check	2-37
16	Operator Information Area (OIA) Line Check with a 3299 in the Network	2-39

No.	Title	Page
17	4 Symbol Check with a 3299 in the Network	2-40
18	Display-to-Host Link Check with a 3299 in the Network	2-42
19	Display-to-Host Communication check with a 3299 in the Network	2-44
20	3299, Attached Display, and 3299-to-Attached-Display Link Test	2-46
21	Check for 8 4 2 1 Error Codes during Normal Operation	2-49

Procedure 1: Check for 3299 Failure If All Its Attached Devices Fail

001

Is the 3274 power-on light lit?

Y N

|

|

002

Go to Procedure 2 on page 2-11.

003

Is the power-on (red) light on the 3299 lit?

Y N

|

|

004

Verify that power is supplied to the 3299. If power is supplied, the unit is defective and should be returned. Follow the 3299 Service/Replacement Procedure on page 2-6.

005

Verify that the 3274 device panel switch is in the down position or that the shorting cap is not connected, whichever is appropriate (See Figure 2-1 **C** on page 2-51.) If this is a new installation, verify that the 3299 input and output signal cables are connected correctly, and that the 3274 has been IMLed successfully. If you are not sure whether a successful IML was achieved, re-IML at this point and verify.

Does the problem still exist?

Y N

|
|
006

Resume normal operation.

007

Do you have a spare 3299 of the same model?

Y N

|
|
008

Go to Procedure 3 on page 2-12.

009

Replace the suspected 3299 with the same-model spare. Make sure the 3299 has its device signal cables properly installed and is powered on. At one of the displays to be tested, set the Normal/Test switch to Test, then to Normal, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate.

Is a **4** symbol displayed in the left portion of the operator information area? (See the note below.) If a printer is attached, is the Ready indicator lit and no error code displayed?

Y N

|
|
010

Go to Procedure 3 on page 2-12.

011

Your 3299 that was replaced is defective. Resume normal operation. Follow the 3299 Service/Replacement Procedure on page 2-6.

Note: *For an IBM 3270 Personal Computer Attachment, ensure that the Personal Computer is set in the correct mode to attach it to the 3274. For 3290 display units, if anything other than a **4** symbol is displayed in the operator information area, go to the 3290 Information Panel Customer Problem Analysis and Resolution, GA23-0125, or the 3290 Information Panel Problem Determination Guide, GA23-0126, whichever is appropriate.*

Procedure 2: 3274 Power Check

001

Is the 3274 power cord plugged into the proper outlet?

Y N

|

|

002

Plug the power cord into the proper outlet, and turn on the 3274.

003

Does the On indicator light when the On/Off switch is set to the On position?

Y N

|

|

004

Verify that the outlet has power. When this has been done, power on the 3274. If the 3274 still fails, record this information on the *3274 Problem Report Form*, GX23-0203, and request appropriate service.

005

Resume operation.

Procedure 3: 3274, 3299, and 3274-to-3299 Link Check

Notes:

1. *Prerequisites for this procedure are an additional display and an additional device cable.*
2. *If this is an installation problem or if the subsystem has been recently reconfigured or recustomized, you should review the Port Assignment Table, especially for any new signal cable routings, the customization data (Configuration Data Card) and process, and host programming, in addition to using this procedure.*
3. *System operation problems can occur during swapping of device signal cables if the device types are different, or if the screen size or features of the devices are not the same.*

DANGER

Never connect or disconnect device signal cables during an electrical storm.

1. At the 3299, disconnect the signal cable that runs from the 3274 to the 3299 input connector. (See Figure 2-1 **A** on page 2-51.)
2. At the associated 3274 device panel, move the switch to the up position, or connect the shorting cap, whichever is appropriate. (See Figure 2-1 **C** on page 2-51.)
3. Attach a working terminal (3178, 3278, 3279, or equivalent) to the signal cable you have just disconnected from the 3299 input position. (See Figure 2-1 **B** on page 2-51.)
4. Set the Normal/Test switch on the display to Test, then back to Normal, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate.
5. If a **4** symbol is now displayed, you have determined that the fault is in the 3299, and you should follow the 3299

Service/Replacement Procedure on page 2-6. (If you have just replaced your 3299, and a **4** symbol is still not displayed, then request service for your 3274.)

6. If a **4** symbol is still not displayed, you now need to determine whether the signal cable is bad or the 3274 port defective.
7. At the suspected 3274 device panel, connect a known working display and a known working signal cable. At the display station, set the Normal/Test switch to Test, then back to Normal, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate.
8. If a **4** symbol is now displayed, you have determined that the signal cable is defective. Contact the person responsible for cable repair or replacement. If a **4** symbol is not displayed, the 3274 port is probably defective. Recheck customization, and request appropriate service.
9. Restore all devices and signal cables to their original configuration. At the 3274 device panel, move the switch to the down position, or disconnect the shorting cap, whichever is appropriate. (See Figure 2-1 **C** on page 2-51.)
10. If, after following the above procedures, you still have all 3299 attached devices failing, request appropriate service.

Procedure 5: 4 Symbol Check without a 3299 in the Network

Look at any of the powered-on display stations. For an IBM 3270 Personal Computer Attachment, ensure that the Personal Computer is set in the correct mode to attach it to the 3274.

001

Is a **4** symbol displayed in the first position of the operator information area?

Y N

|

002

If multiple attached displays fail, go to Procedure 11 on page 2-28. If a single display is failing, go to Procedure 10 on page 2-25.

003

Is an **X** (machine check) symbol followed by a 3-digit code (nnn code) displayed in the operator information area?

Y N

|

004

Go to Procedure 6 on page 2-17.

005

Set the display unit Normal/Test switch to Test, then to Normal, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate. Press the RESET key, and retry the operation. (See the note at the end of this procedure.)

Does the display station still fail?

Y **N**

|

|

006

Resume operation.

007

Go to Procedure 10 on page 2-25.

Note: *Turning a control unit or display off, then on, may affect its operation with the host. When performing a reset and retry operation, you may have to reestablish the host connection and/or log on to the host application.*

Procedure 6: Display-to-Host Link Check without a 3299 in the Network

001

Is an A or B symbol displayed to the right side of the **4** symbol in the operator information area, indicating that the display station is logically connected to the host system?

Y N

|
|
|
|
|

002

Go to Procedure 13 on page 2-34.

003

Is the host system operating without error and communicating with the failing 3274 Control Unit?

Y N

|
|
|
|
|

004

When the host problem has been resolved, resume operation.

005

Is an **X Prog** (program check) symbol followed by a 3-digit code (nnn code) displayed in the operator information area, indicating a program check?

Y N

|
|
|
|
|

006

Go to Procedure 7 on page 2-19.

007

Perform problem determination prescribed by the 3-digit nnn code, using the display station problem determination guide (see "Related Publications" on page iv of this guide for publication order numbers), and the *3270 Information Display System: Reference Summary*, GX20-1878-5 or higher.

Does the operation still fail?

Y **N**

|

008

Resume operation.

009

Probable data stream problem from the host system. If possible, record the sequences of the last keystrokes before the problem occurred, and report the problem to the host system support programmer for additional problem determination and recovery.

Procedure 7: Display-to-Host Communication Check without a 3299 in the Network

001

Is an **X** ~~—~~ symbol followed by a 3-digit code (nnn code) displayed in the operator information area, indicating a communication check?

Y N

|

002

Go to Procedure 14 on page 2-35.

003

Record the symptoms on the appropriate problem report form (see "Related Publications" on page iv for publication order numbers), press the RESET key, and retry the failing operation. (See the note at the end of this procedure.)

Does the operation still fail?

Y N

|

004

Resume operation.

005

Perform problem determination that relates to 3-digit communication check code (nnn code). See Procedure 8 on page 2-21 and the note at the end of this procedure.

Is the host powered on and operating without error?

Y N

|
|
006

When the host system problem is resolved, resume operation.

007

Go to Procedure 14 on page 2-35.

Note: *Perform problem determination prescribed by the 3-digit rrr code, using the 3270 Information Display System: Reference Summary, GX20-1878-5 or higher, or the display station problem determination guide (see "Related Publications" on page iv of this guide for publication order numbers).*

Procedure 8: Internal Modem *Wrap* Test

001

Is an ~~X~~ symbol, followed by a 3-digit code (nnn code), displayed in the operator information area of an attached display?

Y N

002

Record this fact, and any other facts concerning the problem, on the *3274 Problem Report Form*, GX23-0203, and request appropriate service.

003

Is a 501, 502, 506, 513, 517, 520, 521, 525, 529, 530, 531, 532, 535, 536, 537, 538, or 539 code displayed?

Y N

004

For other 5xx codes, perform problem determination using the *3270 Information Display System: Reference Summary*, GX20-1878-5, or higher.

005

Does this 3274 have an integrated modem? (3274 connects directly to a phone line?)

Y N

006

Go to Procedure 9 on page 2-23.

007

At the 3274, hold the Alt IML Address switch in the 2 position while momentarily pressing the IML pushbutton. After about 1 minute, look at the 8 4 2 1 indicators.

Are all four indicators lit?

Y

N

008

A communication problem exists between the 3274 and the host system (no Carrier Detect from the modem).

Request assistance from your communication service personnel. When the problem is resolved, all four indicators will light.

Wait until all four indicators are lit and steady for 1 minute; then continue to step 009 of this procedure.

009

Perform a normal IML. Request the host system operator to restore this 3274 to the active list, and resume operation. If the problem recurs, request appropriate service.

Does this 3274 have the Digital Data Service (DDS) adapter or X.21 feature?

Y N

004

Return the Test/Operate switch to Operate.

Are all four 8 4 2 1 indicators now lit?

Y N

005

A communication problem exists between the 3274 and the host system (no Carrier Detect from the modem).

Request assistance from your communication service personnel. When the problem is resolved, all four indicators will light.

Wait until all four indicators are lit and steady for 1 minute; then continue.

006

Perform a normal IML. Request the host system operator to restore this 3274 to the active list, and resume operation. If the problem recurs, request appropriate service.

007

Return the Test/Operate switch to Operate, and perform a normal IML.

Request the host system operator to restore this 3274 to the active list, and resume operation. If the problem recurs, request assistance from your communication network specialist.

Procedure 10: 3274, Attached Displays, and 3274-to-Attached-Displays Link Test

This procedure involves swapping a suspected display signal cable with another known working display signal cable that is assigned to an active 3274 port. Never swap device signal cables between type A and type B devices, and never use unassigned ports, since system operation could be affected.

DANGER

Never connect or disconnect device signal cables during an electrical storm.

1. At the control unit, swap the signal cable of the failing display with the signal cable from a known working display.
2. Set the Normal/Test switch to Test, then to Normal at both display stations, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate.
3. Press the RESET key on the keyboard, and retry the failing operation.

001

Does the same display station fail?

Y N

|

002

Recheck customization and host programming. Request appropriate service.

003

Is it possible to swap the signal cable of the failing display with the signal cable of a known working display at the display units?

Y N

|

004

To further define the problem, arrange time during which a known working display can be made available. When a display is available, go to step 005 of this procedure.

005

Swap signal cables at the display ends. Set the Normal/Test switch to Test, then to Normal, at both display stations, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate. (For an IBM 3270 Personal Computer Attachment, ensure that the Personal Computer is set in the correct mode for attaching it to the 3274.)

Does the same display station fail?

Y

N

006

The display signal cable is defective. Return the signal cables to their original locations. Set the Normal/Test switch to Test, then to Normal, or turn power off, then on, and wait up to 2 minutes whichever is appropriate. Contact the person responsible for cable repair or replacement.

007

Probable display station failure. Reconnect the display signal cables to their original locations. Set the Normal/Test switch to Test, then to Normal, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate. Request appropriate service.

Procedure 11: IML Check

Notes:

1. *Pressing the IML pushbutton causes an interruption and temporarily disables all displays attached to the 3274. If any attached displays are in use, notify all operators before proceeding.*
2. *Never attach a printer, an IBM 3270 Personal Computer Attachment, or a 3290 display to port 0.*
3. *If the 3274 is locally attached, the Power/Interface switch must be placed in the Local/Offline position and the Local/Offline indicator must be lit. (If the Local/Offline indicator does not light, record this fact on the 3274 Problem Report Form, GX23-0203, and request appropriate service.)*

Press and hold the IML pushbutton.

001

Do the 8 4 2 1 indicators light?

Y N

|
|
002

Record the status of the 8 4 2 1 indicators on the *3274 Problem Report Form*, GX23-0203, and request appropriate service.

003

While observing the 8 4 2 1 indicators, release the IML pushbutton.

Did the 8 4 2 1 indicators sequence on and off for about 2 minutes, ending with all four indicators off?

Y N

|

|

004

Go to step 006 of this procedure.

005

The IML operation was successful. Resume normal operation.

006

Are the 8 4 2 1 indicators flashing a 1010 or 0010 code indicating a bad diskette?

Y N

|

|

007

Go to step 009 of this procedure.

008

Go to step 011 of this procedure.

009

Are the 8 4 2 1 indicators displaying a solid 1101 or 1111 code?

Y N

|

|

010

Go to step 013 of this procedure.

011

Install the backup diskette, and re-IML the 3274.

Does the failure still occur?

Y N

|
|
012

Resume operation.

Order a replacement diskette.

013

Is a 3299 Terminal Multiplexer attached?

Y N

|
014

If your 3274's 8 4 2 1 indicators are displaying a flashing 0100 code, it may be caused by a defective display attached to port 0. To verify this, attach another 3178, 3278, 3279, or equivalent display to port 0, and re-IML the 3274. If a flashing 0100 code is still displayed, record the status of the 8 4 2 1 indicators on the appropriate problem report form (see "Related Publications" on page iv of this guide for publication order numbers), and request appropriate display unit service. If a flashing 0100 code is not displayed, request appropriate service for the 3274.

If you wish to continue operation under the same conditions that existed before the IML pushbutton was pressed, press the IML pushbutton while holding the Alt IML Address switch in the 1 position. (This bypasses the IML tests and allows the unit code to load.) Go to step 016 of this procedure.

015

If your 3274's 8 4 2 1 indicators are displaying a flashing 0100 code, verify that all 3274 device panel switches are set to the down position or that the shorting cap is not connected, whichever is appropriate. See Figure 2-1 **C** on page 2-51. After you verify this, re-IML the 3274. If the 8 4 2 1 indicators are still displaying a flashing 0100 code, it may be caused by a defective 3299. To verify this, replace the suspected 3299 with a

same-model spare and re-IML your 3274. If a flashing 0100 code is still displayed, record the status of the 8 4 2 1 indicators on the *3274 Problem Report Form*, GX23-0203, and request appropriate service. If a 0100 code is no longer displayed, you have determined the 3299 to be defective and should follow the 3299 Service/Replacement Procedure on page 2-6.

If you wish to continue operation under the same conditions that existed before the IML pushbutton was pressed, press the IML pushbutton while holding the Alt IML Address switch in the 1 position. (This bypasses the IML tests and allows the unit code to load.) Go to step 016 of this procedure.

016

Does the problem recur?

Y N

|
|
|
|
|

017

Resume operation.

018

Is this a 3274 Model C control unit?

Y N

|
|
|
|
|

019

Request appropriate service.

020

Go to Procedure 12 on page 2-32.

Procedure 12: Encrypt/Decrypt Check

001

Did an ✕ symbol followed by nnn code 397, 398, or 399 appear in the operator information area of one of the attached displays?

Y N

| |
002

Go to Procedure 8 on page 2-21 or request appropriate service if this is a loop attachment problem.

003

An unrecoverable Encrypt/Decrypt error has occurred. To test the Encrypt/Decrypt adapter and microcode, perform the "Encrypt/Decrypt Feature Test" on page 1-43 of this guide.

Was the test a success?

Y N

| |
004

Request appropriate service.

005

The adapter and the microcode are good. To check the Encrypt/Decrypt battery, turn power off, then on, at the 3274 and perform the "Verifying the Master Key Code" procedure on page 1-41 of this guide.

Did the test yield a 44 code on the port A0 display terminal?

Y N

|

006

The Encrypt/Decrypt adapter, microcode, and battery are functioning properly (test yielded a 99 code), and the problem was probably an intermittent error. Perform the "Entering a Master Key Code" procedure on page 1-38 of this guide, and resume normal operation.

007

The Encrypt/Decrypt battery is faulty. Replace the battery by performing the "Battery Replacement – Models 1C, 21C, 31C, 41C, 51C, and 61C" procedure on page 1-36 of this guide, and reenter your Encrypt/ Decrypt master key code by performing the "Entering a Master Key Code" procedure on page 1-38 of this guide.

Does the problem still exist?

Y N

|

008

Resume normal operation.

009

Request appropriate service.

Procedure 13: Check for Host System and Loop Problems

Call the host system operator to determine whether the host system is operating correctly.

001

Is the host system operating correctly?

Y N

|
|
002

Wait for the host system problem to be corrected; then resume operation.

003

Is this 3274 attached to a loop?

Y N

|
|
004

Go to Procedure 11 on page 2-28.

005

Is the Ext Chk indicator on the 3274 Operator Panel lit?

Y N

|
|
006

Go to Procedure 11 on page 2-28.

007

Perform problem determination on the loop, using the host/8100 maintenance procedures to isolate the problem. If this has already been done, go to Procedure 11 on page 2-28.

Procedure 14: Check of Network Error/Operational Statistics

001

Is the Facility Error Recognition System (FERS), the Display Exception Monitoring Facility (DEMF), or the Network Problem Determination Application (NPDA) available? See the Note at the end of this procedure.

Y N

002

Ensure that problem determination has been performed at the 3274 subsystem (control unit, display station, and printer). If the problem has been isolated to the display station, report the problem to the host system operator or to the Network Control Center for additional problem determination. Record the problem on the appropriate problem report form (see "Related Publications" on page iv of this guide for publication order numbers), and request appropriate service.

003

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 following:

- *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 (NPDA) Error Messages Manual, SC34-2012*
- *Network Problem Determination Application (NPDA) Terminal Use Guide, SC34-2013.*

Note: *To determine whether 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, ask the Network Control Center or the host system operator whether the Network Communication Control Facility (NCCF) and NPDA are available. If NPDA is available, request that it be invoked to perform problem determination on your display.*

Does the same error as before occur on the same printer?

Y N

004

Recheck customization and host programming, and request appropriate service. Restore all signal cables to their original locations.

005

Is it possible to swap the signal cable of the failing printer with the signal cable of a known working printer at the printer stations?

Y N

006

To further define the problem, wait until a known working printer can be made available. When a printer is available, go to step 007 of this procedure.

007

Swap signal cables at the printer stations. Power off, then on, at both printers.

Does the same printer fail as before?

Y N

008

Defective printer signal cable. Return the signal cables to their original locations. Contact the person responsible for device signal cable repair or replacement.

009

Probable printer problem. Return the signal cables to their original locations, and request appropriate service.

Procedure 17: 4 Symbol Check with a 3299 in the Network

Look at any of the powered-on display stations. For an IBM 3270 Personal Computer Attachment, ensure that the Personal Computer is set in the correct mode for attaching it to the 3274.

001

Is a **4** symbol displayed in the lower left corner of the operator information area?

Y N

| |
002

If all attached displays fail, go to Procedure 11 on page 2-28. If a single display is failing, go to Procedure 20 on page 2-46.

003

Is an **X** **↖** (machine check) symbol followed by a 3-digit code (nnn code) displayed in the operator information area?

Y N

| |
004

Go to Procedure 18 on page 2-42.

005

Set the display unit Normal/Test switch to Test, then to Normal, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate. Press the RESET key, and retry the operation. (See the note at the end of this procedure.)

Does the display station still fail?

Y N

| |
006

Resume operation.

007

Go to Procedure 20 on page 2-46.

Note: *Turning a control unit or display off, then on, may affect its operation with the host. When performing a RESET and retry operation, you may have to reestablish the host connection and/or log on to the host application. See the 3274 Control Unit Description and Programmer's Guide, GA23-0061, for details.*

Procedure 18: Display-to-Host Link Check with a 3299 in the Network

001

Is an A or B symbol displayed to the right side of the **4** symbol in the operator information area, indicating that the display station is logically connected to the host system?

Y N

002

Go to Procedure 13 on page 2-34.

003

Is the host system operating without error and communicating with the failing 3274 Control Unit?

Y N

004

When the host problem has been resolved, resume operation.

005

Is an **X** Prog (program check) symbol followed by a 3-digit code (nnn code) displayed in the operator information area, indicating a program check?

Y N

006

Go to Procedure 19 on page 2-44.

007

Perform problem determination prescribed by the 3-digit nnn code, using the display station problem determination guide (see "Related Publications" on page iv of this guide for publication order numbers) and the *3270 Information Display System: Reference Summary*, GX20-1878-5 or higher.

Does the operation still fail?

Y N

|

|

008

Resume operation.

009

Probable data stream problem from the host system. If possible, record the sequences of the last keystrokes before the problem, and report the problem to the host system support programmer for additional problem determination and recovery.

Procedure 19: Display-to-Host Communication Check with a 3299 in the Network

001

Is an **X** ~~—~~ symbol followed by a 3-digit code (nnn code) displayed in the operator information area, indicating a communication check?

Y N

|

002

Go to Procedure 14 on page 2-35.

003

Record the symptoms on the appropriate *Problem Report Form* (see "Related Publications" on page iv of this guide for publication order numbers), press the RESET key, and retry the failing operation. (See the note at the end of this procedure.)

Does the operation still fail?

Y N

|

004

Resume operation.

005

Perform problem determination that relates to 3-digit communication check code (nnn code). See Procedure 8 on page 2-21, and the note at the end of this procedure.

Is the host powered on and operating without error?

Y N

|

006

When the host system problem is resolved, resume operation.

007

Go to procedure 20 on page 2-46.

Note: *Perform problem determination prescribed by the 3-digit nnn code, using the 3270 Information Display System: Reference Summary, GX20-1878-5 or higher, or the display station problem determination guide (see “Related Publications” on page iv of this guide for publication order numbers).*

Procedure 20: 3299, Attached Displays, and 3299-to-Attached-Displays Link Check

This procedure involves swapping a suspected display signal cable with another known working display signal cable that is assigned to an active 3299 output port. Never use an unassigned 3299 output port.

DANGER

Never connect or disconnect device signal cables during an electrical storm.

Note: *System operation problems can occur during swapping of display signal cables if the display types are different or if the screen size or features of the displays are not the same.*

- 1. At the 3299, swap the signal cable of the failing display with the signal cable of a known working display.*
- 2. Set the Normal/Test switch to Test, then to Normal, at both display stations, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate.*
- 3. Press the RESET key on the failing display, and retry the operation.*

001

Does the same display unit fail?

Y N

|

|

002

Recheck customization, and request appropriate service.

003

Is it possible to swap the signal cable of the failing station with the signal cable of a known working display station, at the display stations?

Y N

|

|

004

To further define the problem, arrange time during which a known working display can be made available. When a display is available, go to step 005 of this procedure.

005

Swap signal cables at the display stations. Set the Normal/Test switch to Test, then Normal, at both display stations, or turn power off, then on, and wait up to 2 minutes, whichever is appropriate. For an IBM 3270 Personal Computer Attachment, ensure that the Personal Computer is set in the correct mode for attaching it to the 3274.

Procedure 21: Check for 8 4 2 1 Error Codes during Normal Operation

Note: *The Yes (Y) and No (N) legs in this procedure are in reverse order compared with the other procedures.*

001

Are the 8 4 2 1 indicators displaying a solid 0001 through 1111 code, indicating a “hard” error?

N Y

|

002

Re-IML the 3274. If the error code is repeated, record pertinent data on the *3274 Problem Report Form*, GX23-0203, and request 3274 service.

003

Are the 8 4 2 1 indicators displaying an alternating 1111-0001 code?

N Y

|

004

The diskette is not ready, or an invalid diskette was used. Insert the proper diskette, and resume operation.

005

Are the 8 4 2 1 indicators displaying an alternating 1111-1100 code?

N Y

|

006

The diskette is defective. Insert the backup diskette, and resume operation. If the failure persists, record data on the *3274 Problem Report Form*, GX23-0203, and request 3274 service.

007

Are the 8 4 2 1 indicators displaying an alternating 1000-0001, 1000-0010, 1000-0011, 1000-0100, or 1000-0101 code?

N Y

|

008

Indicates a Type A adapter failure, which can be caused by a defective signal cable, a faulty attached device, or a 3274 hardware problem. Re-IML the 3274. Run the /3 test on page 1-57 to identify the problem signal cable or attached device. Correct the identified problem, and resume operation. If the problem persists, record pertinent data on the *3274 Problem Report Form*, GX23-0203, and request 3274 service.

009

You do not have an operational 8 4 2 1 error code. Return to the "Preliminary Checks" table on page 2-4 or to the "Symptom Table" on page 2-5 to isolate your problem.

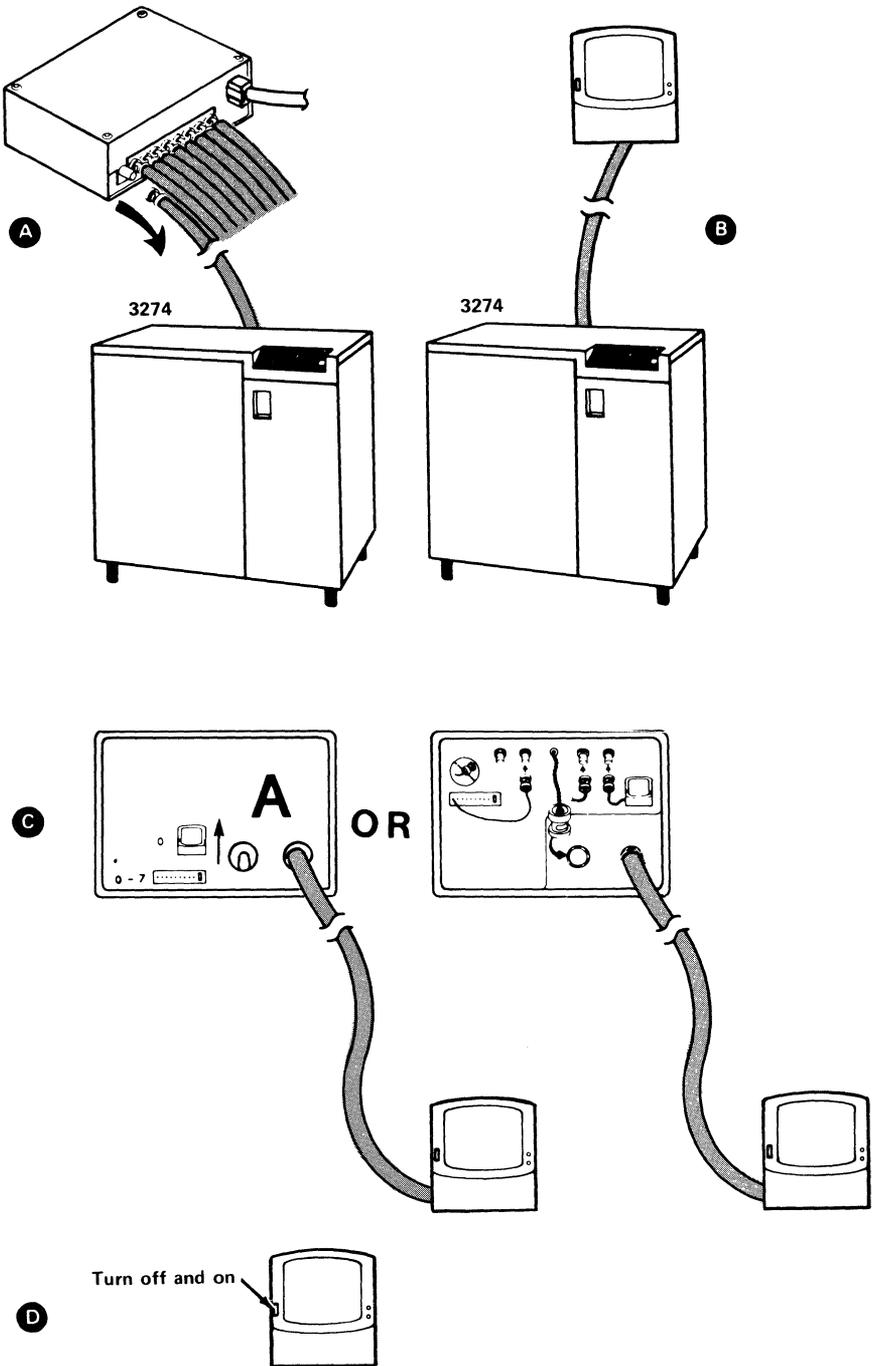


Figure 2-1. IBM 3299 Terminal Multiplexer Configurations

IBM 3274 Control Unit

Problem Report Form

Please fill out this form before requesting service.

1. Are all attached terminals failing? YES NO
 If "NO" is checked, please identify all failing terminals:

2. Check any of the following symbols that are displayed in the operator information area of any failing display station:

Subsystem Ready _____ 4

Host Connection _____ A or B

If one of these three symbols is displayed, please insert the 3-digit code following the symbol.

Communication Problem _____

Machine Check Problem _____

Program Error _____ PROG _____

- 3a. Record the status of the 8 4 2 1 indicators before initializing the 3274. (Check which indicators are on; if all are off, check "All Off.")
- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 8 | 4 | 2 | 1 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All Off | | | |

- 3b. If the 3274 has the Loop Attachment, record the status of the Loop Indicators (check which indicators are on).
- | | | |
|-------------------------------------|--------------------------|--------------------------|
| <input checked="" type="checkbox"/> | External | Machine |
| OK | Check | Check |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

4. Do all the 8 4 2 1 indicators light while the IML pushbutton is pressed and held? (If the 3274 is attached to a loop, the Line Ready, External, and Machine Check indicators should also light.) YES NO

5. Record the status of the 8 4 2 1 indicators after initializing the 3274. (Check which indicators are on; if all are off, check "All Off.")
 When requesting service, please report which of the indicators (step 5) are on.
- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 8 | 4 | 2 | 1 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All Off | | | |
| Never Flashed | | | |

6. Comments (record any other symptom): _____

Address comments concerning this form to IBM Corporation, Department 52Q, Neighborhood Road, Kingston, New York 12401

Printed in U.S.A. GX23-0203-1

Figure 2-2. Sample of an IBM 3274 Control Unit Problem Report Form

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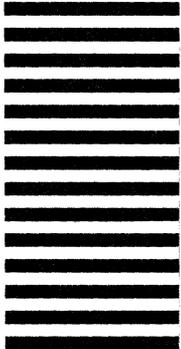
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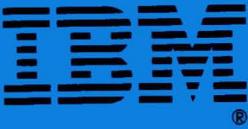
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