TITLE Title Page

IBM 4683/4684 Point of Sale Terminal: Maintenance Manual

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COVER Book Cover

IBM 4683/4684 Point of Sale Terminal:
Maintenance Manual

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EDITION Edition Notice
Seventh Edition (March 1992)

This major revision replaces SY27-0295-05. See the Summary of Changes for brief descriptions of changes made by this edition.

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IBM Point of Sale Scanners and the IBM 1520 Hand-Held Scanner are laser products. Where required, the scanner has a label that identifies its classification. The information on the label in the U.S.A. is shown below.

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Canada	Vous trouverez la traduction des consignes de sécurité dans la brochure portant la référence GA09-0521-02.
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	4683/4684 POST, nr. G511-2111-00.
Finland	Suomenkieliset turvaohjeet ovat kirjasessa, GB11-7352.
France	Les notices de sécurité traduites se trouvent dans la brochure GA11-0734-02 (pour la France).
Germany	Die Sicherheitshinweise befinden sich im "Handelssystem IBM 4680/IBM 4684 Sicherheitshinweise", Teilenummer 25F6466.
Italy	Gli avvisi di sicurezza tradotti si trovano nel manuale di sicurezza, codice GA13-1531.
Norway	Du finner oversatte sikkerhetsmeldinger i håndboken 4683/4684 Kassaterminal, Sikkerhetsinformasjon, GA15-4011-2.
Portugal	Poderá encontrar as indicaç¦es de segurança traduzidas no manual de indicaç¦es de segurança do seu país, GS88-0012-2.
Spain	Puede encontrar las notas de seguridad traducidas en el manual de notas de seguridad de su país, GA10-8943.
Sweden	Svenska översättningar av varningstexterna finns i handboken *Säkerhetsföreskrifter*, GA14-2676.

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PREFACE Preface

This manual has been written for service personnel to use in repairing IBM 4683 and 4684 Point of Sale Terminals. It gives the service person the information needed to repair the following:

- 4683 Base Unit
- 4684 System Unit
- Alphanumeric Keyboard
- ANPOS Keyboard
- 50-Key Keyboard
- 50-Key Modifiable Keyboard/Operator Display (referred to in this manual as the Combined Keyboard/Display)
- Point of Sale Printer Model 1, 2, or 3
- Cash Drawer.

The service personnel using this manual should be:

- Trained to service IBM 4683 and 4684 Point of Sale Terminals
- Trained to service IBM Personal Computers and Personal Systems.

Note: Problem determination should begin in the *IBM 4680 Store System: Problem Determination Guide* or the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

This edition of the manual differs substantially in content from the previous release. See the *Summary of Changes* topic for information on changes to this edition.

Subtopics

PREFACE.1 Store System Library
PREFACE.2 Store System Related Publications -- Software
PREFACE.3 Store System Related Publications -- Hardware

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PREFACE.1 Store System Library

The following chart relates each publication in the library to the task or tasks for which it provides data. Choose the task you want to complete and find the appropriate publication in the corresponding column.

Table 0-1. Store System Library - Publication Grouping by Task

Planning	**Installing**	**Operating**	**Programming**	**Maintaining**
IBM 4680 Store System: Selecting Hardware and Software Components GA27-3691	IBM 4683 Point of Sale Terminal: Installation Guide SA27-3783	IBM 4683/4684 Point of Sale Terminal: Operations Guide SA27-3704	IBM 4680 BASIC: Language Reference SC30-3356	IBM 4680 Store System and IBM 4683/4684 Point of Sale Terminal: Problem Determinatio Guide SY27-0330
IBM 4680 Store System: Planning and Configuration Guide GC30-3532	IBM 4680 Store System: User's Guide SC30-3518	IBM 4680 Store System: Programming Guide SC30-3517		IBM 4680 Store System: Terminal Test Procedures Reference Summary GX27-3779
IBM 4680 Store System: Preparing Your Site GA27-3692	IBM 4684 Point of Sale Terminal: Installation Guide SA27-3837	IBM 4680 Store System: Display Manager User's Guide SC30-3404		IBM 4684 Point of Sale Terminal: Maintenance Summary Card SX27-3885
IBM 4684 Point of Sale Terminal: Introduction and Planning Guide SA27-3835	IBM Personal System/2 Store Loop Adapter/A Installation and Setup Instructions SK2T-0318			IBM 4683/4684 Point of Sale Terminal: Maintenance Manual SY27-0295
	IBM 4684 Store Loop Adapter/A: Installation, Testing, Problem Determination and Technical Reference SD21-0045			IBM 4683/4684 Point of Sale Terminal: Parts Catalog S131-0097
	IBM 4680 Store System: Messages Guide SC30-3521			

See the "Related Publications" topic for the application manuals that support these tasks.

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PREFACE.2 Store System Related Publications -- Software

IBM Retail Industry Programming Support Services
IBM Retail Industry Programming Support Services: Planning and Installation Guide - SC33-0575
IBM Retail Industry Programming Support Services: Base Package Programmer's Guide - SC33-0576
IBM Retail Industry Programming Support Services: Device Drivers Programmer's Guide - SC33-0680
IBM Retail Industry Programming Support Services: Host Communication Package Programmer's Guide - SC33-0650

IBM 4680 General Sales Application
IBM 4680 General Sales Application: Planning and Installation Guide - GC30-3368
IBM 4680 General Sales Application: Guide to Operations - SC30-3369
IBM 4680 General Sales Application: Programming Guide - SC30-3370
IBM 4680 General Sales Application - Price Management Feature: User's Guide - SC30-3461
IBM 4680 General Sales Application - Terminal Offline Feature: User's Guide - SC30-3499

IBM 4680 Supermarket Application
IBM 4680 Supermarket Application: Planning and Installation Guide - GC30-3371
IBM 4680 Supermarket Application: Guide to Operations - SC30-3372
IBM 4680 Supermarket Application: Programming Guide - SC30-3373
IBM 4680 Supermarket Application - Terminal Offline Feature: User's Guide - SC30-3512
IBM 4680 Supermarket Application - Electronic Funds Transfer Feature: User's Guide - SC30-3513

IBM 4680 Chain Drug Sales Application
IBM 4680 Chain Drug Sales Application: Planning and Installation Guide - GC30-3412
IBM 4680 Chain Drug Sales Application: Guide to Operations - SC30-3413
IBM 4680 Chain Drug Sales Application: Programming Guide - SC30-3414

IBM 4680 Store Management Application
IBM 4680 Store Management Application: Planning and Installation Guide - GC30-3483
IBM 4680 Store Management Application: Guide to Operations - SC30-3484
IBM 4680 Store Management Application: Programming Guide - SC30-3487
IBM 4680 Store Management Application - Inventory Control Feature: User's Guide - SC30-3485
IBM 4680 Store Management Application - Price Management Feature: User's Guide - SC30-3486

IBM 4684 Store Sales Application
IBM 4684 Store Sales Application: Planning and Installation Guide - SB11-8470
IBM 4684 Store Sales Application: Programmer's Reference Manual - SB11-8472
IBM 4684 Store Sales Application: Operator's Guide - SB11-8471
IBM 4684 Store Run-time Support System: Installation and User's Guide - SB11-8552
IBM 4684 Store Application Tool Kit: Programmer's Guide - SB11-8478

In-Store Processing
In-Store Processing: Application Development Guide - SC30-3534
In-Store Processing: IBM AIX - Application Development Guide - SC30-3537
In-Store Processing: IBM OS/2 Extended Edition - Application Development Guide - SC30-3538
In-Store Processing: IBM OS/400 - Application Development Guide - SC30-3535
In-Store Processing: IBM 4680 OS - Application Development Guide - SC30-3536

Networks
IBM Local Area Network Support Program - IBM P/N 83X7873
IBM PC Network Baseband Planning Guide - S68X-2269
IBM PC Network Broadband Guide - S68X-2269
IBM Token-Ring Network Introduction and Planning Guide - GA27-3677-2

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PREFACE.3 Store System Related Publications -- Hardware

Scanners
IBM 1520 Hand-Held Scanner User's Guide - GA27-3685
IBM 4686 Retail Point of Sale Scanner: Physical Planning, Installation, and Operation Guide - SA27-3854
IBM 4686 Retail Point of Sale Scanner: Maintenance Manual - SY27-0319
IBM 4687 Point of Sale Scanner Model 1: Physical Planning, Installation, and Operation Guide - SA27-3855
IBM 4687 Point of Sale Scanner Model 1: Maintenance Manual - SY27-0317
IBM 4687 Point of Sale Scanner Model 2: Physical Planning Guide - SA27-3882
IBM 4687 Point of Sale Scanner Model 2: Operator's Guide - SA27-3884
IBM 4687 Point of Sale Scanner Model 2: Maintenance Manual - SY27-0324

IBM Personal Computer and IBM Personal System/2
IBM Guide to Operations - Personal Computer/AT - IBM P/N 6280066
IBM Guide to Operations - Personal Computer/AT - Store Loop Adapter - SA27-3694
IBM Hardware Maintenance and Service - Personal Computer/AT - Store Loop Adapter - SX27-0296
IBM Personal System/2 - Model 50 Quick Reference and Reference Diskette - S68X-2247
IBM Personal System/2 - Model 60 Quick Reference and Reference Diskette - S68X-2213
IBM Personal System/2 - Model 70 Quick Reference and Reference Diskette - S68X-2308
IBM Personal System/2 - Model 80 Quick Reference and Reference Diskette - S68X-2284
IBM Personal System/2 - Store Loop Adapter/A - Supplements for the Hardware Maintenance Library - SK2T-0319

Cabling
A Building Planning Guide for Communication Wiring - G320-8059
IBM Cabling System Planning and Installation Guide - GA27-3361
IBM Cabling System Catalog - G570-2040
IBM PC Network Broadband Guide - S68X-2269
IBM Token-Ring Network Introduction and Planning Guide - GA27-3677
Using the IBM Cabling System with Communication Products - GA27-3620

Setup and Verification
IBM 4680 Store System: Setup and Verification - SA27-3703

Subtopics
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PREFACE.3.1 General Publications

Advanced Data Communications for Stores - General Information - GH20-2188
Distributed Systems Executive - General Information - GH19-6394
IBM Disk Operating System 4.0 - IBM P/N 6280256
IBM Proprinters - SC31-3793
IBM 3270 Emulation Feature for the IBM 4680 Store System - (Online with the product)
IBM 4680 Support for COBOL Version 2 - (Online with the product)
IBM 4680 Store System Regression Tester - (Online with the product)
NetView Distribution Manager: General Information - GH19-6587
Systems Network Architecture: General Overview - GC30-3073

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CHANGES.1 SY27-0295-6 (March 1992)

This edition includes maintenance information about the point-of-sale printer Model 3 and the IBM 4684 Model 200 and Model 300.

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CHANGES.2 SY27-0295-5 (May 1991)

This edition includes maintenance information about the 4683-P base card and the ANPOS keyboard.

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CHANGES.3 SY27-0295-4 (November 1989)

This edition includes information about devices and functions associated with the IBM 4684 and 4683 point-of-sale terminals, as well as additional information relating to previous releases. It differs from the previous release by detailing support for the following devices:

- Token-Ring Network Adapter
- 2-8 Mb 80286 Memory Expansion Adapter
- X.25 Interface Co-Processor/2 Adapter
- ISDN Interface Co-Processor/2 Adapter
- Other PS/2 type adapters.

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CHANGES.4 SY27-0295-3 (December 1988)

This edition includes information about the IBM 4684 Point of Sale Terminal and the IBM 4683 Point of Sale Terminal. It also includes information on the optional Combined Keyboard/Display.

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CHANGES.5 SY27-0295-2 (September 1987)

This edition includes information about devices and functions associated with the IBM 4680 Operating System Version 1 Release 3 as well as additional information relating to previous releases. It includes information on:

- Additional Video Displays
- Alphanumeric Keyboard
- Hand-Held Bar Code Reader
- Matrix Keyboard
- Operator Display
- Shopper Display
- 4683 Point of Sale Terminal 4683-A01
- 4683 Point of Sale Terminal 4683-A02.

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CHANGES.6 SY27-0295-1 (May 1986)

This edition includes information about devices and functions associated with the IBM 4680 Operating System Version 1 Release 2 as well as additional information. It includes information on:

- IBM 1520 Hand-Held Scanner Model A02
- Magnetic Wand Reader
- Non-IBM Coin Dispenser Attachment
- Non-IBM Scale Attachment
- Store Controller Backup.

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1.0 Chapter 1. Repairing the 4683 Base Unit

This chapter contains repair information for the IBM 4683 base unit.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment to it or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

Subtopics

1.1 MAP 1010: 4683 Base Unit Hang Condition
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1.1 MAP 1010: 4683 Base Unit Hang Condition

Symptom Explanation	**Conditions That Could Cause This Symptom**
The 4683-*xx*1 has stopped and is in a hang condition.	A 4683-*xx*1 hang condition can result from a variety of causes. Resetting the 4683-*xx*1 will correct this condition in most cases. This problem determination procedure takes you through the reset procedure.

PICTURE 1

Figure 1-1. Panel Behind the 4683-xx1 Side-Cover

001

This procedure is for a 4683 ONLY. For the 4684, see the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

- Switch **POWER OFF** and then ON at the 4683-*xx*1.

Does the hang condition still exist?

Yes — **No**

002

The 4683-*xx*1 is operating correctly now.

003

Requesting a terminal storage dump (pressing and releasing the 4683-*xx*1 dump switch) will affect overall store system performance. Check with store personnel to determine if a terminal storage dump can be requested at this time.

Can a terminal storage dump be requested?

Yes — **No**

004

1. Hold 4683-*xx*1 dump switch pressed and switch **POWER OFF**. See Figure 1-1.

   This **does not** cause a storage dump. It **does** disable storage retention and cause an IPL when power is switched ON again.

2. Release the dump switch.

3. Disconnect the battery pack and the power cord to remove all power. DC power is still present at the power supply connectors when the power switch is in the off position.

4. Reconnect the power cord and the battery pack.

5. Switch power ON.

6. Wait until the IPL is completed.

- Continue at Step 006.

005

1. Press and release the dump switch.

2. Wait until the storage dump is completed.

3. Notify the store programmer that a storage dump has been taken.

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- Continue at Step 006.

006

(From steps 004 and 005)

Does the hang condition still exist?

Yes — **No**

No → **007**

The 4683-*xx*1 is operating correctly now.

008

1. Hold the 4683-*xx*1 dump switch pressed and switch **POWER OFF** again.
2. Release the dump switch.
3. Disconnect the power cord and the battery pack to remove all power.
4. Reconnect the power cord and the battery pack.
5. Switch power ON.
6. This time when U005 is displayed, press and release the dump switch to load Set Terminal Characteristics (STC).
7. When message Z001 is displayed, enter the terminal number. For Z001 information, see the *IBM 4680 Store System: Problem Determination Guide*
8. Follow instructions on the screen until the terminal program load is completed.
9. Verify that the point-of-sale terminal is operating correctly by running the terminal verification test. See the *IBM 4680 Store System: Problem Determination Guide*

Does the hang condition still exist?

Yes — **No**

No → **009**

The 4683-*xx*1 is operating correctly now.

010

Is there another message or symptom present at the 4683-*xx*1?

Yes — **No**

No → **011**

Follow the procedures in the *IBM 4680 Store System: Problem Determination Guide* to determine if the point-of-sale devices or Feature Expansion cards are the cause of the hang condition.

012

Follow the *User Response* for the message. See the *IBM 4680 Store System: Problem Determination Guide* or the *IBM 4680 Store System: Messages Guide*.

- or -

Follow the *Repair Action* for the symptom in the *IBM 4680 Store System: Problem Determination Guide*.

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1.2 MAP 1020: 4683 Base Unit Problem Isolation Procedure

Use this MAP to determine if a base unit failure is caused by a cable, the power supply, the base card or a memory module. This MAP assumes that the terminal problem was previously isolated to the base unit.

If this procedure detects a fault in the power supply, the power supply is failing.
If no faults are detected in the power supply, the base card or a memory module is failing.

Notes:

1. All voltage measurements should be made with one meter lead on frame ground (power supply chassis) unless stated otherwise.

2. All voltages to the base card are not removed by switching **POWER OFF**. The power supply is designed to supply 5 volts for memory even with the power switch off. The only way to completely remove power from the power supply is to unplug the power cord and remove the battery pack. A hang condition can result after replacing the base unit card if power is not completely removed before base unit card replacement.

001

Note: If you were sent here from the *IBM 4684 Point of Sale Terminal: Problem Determination Guide* and instructed to exchange the base card or the power supply, go directly to "Removing and Replacing 4683 Base Unit Components" in topic 1.4 and exchange the component.

Some messages or symptoms that are normally caused by the base unit may be caused by the cables that attach to the base unit.

- To determine if the message or symptom can be caused by a cable failure, look for your message or symptom in Table 1-2.

Is the message or symptom present in the table?

Yes — **No** → **002**

- Continue at Step 006.

003

- Measure the continuity of the cable associated with the message or symptom, and then return here.

Is the cable operating correctly?

Yes — **No** → **004**

Exchange the failing cable.

005

- Continue at Step 006.

006

(From steps 002 and 005)

Does the terminal continuously POWER ON and OFF until the power switch is set to OFF?

Yes — **No** → **007**

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Go to Step 009.

008

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

009

(From step 007)

The cooling fan (in the power supply) supplies a continuous flow of air through the base unit.

If the fan has stopped running or if the air flow is stopped, the electronic assemblies can be damaged by excessive heat, possibly causing intermittent failures.

The operation of the cooling fan can be verified by listening or by checking the air flow through the ventilating slots on the left side of the base unit.

- A gentle flow of air can be detected going into the rear slots and coming out of the front slots. (A thin piece of paper is deflected when held next to the slots.)

Is the cooling fan operating correctly?
Yes No

010

Continue at Step 022.

011

AC Power is present at the power supply and the cooling fan is operating.

Determine the 4683 model by examining the back panel of the 4683. See Figure 1-16 in topic 1.5.

Is this a 4683-P terminal?
Yes No

LED Blink	**Location of the failing memory module**
2	**CD1** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
3	**CD2** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
4	**CD3** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
5	**CD4** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
6	**CD5** IBM P/N 74F9916 (1 Mb) IBM P/N 74F9917 (2 Mb) IBM P/N 74F9918 (4 Mb)

Figure 1-2. LED Error Codes on the 4683-P base card

012

- Continue at Step 027.

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013

- Press and hold the terminal dump switch and switch **POWER OFF** at the terminal. See Figure 1-3.

- Remove the Feature Expansion card or cover plate in location 2A or 2B. See "Removing a Feature Expansion Card" in topic 1.4.9.1.

- Switch power ON at the terminal.

- Observe the LED on the 4683-P base card for a maximum of 30 seconds after the power is switched ON. For the location of the LED, see [2] on Figure 1-7 in topic 1.4.1.2.

Is the LED blinking?

Yes — **No**

014

- Continue at Step 027.

015

(From step 018)

A base card memory module is failing.

The LED blinks an error code to indicate which module is failing. See Figure 1-2.

- Each blink lasts for one-half second. There is a one-half second interval between blinks.
- There is a three second interval between each series of blinks.
- An LED error code consists of two to six blinks.

- Exchange the failing memory module. See "Removing and Replacing 4683-P Memory Modules CD1 through CD4" in topic 1.4.2 or "Removing and Replacing 4683-P Memory Module CD5" in topic 1.4.3.

- Switch power ON at the terminal.

- Observe the LED on the 4683-P base card again.

Is the LED blinking?

Yes — **No**

016

The failing module has been replaced and the base unit is working correctly.

Complete replacing the base card. See "Replacing the Base Card" in topic 1.4.1.2.

017

Is the LED blinking the same error code as before?

Yes — **No**

018

- Return to Step 015.

019

- Ensure that the memory module is inserted correctly into its socket and, if this is a CD1 through CD4 memory module, that none of its pins are bent. See "Removing and Replacing 4683-P Memory Modules CD1 through CD4" in topic 1.4.2 or "Removing and Replacing 4683-P Memory Module CD5" in topic 1.4.3 for instructions on how to correctly insert a memory

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module.

- Switch power ON at the terminal.

- Observe the LED on the 4683-P base card again.

Is the LED blinking?

Yes → **020**

The base unit is working correctly.

Complete replacing the base card. See "Replacing the Base Card" in topic 1.4.1.2.

No → **021**

A memory module is failing.

Exchange the memory modules one at a time until the LED stops blinking. See "Removing and Replacing 4683-P Memory Modules CD1 through CD4" in topic 1.4.2 or "Removing and Replacing 4683-P Memory Module CD5" in topic 1.4.3.

- or -

The base card is failing.

- or -

See "Removing and Replacing the 4683 Base Card" in topic 1.4.1.

022

(From step 010)

The terminal power is switched ON, but the fan is not operating.

- Have the ac power receptacle checked for correct voltage.

Is the correct voltage present at the ac power receptacle?

Yes → **023**

Have the ac power receptacle serviced before continuing.

No → **024**

The ac power cord could be failing.

- Switch **POWER OFF** at the terminal.

- Disconnect the power cord from the ac source.

- Check both ends of the power cord for damage.

- Check for good continuity of all of the power cord conductors.

Does the power cord have continuity and is it free of damage?

Yes → **025**

Exchange the power cord.

No → **026**

The power supply is failing. See "Removing and Replacing the 4683 Base

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Unit Power Supply" in topic 1.4.7.

027

(From MAP 6120 step 019 in topic 6.18)
(From steps 012, 014, and 035)

- Switch **POWER OFF** at the terminal.

- Disconnect the power cord from the power receptacle.

- Remove the storage retention battery and set it aside until it is needed again in this procedure. See Figure 1-3.

- Disconnect all devices from the base unit. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

- Remove the base card and all Feature Expansion Cards. See "Removing the Base Card" in topic 1.4.1.1 and "Removing a Feature Expansion Card" in topic 1.4.9.1.

- Remove the base unit cover. See "Removing the Base Unit Cover" in topic 1.4.4.1.

- Remove the power supply. See "Removing the Power Supply" in topic 1.4.7.1.

- Place the power supply, top side up, on a non-conductive surface.

- Insert the base card into the power supply. Ensure that the connectors are fully seated.

  Warning: The power supply and base card must be on a non-conductive surface to prevent damage to the base card.

The power supply connectors are now exposed so that continuity and voltage checks may be made.

- Reconnect at least the keyboard, display, and their cables to load the +5 V dc and +12 V dc power supply outputs.

- Plug the power cord into a power receptacle.

- Switch power ON.

- Using a digital multimeter, measure for correct voltages between frame ground and the exposed side of connectors P11 and P12. See Table 1-1 and Figure 1-4.

  Warning: **Keep metal objects away from the exposed base card**.

Are the voltages correct at all test points?

Yes **No**

028

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

029

The "Power Down Imminent" signal at pin P11-B, when grounded, creates a Power On Reset pulse at pin P11-A.

- Switch **POWER OFF** at the base unit.

- Remove the base card from the power supply sockets.

- Switch power ON.

- While measuring for +5 V dc on pin P11-A (Power On Reset) ground pin P11-B to frame ground with a length of wire. The voltage reading at P11-A goes from +5 V dc to near 0 V dc, and then back to +5 V dc. Remove the ground wire.

Did the Power On Reset voltage respond as described?

Yes **No**

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```
  ¦   +---+
  ¦   ¦030¦
  ¦   +---+
  ¦
  ¦   The power supply is failing.  See "Removing and Replacing the 4683
  ¦   Base Unit Power Supply" in topic 1.4.7.
  ¦
+---+
¦031¦
+---+
```

- Switch **POWER OFF** at the base unit.

The 4683-*xx*1 terminals have a battery and logic for storage retention. The 4683-*xx*2 terminals do not have a battery and do not use any of the storage protect circuits in the power supply.

Is this terminal a 4683-*xx*1?
Yes No

```
  ¦    ¦
  ¦   +---+
  ¦   ¦032¦
  ¦   +---+
  ¦
  ¦   Continue at Step 045.
```

PICTURE 2

Figure 1-3. IBM 4683 Base Unit Battery Compartment, Dump Switch, and Power Supply Connectors

```
  ¦
+---+
¦033¦
+---+
```

The storage retention battery charging voltage will be checked with the terminal power **OFF**, but with the power cord attached to the AC source.

The storage retention battery charging voltage can be measured at the two-pin battery cable connector located below the dump switch.

- Measure for +16 V dc to +24 V dc between the top (positive) and bottom pin (negative). See Figure 1-3.

Is the voltage correct?
Yes No

```
  ¦    ¦
  ¦   +---+
  ¦   ¦034¦
  ¦   +---+
  ¦
  ¦   The power supply is failing.  See "Removing and Replacing the 4683
  ¦   Base Unit Power Supply" in topic 1.4.7.
  ¦
+---+
¦035¦
+---+
```

- Locate the storage retention battery removed in Step 027.

- Measure the disconnected battery voltage.

  A fully charged battery measures +6.75 V dc to +7.25 V dc.

Is the battery voltage greater than +6.4 V dc?
Yes No

```
  ¦    ¦
  ¦   +---+
  ¦   ¦036¦
  ¦   +---+
  ¦
  ¦   Obtain a fully charged battery before continuing to Step 037.
  ¦
  ¦   Note:  Charge the new battery for 24 hours to ensure that it is fully
  ¦          charged.
  ¦
  ¦
  ¦
+---+
¦037¦
+---+
(From step 036)
```

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- Plug the battery cable into the socket.

  Note: The base card must be removed before this step.

- Switch power ON.

- Using a length of wire, *momentarily* connect power supply connector pin P11-D to frame ground, to enable the storage retention circuit. See Figure 1-3.

- Connect the common lead of the digital multimeter to the power supply frame ground and measure for +4.5 V dc to +5.5 V dc at power supply connector pin P11-C.

Is the voltage correct at P11-C?

Yes — **No**

No → **038**

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

Yes → **039**

- Momentarily connect power supply pin P11-F to frame ground to disable the storage retention circuit.

- Measure for less than +1.0 V dc at power supply connector pin P11-C.

Is the voltage correct at P11-C?

Yes — **No**

No → **040**

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

Yes → **041**

- Momentarily connect power supply pin P11-D to frame ground.

The storage retention circuit is enabled.

- Switch **POWER OFF** at the base unit.

- Disconnect the power cord from the power supply.

- Measure for +4.5V dc to +5.5 V dc at power supply connector pin P11-H.

Is the voltage correct at P11-H?

Yes — **No**

No → **042**

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

Yes → **043**

- Ensure that power is switched **OFF** and that the power cord is removed from the ac source.

- Check the dump switch circuit, measuring for zero resistance between P11-6 and frame ground. See Figure 1-3.

- Check that the circuit is OPEN when the dump switch is pressed.

Does the dump switch operate correctly?

Yes — **No**

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044

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

045

(From step 032)

Serial data and "soft POR" signals are transmitted from the base card to each of the Feature Expansion Cards through internal jumper wires in the power supply. These lines are from power supply connecter P12 to P13 and from P12 to P14.

- With terminal power switched **OFF**, use Figure 1-3 for locations and check for zero resistance between the following pairs of power supply connector pins:

  P12-12 to P13-S
  P12-13 to P13-R
  P12-14 to P14-S
  P12-15 to P14-R

  P12-N to P13-15
  P12-P to P13-14
  P12-R to P14-15
  P12-S to P14-14

Do all eight lines have good continuity?
Yes No

046

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

047

- Switch **POWER OFF** at the base unit.

- Replace all Feature Expansion Cards.

- Switch power ON.

- Measure the Power On Reset 2 line as follows:

  P13-P +4.75 V dc to +5.25 V dc
  P14-P +4.75 V dc to +5.25 V dc

Are the voltages correct?
Yes No

048

The power supply is failing. See "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

049

The power supply is operating correctly.

Is this a 4683-P terminal?
Yes No

050

The base card is failing. See "Removing and Replacing the 4683 Base Card" in topic 1.4.1.

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+---+

The base card is failing. See "Removing and Replacing the 4683 Base Card" in topic 1.4.1.

- or -

One of the memory modules is failing. See "Removing and Replacing 4683-P Memory Modules CD1 through CD4" in topic 1.4.2 or "Removing and Replacing 4683-P Memory Module CD5" in topic 1.4.3.

PICTURE 3

Figure 1-4. IBM 4683 Base Unit Power Supply and Connectors

Table 1-1. Voltage Test Points

Pin	Voltage Range	Name
P11-A	+4.75 to +5.25 V dc	Power On Reset 1
P11-H	+4.80 to +5.50 V dc	+5 V dc aux
P11-K	+4.75 to +5.25 V dc	+5 V dc internal
P11-M	+4.75 to +5.25 V dc	+5 V dc external
P11-P	+33.0 to +41.0 V dc	+36 V dc printer
P11-S	+11.4 to +13.2 V dc	+12 V dc
P12-B	+33.0 to +41.0 V dc	+36 V dc solenoid
P12-C	+4.75 to +5.24 V dc	+5 V dc external
P12-F	+11.4 to +13.2 V dc	+12 V dc
P12-J	+11.4 to +13.2 V dc	+12 V dc
P12-K	-11.04 to -13.2 V dc	-12 V dc
P13-P	+4.75 to +5.25 V dc	Power On Reset 2
P14-P	+4.75 to +5.25 V dc	Power On Reset 2

Table 1-2. Messages and Symptoms for Cable Failures

Message or Symptom	Connector Number	Go To
T1751	17	"Scanner Connector and Cable" in topic C.1.19.
T3151	3A	"Cash Drawer A Connector and Cable" in topic C.1.1. - or - "Special Attachment Cable" in topic C.1.16.
T3153	3A	"Cash Drawer A Connector and Cable" in topic C.1.1. - or - "Special Attachment Cable" in topic C.1.16.
T3161	3B	"Cash Drawer B Connector and Cable" in topic C.1.2. - or - "Special Attachment Cable" in topic C.1.16.
T3163	3B	"Cash Drawer B Connector and Cable" in topic C.1.2. - or - "Special Attachment Cable" in topic C.1.16.
T4151	4A	"Display A (Alphanumeric, Operator, or Shopper) Connector and Cable" in topic C.1.4.
T4251	4B	"Display B (Alphanumeric, Operator, or

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		Shopper) Connector and Cable" in topic C.1.5.
T5151	5A	"Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7. - or - "Point of Sale Keyboard A and B Connector and Short Cable" in topic C.1.8.
T5451	5B	"Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7.
T5452	5B	"Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7.
T5455	5B	"Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7.
T7151	7	"Model 1 or 2 Printer Card Connector J7 (I/O Interface Cable)" in topic C.3.7.
T7152	7	"Model 1 or 2 Printer Card Connector J7 (I/O Interface Cable)" in topic C.3.7.
W001	1	"4680 Store Loop Connector and Cable" in topic C.1.21.
W003	1	"4680 Store Loop Connector and Cable" in topic C.1.21.
W005	1	"4680 Store Loop Connector and Cable" in topic C.1.21.
W303	5A	"Point of Sale Keyboard A and B Connector and Short Cable" in topic C.1.8. - or - "Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7.
W304	7	"Model 1 or 2 Printer Card Connector J7 (I/O Interface Cable)" in topic C.3.7.
W305	7	"Model 1 or 2 Printer Card Connector J7 (I/O Interface Cable)" in topic C.3.7.
W306	4A	"Display A (Alphanumeric, Operator, or Shopper) Connector and Cable" in topic C.1.4.
W308	5A	"Point of Sale Keyboard A and B Connector and Short Cable" in topic C.1.8. - or - "Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7.
W324	4A	"Display A (Alphanumeric, Operator, or Shopper) Connector and Cable" in topic C.1.4.
W760	1	"4680 Store Loop Connector and Cable" in topic C.1.21.
Display is blank.	4A	"Display A (Alphanumeric, Operator, or Shopper) Connector and Cable" in topic C.1.4.
Cash drawer does not open automatically.	3A - or - 3B	"Cash Drawer A Connector and Cable" in topic C.1.1. - or - "Cash Drawer B Connector and Cable" in topic C.1.2.
Display message will not change.	4A	"Display A (Alphanumeric, Operator, or Shopper) Connector and Cable" in topic C.1.4.
Keyboard does not work correctly.	5A	"Point of Sale Keyboard A and B Connector and Short Cable" in topic C.1.8. - or - "Point of Sale Keyboard A and B Connector and Long Cable" in topic C.1.7.
Scanner does not work correctly.	17	"Scanner Connector and Cable" in topic C.1.19.
Terminal is beaconing or	1	"4680 Store Loop Connector and Cable" in topic C.1.21.

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offline.			

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1.3 Removing and Replacing the 4683 Base Unit

Removing and replacing the base unit is the user's responsibility.

Subtopics
1.3.1 Removing the Base Unit
1.3.2 Replacing the Base Unit

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1.3.1 Removing the Base Unit

"Replacing the Base Unit" is in topic 1.3.2.

Note: With some applications, information is stored in totals retention storage. Use your store procedures to retrieve this information.

1. Switch **POWER OFF** at the base unit.

2. Unplug the base unit power cord from the power receptacle.

3. If this is a 4683-*xx*2 terminal, continue at step 5.

   The terminal is a 4683-*xx*2 if it does *not* have store loop cable socket 1 on the base unit. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

4. Unplug the store loop cable from the store loop receptacle. If the locking clip is present, you must remove it before unplugging the cable. See Figure 1-5.

   Note: It is possible to unplug the store loop cable at the base unit rather than at the store loop receptacle. If you choose to unplug the store loop cable at the base unit, you must attach shorting plug 1B to the cable connector *quickly* to prevent an *open* store loop condition. Shorting plug 1B, P/N 6313948, is secured to the store loop cable near the base unit end. See Figure 1-5.

5. Remove the base unit rear cover.

6. To make reconnecting easier, note the location of the cables that are attached to the base unit.

7. Unplug all the cables from the base unit. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

8. Remove the thumbscrews that attach the alphanumeric or operator display post or arm to the base unit. Remove the display.

9. Remove all remaining devices from the base unit.

10. Record the serial number from the Repair Identification (RID) tag on the base unit.

    If no RID tag is present, record the serial number from the serial number plate on the base unit.

11. If the base unit is going to be shipped to another location, you must remove these items. See Appendix D, "Packing Items for Shipment."

    - All cables
    - The power cord
    - The battery pack (applies to 4683-*xx*1 terminals only)
    - The Feature Expansion Cards, if any are present. (You must install a filler plate to cover the opening created by the removal of any Feature Expansion Card.)

12. Replace the rear cover.

Reference	**Topic**
Removing the Battery Pack	1.4.5.1
Removing the Power Cord	1.4.6.1
Removing a Feature Expansion Card	1.4.9.1
Removing the Base Unit Rear Cover	1.4.8.1

PICTURE 4

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Figure 1-5. Removing the Base Unit

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1.3.2 Replacing the Base Unit

"Removing the Base Unit" is in topic 1.3.1 .

1. Switch **POWER OFF** at the base unit.

2. Remove the base unit rear cover. See "Removing the Rear Cover" in topic 1.4.8.1.

3. Replace the following items:

   - The power cord
   - The battery pack (applies to 4683-*xx*1 terminals only)
   - The blank filler plates, if applicable
   - The Feature Expansion Cards, if applicable.

4. Write the serial number of the old base unit (recorded previously) on a new RID tag and place the tag on this base unit. Position it to the rear of the serial number plate.

5. Place the alphanumeric or operator display in position on the base unit and pass the display cable through the cable slot on the base unit.

6. Fasten the display to the base unit using the thumbscrews. See Figure 1-6.

7. Position all remaining devices on the base unit.

8. If this is a 4683-*xx*2 terminal, ensure that cable 11 is connected to socket 11 in the partner terminal base unit, and continue at step 11.

   The terminal is a 4683-*xx*2 if it does *not* have store loop cable socket 1 on the base unit. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

9. Plug the store loop cable into base unit socket 1.

   Note: If shorting plug 1B is attached to the cable, remove the shorting plug and quickly plug the cable into socket 1 to prevent an *open* store loop condition. See Figure 1-6.

10. Plug the store loop cable into the store loop receptacle and install the locking clip.

11. Plug all the cables into the base unit. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

12. Replace the rear cover.

13. Plug the base unit power cord into a power receptacle and switch power ON.

14. If your 4683 is *not* attached to the IBM 4680 Store System, continue at step 18.

15. When U005 displays, press the dump switch on the 4683-*xx*1 terminal to force SET TERMINAL CHARACTERISTICS (STC) to load. For the location of the dump switch, see topic 1.2.

16. When the Z001 message displays, enter the terminal number.

17. When the terminal IPL is complete, continue at step 18.

18. Verify that the base unit is operating correctly by running the "Verification Tests" for the 4680 Store System in topic 1.6, for the 4684 in topic 1.7 or in the documentation for your system.

19. When the terminal verification tests have run successfully, update VPD with the serial number from the new RID tag by running the VPD Entry Procedure for the 4680 Store System in topic 1.9, for the 4684 System in topic 1.10, or in the documentation for your system.

Reference	**Topic**
Replacing the Power Cord	1.4.6.2

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Replacing the Battery Pack	1.4.5.2
Replacing the Feature Expansion Card	1.4.9.2

PICTURE 5

Figure 1-6. Replacing the Base Unit

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1.4 Removing and Replacing 4683 Base Unit Components

Subtopics

1.4.1 Removing and Replacing the 4683 Base Card
1.4.2 Removing and Replacing 4683-P Memory Modules CD1 through CD4
1.4.3 Removing and Replacing 4683-P Memory Module CD5
1.4.4 Removing and Replacing the 4683 Base Unit Cover
1.4.5 Removing and Replacing the 4683 Base Unit Battery Pack
1.4.6 Removing and Replacing the 4683 Base Unit Power Cord
1.4.7 Removing and Replacing the 4683 Base Unit Power Supply
1.4.8 Removing and Replacing the 4683 Base Unit Rear Cover
1.4.9 Removing and Replacing an 4683 Feature Expansion Card

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1.4.1 Removing and Replacing the 4683 Base Card

Subtopics
1.4.1.1 Removing the Base Card
1.4.1.2 Replacing the Base Card

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1.4.1.1 Removing the Base Card

1. Sign off the terminal using the store procedure. If this is a 4683-*xx*2 terminal, go to step 7.

   Note: Perform steps 2 through 6 as a final verification that the 4683 base card is failing.

2. Press the dump switch and switch **POWER OFF** at the base unit immediately to disable storage retention. Disconnect the battery pack and power cord.

3. Wait thirty seconds, then reconnect the power cord and switch **POWER ON** at the base unit.

4. When U005 displays, press the dump switch to load Set Terminal Characteristics (STC).

5. When Z001 displays, enter the terminal number. Wait for the terminal load to complete.

6. Run the appropriate Terminal Verification Test. If terminal verification is successful, **do not** replace the base card. If terminal verification is unsuccessful, continue at 7.

7. Switch **POWER OFF** at the base unit.

8. Disconnect the power cord from the power receptacle.

9. If this is a 4683-*xx*1 terminal, disconnect cable 1 from the store loop receptacle. If this is a 4683-*xx*2 terminal, disconnect cable 11 from the 4683 or 4684.

10. Disconnect the battery pack cable from its socket (4683-*xx*1 only).

11. Pull straight up on the base unit rear cover and remove it.

12. Disconnect the cables from the base card. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

13. Release the base card by pressing in on the latches [1] and turning them counterclockwise. See Figure 1-7 in topic 1.4.1.2.

14. Pull the base card straight out.

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1.4.1.2 Replacing the Base Card

When replacing the 4683-P base card, use the memory components from the first 4683-P base card unless they are defective.

1. Before you install the new base card, record the Engineering Change (EC) number for later use. The base card EC number is located on the component side near cable socket 7 at the rear of the card.

2. Put the base card into the base unit and push the base card in until its face plate is aligned with the back of the unit. See Figure 1-7.

3. Fasten the base card by pressing in on the latches [1] and turning them clockwise.

4. Plug the cables into the base card. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

5. Replace the base unit rear cover. See "Replacing the Rear Cover" in topic 1.4.8.2.

6. Plug the battery pack cable into its socket (4683-*xx*1 only) and plug the power cord into a power receptacle.

7. If this is a 4683-*xx*1 terminal, connect the store loop cable to the store loop receptacle. If this is a 4683-*xx*2 terminal, connect cable 11 to socket 11 in the 4683 or 4684.

8. Perform the steps in Table 1-3.

   Note: The store controller or 4684 must be operational before you can perform the steps.

Reference	**Topic**
Removing the Battery Pack	1.4.5.1
Removing the Rear Cover	1.4.8.1
Replacing the Battery Pack	1.4.5.2

Table 1-3. Base Card Test Procedures

If Your Terminal is Attached to an IBM 4680 Store System:	**If Your Terminal is Not Attached to an IBM 4680 Store System:**
(a) Switch terminal power ON. (b) When U005 displays, press the dump switch on the 4683-*xx*1 terminal to force SET TERMINAL CHARACTERISTICS (STC) to load. For the location of the dump switch, see Figure 1-3 in topic 1.2. (c) When the Z001 message displays, enter the terminal number. (d) Verify that the base unit is operating correctly by running the "Verification Tests" in topic 1.6. (e) When the terminal verification tests have run successfully, update VPD with the serial number from the new RID tag by running the "VPD Entry Procedure" in topic 1.9.	(a) Switch terminal power ON. (b) Verify that the base unit is operating correctly by running the "Verification Tests" in topic 1.7 or in the documentation for your system. (c) When the terminal verification tests have run successfully, update VPD with the serial number from the new RID tag by running the "VPD Entry Procedure" in topic 1.10 or in the documentation for your system.

PICTURE 6

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Figure 1-7. Removing and Replacing the Base Card

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1.4.2 Removing and Replacing 4683-P Memory Modules CD1 through CD4

Note: These memory modules are located at CD1, CD2, CD3 and CD4 on the 4683-P base card. See Figure 1-8 in topic 1.4.2.2.

Subtopics

1.4.2.1 Removing Modules CD1 through CD4
1.4.2.2 Replacing Modules CD1 through CD4

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1.4.2.1 Removing Modules CD1 through CD4

1. Remove the base card from the terminal. See "Removing the Base Card" in topic 1.4.1.1.

2. To remove a memory module:

   a. Grasp the memory module [1] in the middle. See Figure 1-8 in topic 1.4.2.2.

   b. Lift up on the memory module with a gentle rocking motion.

Table 1-4. 4683-P Base Card LED Error Codes. Note that there are no IBM part numbers on the memory modules and that the 256K x 4 bit memory modules have one less pin than the 1M x 4 bit memory modules.

LED Blink	**Location of the failing memory module**
2	**CD1** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
3	**CD2** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
4	**CD3** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
5	**CD4** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
6	**CD5** IBM P/N 74F9916 (1 Mb) IBM P/N 74F9917 (2 Mb) IBM P/N 74F9918 (4 Mb)

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1.4.2.2 Replacing Modules CD1 through CD4

To replace a memory module,

1. Face the rear or cable edge of the 4683-P base card. See Figure 1-8.

2. Rotate the memory module [1] until its beveled edge [2] is on the right with the pins down.

3. Insert the memory module into the socket with a gentle rocking motion until seated.

   Note: Ensure that the memory module is inserted correctly and that no pins are bent.

4. Put the base card into the base unit and push the base card in until its face plate is aligned with the back of the unit. See Figure 1-7 in topic 1.4.1.2.

5. Fasten the base card by pressing in on the latches and turning them clockwise.

6. Plug the cables into the base card. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

7. Connect the power cord to the power receptacle.

PICTURE 7

Figure 1-8. Removing and Replacing Memory Modules CD1 through CD4

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1.4.3 Removing and Replacing 4683-P Memory Module CD5

Note: This memory module is located at CD5 on the 4683-P base card. See Figure 1-9 in topic 1.4.3.2.

Subtopics
1.4.3.1 Removing Module CD5
1.4.3.2 Replacing Module CD5

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1.4.3.1 Removing Module CD5

1. Remove the base card from the terminal. See "Removing the Base Card" in topic 1.4.1.1.

2. To remove memory module CD5:

    a. Pull the retainers [1] outward simultaneously until they release the module. See Figure 1-9 in topic 1.4.3.2.

    b. Lift the module [3] from the memory module connector [2].

Table 1-5. 4683-P Base Card LED Error Codes. Note that there are no IBM part numbers on the memory modules and that the 256K x 4 bit memory modules have one less pin than the 1M x 4 bit memory modules.

LED Blink	**Location of the failing memory module**
2	**CD1** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
3	**CD2** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
4	**CD3** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
5	**CD4** IBM P/N 74F9914 (256K x 4 bit) IBM P/N 74F9915 (1M x 4 bit)
6	**CD5** IBM P/N 74F9916 (1 Mb) IBM P/N 74F9917 (2 Mb) IBM P/N 74F9918 (4 Mb)

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1.4.3.2 Replacing Module CD5

To replace memory module CD5:

1. Slide the memory module [1] into the memory module connector [2] at an angle. Make sure the module is properly aligned with the retainers [3]. See Figure 1-9.

2. Push the top of the module down and back until the retainers [3] snap into place.

3. Put the base card into the base unit and push the base card in until its face plate is aligned with the back of the unit. See Figure 1-7 in topic 1.4.1.2.

4. Fasten the base card by pressing in on the latches [1] and turning them clockwise.

5. Plug the cables into the base card. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

6. Connect the power cord to the power receptacle.

PICTURE 8

Figure 1-9. Removing and Replacing Memory Module CD5

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1.4.4 Removing and Replacing the 4683 Base Unit Cover

Subtopics
1.4.4.1 Removing the Base Unit Cover
1.4.4.2 Replacing the Base Unit Cover

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1.4.4.1 Removing the Base Unit Cover

1. Sign off the terminal using the store procedure.

2. Switch **POWER OFF** at the base unit.

3. Disconnect the power cord from the power receptacle.

4. If this is a 4683-*xx*1 terminal, disconnect cable 1 from the store loop receptacle. If this is a 4683-*xx*2 terminal, disconnect cable 11 from the base unit.

5. Remove the base unit from the terminal by disconnecting and removing any attached I/O devices.

6. Remove the power cord.

7. Set the base unit bottom side up.

8. Lift the holding tabs [1] as shown in Figure 1-10 in topic 1.4.4.2.

9. Hold the cover in place and push the base unit away from the holding tabs.

10. Continue pushing in this direction until the cover retainers [2] no longer overlap.

11. Set the base unit top side up, being careful that it does not fall away from the cover.

12. Lift the cover off.

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1.4.4.2 Replacing the Base Unit Cover

1. Put the cover into position with the retainers [2] set to overlap as shown in Figure 1-10.

2. Hold the base unit in place.

3. Push the cover over the base unit until the holding tabs [1] lock into place.

4. Replace the power cord. See "Replacing the Power Cord" in topic 1.4.6.2.

5. Replace the base unit on the terminal by replacing the I/O devices. See "Replacing the Base Unit" in topic 1.3.2.

6. If this is a 4683-*xx*1 terminal, connect the store loop cable to the store loop receptacle. If this is a 4683-*xx*2 terminal, connect cable 11 to socket 11 in the base unit.

7. Plug the power cord into a power receptacle.

8. Switch the base unit power ON.

9. Sign on the terminal using the store procedure.

PICTURE 9

Figure 1-10. Removing and Replacing the Base Unit Cover

Reference	**Topic**
Removing the Base Unit	1.3.1
Removing the Power Cord	1.4.6.1
Replacing the Power Cord	1.4.6.2
Replacing the Base Unit	1.3.2

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1.4.5 Removing and Replacing the 4683 Base Unit Battery Pack

Note: The battery pack is installed in the 4683-*xx*1 terminal only.

CAUTION:
The battery pack is composed of nickel cadmium batteries. Dispose of defective battery packs according to your local government regulations.

To fully charge the battery for terminal storage retention, power must be supplied to the terminal through the power cord for at least 14 hours. The battery will charge enough to run the "Terminal Storage Retention Test" if power is supplied for approximately 3 hours.

Subtopics
1.4.5.1 Removing the Battery Pack
1.4.5.2 Replacing the Battery Pack

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1.4.5.1 Removing the Battery Pack

1. DO NOT switch power off at the base unit.

2. Remove the base unit side cover (battery access). See Figure 1-11 in topic 1.4.5.2.

3. Unplug the battery cable from the base unit socket.

4. Remove the battery pack.

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1.4.5.2 Replacing the Battery Pack

1. Remove the base unit side cover (battery access). See Figure 1-11.
2. Place the battery pack into the opening in the base unit.
3. Plug the battery cable into the base unit socket.
4. Replace the base unit side cover (battery access).

PICTURE 10

Figure 1-11. Removing and Replacing the Battery Pack

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1.4.6 Removing and Replacing the 4683 Base Unit Power Cord

Subtopics
1.4.6.1 Removing the Power Cord
1.4.6.2 Replacing the Power Cord

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1.4.6.1 Removing the Power Cord

1. Switch **POWER OFF** at the base unit.

2. Unplug the base unit power cord from the power receptacle.

3. Remove all devices from the top of the base unit.

4. Remove the base unit side cover (battery access). See Figure 1-12 in topic 1.4.6.2.

5. Set the base unit on its left side.

6. Unplug the power cord from the base unit and pull it through the hole below the side cover.

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1.4.6.2 Replacing the Power Cord

1. Set the base unit on its left side.

2. Place the power cord in through the hole below the side cover and plug it into the base unit socket. See Figure 1-12.

3. Place the power cord in the groove as shown and route it toward the rear of the base unit.

4. Replace the base unit side cover.

5. Put the base unit in operating position.

6. Plug the base unit power cord into a power receptacle.

7. Place the devices in position on the base unit.

PICTURE 11

Figure 1-12. Removing and Replacing the Power Cord

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1.4.7 Removing and Replacing the 4683 Base Unit Power Supply

Subtopics
1.4.7.1 Removing the Power Supply
1.4.7.2 Replacing the Power Supply

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1.4.7.1 Removing the Power Supply

1. Sign off the terminal using the store procedure.

2. Switch **POWER OFF** at the base unit.

3. Disconnect 4683-*xx*1 cable 1 from the store loop receptacle or disconnect 4683-*xx*2 cable 11 from the 4683-*xx*1 base unit.

4. Disconnect the power cord from the power receptacle and remove it. See topic 1.4.6.

5. Remove the following:

   - Base Unit from the Terminal. See topic 1.3.1.
   - Battery Pack. See topic 1.4.5.1.
   - Base Card. See topic 1.4.1.1.
   - Feature Expansion Card(s). See topic 1.4.9.1.
   - Base Unit Cover. See topic 1.4.4.1.

6. Remove the screws [1] as shown in Figure 1-13 in topic 1.4.7.2.

7. Lift up on the retainer [2] and remove the power supply from the frame assembly.

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1.4.7.2 Replacing the Power Supply

1. Record the Engineering Change (EC) level number of the power supply and of the base card for later use.

   Note: The base card EC number is on the component side near cable socket 7. The power supply EC number is in the battery compartment, behind the battery.

2. Place the power supply in the frame assembly. Ensure that the tabs on the power supply fit into the slots in the frame assembly.

3. Push the power supply toward the base card until the retainer [2] locks into place. See Figure 1-13.

4. Replace the screws [1].

5. Replace the following:

   - Base Unit Cover. See topic 1.4.4.2.
   - Base Card See topic 1.4.1.2.
   - Feature Expansion Card(s). See topic 1.4.9.2.
   - Battery Pack. See topic 1.4.5.2.
   - Base Unit on the Terminal. See topic 1.3.2.

6. Connect 4683-*xx*1 cable 1 to the store loop receptacle or connect 4683-*xx*2 cable 11 to 4683-*xx*1 base unit socket 11.

7. Install the base unit power cord and plug it into a power receptacle. See topic 1.4.6.2.

8. Perform the steps in the following table.

   Note: The store controller or 4684 must be operational before you can perform the steps.

If Your Terminal is Attached to an IBM 4680 Store System:	**If Your Terminal is Not Attached to an IBM 4680 Store System:**
(a) Switch terminal power ON. (b) When U005 displays, press the dump switch on the 4683-*xx*1 to force Set Terminal Characteristics (STC) to load. For the location of the dump switch, see Figure 1-3 in topic 1.2. (c) When the Z001 message displays, enter the terminal number. (d) Verify that the base unit is operating correctly by running the "Verification Tests" in topic 1.6. (e) When the terminal verification tests have run successfully, update VPD with the serial number from the new RID tag by running the "VPD Entry Procedure" in topic 1.9.	(a) Switch terminal power ON. (b) Verify that the system unit is operating correctly by running the "Verification Tests" in topic 1.7 or in the documentation for your system. (c) When the terminal verification tests have run successfully, update VPD with the serial number from the new RID tag by running the "VPD Entry Procedure" in topic 1.10 or in the documentation for your system.

PICTURE 12

Figure 1-13. Removing and Replacing the Power Supply

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1.4.8 Removing and Replacing the 4683 Base Unit Rear Cover

Subtopics
1.4.8.1 Removing the Rear Cover
1.4.8.2 Replacing the Rear Cover

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1.4.8.1 Removing the Rear Cover

1. Pull straight up on the rear cover and remove it.

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1.4.8.2 Replacing the Rear Cover

1. Ensure that the cables are installed neatly and that they do not interfere with the cover when it is pushed into place.

2. Put the rear cover into place and push straight down.

PICTURE 13

Figure 1-14. Removing and Replacing the Rear Cover

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1.4.9 Removing and Replacing an 4683 Feature Expansion Card

Subtopics
1.4.9.1 Removing a Feature Expansion Card
1.4.9.2 Replacing a Feature Expansion Card

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1.4.9.1 Removing a Feature Expansion Card

1. Press and hold the dump switch, and then switch **POWER OFF** at the base unit. For the location of the dump switch, see Figure 1-3 in topic 1.2.

2. Unplug from the power receptacle the base unit power cord and the power cord of any device attached to the Feature Expansion card.

3. Remove the base unit rear cover.

4. To make reconnecting easier, note the location of the cables that are attached to the Feature Expansion card. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

   Note: If you exchange a card, you must put its replacement in the same location.

5. Unplug the cables from the card.

6. Release the card by pressing in on the latches and turning them counterclockwise. See Figure 1-15 in topic 1.4.9.2.

7. Pull the card straight out.

8. If the Feature Expansion card is going to be sent to another location, see Appendix D, "Packing Items for Shipment."

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1.4.9.2 Replacing a Feature Expansion Card

1. Press and hold the dump switch, and then switch **POWER OFF** at the base unit.

2. Unplug from the power receptacle, the base unit power cord and the power cord of any device attached to the Feature Expansion card.

3. Remove the base unit rear cover.

4. Remove the filler panel in location 2A or 2B. See Figure 1-15.

5. Insert the Feature Expansion card and push it all the way in. For exchanges, the replacement must go in the same location.

6. Press in on the latches and turn them clockwise to fasten the card.

7. Plug the cables into the Feature Expansion card and replace the base unit rear cover. See "4683 Base Unit Cable Sockets and Devices" in topic 1.5.

8. Plug the base unit power cord into a power receptacle, and switch power ON.

9. When the terminal IPL is complete, verify that the Feature Expansion card is operating correctly by running the "Terminal Verification Test Using the 4680 Operating System" in topic 1.6, the "Terminal Verification Test Using the 4684 Reference Diskette" in topic 1.7, or the "Terminal Verification Tests" in the documentation for your system.

Reference	**Topic**
Removing the Base Unit Rear Cover	1.4.8.1

PICTURE 14

Figure 1-15. Removing and Replacing a Feature Expansion card

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1.5 4683 Base Unit Cable Sockets and Devices

Table 1-6. IBM 4683 Base Unit Sockets and Devices

Socket Number	**Device Name**	**Cable Number**
1	Store Loop	1
3A	Cash Drawer A	3
3B	Cash Drawer B or Remote Alarm	3
4A	Alphanumeric, Operator, or Shopper Display	4
4B	Alphanumeric, Operator, or Shopper Display	4
5A	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Combined Keyboard/Display, or Matrix Keyboard	5
5B	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Combined Keyboard/Display, Matrix Keyboard, 1520 Hand-Held Scanner Model A02, or Dual-Track MSR	5
6	Single-Track Magnetic Stripe Reader (MSR) **Note:** Socket 6 is located on the 50-key keyboard.	None
7	Printer	7
9A	Reserved	-
9B	Hand-Held Bar Code Reader	-
11	4683-*xx*2 **TO** 4683-*xx*1 or 4684	11
17	Checkout Scanner or Scanner/Scale	17
21	1520 Hand-Held Scanner Model A01, Optical Character Reader (OCR), or Scale	21
22	Reserved	-
23	RS-232 Device	23
25	RS-232 or Current Loop Device	25
26	Magnetic Wand	26
29	Coin Dispenser	29
81	Video Display	81
82	Video Display	82

PICTURE 15

Figure 1-16. IBM 4683 Base Unit Back Panels

Note: The back panel of the 4683-A01 looks the same as the 4683-P or 4683-001. The back panel of the 4683-A02 looks the same as the 4683-002 except the 4683-A02 has socket 9A.

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1.6 Terminal Verification Test Using the 4680 Operating System

Test Description
The Terminal Verification Tests (sometimes called CSU tests) verify correct operation of the Feature Expansion cards and the devices connected to the base unit. The progress and results of these tests is shown as a series of messages on the terminal display. The tests run for the Feature Expansion cards and devices that are *configured* for your terminal. Tests are *bypassed* for Feature Expansion cards and devices that are *not configured* for your terminal.

1. Key in **S1, 9, 2, S2** to start the Terminal Verification Tests.

2. Follow the instructions on the display.

   - If an error message displays, follow the *User Response* for the message in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

   - If a symptom is observed, follow the *Action* for the symptom in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

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1.7 Terminal Verification Test Using the 4684 Reference Diskette

1. Ensure that the 4683 is attached to a 4684.

2. Use your store procedures to stop any application programs that are running on the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

3. Switch **POWER OFF** at the 4684.

4. Do the following to IPL the 4684:

   a. Insert the 4684 Reference Diskette in the 4684 diskette drive.

   b. Switch power ON at the 4683.

   c. Switch power ON at the 4684.

   A Reference Diskette Copyright message displays after the Power-On Self Test then message M0001 PRESS THE 1 KEY displays (alphanumeric display only).

5. Press **1** on the 4684 *primary* keyboard, if prompted.

   MENU-M1 displays.

6. Select START TESTS from MENU-M1.

7. Select RUN VERIFICATION TESTS from MENU-T1.

8. Follow the instructions on the display.

   - If an error message displays, follow the *User Response* for the message in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide* after completion of the remaining verification tests.

   - If a symptom is observed, follow the *Action Sequence* for the symptom in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide* after completion of the remaining verification tests.

   Note: A high density diskette is required to run the verification tests. Ensure that the diskette is *not* write protected and that it is in good condition.

   When the system unit verification tests are running, progress messages are displayed. For example, "Completed testing keyboard 3."

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1.8 Collecting Vital Product Data for the 4683

1. Switch **POWER OFF** at the 4683 base unit.

2. Unplug the base unit power cord from the power receptacle.

3. Record the serial number of the terminal.

   The serial number is embossed on the top of the base unit cover at the right rear corner.

4. Record the seven-character Engineering Change (EC) number of the base card installed in the base unit.

   The EC number is usually located on a label on the component side of the base card near cable socket 7. If you do not find it there, look near the center of the card.

5. Record the EC number of the power supply installed in your base unit.

   The EC number is found in the storage retention battery compartment behind the side cover (battery access).

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1.9 Entering Vital Product Data Using the 4680 Operating System

Description
This procedure is used to enter vital product data for the 4683. The data is stored in totals retention storage. Before starting this procedure, ensure that: □ The 4683 is attached to an *active* store loop □ The store loop is being controlled by an *active* store controller. □ The store controller is running the 4680 operating system.

1. Start test mode by keying in **S1, 9, 1, S2**.

2. When message T0010 displays, key in **9, 8, S2**.

   Message T9801 displays.

3. Key in the serial number of your terminal including the dash (embossed on the base unit or on the RID tag).

   The assignment of the alphabetic keys is shown on the following topic.

4. Press **S2**.

   One of the following messages displays:

   Message T9802
   - or -
   Message T9803

5. Key in the seven-character EC number of the base card installed in your base unit.

   If there are more than seven characters in the EC number, enter only the first seven characters and omit the dash (-), if present.

6. Press **S2**.

   Message T9804 displays.

7. Key in the EC number of the power supply installed in your base unit.

8. Press **S2**.

   Message T9805, then message T0010, displays.

9. Switch **POWER OFF** at the base unit, wait 5 seconds, and switch power ON again.

   Note: To print and review the data just entered, see "Printing Vital Product Data Using the 4680 Operating System" in topic 1.9.1.

PICTURE 16

Figure 1-17. 50-Key Keyboard and Combined Keyboard/Display Keyboard Vital Product Data Entry Key Assignments

PICTURE 17

Figure 1-18. Matrix Keyboard Vital Product Data Entry Key Assignments

PICTURE 18

Figure 1-19. Alphanumeric Keyboard Key Assignments

Subtopics
1.9.1 Printing Vital Product Data Using the 4680 Operating System

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1.9.1 Printing Vital Product Data Using the 4680 Operating System

1. Ensure that the 4683 is attached to an *active* store loop that is being controlled by an *active* store controller.

   If this is a 4683-002, ensure that it is attached to an *active* 4683-*xx*1.

2. Start Test Mode by keying in **S1, 9, 1, S2**.

3. When message T0010 displays, key in **9, 7, S2**.

   Message T9701 displays.

4. Key in the 3-digit terminal number.

5. Press **S2**.

   - If message T9702 displays, the terminal number entered was the wrong length. Re-enter the 3-digit terminal number.

   - If message T9703 displays, the number was not valid or was not found. Re-enter a valid terminal number.

6. The vital product data for the selected terminal is printed at the receipt station.

   The vital product data is printed one item per line. Each item represents a segment of the vital product data for the selected terminal.

   The first three lines list the terminal number, type and model, and serial number.

   The next three lines list the EC number for the base card, the power supply, and the base card Read Only Storage (ROS) module.

   The remainder of the lines lists the EC number of the microprocessor modules for each device that is connected.

   Message T9701 displays when printing is finished.

7. Vital product data for additional terminals can be printed by entering a new number.

8. To end this procedure, key in **0, S2**.

   Message T0010 displays.

9. To end Test Mode, key in **9, 9, S2**.

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1.10 Entering Vital Product Data Using the 4684 Reference Diskette

Description
This procedure is used to enter vital product data when the 4683 is attached to an IBM 4684 using the 4684 Reference Diskette. The data is stored in totals retention storage.

1. Switch **POWER OFF** at the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

2. Do the following to IPL the 4684:

   a. Insert the 4684 Reference Diskette in the 4684 diskette drive.
   b. Switch power ON at the 4683.
   c. Switch power ON at the 4684.

   A Reference Diskette Copyright message displays, then message M0001 PRESS THE 1 KEY displays (alphanumeric display only).

3. Press **1** on the 4684 *primary* keyboard if prompted.

   MENU-M1 displays.

4. Select START UTILITIES from MENU-M1.

5. Select SET/PRINT VITAL PRODUCT DATA from MENU-U1.

6. Select ENTER 4683 VITAL PRODUCT DATA from MENU-U2.

   Note: To bypass an entry, press **S2** (or Enter). The assignment of the alphabetic keys is shown on the following topic.

   Message T9801 displays.

7. Key in the 7-digit type and model number of the 4683 base unit *excluding* the dash (-) followed by S2 (or Enter).

   EXAMPLE: 4683002

   Message T9802 displays.

8. Key in the 7-digit serial number of the 4683 base unit *including* the dash (-) followed by S2 (or Enter).

   EXAMPLE: 23-12345

   Message T9803 displays.

9. Key in the EC number of the base card installed in your 4683 base unit followed by S2 (or Enter).

   Message T9804 displays.

10. Key in the EC number of the power supply installed in your 4683 base unit followed by S2 (or Enter).

    Note: To print and review the data just entered, see "Printing Vital Product Data Using the Reference Diskette" in topic 2.18.

PICTURE 19

Figure 1-20. 50-Key Keyboard and Combined Keyboard/Display Keyboard Key Assignments

PICTURE 20

Figure 1-21. Matrix Keyboard Key Assignments

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PICTURE 21

Figure 1-22. Alphanumeric Keyboard Key Assignments

Subtopics
1.10.1 Printing Vital Product Data Using the 4684 Reference Diskette

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1.10.1 Printing Vital Product Data Using the 4684 Reference Diskette

1. Ensure that the 4683 is attached to a 4684.

2. Use your store procedures to stop any application programs that are running on the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

3. Switch **POWER OFF** at the 4684.

4. Do the following to IPL the 4684:

   a. Insert the 4684 Reference Diskette in the 4684 diskette drive.
   b. Switch power ON at the 4683.
   c. Switch power ON at the 4684.

   A Reference Diskette Copyright message displays, then message M0001 PRESS THE 1 KEY displays (alphanumeric display only).

5. Press **1** on the 4683 *primary* keyboard if prompted and follow the remainder of this procedure at the 4683.

   MENU-M1 displays.

6. Select START UTILITIES from MENU-M1.

7. Select SET/PRINT VITAL PRODUCT DATA from MENU-U1.

8. Select PRINT 4683 VITAL PRODUCT DATA from MENU-U2.

9. The vital product data for the selected terminal is printed at the customer receipt station on the point-of-sale printer attached to the 4684.

   The vital product data is printed one item per line. Each item represents a segment of the vital product data for the selected terminal.

   The first four lines list:

   Terminal type
   Terminal serial number
   EC number of the base card
   EC number of the power supply.

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2.0 Chapter 2. Repairing the 4684 System Unit

This chapter contains repair information for the 4684 system unit.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment to it or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

Subtopics

2.1 MAP 2010: 4684 System Unit Problem Isolation Procedure
2.2 4684 System Unit Messages
2.3 4684 Failure Symptoms
2.4 MAP 2020: 4684 Baseband Network
2.5 MAP 2030: 4684 Blank Video Display
2.6 MAP 2040: 4684 Configuration Error
2.7 MAP 2050: 4684 System Board Video
2.8 MAP 2060: 4684 Token Ring
2.9 MAP 2070: 4684 U001 Message
2.10 MAP 2080: 4684 has 201 Memory Error and 164 Displayed at Power ON
2.11 MAP 2090: 4684 Power
2.12 4684 System Unit Cable Sockets and Devices
2.13 Removing and Replacing 4684 System Unit Components
2.14 Running 4684 Tests Using the Reference Diskette
2.15 Collecting Vital Product Data for the 4684
2.16 Entering Vital Product Data Using the 4684 Reference Diskette
2.17 Entering Vital Product Data Using the 4680 Operating System
2.18 Printing Vital Product Data Using the Reference Diskette
2.19 Printing Vital Product Data Using the 4680 Operating System

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2.1 MAP 2010: 4684 System Unit Problem Isolation Procedure

Symptom Explanation	**Conditions That Could Cause This Symptom**
It has been determined that the 4684 system unit is failing. This MAP helps determine the element within the 4684 system unit that is causing it to fail.	□ The system board is failing □ The power supply is failing □ The diskette drive is failing □ The fixed disk drive is failing □ An Option Adapter is failing.

You must always use the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide* **to determine that the 4684 system unit is failing before using this MAP.**

This is the entry point for all 4684 system unit failures. The MAPs, message list, and symptom tables help you determine the failing Field Replaceable Unit (FRU).

The tests are intended to test **only** IBM products listed in this manual. Non-IBM products, prototype cards, or modified options can give false errors and system responses that may not be valid.

IMPORTANT:

□ This MAP requires the use of the 4684 Reference Diskette to run tests.

If you do not have the diskette, look under the 4684 cash drawer till. It was stored there when the 4684 was installed. Please return it to the cash drawer when you are finished using it.

See the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide* for instructions on creating a backup copy of your original reference diskette.

□ When the 4684 is connected to a baseband network and the network cables are disconnected from the rear of the 4684, the network will become disabled (open) unless the two cables are connected together using an adapter.

If the baseband network is connected to a PC Network Baseband Adapter in option slot 1 or 2, ask the user for permission to disconnect the 4684 from the network or assistance in preventing an open network.

If the baseband network is connected to sockets 1A and 1B at the rear of the 4684, you can prevent an open or disabled network by connecting the network cables together using the 4684 Baseband Network Cable Adapter. See Figure 2-8 in topic 2.9.

□ When testing the diskette drive, a high-density scratch diskette is required.

□ If more than one error code is displayed, diagnose the first error code first. The cause of the first error code can cause false error codes to be displayed.

□ Each terminal has a display and keyboard that is designated as primary while using the Reference Diskette. You must use the primary keyboard to control testing.

□ If more than one keyboard is attached and one of them does not work, try using a different attached keyboard.

□ If you exchange a suspected Field Replaceable Unit (FRU) and the original symptom still remains, it is possible that some other FRU is failing and causing a false symptom to occur.

If you suspect this is happening, remove the Option Adapters in slots 1, 2 and 6, diskette drive, and fixed disk, one at a time, to see if the symptoms change.

Remember, when you remove one of these cards or devices, a power-on self test error related to that device will occur. You will have to ignore these errors and look for a change in the original failure symptom.

001

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- Verify that all internal and external connectors are installed correctly.

- Switch **POWER OFF** at the 4684.

- Insert your Reference Diskette into the diskette drive.

- Switch power ON at the 4684.

Is the green 4684 POWER-GOOD light at the front of the 4684 ON?
Yes **No**

002

Go to Step 014.

003

- Listen carefully for the fan in the 4684 system unit.

Is the fan running?
Yes **No**

004

Go to "MAP 2090: 4684 Power" in topic 2.11.

005

- Observe the display(s) carefully after switching power ON.

After the power-on self tests have been completed:

- The IBM Copyright message is displayed.
- Message M0001 is displayed (alphanumeric display only).
- MENU-M1 is displayed.

Note: This can take several minutes to display, depending on the terminal configuration.

Did MENU-M1 display correctly?
Yes **No**

006

- Continue at Step 008.

007

- Continue at Step 012.

008

(From step 006)

Did any message(s) display?
Yes **No**

009

Go to Step 011.

Table 2-1. IBM 4684 System Unit Sockets, Ports and Devices. The 4684 ports are associated with devices that may be either on the system board (memory) or external to it (keyboards,

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displays). The port number is related to the error code that is displayed when the device or function fails. For example, the keyboard is connected to port 3 and the keyboard error code is 3*nn*. See "4684 System Unit Messages" in topic 2.2.

Socket Number	**Port Number**	**Device Name**	**Cable Number**
1A	30	Baseband Network	-
1B	30	Baseband Network	-
1B	166/167	Token Ring Network (side card, Model 300 only)	-
3A	-	Cash Drawer A or Remote Alarm A	3
3B	-	Cash Drawer B or Remote Alarm B	3
4A or 4B	-	Alphanumeric, Operator, or Shopper Display	4
5A	-	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Matrix Keyboard, Combined Keyboard/Display, or Dual-Track MSR	5
5B	-	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Matrix Keyboard, Combined Keyboard/Display, Dual-Track MSR, or 1520 Hand-Held Scanner Model A02.	5
6	-	Single-Track Magnetic Stripe Reader (MSR) **Note:** Socket 6 is located on the 50-key keyboard.	None
7	-	Point-of-Sale Printer	7
9A	-	Alphanumeric, Operator, Shopper Display or Hand-Held Bar Code Reader	-
9B	-	Alphanumeric, Operator, Shopper Display or Hand-Held Bar Code Reader	-
11	-	4683-*xx*2	11
17	-	Checkout Scanner or Scanner/Scale	17
[1]	3	System Unit Keyboard	-
[2]	86	Pointing Device (Mouse)	-
[AA]	24	System Unit Video Display	-
[BB]	4	System Unit Printer	-
[CC]	11	System Unit Asynchronous Communications	-
[DD]	-	Dump Switch	-
Internal	1	System board functions	-
Internal	2	Memory	-
Internal	6	Diskette Drive	-

[3]PICTURE 22

Figure 2-1. IBM 4684 System Unit Back Panel

```
 +---+
 |010|
 +---+
```

- Press **S1** (ESC on the Enhanced A/N Keyboard) to continue the IPL process. Additional information may be displayed about the failures that were detected. Follow the instructions that are displayed.

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- See "4684 System Unit Messages" in topic 2.2. It provides a quick method to determine the most likely cause of an error message or it directs you to a test procedure or a MAP.

  You will only find messages that can be caused by a hardware failure or a diskette media failure. For other messages, refer to the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

  Note: If you exchange a suspected Field Replaceable Unit (FRU) and the original symptom still remains, it is possible that some other FRU is failing and causing a false symptom to occur.

  If you suspect this is happening, remove the Option Adapters in slots 1, 2 and 6 (side card), diskette drive, and fixed disk, one at a time, to see if the symptoms change.

  Remember, when you remove one of these cards or devices, a power-on self test error related to that device will occur. You will have to ignore these errors and look for a change in the original failure symptom.

011

(From step 009)

The A/N, operator or video display is probably blank.

- If the A/N or operator display is blank, exchange the A/N display.
- If the video display is blank, go to "MAP 2030: 4684 Blank Video Display" in topic 2.5.

012

(From step 007)

- At MENU-M1, select "Start Tests".
- At MENU-T1, select "Run System Unit Tests".
- At MENU-T2, select "Test System Unit".
- At MENU-T3, select "Run Tests One Time".
- At MENU-T4, select "Test All Devices".

  Note: If you have a token-ring installed, you will need to go to the section "Running the 4684 Token Ring Network Adapter Test" in topic 2.14.12 while running the IBM Token Ring Network test for further information.

- Follow the instructions on the display. For the location of the IBM 4684 System Unit sockets, ports and devices, see Table 2-1 and Figure 2-1.

- If tests cannot be started, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

  Note: If you exchange a suspected Field Replaceable Unit (FRU) and the original symptom still remains, it is possible that some other FRU is failing and causing a false symptom to occur.

  If you suspect this is happening, remove the Option Adapters in slots 1, 2 and 6 (side card) diskette drive, and fixed disk, one at a time, to see if the symptoms change.

  Remember, when you remove one of these cards or devices, a power-on self test error related to that device will occur. You will have to ignore these errors and look for a change in the original failure symptom.

- If an error message is displayed, follow the action indicated by the test or see "4684 System Unit Messages" in topic 2.2.

- If a symptom is observed, go to "4684 Failure Symptoms" in topic 2.3.

- If no failures are detected, go to Step 013.

013

(From step 012)

- If you are still experiencing a failure, check all cables and

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connectors for proper installation and if no problem is found:

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
- or -
Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

- If you are experiencing a problem with a device not supported by the tests on the Reference Diskette, refer to the device service manual for testing instructions.

- If you are experiencing an intermittent 162 or 165 problem (configuration problem) exchange the system board.

- If you suspect any other intermittent problem, start an error log and run the system unit tests again. See "Logging Errors" in topic 2.14.14.

014

(From step 002)

Is the power cord plugged into a functioning, properly grounded electrical outlet?

Yes **No**

015

- Switch **POWER OFF** at the 4684.

- Attach the 4684 to a functioning, properly grounded electrical outlet. Return to Step 001 in this MAP to verify system operation.

016

Go to "MAP 2090: 4684 Power" in topic 2.11.

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2.2 4684 System Unit Messages

Subtopics

2.2.1 Examples of 4684 Messages
2.2.2 4684 Power-On Self Test Message Index
2.2.3 4684 Power-On Self Test Messages
2.2.4 4684 Mnnnn Messages
2.2.5 4684 Tnnnn and Unnn Messages

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2.2.1 Examples of 4684 Messages

Following are examples of message formats that can appear on your display. The message number you will find in the message list is underscored (***n*** = any number and ***x*** = any character).

Three-Character Messages

- *xx***201**
- 15:05:07 Slot=0 1024Kb Memory **201** *'text'*
- *xxxxx xxxx* **201**
- *xxxxx* **201**
- **201**.

Four-Character Messages

- **1110**
- **U*nnn***.

Five-Character Messages

- **14527**
- **T*nnnn*** *'text'*
- **M*nnnn*** *'text'*.

Eight-Character Messages

These messages are generated by Version 3.00 of the IBM 4684 Point of Sale Terminal Reference Diskette.

Example: Error Code **0001010*n***

0 = First Digit
001 = Device Number
01 = Error Number
0 = Slot Number
n = Modifier

The following topic contains an index of all the power-ON self test messages generated by the 4684.

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2.2.2 4684 Power-On Self Test Message Index

Error	**Topic**
Bad Command Interpret	2.2.3
Missing Com Interpret	2.2.3
Disk Boot Failure	2.2.3
C0000 to C3FFF	2.2.3
C4000 to CFFFF	2.2.3
D0000 to D7FFF	2.2.3
D8000 to DFFFF	2.2.3
Parity Check	2.2.3
ROM Error	2.2.3
101 to 109	2.2.3
110	2.2.3
111	2.2.3
112 to 113	2.2.3
114	2.2.3
161	2.2.3
162	2.2.3
163	2.2.3
164	2.2.3
165 to 166	2.2.3
1nn	2.2.3
201 to 203	2.2.3
301	2.2.3
302 to 303	2.2.3
304	2.2.3
305	2.2.3
4nn	2.2.3
601 to 602	2.2.3
652	2.2.3
6nn	2.2.3
7nn	2.2.3
11nn	2.2.3
12nn	2.2.3
14nn	2.2.3
17nn	2.2.3
24nn	2.2.3
28nn	2.2.3
3015	2.2.3
30nn	2.2.3
4601	2.2.3

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4610 to 4611	2.2.3
4612	2.2.3
4613	2.2.3
4620 to 4630	2.2.3
4640	2.2.3
4641	2.2.3
4650	2.2.3
46nn	2.2.3
62nn	2.2.3
6300 to 63F7	2.2.3
8603	2.2.3
8604	2.2.3
10012	2.2.3
100nn	2.2.3
104nn	2.2.3
121nn	2.2.3
14527	2.2.3
145nn	2.2.3
14601	2.2.3
14610 to 14611	2.2.3
14612	2.2.3
14613	2.2.3
14620 to 14630	2.2.3
14640	2.2.3
14641	2.2.3
146nn	2.2.3
16500	2.2.3
16520	2.2.3
16530	2.2.3
16540	2.2.3
16550	2.2.3
166nn	2.2.3
167nn	2.2.3
194nn	2.2.3
251nn	2.2.3
nn301	2.2.3
0001010n to 0001090n	2.2.3
0001100n	2.2.3
0001110n	2.2.3
0001120n to 0001130n	2.2.3
0001140n	2.2.3
000161nn	2.2.3

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000162nn	2.2.3
000163nn	2.2.3
000164nn	2.2.3
000165nn to 000166nn	2.2.3
0001nnnn	2.2.3
0002010n to 0002030n	2.2.3
0003010n	2.2.3
0003020n to 0003030n	2.2.3
0003040n	2.2.3
0003050n	2.2.3
0004nnnn	2.2.3
0006010n to 0006020n	2.2.3
0006520n	2.2.3
0006nnnn	2.2.3
0007nnnn	2.2.3
0011nnnn	2.2.3
0012nnnn	2.2.3
0014nnnn	2.2.3
0017nnnn	2.2.3
0024nnnn	2.2.3
0028nnnn	2.2.3
003015nn	2.2.3
0030nnnn	2.2.3
004601nn	2.2.3
004610nn to 004611nn	2.2.3
004612nn	2.2.3
004613nn	2.2.3
004620nn to 004630nn	2.2.3
004640nn	2.2.3
004641nn	2.2.3
004650nn	2.2.3
0046nnnn	2.2.3
0062nnnn	2.2.3
0086030n	2.2.3
0086040n	2.2.3
010012nn	2.2.3
0100nnnn	2.2.3
0104nnnn	2.2.3
0121nnnn	2.2.3
014527nn	2.2.3
0145nnnn	2.2.3
014601nn	2.2.3

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014610nn to 014611nn	2.2.3
014612nn	2.2.3
014613nn	2.2.3
014620nn to 014630nn	2.2.3
014640nn	2.2.3
014641nn	2.2.3
0146nnnn	2.2.3
016500nn	2.2.3
016520nn	2.2.3
016530nn	2.2.3
016540nn	2.2.3
016550nn	2.2.3
0166nnnn	2.2.3
0167nnnn	2.2.3
0194nnnn	2.2.3
0251nnnn	2.2.3

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2.2.3 4684 Power-On Self Test Messages

These messages for the IBM 4684 Point of Sale Terminal are in alphabetic and numeric order.

When the IBM 4684 Point of Sale Terminal is powered ON, power-on self tests (POSTs) are performed automatically on the 4684 and most of the adapters. If the 4684 detects errors, an error code is displayed.

After the tests have successfully completed, the 4684 starts an initial program load (IPL). At this time it loads and initializes device drivers. If a video display is attached to the 4684, the display is used to indicate the successful or unsuccessful loading of the drivers that are required by the configuration records.

The messages in this list are only those that relate to hardware failures in the 4684 System Unit. If you have a message that is not in the following list, contact the store programmer or your support organization for assistance.

Bad or Missing Command Interpreter

Explanation: A 4684 diskette error occurred during IPL from a diskette.

User Response:

- Check for excessive dirt or dust on the head home position sensor in the diskette drive.
- Try a different diskette.

If the problem persists:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

Disk Boot Failure

Explanation: A 4684 diskette error occurred during the IPL.

User Response:

- Check for excessive dirt or dust on the head home position sensor in the diskette drive.
- Try a different diskette.

If the problem persists:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

C0000 through C3FFF

Explanation:

Model 1*xx* or 200 - A system board error occurred.
Model 300 - An adapter error occurred.

User Response:

Model 1*xx* or 200 - Exchange the system board. See

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"Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Model 300 -

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

C4000 through CFFFF

Explanation: An adapter error occurred.

User Response:

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

D0000 through D7FFF

Explanation: A Baseband Network error occurred.

User Response:

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Model 1*xx* or 200 - Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Model 300 -

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

D8000 through DBFFF

Explanation: A 4684 device channel error occurred.

User Response:

Model 1*xx* or 200 - Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Model 300 -

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

Installing the IBM 4683/4684 Diagnostic Drivers [A1I2] (C) Copyright IBM Corp. 1989

Explanation: The diagnostic drivers are being installed.

User Response: If the IPL stops with this message displayed and does not continue, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Installing the IBM 4683/4684 RIPSS Drivers [A1I2] (C) Copyright IBM Corp. 1989

Explanation: The Retail Industry Programming Support Services drivers are being installed.

User Response: If the IPL does not complete but stops with this message displayed, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Parity Check

Explanation: A 4684 parity check error occurred.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

ROM Error

Explanation: A 4684 ROM error occurred.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

---

101 to 109

Explanation: A 4684 system unit error occurred.

0001010n to 0001090n are also covered by this Explanation and User Response.

User Response:

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

110

Explanation: A 4684 system unit or Option Adapter error occurred.

0001100n is also covered by this Explanation and User Response.

User Response:

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select RUN TESTS ONE TIME from MENU-T3.
5. Select TEST ALL DEVICES from MENU-T4.
6. Follow the instructions on the display.

111

Explanation: A 4684 system unit I/O parity error occurred.

0001110n is also covered by this Explanation and User Response.

User Response:

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

---

112 to 113

Explanation: A 4684 system unit or Option Adapter error occurred.

0001120n to 0001130n are also covered by this Explanation and User Response.

User Response:

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select RUN TESTS ONE TIME from MENU-T3.
5. Select TEST ALL DEVICES from MENU-T4.
6. Follow the instructions on the display.

If tests cannot be run, exchange the system board. See

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"Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

114

Explanation: A 4684 system unit I/O parity error occurred.

0001140n is also covered by this Explanation and User Response.

User Response:

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card and Memory Expansion Adapter (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 114 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 114 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 114 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

161

Explanation: A nonvolatile storage error occurred or the storage retention battery is failing.

000161nn is also covered by this Explanation and User Response.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

162

Explanation: A 4684 configuration or hardware error occurred. One of the internal devices in the 4684 system unit can cause this problem.

000162nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

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163

Explanation: A 4684 date and time error occurred.

000163nn is also covered by this Explanation and User Response.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

164

Explanation: A 4684 memory configuration error occurred.

000164nn is also covered by this Explanation and User Response.

User Response:

- If you also have a 201 memory test error, see "MAP 2080: 4684 has 201 Memory Error and 164 Displayed at Power ON" in topic 2.10.
- If you have a 164 error only, run the memory tests using the following steps:

1. Press **S1** (ESC on an Enhanced A/N keyboard) to proceed.
2. Select START TESTS from MENU-M1.
3. Select RUN SYSTEM UNIT TESTS from MENU-T1.
4. Select TEST SYSTEM UNIT from MENU-T2.
5. Select RUN TESTS ONE TIME from MENU-T3.
6. Select *nnnn* Kb MEMORY from MENU-T4.

   Note: *nnnn* = memory size
7. Follow the instructions on the display.

If the test does not detect a memory failure:

1. Exchange the 4684 Feature Card and Memory Expansion adapter (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
2. Exchange the memory module packages, one at a time.
3. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

---

165 to 166

Explanation: An Option Adapter or configuration error occurred.

000165nn to 000166nn are also covered by this Explanation and User Response.

User Response: Go to "MAP 2040: 4684 Configuration Error" in topic 2.6.

1nn

Explanation: A system unit, option adapter, configuration, or ROM error occurred.

0001nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Switch **POWER OFF** at the 4684.
2. Remove the 4684 covers. See "Removing the System Unit Cover" in topic 2.13.4.1.
3. Remove all the Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
4. Remove the 4684 Feature Card Expansion **or** 4684

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Feature Card and Memory Expansion (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.

5. Switch **POWER ON** at the 4684 and wait for the IPL to start.
   - If error message 111 displays, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If error message 111 *does not* display during the IPL, reconnect the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion and the Option Adapters, one at a time, until the error is displayed again. Exchange the adapter that causes 111 to display.

See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Note: Be sure to **POWER OFF** when unplugging and reconnecting cards or adapters.

---

201 to 203

Explanation: A 4684 memory error occurred.

0002010n to 0002030n are also covered by this Explanation and User Response.

User Response:

- If you also have a 164 memory configuration error, see "MAP 2080: 4684 has 201 Memory Error and 164 Displayed at Power ON" in topic 2.10.
- If you have a 201 error only, and you **cannot** continue the IPL by pressing **S1** or **ESC**, go to step 1 under **Replacing Memory Modules**.
- If you have a 201 error only and you **can** continue the IPL by pressing **S1** or **ESC**, run the memory tests as follows:

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select RUN TESTS ONE TIME from MENU-T3.
5. Select *nnnn* Kb MEMORY from MENU-T4.

   Note: *nnnn* = memory size
6. Follow the instructions on the display.

Replacing Memory Modules: If no errors are detected by the test, continue with the following steps:

1. Exchange the memory module packages on the system board. See Figure 2-21 in topic 2.13.10.2 and Figure 2-22 in topic 2.13.10.2.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the memory module package on the Feature Card and Memory Expansion Adapter in slot 5 (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
4. Exchange the memory modules on the memory expansion option adapter in slot 1 or slot 2 (if present). See Figure 2-9 in topic 2.10.
5. Exchange the memory expansion option adapter in slot 1 or slot 2 (if present). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

301

Explanation: A 4684 system unit keyboard error occurred.

0003010n is also covered by this Explanation and User Response.

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Note: If no system unit keyboard is present, this error will appear momentarily and then be removed. If this happens, ignore the error.
If you have a system unit keyboard and the error is displayed, a failure has been detected. Continue to the *User Response* for this message.

User Response:

1. Ensure that the system unit keyboard is attached to socket 1 on the system unit.
2. Ensure that keys are not pressed on the keyboard.
3. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

---

302 to 303

Explanation: A 4684 system unit keyboard error occurred.

0003020n to 0003030n are also covered by this Explanation and User Response.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

304

Explanation: A 4684 system unit keyboard error occurred.

0003040n is also covered by this Explanation and User Response.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

305

Explanation: A 4684 system unit keyboard error occurred.

0003050n is also covered by this Explanation and User Response.

User Response: Exchange the fuse on the system board. The fuse is located directly in front of the keyboard cable connector on the system board.

If the fuse continues to blow:
1. Ensure that an Enhanced Alphanumeric keyboard cable is not being used to attach an ANPOS keyboard to the 4684 system unit.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the Enhanced A/N Keyboard.
4. Exchange the Enhanced A/N Keyboard cable.

4nn

Explanation: A 4684 printer port error occurred.

0004nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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601 to 602

Explanation: A 4684 diskette error occurred.

0006010n to 0006020n are also covered by this Explanation

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and User Response.

User Response:

- Check for excessive dirt or dust on the head home position sensor in the diskette drive.
- Try a different diskette.

If the problem persists:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

652

Explanation: A 4684 diskette error occurred.

0006520n is also covered by this Explanation and User Response.

User Response:

- Check for excessive dirt or dust in the diskette drive.
- Try a different scratch diskette.

If the problem persists:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

6nn

Explanation: A 4684 diskette drive error occurred.

0006nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

7nn

Explanation: A 4684 math co-processor error occurred. The 40-pin math co-processor socket is located on the 4684 system board under the power supply.

0007nnnn is also covered by this Explanation and User Response.

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Note: In this message, ***n*** = any number.

User Response:

1. Exchange the math co-processor module on the system board.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

11nn

Explanation: A 4684 system board asynchronous port error occurred. This error can be caused by any attached serial device.

0011nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

12nn

Explanation: A 4684 Dual Asynchronous Option Adapter error occurred.

0012nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the Dual Asynchronous Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

14nn

Explanation: A Proprinter error occurred.

0014nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Ensure that the printer is properly connected and powered-ON.
2. Run the printer self-test. See the documentation supplied with the printer.
   - If the printer self-test does not run correctly, the printer is failing. See the printer service manual.
3. Install a wrap plug on the parallel port and run the printer port test. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14.
   - If the printer port test detects a failure, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
   - If the printer port test does not detect a failure, exchange the printer cable.

17nn

Explanation: A 4684 fixed disk drive error occurred.

0017nnnn is also covered by this Explanation and User

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Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the fixed disk. See "Removing and Replacing the 4684 Fixed Disk Drive" in topic 2.13.8.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

24nn

Explanation: A 4684 system board video error occurred.

0024nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response: Go to "MAP 2050: 4684 System Board Video" in topic 2.7.

28nn

Explanation: An IBM 3270 Connection Adapter error occurred.

0028nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the IBM 3270 Connection Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the System Board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

3015

Explanation:

0028nnnn is also covered by this Explanation and User Response.

Model 1*xx* or 200 - The Baseband Network is disconnected or failing.

Model 300 - A Baseband Network Adapter or a PC Network Baseband Adapter/A error occurred.

User Response:

Model 1*xx* or 200 - Ensure that the network cables or wrap plug and terminators are properly connected. If no problem is found, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

Model 300 - Ensure that the network cables or the wrap plug and terminators are properly connected to the adapter. If no problem is found, exchange the Baseband Network Adapter in slot 6 (side card), or exchange the PC Network Baseband Adapter/A in either slot 1 or in slot 2. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

30nn

Explanation: A 4684 system board Baseband Network error

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occurred.

0030nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response: Go to "MAP 2020: 4684 Baseband Network" in topic 2.4.

4601

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004601nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the System Board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

4610 to 4611

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004610nn to 004611nn are also covered by this Explanation and User Response.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the inside and outside memory modules on the X.25 Adapter Card one at a time.

4612

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004612nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange inside memory module on the X.25 Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

4613

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004613nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the outside memory module on the X.25

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Adapter Card.

Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

4620 to 4630

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004620nn to 004630nn are also covered by this Explanation and User Response.

User Response: Ensure that the 37-pin wrap plug was connected to the adapter when the test was run.

If the wrap plug was connected:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the inside and outside memory module on the X.25 Adapter Card one at a time.

4640

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004640nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the inside memory module on the X.25 Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

4641

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004641nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange outside memory module on the X.25 Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

4650

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

004650nn is also covered by this Explanation and User Response.

User Response: Exchange the X.25 communication cable.

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46nn

Explanation: The IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter test detected an error.

0046nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the IBM Realtime Interface Co-Processor Multiport/2 or X.25/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the inside and outside memory modules on the X.25 Adapter Card one at a time.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

62nn

Explanation: A 4684 Store Loop Adapter/A error occurred.

0062nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the 4684 Store Loop Adapter/A. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

6300 to 63F7

Explanation: These errors are caused by devices that are configured but not responding or by devices that are responding but are not configured.

User Response: Ensure that configuration has been performed. See the configuration procedures in the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

- If these error messages occur along with a 14527 message, see the 14527 message in the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.
- If the device(s) indicated by these error messages have been exchanged and the problem persists:
  1. Exchange the 4684 power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.
  2. Exchange the 4684 system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

8603

Explanation: A 4684 pointing device error occurred.

0086030n is also covered by this Explanation and User Response.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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Explanation: A 4684 pointing device error occurred.

0086040n is also covered by this Explanation and User Response.

User Response: Perform the following procedure:

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select RUN TESTS ONE TIME from MENU-T3.
5. Select MOUSE PORT from MENU-T4.
6. Follow the instructions on the display.

10012

Explanation: A 4684 Multiprotocol Communications Adapter error occurred.

010012nn is also covered by this Explanation and User Response.

User Response: Ensure that the wrap plug was installed when the test was run.

If the wrap plug was installed:

1. Exchange the multiprotocol communications adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the 4684 Feature Card Expansion **or** 4684 Feature Card and Memory Expansion Adapter (if present). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 and "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.
3. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

100nn

Explanation: A 4684 Multiprotocol Communications Adapter error occurred.

0100nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the Multiprotocol Communications Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

104nn

Explanation: A 4684 ESDI fixed disk drive error occurred.

0104nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the fixed disk. See "Removing and Replacing the 4684 Fixed Disk Drive" in topic 2.13.8.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the Disk Drive Interposer. See Figure 2-23 in topic 2.13.12.2.

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121nn

Explanation: A 300/1200/2400 Internal Modem/A error occurred.

0121nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the 300/1200/2400 Internal Modem/A. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

14527

Explanation: A device channel error occurred. Any device attached to the channel can cause this message. One or more 63*nn* errors may also display.

014527nn is also covered by this Explanation and User Response.

User Response: Note any 63*nn* errors that display.

- If these error messages occur along with 63nn messages, see the 14527 message in the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.
- If the 14527 message is the only error message:
  1. Exchange the 4684 system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
  2. Exchange the 4684 power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

145nn

Explanation: A device channel error occurred.

0145nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

14601

Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014601nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

14610 to 14611

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Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014610nn to 014611nn are also covered by this Explanation and User Response.

User Response:

1. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange inside and outside memory modules on the ISDN Adapter Card one at a time.

14612

Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014612nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the inside memory module on the ISDN Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

2. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

14613

Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014613nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the outside memory module on the ISDN Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

2. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

14620 to 14630

Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014620nn to 014630nn are also covered by this Explanation and User Response.

User Response: Ensure that the wrap plug was connected to the adapter when the test was run.

If the wrap plug was connected:

1. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the inside and outside memory modules on the ISDN Adapter Card, one at a time.

14640

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Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014640nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the inside memory module on the ISDN Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest them before installing a new memory module package.

2. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

14641

Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

014641nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the outside memory module on the ISDN Adapter Card.

   Note: Always swap the inside and outside memory module packages and retest before installing a new memory module package.

2. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

146nn

Explanation: The ISDN Interface Co-Processor/2 Adapter test detected an error.

0146nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the ISDN Interface Co-Processor/2 Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the inside and outside memory modules on the ISDN Adapter Card one at a time.

   Note: Always swap the inside and outside memory module packages and retest them before installing a new memory module package.

16500

Explanation: A 6157 Tape Attachment Adapter error occurred.

016500nn is also covered by this Explanation and User Response.

User Response:

Exchange the 6157 Tape Attachment Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

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16520

Explanation: A 6157 Streaming Tape Drive error occurred.

016520nn is also covered by this Explanation and User Response.

User Response:

Exchange the 6157 Streaming Tape Drive.

16530

Explanation: A 6157-002 Streaming Tape Drive error occurred.

016530nn is also covered by this Explanation and User Response.

User Response:

Exchange the 6157-002 Streaming Tape Drive.

16540

Explanation: A 6157 Streaming Tape Drive error occurred.

016540nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the 6157 Streaming Tape Drive.
2. Exchange the 6157 Tape Attachment Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

16550

Explanation: A 6157-002 Streaming Tape Drive error occurred.

016550nn is also covered by this Explanation and User Response.

User Response:

1. Exchange the 6157-002 Streaming Tape Drive.
2. Exchange the 6157-002 Tape Attachment Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

166nn

Explanation: An IBM Token Ring Network Adapter error occurred.

0166nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Determine the location of the Token Ring option adapter. It may be attached to the system board as a side card or it may be plugged into one of the two optional adapter slots. Exchange the IBM Token Ring Network adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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167nn

Explanation: An alternate IBM Token Ring Network Adapter error occurred.

0167nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Determine the location of the Token Ring option adapter. It may be attached to the system board as a side card or it may be plugged into one of the two optional adapter slots. Exchange the IBM Token Ring Network adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

194nn

Explanation: A 2-8Mb 80286 Memory Expansion adapter error occurred.

0194nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response:

1. Exchange the memory module packages on the adapter one at a time. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
2. Exchange the 2-8Mb 80286 Memory Expansion adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
3. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

251nn

Explanation: A V.32 Modem/A adapter error occurred.

0251nnnn is also covered by this Explanation and User Response.

Note: In this message, ***n*** = any number.

User Response: Exchange the V.32 Modem/A adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

0001010n to 0001090n

Explanation: See 101 to 109 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000110

Explanation: See 110 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0001110n

Explanation: See 111 in topic 2.2.3.

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Note: In this message, ***n*** = any number.

0001120n to 0001130n

Explanation: See 112 to 113 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000114

Explanation: See 114 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000161nn

Explanation: See 161 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000162nn

Explanation: See 162 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000163nn

Explanation: See 163 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000164nn

Explanation: See 164 in topic 2.2.3.

Note: In this message, ***n*** = any number.

000165nn to 000166nn

Explanation: See 165 to 166 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0001nnnn

Explanation: See 1nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0002010n to 0002030n

Explanation: See 201 to 203 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0003010n

Explanation: See 301 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0003020n to 0003030n

Explanation: See 302 to 303 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0003040n

Explanation: See 304 in topic 2.2.3.

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Note: In this message, ***n*** = any number.

0003050n

Explanation: See 305 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0004nnnn

Explanation: See 4nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0006010n to 0006020n

Explanation: See 601 to 602 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0006520n

Explanation: See 652 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0006nnnn

Explanation: See 6nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0007nnnn

Explanation: See 7nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0011nnnn

Explanation: See 11nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0012nnnn

Explanation: See 12nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0014nnnn

Explanation: See 14nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0017nnnn

Explanation: See 17nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0024nnnn

Explanation: See 24nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0028nnnn

Explanation: See 28nn in topic 2.2.3.

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Note: In this message, ***n*** = any number.

003015nn

Explanation: See 3015 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0030nnnn

Explanation: See 30nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

004601nn

Explanation: See 4601 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004610nn to 004611nn

Explanation: See 4610 to 4611 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004612nn

Explanation: See 4612 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004613nn

Explanation: See 4613 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004620nn to 004630nn

Explanation: See 4620 to 4630 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004640nn

Explanation: See 4640 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004641nn

Explanation: See 4641 in topic 2.2.3.

Note: In this message, ***n*** = any number.

004650nn

Explanation: See 4650 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0046nnnn

Explanation: See 46nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0062nnnn

Explanation: See 62nn in topic 2.2.3.

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Note: In this message, ***n*** = any number.

0086030n

Explanation: See 8603 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0086040n

Explanation: See 8604 in topic 2.2.3.

Note: In this message, ***n*** = any number.

010012nn

Explanation: See 10012 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0100nnnn

Explanation: See 100nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0104nnnn

Explanation: See 104nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0121nnnn

Explanation: See 121nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

014527nn

Explanation: See 14527 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0145nnnn

Explanation: See 145nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

014601nn

Explanation: See 14601 in topic 2.2.3.

Note: In this message, ***n*** = any number.

014610nn to 014611nn

Explanation: See 14610 to 14611 in topic 2.2.3.

Note: In this message, ***n*** = any number.

014612nn

Explanation: See 14612 in topic 2.2.3.

Note: In this message, ***n*** = any number.

014613nn

Explanation: See 14613 in topic 2.2.3.

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Note: In this message, ***n*** = any number.

014620nn to 014630nn

Explanation: See 14620 to 14630 in topic 2.2.3.

Note: In this message, ***n*** = any number.

014640nn

Explanation: See 14640 in topic 2.2.3.

Note: In this message, ***n*** = any number.

014641nn

Explanation: See 14641 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0146nnnn

Explanation: See 146nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

016500nn

Explanation: See 16500 in topic 2.2.3.

Note: In this message, ***n*** = any number.

016520nn

Explanation: See 16520 in topic 2.2.3.

Note: In this message, ***n*** = any number.

016530nn

Explanation: See 16530 in topic 2.2.3.

Note: In this message, ***n*** = any number.

016540nn

Explanation: See 16540 in topic 2.2.3.

Note: In this message, ***n*** = any number.

016550nn

Explanation: See 16550 in topic 2.2.3.

Note: In this message, ***n*** = any number.

0166nnnn

Explanation: See 166nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0167nnnn

Explanation: See 167nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

0194nnnn

Explanation: See 194nn in topic 2.2.3.

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Note: In this message, ***n*** = any number.

0251nnnn

Explanation: See 251nn in topic 2.2.3.

Note: In this message, ***n*** = any number.

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2.2.4 4684 Mnnnn Messages

These messages are generated by the IBM 4684 Point of Sale Terminal when running tests, utilities, or configuration.

M0001 **M0001 Please press 1.**

Explanation: This message appears following the copyright message. When the 1 key is pressed (on the primary keyboard), the program can determine the keypad layout for the primary keyboard.

User Response: Press **1** on the primary keyboard.

If the display does not proceed to MENU-M1:
1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

M0002 **M0002 The 4684 system unit is failing.**

Explanation: An error was detected when reading or writing non-volatile memory.

User Response: Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

M0010 **M0010 Error securing fixed disk.**

Explanation: An error was detected when securing the fixed disk before moving the 4684.

User Response:

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select RUN TESTS ONE TIME from MENU-T3.
5. Select FIXED DISK from MENU-T4.
6. Follow the instructions on the display.

M0011 **M0011 No fixed disk found.**

Explanation: The program detected no fixed disk when one was expected.

User Response:

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select RUN TESTS ONE TIME from MENU-T3.
5. Select FIXED DISK from MENU-T4.
6. Follow the instructions on the display.

If the test cannot be run:

1. Exchange the fixed disk. See "Removing and Replacing the 4684 Fixed Disk Drive" in topic 2.13.8.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

M0100 **M0100 Error reading 4684 Reference Diskette.**

Explanation: An error was detected when reading the Reference Diskette.

User Response:

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1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

M0101 **M0101 A Configuration Error has occurred. Do you want to run configuration?**

Explanation: A configuration error or mismatch was detected during the IPL.

User Response: See "MAP 2040: 4684 Configuration Error" in topic 2.6.

M0110 **M0110 Error reading 4684 Reference Diskette.**

Explanation: An error was detected when reading the Reference Diskette.

User Response:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

M0300 **M0300 Primary keyboard is failing**

Explanation: The keyboard that was configured as the primary keyboard for the terminal being tested is not connected or is failing.

The primary keyboard is the keyboard you use for input when the Reference Diskette is being used.

If the 4683 is powered off while in test mode, this message displays when power is switched on again. This is not an error condition.

User Response: If M0300 remains on the display:

1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

M0310 **M0310 Display failed**
Primary Display err.

Explanation: The display that was configured as the primary display for the terminal being tested is not connected or is failing.

The primary display is the display that displays messages when the Reference Diskette is being used.

If the 4683 is powered OFF while in test mode, this message displays when power is switched ON again. This is not an error condition.

User Response: If M0310 remains on the display, ensure that the display cable is connected to the display and to

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the 4684 system unit.

If no problem is found and corrected, follow this list to isolate and correct the cause of this error message.

1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

M0320 **M0320 Primary keyboard is failing**

Explanation: The keyboard that was configured as the primary keyboard for the terminal being tested is not connected or is failing.

The primary keyboard is the keyboard you use for input when the Reference Diskette is being used.

If the 4683 is powered off while in test mode, this message displays when power is switched on again. This is not an error condition.

User Response: If M0320 remains on the display:

1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

M0330 **M0330 Display failed**
Primary Display err.

Explanation: The display that was configured as the primary display for the terminal being tested is not connected or is failing.

The primary display is the display that displays messages when the Reference Diskette is being used.

If the 4683 is powered off while in test mode, this message displays when power is switched on again. This is not an error condition.

User Response: If M0330 remains on the display, ensure that the display cable is connected to the display and to the 4684 system unit.

If no problem is found and corrected, follow this list to isolate and correct the cause of this error message.

1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

M1063 **M1063 Error while reading description file (ADF). Refer to Problem Determination Guide.**

Explanation: A failure was detected when trying to read a description file (ADF) from the Reference Diskette.

Note: When this message displays during configuration, the system unit configuration process is not complete and the resulting configuration is unpredictable.

User Response:

- If you have added a new device or adapter, use the COPY OPTION DISKETTE to copy the files from the option diskette that comes with the adapter to the Backup Reference Diskette.

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- If you have not added a new device or adapter, make sure that the Backup Reference Diskette has the option files required for any installed adapters.

  Note: When this message displays during configuration, the system unit configuration process is not complete and the resulting configuration is unpredictable.

  A 4684 Model 300 requires Reference Diskette, Version 3.00 or higher.

- If the problem persists, have the 4684 system unit serviced.

M1064 **M1064 Adapter conflict found. Refer to Problem Determination Guide.**

Explanation: Automatic configuration has detected that there is a conflict between installed Option Adapters in the 4684. This conflict was caused by a ROM address space conflict, a RAM address space conflict, or an interrupt level conflict.

User Response:

1. If you connect a video display and an Enhanced A/N Keyboard to the 4684, use the OPTIONAL SYSTEM UNIT CONFIGURATION from MENU-C1 to select a non-conflicting value.
2. If no video display and Enhanced A/N Keyboard are connected, the store programmer must alter the description file (ADF) to select a non-conflicting value.

M1065 **M1065 No description file (ADF) found for an installed adapter or planar. Configuration cannot be completed until missing ADF is present.**

Explanation: Automatic configuration has detected that there is no description file (ADF file) on the Backup Reference Diskette for an installed Adapter or the planar.

User Response:

- If you have added a new device or adapter, use the COPY OPTION DISKETTE to copy the files from the option diskette that comes with the adapter to the Backup Reference Diskette.

- If you have not added a new device or adapter, make sure that the Backup Reference Diskette has the option files required for any installed adapters.

  Note: When this message displays during configuration, the system unit configuration process is not complete and the resulting configuration is unpredictable.

  A 4684 Model 300 requires Reference Diskette, Version 3.00 or higher.

- If the problem persists, have the 4684 system unit serviced.

M1066 **M1066 The fixed disk type could not be read from the fixed disk. Refer to Problem Determination Guide.**

Explanation: The fixed disk type on the fixed disk cannot be read. It is either missing or it is not valid. This error will occur each time configuration is run until the type number is written to the fixed disk by the "FORMAT FIXED DISK" procedure.

Warning: Formatting the fixed disk will destroy the data stored on the fixed disk. Be sure that the fixed disk is

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first backed up by the user to save the data.

User Response:

1. Select CHANGE 4684 DEFAULT CONFIGURATION from MENU-C2.
2. Select ENTER THE FIXED DISK TYPE from MENU-C4.
3. If the fixed disk type is printed on a label attached to the fixed disk drive, key in that number.
4. If no fixed disk type is printed on the label and you have a 30-Megabyte fixed disk, key in "33" for the fixed disk type.
5. Return to MENU-C2.
6. Select ACTIVATE NEW CONFIGURATION from MENU-C2.

   The 4684 will restart.

   When possible, perform the following steps to write the fixed disk type on the fixed disk:
7. Select START TESTS from MENU-M1.
8. Select RUN SYSTEM UNIT TESTS from MENU-T1.
9. Select FORMAT FIXED DISK from MENU-T2.
10. Select PREPARE DRIVE C FOR DOS from MENU-F1.

M1067 **M1067 The fixed disk type could not be read from the fixed disk or it does not compare with the configured type. Refer to Problem Determination Guide.**

Explanation: The fixed disk type on the fixed disk cannot be read from the fixed disk or it does not compare to the fixed disk type configured. This error occurs each time format is attempted until the type numbers agree.

Warning: Formatting the fixed disk destroys the data stored on the fixed disk. Be sure that the fixed disk is first backed up to save the data.

User Response:

1. Select START CONFIGURATION from MENU-M1.
2. Select CREATE/CHANGE CONFIGURATION from MENU-C1.
3. Select CHANGE 4684 DEFAULT CONFIGURATION from MENU-C2.
4. Select ENTER THE FIXED DISK TYPE from MENU-C4.
5. If the fixed disk type is printed on a label attached to the fixed disk drive, key in that number.
6. If no fixed disk type is printed on the label and you have a 30-Megabyte fixed disk, key in "33" for the fixed disk type.

   When possible, perform the following steps to write the fixed disk type on the fixed disk:
7. Select START TESTS from MENU-M1.
8. Select RUN SYSTEM UNIT TESTS from MENU-T1.
9. Select FORMAT FIXED DISK from MENU-T2.
10. Select PREPARE DRIVE C FOR DOS from MENU-F1.

M1068 **M1068 The disk is unreadable in a necessary system area. It may not be formatted for this system or it has become unreadable. A factory preparation may be necessary.**

Explanation: The format program has detected that the fixed disk is unreadable in a necessary system area. It may not be formatted for this system or it has become unreadable. A factory preparation may be necessary to correct this error. A factory preparation erases all previously found errors. The fixed disk type written to the disk will then be the same as the fixed disk type that is configured.

User Response:

1. Press **S1** (ESC on an Enhanced A/N Keyboard).
2. If a factory preparation is desired, answer YES. Otherwise, answer NO.

M1069 **M1069 Fixed disk configuration changed.**

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Explanation: Automatic configuration has detected that there was a change in the fixed disk configuration.

User Response: No action is required. This message is only to inform the user of a change.

M1080 **M1080 Required Video Display and Enhanced A/N Keyboard are not present. Use Create/Change Configuration.**

Explanation: The requested procedure requires a video display and an Enhanced A/N keyboard. If these are not present, it cannot be performed.

User Response: If you connect a video display and an Enhanced A/N Keyboard to the 4684, use the CREATE/CHANGE CONFIGURATION selection from MENU-C1 to configure them.

M3001

Explanation: The Baseband Network Transmit/Receive Verification test has detected that no Baseband Network Adapter is present.

User Response: Ensure that this 4684 is a Model 111, 131, or 161. Other models do not support the Baseband Network Adapter. If this 4684 is a Model 111, 131, or 161, exchange the 4684 system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

M3002

Explanation: The Baseband Network Transmit/Receive Verification test has detected a failure.

User Response: Ensure that the network is not open between the transmitting and receiving terminals. If this error persists:

1. The Baseband Network cable is open between the transmitting and receiving terminals.
2. Exchange the system board in the transmitting terminal.
3. Exchange the system board in the receiving terminal.

M3004

Explanation: The Baseband Network Transmit/Receive Verification test has detected that the terminals being tested are not in the correct transmit or receive mode.

User Response: Restart the Transmit/Receive test and ensure that one of the terminals being tested is placed in receive mode and that the other is placed in transmit mode.

M3015

Explanation:

- **For 4684 Models 1*xx* or 200:**

  The Baseband Network is disconnected or failing.

- **For 4684 Model 300:**

  A Baseband Network Adapter or a PC Network Baseband Adapter/A error occurred.

User Response:

- **For 4684 Models 1*xx* or 200:**

  Ensure that the network cables or wrap plug and terminators are properly connected. If no problem is found, exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in

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topic 2.13.14.

- **For 4684 Model 300:**

  Ensure that the network cables or the wrap plug and terminators are properly connected to the adapter. If no problem is found, exchange the Baseband Network Adapter in slot 6 (side card), or exchange the PC Network Baseband Adapter/A in either slot 1 or in slot 2. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

M30nn-nn

Explanation: An error was detected during the Baseband Network Adapter test.

User Response: Go to "MAP 2020: 4684 Baseband Network" in topic 2.4.

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2.2.5 4684 Tnnnn and Unnn Messages

T*nnnn* messages are generated by the 4684 point-of-sale terminal when tests are running.

U*nnn* messages are generated by the 4684 point-of-sale terminal during terminal IPL.

Tnnnn

Explanation: T*nnnn* messages are generated by the IBM 4684 when running tests. A T*nnnn* message indicates an error was detected during the POS DEVICE TESTS or the VERIFICATION TESTS.

User Response: See the T*nnnn* message in the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

- If your T*nnnn* message indicates a keyboard, cash drawer, system unit, or another repairable device, go to the repair chapter in this manual for that device.
- If the problem was not corrected by exchanging or repairing a device or device cable:
  1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
  2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

U001

Explanation: The display with the U001 message has completed the power-on self tests and it is waiting to receive communications from the 4684 system unit.

This message can be caused by the system board or any one of the devices attached to the system unit.

User Response: Go to "MAP 2070: 4684 U001 Message" in topic 2.9.

U002

Explanation: The 4683 has completed the power-on self tests and it is waiting to receive communications from the 4684.

User Response: After power is switched ON at the 4684 system unit, wait a maximum of 15 seconds for the next message to be displayed at the 4683.

If U002 remains on the display:

1. Ensure that the 4684 is powered-ON and operational.
2. If the 4684 is operational and U002 is still displayed, switch **POWER OFF** at the 4684.
3. Switch **POWER OFF** at the 4683.
4. Examine for damage or loose connection:
   - Socket 11 on the 4683
   - Socket 11 on the 4684
   - Both ends of cable 11.
5. If no problem was found and corrected, see the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide* for more information.

U003

Explanation: The 4684 power-on self tests have established communications on the device channel. An attached 4683 display will be in the same state as the 4684.

User Response: Wait a minimum of 60 seconds for the IPL to proceed.

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If U003 remains on the display, look for any other message or symptom that occurred during the IPL to further define the failure.

If no other messages or symptoms occur:

1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
2. Exchange the Option Adapters in option (feature) slots 1, 2 and 6 (side card) one at a time. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

U004

Explanation: The 4684 has completed the power-on self tests and the terminal load has started. An attached 4683 display will be the same as the 4684.

User Response: Wait a minimum of 30 seconds for the IPL to proceed.

If U004 remains on the display and you also have another message or symptom, follow the *User Response* for the message or symptom described in this section.

If U004 remains on the display and this is the only message or symptom, IPL the 4684 using a different Reference Diskette.

If U004 remains on the display:

1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.
2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

U006

Explanation: The 4684 has completed the power-on self tests and the terminal load has established communications on the device channel. An attached 4683 display will be in the same state as the 4684.

User Response: Wait a maximum of 10 seconds for the IPL to proceed.

If U006 remains on the display, look for any other message or symptom that occurred during the IPL to further define the failure.

U007

Explanation: Communications on the device channel have been completed and the terminal is waiting for the application program to load.

User Response: Wait a minimum of 10 seconds for the application to begin.

If U007 remains on the display, report this problem to the store programmer.

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2.3 4684 Failure Symptoms

Subtopics

2.3.1 4684 Baseband Network Symptoms
2.3.2 4684 Diskette Drive Symptoms
2.3.3 4684 Fixed Disk Drive Symptoms
2.3.4 4684 Mouse or Pointing Device Symptoms
2.3.5 4684 System Unit Printer Symptoms
2.3.6 4684 System Unit Video Display Symptoms
2.3.7 4684 Token-Ring Network Symptoms
2.3.8 4684 Miscellaneous Symptoms

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2.3.1 4684 Baseband Network Symptoms

Table 2-2. Baseband Network Symptoms

Symptom	**Action Sequence**
All Baseband Network symptoms	Select the BASEBAND NETWORK test from MENU-T4. □ If an M30*nn* error is displayed: see "MAP 2020: 4684 Baseband Network" in topic 2.4. □ If no M30*nn* error is displayed, 1. Ensure that a terminator plug is installed in the last terminal in the baseband network. See Figure 2-2 in topic 2.4. 2. Run the baseband network tests at the other terminals in the baseband network.

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2.3.2 4684 Diskette Drive Symptoms

Table 2-3. Diskette Drive Symptoms

Symptom	**Action Sequence**
The diskette drive in-use light stays ON.	1. If there is a diskette in the drive, ensure that: a. The diskette is good and not damaged. Try a backup copy if you have one. b. The diskette is inserted correctly - label up and metal shutter end first. c. Your software program is operating correctly. 2. If the above items are correct and the diskette drive in-use light still stays ON: a. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. b. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. c. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. d. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.
The diskette drive does not work correctly.	1. If there is a diskette in the drive, ensure that: a. The diskette is good and not damaged. Try a backup copy if you have one. b. The diskette is inserted correctly - label up and metal shutter end first. c. Your software program is operating correctly. 2. If the above items are correct and the diskette drive still does not work correctly: a. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. b. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. c. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. d. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.
Miscellaneous Diskette Drive Problems: □ Loads program from fixed disk □ Disk boot failure displays □ Unable to load tests from Reference Diskette □ Insert diskette prompt displays	1. Check for excessive dirt in the head home sensor of the drive and clean the diskette drive as necessary. 2. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. 3. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. 4. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. 5. Exchange the disk drive interposer. See Figure 2-23 in

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¦                                ¦     topic 2.13.12.2.                ¦
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2.3.3 4684 Fixed Disk Drive Symptoms

Table 2-4. Fixed Disk Drive Symptoms

Symptom	**Action Sequence**
The disk in-use light is always ON.	Run the fixed disk tests. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14.
The disk in-use light never turns ON.	Run the fixed disk tests. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14.

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2.3.4 4684 Mouse or Pointing Device Symptoms

Table 2-5. Mouse or Pointing Device Symptoms

Symptom	**Action Sequence**
The mouse or pointing device does not work.	Use the mouse port test on the Reference Diskette to help find the cause of the problem. **If the tests do not find the cause of the problem**, check for additional testing information in the instructions that were supplied with the pointing device. **If no testing information is available**, have the mouse or the pointing device serviced.

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2.3.5 4684 System Unit Printer Symptoms

Note: These symptoms apply only to the printer attached to the system unit/socket printer of the 4684 system unit, not the printer attached to socket 7.

Table 2-6. System Unit Printer Symptoms

Symptom	**Action Sequence**
The printer does not work correctly.	1. Ensure that the printer is powered-ON and online. 2. Ensure that the printer signal cable is correctly connected to the system unit printer socket. For the location of the 4684 system unit printer socket, see "4684 System Unit Cable Sockets and Devices" in topic 2.12. 3. If the above items are correct and the printer still does not work: a. Try running the printer tests using the documentation for the printer. b. If the tests show that the printer is operating correctly or that the printer test cannot be run, exchange the system board.

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2.3.6 4684 System Unit Video Display Symptoms

Note: These symptoms apply only to the video display attached to the system unit video display socket of the 4684 system unit.

Table 2-7. System Unit Video Display Symptoms

Symptom	**Action Sequence**
Video Display Problems: □ Incorrect colors □ No characters (blank) □ Missing, broken or incorrect characters □ Distorted image □ Out-of-focus characters □ Jittery image □ Rolling display □ No high intensity □ Unreadable video display.	Go to "MAP 2050: 4684 System Board Video" in topic 2.7.
Video display is blank. The terminal appears to be in a hang condition.	Go to "MAP 2030: 4684 Blank Video Display" in topic 2.5.
Video display is displaying a message that does not change. The terminal appears to be in a hang condition.	1. Switch **POWER OFF** at the 4684. 2. Switch power ON at the 4684. 3. Observe the video display carefully. □ If an error message is displayed, go to "4684 System Unit Messages" in topic 2.2. □ If the video display is blank, go to "MAP 2030: 4684 Blank Video Display" in topic 2.5. □ If the video display is unreadable, go to "MAP 2050: 4684 System Board Video" in topic 2.7. □ If another symptom is observed, go to "4684 Failure Symptoms" in topic 2.3.
Video display is displaying **ET - nn:nn:nn** in the top left of the screen (nn = any number).	This symptom indicates that this 4684 has a Token Ring Network Adapter installed, no diskette was inserted in the diskette drive and the fixed disk has no boot record when the 4684 power was switched ON. 1. Ensure that this 4684 can be IPLed using the Backup Reference Diskette. If it cannot, have the 4684 serviced. 2. If you normally IPL this 4684 from the fixed disk, ensure that the fixed disk has a boot record. Contact your store programmer if necessary.
Video display is displaying **nn:nn:nn** in the top right of the screen (nn = any number).	This symptom indicates that this 4684 has a Baseband Network Adapter installed, no diskette was inserted in the diskette drive and the fixed disk has no boot record when the 4684 power was switched ON. 1. Ensure that this 4684 can be IPLed using the Backup Reference Diskette. If it cannot, have the 4684 serviced. 2. If you normally IPL this 4684 from the fixed disk, ensure that the fixed disk has a boot record. Contact your store programmer if necessary.
The terminal IPL results in BASIC being loaded rather than the application.	Look for error messages displayed during the IPL. If none are displayed:

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Note: This would be apparent only on a video display.	Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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2.3.7 4684 Token-Ring Network Symptoms

Table 2-8. IBM Token Ring Network Symptoms

Symptom	**Action Sequence**
All Token Ring network symptoms	Run the IBM TOKEN-RING NETWORK test. See "Running the 4684 Token Ring Network Adapter Test" in topic 2.14.12.

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2.3.8 4684 Miscellaneous Symptoms

Table 2-9. Miscellaneous Symptoms

Symptom	**Action Sequence**
No beep(s) during IPL and: □ Blank display □ Unreadable display □ Distorted video display image.	Go to "MAP 2090: 4684 Power" in topic 2.11.
Continuous beep or repeating short beeps	1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. 2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.
Any other audio error	1. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. 2. Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.
1 or 2 short beeps and 112 or 113 error message	Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
Incorrect POST memory size	Run the memory tests. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14.
Cannot finish diagnostic tests	Go to "MAP 2090: 4684 Power" in topic 2.11.
4684 POWER GOOD light is not on	Go to "MAP 2090: 4684 Power" in topic 2.11.
You are experiencing intermittent failures that cannot be associated with any particular device.	1. Ensure that: a. All cables and cords are correctly connected to the 4684. b. When the 4684 is powered-ON, you can hear the fan. If no air is flowing, the 4684 can overheat causing intermittent problems. 2. If the previous items are correct and the problem persists, make a note of the problem and what the 4684 was doing when the problem occurred. Run the system unit tests continuously to help isolate the failure. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14.
The 4684 system unit "beeper" does not work.	Have the 4684 system unit serviced to exchange the system board.
The "insert diskette prompt" graphic appears even if a diskette is inserted in the diskette drive when powering on. This appears only on a video display.	1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. 2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. 3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. 4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.

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The DOS prompt (C>) appears after powering ON using the application or Reference Diskette. This will appear only on a video display.	1. Exchange the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. 2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. 3. Exchange the diskette drive cable (if present). See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7. 4. Exchange the disk drive interposer. See Figure 2-23 in topic 2.13.12.2.
Cannot configure an Option Adapter.	1. Exchange the new Option Adapter. 2. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
A 4684 Option Adapter is installed and configured but does not appear in MENU-T4 so that it can be selected for test.	Exchange the Option Adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
Disk boot failure	See Diskette Drive Symptoms.

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2.4 MAP 2020: 4684 Baseband Network

Symptom Explanation	**Conditions That Could Cause This Symptom**
There is a baseband network problem.	□ The 4684 Baseband Network Adapter (slot 6) is failing. □ The PC Network Baseband Adapter/A (slot 1 or slot 2) is failing. □ The 4684-1xx or 4684-200 system board is failing. □ The baseband network cable is failing. □ The baseband network extender is failing.

001

Is the failing 4684 a Model 300?

Yes — **No**

002

Go to map Step 051 to continue.

003

Are the four digits (*nnnn*) of your M*nnnn* error code 3015, 3041 or 3042?

Yes — **No**

004

The Baseband Network Adapter has failed.

- or -

The PC Network Baseband Adapter/A has failed.

- Determine if a Baseband Network Adapter is installed in slot 6 (side card)

  - or -

  If a PC Network Baseband Adapter/A is installed in slot 1 or slot 2.

Exchange the Baseband Network Adapter in slot 6, go to "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

- or -

Exchange the PC Network Baseband Adapter/A in slot 1 or in slot 2. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

Note: Disconnecting the network cable from the 4684 will disable network communications.

005

Are the four digits of your M*nnnn* error code, 3015?

Yes — **No**

006

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Go to Step 045.

007

Is there more than one 4684 in the network?

Yes **No**

008

Continue at Step 016.

009

Are all 4684s on the network failing?

Yes **No**

010

Go to Step 016.

011

Is there an extender in the network?

Yes **No**

012

Go to Step 044.

013

Are all failing 4684s connected to the same IN port on the extender?

Yes **No**

014

Go to Step 039.

015

Go to Step 033.

PICTURE 23

Figure 2-2. Baseband Network Wrap or Terminator Plug

016

(From step 010)

Is only one 4684 on the network failing?

Yes **No**

017

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+---+
Go to Step 027.

018

- Determine if a Baseband Network Adapter is installed in slot 6 (side card).

  - or -

- If a PC Network Baseband Adapter/A is installed in slot 1 or in slot 2.

Is the Baseband Network Adapter located in slot 6 (side card)?
Yes No

019

- Disconnect the 4684 from the network.

  Note: Disconnecting the network cable from the 4684 will disable network communications.

- Insert the PC Network Baseband Adapter/A black WRAP plug into the adapter.

- Select the Baseband Network test from MENU-T4.

Did you successfully complete the network advanced diagnostic tests?
Yes No

020

The PC Network Baseband Adapter/A has failed. Exchange the adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

021

Continue at Step 024.

022

- Disconnect the network adapter cable.

- Install the wrap plug (IBM P/N 96X4974) into either port of the adapter.

- To prevent disabling the communications network, connect the network cables together using the 4684 Baseband Network Cable Adapter. See Figure 2-3.

  - or -

- If this is the last terminal in the network, install the 4684 Baseband Network Cable Adapter and the terminator plug to the network cable.

- Select the Baseband Network test from MENU-T4.

Did you successfully complete the network advanced diagnostic tests?
Yes No

023

The Baseband Network Adapter in slot 6 has failed. Exchange the adapter. Go to "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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024

Is there an extender in the network?

Yes — **No**

025

Replace the network adapter cable.

026

Go to Step 039.

027

(From step 017)

Is there an extender in the network?

Yes — **No**

028

Go to Step 044.

029

Are all failing 4684s connected to the same IN port on the extender?

Yes — **No**

030

Go to Step 042.

031

Are all 4684s connected to this IN port failing?

Yes — **No**

032

There is a cable failure between the last working 4684 and the failing 4684s.

033

(From step 015)

- Determine if a Baseband Network Adapter is installed in slot 6 (side card).

  - or -

- If a PC Network Baseband Adapter/A is installed in slot 1 or in slot 2.

Is the Baseband Network Adapter located in slot 6 (side card)?

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Yes No

034

- Disconnect the 4684 from the network.

  Note: Disconnecting the network cable from the 4684 will disable network communications.

- Insert the PC Network Baseband Adapter/A black WRAP plug into the adapter.

- Select the Baseband Network test from MENU-T4.

Did you successfully complete the network advanced diagnostic tests?
Yes No

035

The PC Network Baseband Adapter/A has failed. Exchange the adapter. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

036

Continue at Step 039.

037

- Disconnect the network adapter cable.

- Install the wrap plug (IBM P/N 96X4974) into either port of the adapter. See Figure 2-2.

- To prevent disabling the communications network, connect the network cables together using the 4684 Baseband Connector Adapter. See Figure 2-3.

  - or -

- If this is the last terminal in the network, install the 4684 Baseband Connector Adapter and the Baseband Network Terminator Plug to the network cable. To test a 4684, disconnect the network.

- Select the Baseband Network test from MENU-T4.

Did you complete the tests without a failure?
Yes No

038

The Baseband Network Adapter in slot 6 has failed. Exchange the adapter. Refer to "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

039

(From steps 014 and 026)

- Perform the following test procedure on the extender:

  1. Unplug the extender power cord from the outlet.
  2. Disconnect **all** cables and wrap and terminator plugs.
  3. Connect the power cord to the extender and plug it into an outlet. The indicator light should be green. If the indicator light is red or is not illuminated, replace the extender.
  4. Insert a wrap plug in an **OUT** port.
  5. Insert a wrap plug in an **IN** port.
  6. Press and hold the TEST button. The indicator light goes OFF

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momentarily and then returns to green. If this does not occur, the extender has failed.
7. Press and hold the TEST button once again. The indicator light should be red. If this does not occur, the extender has failed.
8. Repeat steps 5 through 7 for each remaining **IN** port on the extender.

Note: After completing the previous test procedure, disconnect the power cord from the wall outlet to reset the extender.

Did you complete the extender diagnostic procedure without a failure?
Yes **No**

040

Replace the extender.

041

Make sure the network is configured correctly with only one wrap plug installed. If the network is configured correctly, then a cable between 4684s has failed. Inspect all cables for damaged or broken connectors and replace any failing ones.

042

(From step 030)

- Perform the following test procedure on the extender:

1. Unplug the extender power cord from the outlet.
2. Disconnect **all** cables and connectors.
3. Connect the power cord to the extender and plug it into an outlet. The indicator light should be green. If the indicator light is red or is not illuminated, replace the extender.
4. Insert a wrap plug in an **OUT** port.
5. Insert a wrap plug in an **IN** port.
6. Press and hold the TEST button. The indicator light goes OFF momentarily and then returns to green. If this does not occur, the extender has failed.
7. Press and hold the TEST button once again. The indicator light should be red. If this does not occur, the extender has failed.
8. Repeat steps 5 through 7 for each remaining **IN** port on the extender.

Note: After completing the previous test procedure, disconnect the power cord from the power receptacle to reset the extender.

Did you complete the extender diagnostic procedure without a failure?
Yes **No**

043

Replace the extender.

044

(From steps 012 and 028)

Up to eight 4684s can be serially connected either as a small network or as a single link attached to an **IN** port of an extender. Make sure that the network is configured correctly with only one wrap plug installed. If the network is configured correctly, a cable between 4684s has failed. Inspect all cables for damaged or broken connectors and replace any failing ones.

PICTURE 24

Figure 2-3. 4684 Baseband Network Cable Adapter and Baseband Network Terminator Plug. Connecting network cables using the 4684 Baseband Network Cable Adapter (top); Connecting network

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cables using the terminator plug (bottom).

045

(From step 006)

Is there an extender in the network?

Yes **No**

046

Go to Step 048.

047

Replace the extender.

048

(From step 046)

Does *ONLY ONE* of the failing 4684s have 3042 as the first four digits of the M*nnnn* error code?

Yes **No**

049

If more than one 4684 in the network displays the error code **M3042**, each 4684 with this error condition must be tested. To test each 4684, disconnect the network adapter cables, insert a wrap plug into either port, and select the Baseband Network test from MENU-T4. Exchange the Baseband Network Adapter or the PC Network Baseband Adapter/A in the 4684 that displays the failure. If the adapter is in slot 6 (side card), go to "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. If the adapter is in slot 1 or in slot 2, see "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

050

If only one 4684 in the network displays the error code **M3042**, exchange the Baseband Network Adapter or the PC Network Baseband Adapter/A in the 4684 that displays the failure. If the adapter is in slot 6 (side card), go to "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. If the adapter is in slot 1 or in slot 2, go to "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.

051

Are the four digits (*nnnn*) of your M*nnnn* error code 3015, 3041 or 3042?

Yes **No**

052

The baseband network on the system board has failed. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

053

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Are the four digits of your M*nnnn* error code 3015?
Yes **No**

054

Go to Step 085.

055

Is there more than one 4684 in the network?
Yes **No**

056

Continue at Step 077.

057

Are all 4684's on the network failing?
Yes **No**

058

Go to Step 064.

059

Is there an extender in the network?
Yes **No**

060

Go to Step 084.

061

Are all failing 4684's connected to the same IN port on the extender?
Yes **No**

062

Go to Step 079.

063

Go to Step 077.

064

(From step 058)

Is only one 4684 on the network failing?
Yes **No**

065

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Go to Step 071.

066

- Disconnect the network adapter cable.

- Install the wrap plug (IBM P/N 96X4974) into either port of the adapter.

- To prevent the network from being open, connect the network cables together using the 4684 Baseband Network Cable Adapter. See Figure 2-3.
  - or -

- If this is the last terminal in the network, install the 4684 Baseband Network Cable Adapter and the terminator plug to the network cable.

- Select the BASEBAND NETWORK ADVANCED DIAGNOSTIC TEST from MENU-T4.

Did you successfully complete the network advanced diagnostic tests?

Yes — **No**

067

The baseband network on the system board has failed. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

068

Is there an extender in the network?

Yes — **No**

069

Replace the network adapter cable.

070

Go to Step 079.

071

(From step 065)

Is there an extender in the network?

Yes — **No**

072

Go to Step 084.

073

Are all failing 4684's connected to the same IN port on the extender?

Yes — **No**

074

Go to Step 082.

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075

Are all 4684's connected to this IN port failing?

Yes — **No**

076

There is a cable failure between the last working 4684 and the failing 4684s.

077

(From step 063)

- Disconnect the network adapter cable.

- Install the wrap plug (IBM P/N 96X4974) into either port of the adapter. See Figure 2-2.

- To prevent the baseband network from being open, connect the network cables together using the 4684 Baseband Connector Adapter. See Figure 2-3.

  - or -

- If this is the last terminal in the network, install the 4684 Baseband Connector Adapter and the Baseband Network Terminator Plug to the network cable. To test a 4684, disconnect the network.

- Select the BASEBAND NETWORK ADVANCED DIAGNOSTIC TEST from MENU-T4.

Did you complete the tests without a failure?

Yes — **No**

078

The baseband network on the system board has failed. Exchange the system board on the failing 4684. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

079

(From steps 062 and 070)

- Perform the following test procedure on the extender:

  1. Unplug the extender power cord from the outlet.
  2. Disconnect **all** cables and wrap and terminator plugs.
  3. Connect the power cord to the extender and plug it into an outlet. The indicator light should be green. If the indicator light is red or is not illuminated, replace the extender.
  4. Insert a wrap plug in an **OUT** port.
  5. Insert a wrap plug in an **IN** port.
  6. Press and hold the TEST button. The indicator light goes OFF momentarily and then returns to green. If this does not occur, the extender has failed.
  7. Press and hold the TEST button once again. The indicator light should be red. If this does not occur, the extender has failed.
  8. Repeat steps 5 through 7 for each remaining **IN** port on the extender.

  Note: After completing the previous test procedure, disconnect the power cord from the wall outlet to reset the extender.

Did you complete the extender diagnostic procedure without a failure?

Yes — **No**

080

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Replace the extender.

081

Make sure the network is configured correctly with only one wrap plug installed. If the network is configured correctly, then a cable between 4684s has failed. Inspect all cables for damaged or broken connectors and replace any failing ones.

082

(From step 074)

- Perform the following test procedure on the extender:

  1. Unplug the extender power cord from the outlet.
  2. Disconnect **all** cables and connectors.
  3. Connect the power cord to the extender and plug it into an outlet. The indicator light should be green. If the indicator light is red or is not illuminated, replace the extender.
  4. Insert a wrap plug in an **OUT** port.
  5. Insert a wrap plug in an **IN** port.
  6. Press and hold the TEST button. The indicator light goes OFF momentarily and then returns to green. If this does not occur, the extender has failed.
  7. Press and hold the TEST button once again. The indicator light should be red. If this does not occur, the extender has failed.
  8. Repeat steps 5 through 7 for each remaining **IN** port on the extender.

  Note: After completing the previous test procedure, disconnect the power cord from the power receptacle to reset the extender.

Did you complete the extender diagnostic procedure without a failure?
Yes **No**

083

Replace the extender.

084

(From steps 060 and 072)

Up to eight 4684s can be serially connected either as a small network or as a single link attached to an **IN** port of an extender. Make sure that the network is configured correctly with only one wrap plug installed. If the network is configured correctly, a cable between 4684s has failed. Inspect all cables for damaged or broken connectors and replace any failing ones.

085

(From step 054)

Is there an extender in the network?
Yes **No**

086

Go to Step 088.

087

Replace the extender.

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088

(From step 086)

Does *ONLY ONE* of the failing 4684s have 3042 as the first four digits of the M*nnnn* error code?

Yes | **No**

089

If more than one 4684 in the network displays the error code **M3042**, each 4684 with this error condition must be tested. To test each 4684, disconnect the network adapter cables, insert a wrap plug into either port, and select the BASEBAND NETWORK ADVANCED DIAGNOSTIC TEST from MENU-T4. Exchange the system board in the 4684 that fails. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

090

If only one 4684 in the network displays the error code **M3042**, replace the system board on that 4684. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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2.5 MAP 2030: 4684 Blank Video Display

Symptom Explanation	**Conditions That Could Cause This Symptom**
The video display on a 4684 is blank after power is switched ON.	□ The system board is failing. □ An internal system unit device or Option Adapter is failing.

Note: This MAP assumes that the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide* has been used to determine that the 4684 system unit is failing.

001

Any one of the system unit internal devices or Option Adapters can be causing the blank video display.

These devices should be disconnected and then reconnected, one at a time, to determine the failing device.

- Switch **POWER OFF** at the 4684.

- Remove the 4684 system unit cover. See "Removing and Replacing the 4684 System Unit Cover" in topic 2.13.4.

- To make reconnecting easier, note the location of the devices and Option Adapters as they are disconnected.

- Connect the video display to the system unit video socket.

- Unplug any Option Adapter in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

- Unplug the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion Adapter in slot 5 (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.

- Unplug the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.

- Unplug the fixed disk drive (if present). See "Removing and Replacing the 4684 Fixed Disk Drive" in topic 2.13.8.

- Switch power ON while observing the display.

Did the video display a message?

Yes → **No**

002

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

003

A device or Option Adapter that was disconnected is failing. They should be reconnected, one at a time, to identify the failing device.

- Switch **POWER OFF** at the system unit.

- Reconnect one of the devices to the base unit.

- Switch power ON and wait a few seconds.

Did the video display a message?

Yes → **No**

004

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```
 ¦   Go to "MAP 2050:  4684 System Board Video" in topic 2.7.
 ¦
+---+
¦005¦
+---+
```

- Return to Step 003 and repeat the steps for each device until the failing device or Option Adapter is determined.

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2.6 MAP 2040: 4684 Configuration Error

Symptom Explanation	**Conditions That Could Cause This Symptom**
You have entered this map because a 165, 166, or M0101 error message is displayed. A device on the system unit board or a system unit option has failed.	□ The system board is failing □ A system unit option installed in slot 1 through 8 is failing □ The fixed disk drive is failing □ The disk drive interposer is failing.

001

- Switch **POWER OFF** at the 4684.

- Remove the system unit cover to determine what system unit options are present. See "Removing and Replacing the 4684 System Unit Cover" in topic 2.13.4.

- Insert the Reference Diskette.

- Switch power ON at the 4684.

- When the error message (165 or 166) displays, press **S1** (Esc on the Enhanced A/N Keyboard) to proceed.

- When the error message M0101 displays, answer **no**.

- When MENU-M1 displays:

  1. Select START CONFIGURATION from MENU-M1.

  2. Select VIEW ACTIVE CONFIGURATION from MENU-C1.

  3. Select VIEW 4684 CONFIGURATION from MENU-C5.

     The 4684 system board has eight feature slots for adapters, though only six are used. See Figure 2-4.

     The configuration of the slots can be viewed by following the displayed prompts.

  4. Carefully observe and record the displayed configuration for slots 1 through 8.

  5. Select QUIT from MENU-C5.

  6. Select QUIT from MENU-C1.

     MENU-M1 displays.

  7. Select START TESTS.

     MENU-T1 displays.

  8. Select RUN SYSTEM UNIT TESTS

     MENU-T2 displays.

  9. Select TEST SYSTEM UNIT

  10. Carefully observe and record the devices listed.

- Compare the recorded configuration for slots 1 through 8 to the devices in the list of the installed devices.

If a system unit option was recorded the first time you viewed configuration and was **NOT** recorded in the installed device list, that system unit option is failing. Exchange the system unit option device. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

- or -

If the fixed disk was recorded the first time you viewed configuration and was **NOT** recorded the second time, the fixed disk is failing. Exchange the fixed disk. See "Removing and Replacing the 4684 Fixed Disk Drive" in

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topic 2.13.8.

- or -

If other devices that are resident on the system board were recorded the first time you viewed configuration and were **NOT** recorded the second time, the system board is failing. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

---

1. **4684 Device List for Feature Slots 1-8.**
   These slots are all under the covers of the 4684 and cannot be accessed without removing the top cover. Some of the slots are imbedded into the system board and have no physical connector for a card or devic

   - Slots 1 and 2 are used to connect the following Option Adapters:

     - Dual Asynchronous Adapter
     - ISDN Interface Co-Processor/2
     - Multiprotocol Adapter
     - 4684 Store Loop Adapter/A
     - Multiprotocol Communication Adapter
     - PC Network Baseband Adapter/A
     - Token Ring Network Adapter
     - IBM Realtime Interface Co-Processor Multiport/2 or X.25/2
     - 300/1200/2400 Internal Modem/A
     - 2-8Mb 80286 Memory Expansion Adapter.

   - Slots 3 and 4 are not present on the 4684.

   - Slot 5 is used to connect the Feature Card and Memory Expansion Adapter to the system board. It can be used by this adapter only. When the adapter is installed, it provides connections for the slot 1 and 2 Option Adapters.

   - Slot 6

     - **For 4684 Model 1*xx* and 200**

       This slot is imbedded in the system board and used by the Baseband Network Adapter.

     - **For 4684 Model 300**

       This slot is used by the Baseband Network side card or the Token Ring Network side card.

   - Slot 7 is imbedded in the system board and used by the Device Channel Adapter only.

   - Slot 8 connects the Fixed Disk Adapter to the system board and is used by this adapter only.

2. **4684 Port List.**
   The 4684 ports are associated with devices that may be either on the system board (memory) or external it (keyboards, displays). The port number is related to the error code that is displayed when the devi or function fails. For example, the keyboard is connected to port 3 and the keyboard error code is 3*nn*. See "4684 System Unit Messages" in topic 2.2.

   - Port 1: System board functions (internal)
   - Port 2: Memory (internal)
   - Port 3: System Unit Keyboard [1]
   - Port 4: System Unit Printer [BB]
   - Port 6: Diskette drive (internal)
   - Port 11: System Unit Asynchronous Communications [CC]
   - Port 24: System Unit Video Display [AA]
   - Port 30: Baseband Network (sockets 1A and 1B)
   - Port 86: Pointing device (mouse) [2]
   - Port 166: Token Ring (socket 1B, Model 300)

[3]PICTURE 25

Figure 2-4. IBM 4684 System Unit Back Panel

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2.7 MAP 2050: 4684 System Board Video

Symptom Explanation	**Conditions That Could Cause This Symptom**
It has been determined that the 4684 system unit video display is failing. This MAP helps isolate the failure to the 4684 system board or the video display.	□ The video display is failing. □ The system board is failing. □ The display power cord is failing.

001

- Switch **POWER OFF** at the 4684.

- Set the display contrast control to its maximum position.

- Set the display brightness control to its middle position.

- Ensure that the Reference Diskette is in the diskette drive.

- Ensure that power is switched ON at the display.

- Switch the power ON at the 4684.

Is the screen blank (dark with no image)?

Yes Go to Step 010.

No **002**

003

- Switch **POWER OFF** at the 4684.

- Switch **POWER OFF** at the display.

- Disconnect the display signal cable from the system unit.

- Switch the power ON at the display.

Is the screen still dark?

Yes - Go to "MAP 2030: 4684 Blank Video Display" in topic 2.5.

No **004**

005

Does the display have a detachable power cord?

Yes Exchange the video display.

No **006**

007

- Ensure that the display power cord has continuity.

Does the display power cord have continuity?

Yes **008**

No

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Exchange the display power cord.

009

Exchange the video display.

010

Is an image visible on the display (for example: characters, menu, cursor)?
Yes No

011

Go to Step 021.

012

Does the display have any obvious problems such as jittering, rolling, shifting, or out-of-focus characters?
Yes No

013

Go to Step 019.

014

Is the screen readable enough to run the tests?
Yes No

015

Go to Step 021.

PICTURE 26

Figure 2-5. System Unit Display Connector

016

- At MENU-M1, select START TESTS.

- At MENU-T1, select RUN SYSTEM UNIT TESTS.

- At MENU-T2, select TEST SYSTEM UNIT.

- At MENU-T3, select RUN TESTS ONE TIME.

- At MENU-T4, select the VIDEO GRAPHICS ARRAY test.

- Advance to the Video Test Menu. Do not start the video tests.

- Disconnect the display signal cable from the system unit (do not power OFF the system unit).

- Use the following procedure to check the system unit display connector for the proper voltages.

  1. Press **7** to start the **sync** test (do not press Enter), and then check for:
     - 0 to +0.2 V dc from pin 13 to 10 (ground)
     - 0 to +0.2 V dc From pin 14 to 10 (ground)

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2. Press Enter, and then check for:
   - +3.0 to 4.0 V dc from pin 13 to 10 (ground)
   - 0 to +0.2 V dc from pin 14 to 10 (ground)
3. Press Enter, and then check for:
   - 0 to +0.2 V dc from pin 13 to 10 (ground)
   - 0 to +0.2 V dc from pin 14 to 10 (ground)
4. Press Enter, and then check for:
   - 0 to +1.0 V dc from pin 13 to 10 (ground)
   - +3.0 to 5.2 V dc from pin 14 to 10 (ground)

Are the voltages correct?
Yes **No**

017

- Switch **POWER OFF** at the 4684.

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

018

Exchange the video display.

019

Do all the display controls work properly?
Yes **No**

020

Exchange the video display.

021

Does the display have a self test?
Yes **No**

022

Go to Step 026.

023

- Activate the display self test.

Did the display self test complete successfully?
Yes **No**

024

Exchange the video display.

025

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

026

Did you receive just one short beep during the power-on self test (POST)

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of the 4684?
Yes No

027

- Switch **POWER OFF** at the 4684.

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

028

Exchange the video display.

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2.8 MAP 2060: 4684 Token Ring

Symptom Explanation	**Conditions That Could Cause This Symptom**
You have entered this MAP because the token-ring test indicated a 166*nn* or 167*nn* error.	□ The Token Ring Adapter is failing □ The Token Ring Adapter cable is failing

001

Have you run the token-ring test?

Yes **No**

002

- Go to "Running the 4684 Token Ring Network Adapter Test" in topic 2.14.12 and run the token-ring test. Return to this MAP if a failure is detected.

003

Are you using a Token Ring Adapter cable with a modular telephone type plug at one end?

Yes **No**

004

Go to Step 006 in this MAP.

005

Go to Step 011 in this MAP.

006

- Disconnect the Token Ring Adapter cable from the adapter and the network.

- Using an ohmmeter (or other device for measuring continuity) check the adapter cable for continuity between:

  □ Pin 1 and Pin 9 at the D-connector
  □ Pin 5 and Pin 6 at the D-connector
  □ The cable shield of the D-connector end and the cable shield at the data connector end that attaches to the communications network. See Figure 2-7.

Do you have continuity on all wires and between shields?

Yes **No**

007

Exchange the Token Ring Adapter cable.

008

- Check the adapter cable for shorts by inserting an assembled IBM Cabling System Data Connector that has no cable attached to it into the data connector end of the cable being tested. This will open the shorting bars of the adapter cable being tested. (Alternately, you may use another adapter cable that you know is working properly.)

- Using your testing device, check the adapter cable to see that there are

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no short circuits between any two pins of the D-connector or between the shield and any pin. See Figure 2-6.

Is the cable free of shorts?

Yes → Exchange the Token Ring Adapter cable.

No → **009**

009

Exchange the Token Ring Adapter cable.

010

Go to Step 014.

011

- See the *IBM Token Ring Network Telephone Twisted-Pair Media Guide* for instructions on how to perform the following tests:

  - Check the continuity between the two ends of the telephone cable.
  - Swap cables with a known good cable and see if the problem goes away.

Did you discover a problem?

Yes → Continue at Step 014.

No → **012**

012

Continue at Step 014.

013

Exchange the telephone cable that is failing.

014

The cable tests have been completed without finding a problem. It is possible that an intermittent problem exists. The following steps should help you to identify any additional symptoms.

- If you do not have a cable with a modular telephone plug at one end, check to make sure that your cable is firmly attached to the adapter and that the thumb screws are tightened.
- If you do have a cable with a modular telephone plug at one end, make sure that the wrap plug is firmly seated against the back of the adapter when the test is run.
- Make sure that the adapter is firmly seated in the adapter slot in the system unit.
- Run the test again as follows:

  1. Select START TESTS from MENU-M1.
  2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
  3. Select TEST SYSTEM UNIT from MENU-T2.
  4. Select LOG OR DISPLAY ERRORS from MENU-T3.
  5. Select either log to diskette or to printer.

     Note: Logging to printer requires a system unit printer. The 4680 printer will not print the error log.

     When logging to a diskette, a maximum of 30 error records will be logged.
  6. Select RUN TESTS CONTINUOUSLY from MENU-T3.
  7. Select TOKEN-RING TEST from MENU-T4.

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8. Let the test run for several minutes, then stop the test.

9. Examine the error log by selecting LOG OR DISPLAY ERRORS from MENU-T3.

10. If a 0166nnnn or 0167nnnn (***n*** = any number) error is logged, see "Examples of 4684 Messages" in topic 2.2.1 and the discussion on that topic about how to locate an eight-character message.

11. If the error log does not indicate other failures, your adapter or cable is probably not the cause of the suspected problem. Seek technical assistance.

PICTURE 27

Figure 2-6. Token Ring Adapter Cable Wiring - Disconnected

PICTURE 28

Figure 2-7. Token Ring Adapter Cable Wiring - Connected

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2.9 MAP 2070: 4684 U001 Message

Symptom Explanation	**Conditions That Could Cause This Symptom**
The display with U001 has completed its power-on self test. It is waiting for communications from the base unit.	□ The system board is failing. □ An internal system unit device or Option Adapter is failing.

Note: This MAP assumes that the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide* has been used to determine that the 4684 system unit is failing.

001

Any one of the system unit internal devices or Option Adapters can be causing the U001 message.

These devices will be disconnected and then reconnected, one at a time, to determine the failing device.

- Switch **POWER OFF** at the 4684.

Notes:

1. When the 4684 is connected to a baseband network and the network cables are disconnected from the rear of the 4684, the network will become disabled (open) unless the two cables are connected together using an adapter.

2. If the baseband network is connected to a PC Network Baseband Adapter in option slot 1 or 2, ask the user for permission to disconnect the 4684 from the network or assistance in preventing an open network.

3. If the baseband network is connected to sockets 1A and 1B at the rear of the 4684, you can prevent an open or disabled network by connecting the network cables together using the 4684 Baseband Network Cable Adapter. See Figure 2-8.

PICTURE 29

Figure 2-8. 4684 Baseband Network Cable Adapter and Baseband Network Terminator or Wrap Plug. Connecting network cables using the 4684 Baseband Connector Adapter (top) and the Terminator or Wrap Plug (bottom).

This procedure prevents the network from being open.

- Unplug all cables from the rear of the 4684 except the display with the U001 message.

- Remove the 4684 system unit cover. See "Removing and Replacing the 4684 System Unit Cover" in topic 2.13.4.

- To make reconnecting easier, note the location of the devices and Option Adapters as they are disconnected.

- Ensure that one of the following displays is connected:

  □ Alphanumeric Display
  □ Operator Display
  □ The display on the Combined Keyboard/Display.

- Unplug any Option Adapters in slots 1, 2 and 6 (side card). See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

- Unplug the 4684 Feature Card and Memory Expansion Adapter in slot 5 (if present). See "Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter" in topic 2.13.11.

- Unplug the diskette drive. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7.

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- Unplug the fixed disk drive (if present). See "Removing and Replacing the 4684 Fixed Disk Drive" in topic 2.13.8.

- Switch power ON while observing the display.

Did the display message progress beyond U001?

Yes — **No** → **002**

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

003

A device or Option Adapter that was disconnected is failing. They should be reconnected one at time to identify the failing device.

- Switch **POWER OFF** at the system unit.

- Reconnect one of the devices to the base unit.

- Switch power ON and wait a few seconds.

Did the display message proceed beyond U001?

Yes — **No** → **004**

Exchange the device or Option Adapter that was last reconnected. See "Removing and Replacing the 4684 System Unit" in topic 2.13.1.

005

- Return to Step 003 and repeat the steps for each device until the failing device or Option Adapter is determined.

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2.10 MAP 2080: 4684 has 201 Memory Error and 164 Displayed at Power ON

Symptom Explanation	**Conditions That Could Cause This Symptom**
A 201 memory error and a 164 configuration error were both displayed during the Initial Program Load (IPL). □ 201 = memory test failure □ 164 = configured memory is not recognized at IPL.	□ A memory module package on the system board is failing. □ A memory module package on a memory adapter is failing. □ A Feature Memory Adapter is failing. □ The system board is failing. □ The 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion Adapter is failing.

001

PICTURE 30

Figure 2-9. Memory Expansion Options

Note: If you have just removed memory from the 4684 do not use this MAP. The 4684 should be reconfigured when memory is added or removed.

- Switch **POWER OFF** at the 4684.

- Insert the Reference Diskette.

- Switch power ON at the 4684.

- When error messages 201 and 164 display, press **S1** (ESC on the Enhanced A/N Keyboard) to proceed.

- When message M0101 A CONFIGURATION ERROR HAS OCCURRED. DO YOU WANT TO RUN CONFIGURATION? is displayed, answer **NO**.

- When MENU-M1 is displayed:

  1. Select START TESTS from MENU-M1.
  2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
  3. Select TEST SYSTEM UNIT from MENU-T2.
  4. Select RUN TESTS ONE TIME from MENU-T3.
  5. Select the nnnn Kb MEMORY TEST from MENU-T4. (nnnn = amount of memory recognized)

  □ If no errors are detected by the test, continue at Step 002.
  □ If the test detects an error, follow the instructions that are displayed.

002

- Switch **POWER OFF** at the 4684.

- Remove the system unit cover. See "Removing and Replacing the 4684 System Unit Cover" in topic 2.13.4.

See Figure 2-9 for a view of available memory expansion options. There are several combinations of memory that can be installed in the 4684.

□ The following is the maximum amount of memory that may be installed on the system board:

- 4Mb for 4684 Model 1*xx* and 200
- 8Mb for 4684 Model 300.

□ Slot 1 or 2 can have the 2Mb Memory Expansion Adapter installed. This adapter may have between 0.5Mb (512 Kb) and 2Mb (2048 Kb) of memory. There are eight sockets for modules on this adapter. Each socket may contain 256Kb of memory.

□ Slot 1 or 2 can have the 2-8Mb 80286 Memory Expansion Adapter

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installed. This adapter may have between 2Mb (2048 Kb) and 8Mb (8192 Kb) of memory. There are four sockets for modules on this adapter. This adapter will not cause the 164 and 201 error messages to display during the power ON sequence.

□ Slot 5 may have the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion Adapter installed. This adapter has one socket for a memory module. The module contains either 1Mb (1024 Kb) or 2Mb (2048 Kb) of memory. If the module has logic mounted on both sides, it contains 2Mb of memory. If it has logic on one side only, it contains 1Mb of memory.

- Determine if this 4684 has a feature memory expansion in slot 1, slot 2 or slot 5, how much memory is installed in each, and record these amounts. See Figure 2-9.

- Insert the Reference Diskette.

- Switch power ON at the 4684.

- When error messages 201 and 164 display, press **S1** (ESC on the Enhanced A/N keyboard) to proceed.

- When message M0101 A CONFIGURATION ERROR HAS OCCURRED. DO YOU WANT TO RUN CONFIGURATION is displayed, answer **NO**.

- When MENU-M1 is displayed:

  1. Select START CONFIGURATION from MENU-M1.
  2. Select VIEW ACTIVE CONFIGURATION from MENU-C1.
  3. Select VIEW 4684 CONFIGURATION from MENU-C5.

The system unit configuration will display. Record the following information:

□ The total usable memory
□ The system board memory
□ Slot 1, slot 2 and slot 5 memory (if any).

- Compare the memory amount shown during VIEW CONFIGURATION to that of the cards in slots 1, 2, and 5.

  Note: When a memory module, memory adapter or system board is exchanged, configuration must be run to reconfigure the installed memory.

If VIEW CONFIGURATION does not indicate 1024Kb of memory on the system board:

Exchange the memory module on the system board. See "Removing and Replacing Memory Modules on the 4684 System Board" in topic 2.13.10.
- or -
Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

- or -

If slot 1, slot 2, or slot 5 has a memory adapter and the amount of memory shown during VIEW CONFIGURATION for one of them was less than that of the cards:

Exchange the memory modules on the appropriate memory adapter one at a time until the failing module is located. See "Removing and Replacing Memory Modules on the 4684 System Board" in topic 2.13.10.
- or -
Exchange the memory adapter in the appropriate slot. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9.
- or -
Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
- or -
Exchange the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion Adapter between the feature cards and the system board. See "Removing and Replacing the 4684 Feature Card Expansion" in topic 2.13.12.

- or -

If there are no memory adapters in slot 1, slot 2 or slot 5, or the amount of memory recorded is as expected:

Exchange the memory module on the system board. See "Removing and Replacing Memory Modules on the 4684 System Board" in topic 2.13.10.
- or -

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Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

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2.11 MAP 2090: 4684 Power

Symptom Explanation	**Conditions That Could Cause This Symptom**
You have entered this MAP because you were unable to complete the power on self test, or you suspect a power problem.	□ The power supply is failing □ The system board is failing □ An external device is failing □ A diskette or fixed disk drive is failing □ An Option Adapter is failing □ The fan is failing □ The power cord is failing □ The power supply interposer is failing.

001

(From MAP 6120 step 019 in topic 6.18)

- Switch **POWER OFF** at the 4684.

- Unplug the power cord from the electrical outlet.

- Remove the cover from the 4684 system unit. See "Removing and Replacing the 4684 System Unit Cover" in topic 2.13.4.

- Replug the power cord to the electrical outlet.

- Switch power ON and determine if the fan is running.

Is the fan running?
Yes **No**

Go to Step 008.

002

003

(From step 011)

- Switch **POWER OFF** at the 4684.

- Unplug the power cord from the electrical outlet.

Note: Label the location of each cable connected to the rear of the power supply to make it easier to reconnect later.

- Disconnect all cables from the rear of the power supply.

- Remove the power supply and place it on a work surface. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.

- Connect the power cord to the 4684 power supply.

- Replug the power cord to the electrical outlet and switch power ON.

Is the green POWER GOOD light on?
Yes **No**

Exchange the power supply.

004

005

- Switch **POWER OFF** at the power supply.

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- Remove the power supply interposer from the system board and plug it onto the power supply connector. See Figure 2-10.

- Switch power ON at the power supply and measure at the interposer connector for the voltages shown in Table 2-10.

Are all voltages correct?

Yes — Replace the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6.
- or -
Replace the power supply interposer.

No — **006**

PICTURE 31

Figure 2-10. Power Supply Connector

Table 2-10. Power Supply to Planar

Pin Number	**Designation**
1	SPARE
2	SPARE
3	+ 5V
4	+ 5 RET
5	+ 5V
6	+ 5 RET
7	+ 5V
8	+ 5 RET
9	+ 5V
10	+ 5 RET
11	+ 5V
12	+ 5 RET
13	+ 5V
14	+ 5 RET
15	C/D 1 OPEN SOL
16	C/D 1 DRIVE SENSE
17	C/D 1 OPEN SENSE
18	POR
19	POR
20	SYNC
21	ACPROP
22	FIXED DISK ACCESS
23	FIXED DISK ACCESS
24	C/D 2 OPEN SOL
25	C/D 2 DRIVE SENSE

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26	C/D 2 OPEN SENSE
27	SIGNAL A
28	SIGNAL B
29	SIGNAL A
30	SIGNAL B
31	+ 12V
32	+ 12 RET
33	+ 12V
34	+ 12 RET
35	- 12V
36	- 12 RET
37	SPARE
38	SPARE
39	SPARE
40	SPARE

007

Continue at Step 013.

008

(From step 002)

- Switch **POWER OFF** at the 4684.

- Disconnect the power cord from the electrical outlet.

- Disconnect the power cord from the 4684 system unit.

- Measure the power cord for continuity.

Is the power cord operating correctly?
Yes No

009

Exchange the power cord.

PICTURE 32

Position 1	- 12 V dc
Position 2	Ground
Position 3	- 12 V dc

Figure 2-11. Fan Connector and Voltages

010

- Reconnect the power cord to the 4684 system unit.

- Reconnect the power cord to the electrical outlet.

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- Ensure that power is **OFF** at the 4684.

- Unplug the fan connector.

  Note: When the fan is not plugged in, do not apply power to the 4684 for more than five minutes.

- Switch power ON at the 4684.

- Check the fan connector for approximately -12.0 V dc (includes a range of -9.0 to -15.0 V dc), as shown in Figure 2-11.

Is the voltage correct?
Yes **No**

011

- Replug the fan connector to the system board.

Go to Step 003.

012

Replace the fan assembly. See "Removing and Replacing the 4684 System Unit Cooling Fan" in topic 2.13.5.

013

(From step 007) .

You may have a failing device causing the power supply to be overloaded.

- Switch **POWER OFF** at the 4684.

- Disconnect all devices from the back panel of the 4684.

- Switch power ON at the 4684.

Is the POWER GOOD light on?
Yes **No**

014

Go to Step 016.

015

Note: Always switch **POWER OFF** at the 4684 each time a device is reconnected.

- Reconnect the devices that were disconnected, one at a time, until the device causing the POWER GOOD light to be OFF is isolated.

016

(From step 014) .

You may have a failing Option Adapter card plugged into the 4684.

- Switch **POWER OFF** at the 4684.

- Unplug the Option Adapter cards in slots 1, 2, and 6 (side card).

- Switch power ON at the 4684.

Is the POWER GOOD light on?
Yes **No**

017

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Go to Step 019.

018

- One at a time, plug in each of the Option Adapters that were unplugged, until the adapter causing the POWER GOOD light to be OFF is isolated.

  Note: Always switch **POWER OFF** at the 4684 each time a device is reconnected.

019

(From step 017) .

You may have a failing diskette drive or fixed disk in the 4684.

- Switch **POWER OFF** at the 4684.

- Disconnect each of the drives present in the 4684. See "Removing and Replacing the 4684 Diskette Drive" in topic 2.13.7 and "Removing and Replacing the 4684 Fixed Disk Drive" in topic 2.13.8.

- Switch power ON at the 4684.

Is the POWER-GOOD light on?

Yes **No**

020

Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

021

- One at a time, reconnect each of the drives that were disconnected, until the drive causing the POWER GOOD light to be OFF is isolated.

  Note: Always switch **POWER OFF** at the 4684 each time a device is reconnected.

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2.12 4684 System Unit Cable Sockets and Devices

Table 2-11. IBM 4684 System Unit Sockets and Devices

Socket Number	**Device Name**	**Cable Number**
1A	Baseband Network	-
1B	Baseband Network	-
1B	Token Ring Network (side card, Model 300 only)	-
3A	Cash Drawer A or Remote Alarm A	3
3B	Cash Drawer B or Remote Alarm B	3
4A or 4B	Alphanumeric, Operator, or Shopper Display	4
5A	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Matrix Keyboard Combined Keyboard/Display, or Dual-Track MSR	5
5B	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Matrix Keyboard Combined Keyboard/Display, Dual-Track MSR, or 1520 Hand-Held Scanner Model A02	5
6	Single-Track Magnetic Stripe Reader (MSR) **Note:** Socket 6 is located on the 50-key keyboard.	None
7	Point-of-Sale Printer	7
9A	Alphanumeric, Operator, Shopper Display or Hand-Held Bar Code Reader	-
9B	Alphanumeric, Operator, Shopper Display or Hand-Held Bar Code Reader	-
11	4683-*xx*2	11
17	Checkout Scanner or Scanner/Scale	17
[1]	System Unit Keyboard	-
[2]	Pointing Device (Mouse)	-
[AA]	System Unit Video Display	-
[BB]	System Unit Printer	-
[CC]	System Unit Asynchronous Communications	-
[DD]	Dump Switch	-

PICTURE 33

Figure 2-12. IBM 4684 System Unit Back Panel

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2.13 Removing and Replacing 4684 System Unit Components

Some of the procedures described in this section may expose your fixed disk to excessive movement. To avoid damage to your fixed disk, you must secure it before moving it. If your system unit is operational, load the Reference Diskette and run the utility "Move the 4684" which secures the fixed disk. If your system unit is *not* operational, use extreme care to avoid exposing the fixed disk to excessive movement.

Subtopics

2.13.1 Removing and Replacing the 4684 System Unit
2.13.2 Removing and Replacing the 4684 System Unit Rear Cover
2.13.3 Removing and Replacing the 4684 System Unit Power Cord
2.13.4 Removing and Replacing the 4684 System Unit Cover
2.13.5 Removing and Replacing the 4684 System Unit Cooling Fan
2.13.6 Removing and Replacing the 4684 System Unit Power Supply
2.13.7 Removing and Replacing the 4684 Diskette Drive
2.13.8 Removing and Replacing the 4684 Fixed Disk Drive
2.13.9 Removing and Replacing a 4684 Option Adapter
2.13.10 Removing and Replacing Memory Modules on the 4684 System Board
2.13.11 Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter
2.13.12 Removing and Replacing the 4684 Feature Card Expansion
2.13.13 Removing and Replacing the 4684 Inner Frame
2.13.14 Removing and Replacing the 4684 System Board and Side Card

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2.13.1 Removing and Replacing the 4684 System Unit

Subtopics
2.13.1.1 Removing the System Unit
2.13.1.2 Replacing the System Unit

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2.13.1.1 Removing the System Unit

1. Sign off the terminal using the store procedure.

2. If possible, run the "Move the 4684" utility from MENU-U1 of the Reference Diskette to secure the fixed disk.

3. Switch **POWER OFF** at the 4684 system unit.

4. Switch **POWER OFF** at any devices attached to the terminal and remove the power cords.

5. Remove the rear cover. See Figure 2-13 in topic 2.13.2.2.

6. Disconnect the power cord from the power receptacle.

7. Disconnect all cables.

   To prevent the baseband network from opening, connect the network cables together using the 4684 Baseband Network Cable Adapter.

   If this is the end terminal in the network, install the 4684 Baseband Connector adapter and the Baseband Network Terminator or wrap plug to the network cable. See Figure 2-8 in topic 2.9.

8. Note the location of each cable as it is being removed. This will help when replacing the system unit.

9. Remove all devices that are attached to the system unit.

10. Remove the 4684 system unit from the terminal.

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2.13.1.2 Replacing the System Unit

1. Replace the 4684 system unit on the terminal.

2. Attach all devices that were previously attached to the system unit.

3. Reconnect all cables.

4. Plug the power cords into a power receptacle.

5. Switch power ON to any devices attached to the terminal.

6. Switch the 4684 system unit power ON.

7. If a system board or power supply was replaced, their EC number should be entered into Vital Product Data. See "Entering Vital Product Data Using the 4684 Reference Diskette" in topic 2.16.

8. Sign on the terminal using the store procedure.

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2.13.2 Removing and Replacing the 4684 System Unit Rear Cover

Subtopics
2.13.2.1 Removing the System Unit Rear Cover
2.13.2.2 Replacing the System Unit Rear Cover

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2.13.2.1 Removing the System Unit Rear Cover

Pull straight up on the rear cover and remove it.

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2.13.2.2 Replacing the System Unit Rear Cover

Put the rear cover into place and push straight down.

Note: Some option adapters that have external cables may interfere with the placement of the rear cover.

PICTURE 34

Figure 2-13. Removing and Replacing the System Unit Rear Cover

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2.13.3 Removing and Replacing the 4684 System Unit Power Cord

Subtopics
2.13.3.1 Removing the System Unit Power Cord
2.13.3.2 Replacing the System Unit Power Cord

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2.13.3.1 Removing the System Unit Power Cord

1. Switch **POWER OFF** at the 4684 system unit.
2. Unplug the 4684 system unit power cord from the power receptacle.
3. Remove all devices from the top of the 4684 system unit.
4. Turn the 4684 system unit bottom side up.
5. Unplug the power cord from the 4684 system unit.

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2.13.3.2 Replacing the System Unit Power Cord

1. Turn the 4684 system unit bottom side up.

2. Place the power cord in through the hole on the bottom of the system unit, and plug it into the 4684 system unit socket.

3. Place the power cord in the groove in the bottom of the system unit and route it toward the rear.

4. Put the 4684 system unit in operating position.

PICTURE 35

Figure 2-14. Removing and Replacing the System Unit Power Cord

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2.13.4 Removing and Replacing the 4684 System Unit Cover

Subtopics
2.13.4.1 Removing the System Unit Cover
2.13.4.2 Replacing the System Unit Cover

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2.13.4.1 Removing the System Unit Cover

1. If applicable, remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Loosen the cover screw [1].

3. Remove the cover by sliding it forward and lifting it up.

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2.13.4.2 Replacing the System Unit Cover

1. Switch **POWER OFF** at the 4684.
2. Put the cover on the system unit.
3. Slide the cover forward over the 4684 system unit.
4. Tighten the cover screw [1].

PICTURE 36

Figure 2-15. Removing and Replacing the System Unit Cover

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2.13.5 Removing and Replacing the 4684 System Unit Cooling Fan

Subtopics
2.13.5.1 Removing the System Unit Cooling Fan
2.13.5.2 Replacing the System Unit Cooling Fan

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2.13.5.1 Removing the System Unit Cooling Fan

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the cover from the 4684 system unit. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Remove the fixed disk drive from the 4684 system unit. See "Removing the Fixed Disk Drive" in topic 2.13.8.1.

4. Remove the diskette drive from the 4684 system unit. See "Removing the Diskette Drive" in topic 2.13.7.1.

5. Remove the fan guard by lifting it in the direction of the arrow.

6. Unplug the cooling fan plug [1] as shown in Figure 2-16.

7. Remove the inner frame. See "Removing and Replacing the 4684 Inner Frame" in topic 2.13.13.

8. Loosen the two screws [2] on the cooling fan.

9. Remove the fan from the inner frame.

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2.13.5.2 Replacing the System Unit Cooling Fan

1. Ensure that the 4684 system unit power is **OFF**.
2. Attach the cooling fan to the inner frame.
3. Tighten the two screws [2] on the cooling fan.
4. Replace the inner frame.
5. Replace the fan guard by sliding it in the opposite direction of the arrow.
6. Replace the fixed disk drive.
7. Plug the cooling fan plug [1] into the receptacle. See "Replacing the Fixed Disk Drive" in topic 2.13.8.2.
8. Replace the rear cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

PICTURE 37

Figure 2-16. Removing and Replacing the System Unit Cooling Fan

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2.13.6 Removing and Replacing the 4684 System Unit Power Supply

Subtopics
2.13.6.1 Removing the System Unit Power Supply
2.13.6.2 Replacing the System Unit Power Supply

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2.13.6.1 Removing the System Unit Power Supply

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Remove the power cord. See "Removing the System Unit Power Cord" in topic 2.13.3.1.

4. Remove the two screws [2].

5. Press down on the latch [1] in Figure 2-17 and slide the power supply in the direction of the arrow.

6. Lift the power supply out of the system unit.

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2.13.6.2 Replacing the System Unit Power Supply

1. Ensure power is **OFF** on the 4684 power supply.

2. Record the EC number of the power supply. This number will be needed later to enter into Vital Product Data. The number is located on a label on the right side of the power supply.

3. Place the power supply in the system unit as shown in Figure 2-17.

4. Slide the power supply in the opposite direction of the arrow until the latch [1] locks into place.

5. Replace the two screws [2].

6. Replace the power cord. See "Replacing the System Unit Power Cord" in topic 2.13.3.2.

7. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

8. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions on testing the unit after replacement.

9. After testing, go to "Entering Vital Product Data Using the 4684 Reference Diskette" in topic 2.16 and enter the EC number for the new power supply.

PICTURE 38

Figure 2-17. Removing and Replacing the System Unit Power Supply

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2.13.7 Removing and Replacing the 4684 Diskette Drive

Subtopics
2.13.7.1 Removing the Diskette Drive
2.13.7.2 Replacing the Diskette Drive

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2.13.7.1 Removing the Diskette Drive

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Disconnect the diskette drive cable (if present) from the disk drive interposer.

4. Pull up on the latch [1] in Figure 2-18 and slide and lift the diskette drive in the directions indicated by the arrow.

5. Lift the diskette drive out of the system unit.

6. Disconnect the diskette drive cable (if present) from the diskette drive.

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2.13.7.2 Replacing the Diskette Drive

1. Ensure power is **OFF** on the 4684 system unit.

2. Connect the diskette drive cable (if present) to the diskette drive.

3. Place the diskette drive in the system unit as shown in Figure 2-18.

4. Slide and lower the diskette drive in the opposite directions indicated by the arrow until the latch [1] locks into place.

5. Connect the diskette drive cable (if present) to the disk drive interposer.

6. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

7. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions on testing the unit after replacement.

PICTURE 39

Figure 2-18. Removing and Replacing the Diskette Drive

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2.13.8 Removing and Replacing the 4684 Fixed Disk Drive

Note: To avoid damage to your fixed disk, you must secure it before moving it. If your system unit is operational, load the Reference Diskette and run the utility "Move the 4684" which secures the fixed disk. If your system unit is *not* operational, use extreme care to avoid exposing the fixed disk to excessive movement. If you are replacing the fixed disk drive, be sure the original fixed disk is backed up.

Subtopics
2.13.8.1 Removing the Fixed Disk Drive
2.13.8.2 Replacing the Fixed Disk Drive

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2.13.8.1 Removing the Fixed Disk Drive

1. If possible, run the "Move the 4684" utility from MENU-U1 of the Reference Diskette to secure the fixed disk.

2. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

3. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

4. Remove the fan guard. See "Removing the System Unit Cooling Fan" in topic 2.13.5.1.

5. Pull up on the latch [1] and slide and lift the fixed disk drive in the directions indicated by the arrow.

6. Lift the fixed disk drive out of the system unit.

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2.13.8.2 Replacing the Fixed Disk Drive

1. Ensure power is **OFF** on the 4684 system unit.

2. Place the fixed disk drive in the system unit as shown in Figure 2-19.

3. Slide and lower the fixed disk drive in the opposite directions indicated by the arrow until the latch [1] locks into place.

4. Replace the fan guard. See "Replacing the System Unit Cooling Fan" in topic 2.13.5.2.

5. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

6. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions on testing the unit after replacement.

PICTURE 40

Figure 2-19. Removing and Replacing the Fixed Disk Drive

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2.13.9 Removing and Replacing a 4684 Option Adapter

Subtopics
2.13.9.1 Removing an Option Adapter
2.13.9.2 Replacing an Option Adapter

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2.13.9.1 Removing an Option Adapter

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Remove any cable attached to the Option Adapter.

4. Loosen the screw [1] as shown in Figure 2-20, grasp the adapter by the blue handle and slide it out of the system unit.

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2.13.9.2 Replacing an Option Adapter

1. Ensure power is **OFF** on the 4684 system unit.

2. Grasp the adapter by the blue handle and place it in the system unit in the same slot it was removed from. See Figure 2-20.

3. Firmly slide the adapter in the opposite direction of the arrow and tighten the screw [1].

4. Replace any cables to the adapter.

5. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

6. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions about testing the unit after replacement.

PICTURE 41

Figure 2-20. Removing and Replacing the Option Adapter

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2.13.10 Removing and Replacing Memory Modules on the 4684 System Board

Note: There are two memory module connectors on the 4684 system board. If you have only one memory module, it must be installed in the outside or left-most connector. When two memory modules are installed, the outside or left-most module is low memory and the inside module is high memory.

Subtopics
2.13.10.1 Removing a Memory Module
2.13.10.2 Replacing a Memory Module

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2.13.10.1 Removing a Memory Module

1. Pull the retainers [1] outward simultaneously until they release the module. See Figure 2-21 in topic 2.13.10.2.

2. Lift the module [3] from the memory module connector [2].

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2.13.10.2 Replacing a Memory Module

1. Slide the memory module [1] into the memory module connector [2] at an angle. Make sure the module is properly aligned with the retainers [3]. See Figure 2-22.

2. Push the top of the module down and back until the retainers [3] snap into place.

PICTURE 42

Figure 2-21. Removing Memory Modules

PICTURE 43

Figure 2-22. Replacing Memory Modules

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2.13.11 Removing and Replacing the 4684 Feature Card and Memory Expansion Adapter

Subtopics
2.13.11.1 Removing the Feature Card and Memory Expansion Adapter
2.13.11.2 Replacing the Feature Card and Memory Expansion Adapter

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2.13.11.1 Removing the Feature Card and Memory Expansion Adapter

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Remove Option Adapters and note their slot locations. See "Removing an Option Adapter" in topic 2.13.9.1.

4. Lift the 4684 Feature Card and Memory Expansion Adapter in the direction of the arrow in Figure 2-23 in topic 2.13.12.2.

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2.13.11.2 Replacing the Feature Card and Memory Expansion Adapter

1. Ensure power is **OFF** on the 4684 system unit.

2. Lower the 4684 Feature Card and Memory Expansion Adapter in the opposite direction of the arrow in Figure 2-23 in topic 2.13.12.2.

3. Replace any option adapters. See "Removing and Replacing a 4684 Option Adapter" in topic 2.13.9 or "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.

4. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

5. Replace the 4684 system unit on the terminal. See "Replacing the System Unit" in topic 2.13.1.2.

6. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions on testing the unit after replacement.

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2.13.12 Removing and Replacing the 4684 Feature Card Expansion

Subtopics
2.13.12.1 Removing the Feature Card Expansion
2.13.12.2 Replacing the 4684 Feature Card Expansion

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2.13.12.1 Removing the Feature Card Expansion

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Remove all Option Adapters and note their slot locations. See "Removing an Option Adapter" in topic 2.13.9.1.

4. Lift the feature card expansion adapter in the direction of the arrow in Figure 2-23 in topic 2.13.12.2.

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2.13.12.2 Replacing the 4684 Feature Card Expansion

1. Ensure power is **OFF** on the 4684 system unit.

2. Lower the feature card expansion adapter in the opposite direction of the arrow in Figure 2-23.

3. Replace any Option Adapters. See "Replacing an Option Adapter" in topic 2.13.9.2.

4. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

5. Replace the 4684 system unit on the terminal. See "Replacing the System Unit" in topic 2.13.1.2.

6. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions on testing the unit after replacement.

PICTURE 44

Figure 2-23. Removing and Replacing the 4684 Feature Card Expansion or the 4684 Feature Card and Memory Expansion

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2.13.13 Removing and Replacing the 4684 Inner Frame

Subtopics
2.13.13.1 Removing the Inner Frame
2.13.13.2 Replacing the Inner Frame

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2.13.13.1 Removing the Inner Frame

1. Remove the 4684 system unit from the terminal. See "Removing the System Unit" in topic 2.13.1.1.

2. Remove the system unit cover. See "Removing the System Unit Cover" in topic 2.13.4.1.

3. Remove the power supply. See "Removing the System Unit Power Supply" in topic 2.13.6.1.

4. Remove the diskette drive. See "Removing the Diskette Drive" in topic 2.13.7.1.

5. Remove the fan guard. See "Removing and Replacing the 4684 System Unit Cooling Fan" in topic 2.13.5.

6. Remove the fixed disk drive. See "Removing the Fixed Disk Drive" in topic 2.13.8.1.

7. Note their locations, and remove any Option Adapters. See "Removing an Option Adapter" in topic 2.13.9.1.

8. Disconnect the 4684 system unit cooling fan. See "Removing and Replacing the 4684 System Unit Cooling Fan" in topic 2.13.5.

9. Remove the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion Adapter by lifting them in the direction of the arrow in Figure 2-25 in topic 2.13.14.1.

10. Note their locations and remove the system board screws and the two rear screws as shown in Figure 2-26 in topic 2.13.14.1.

11. Locate the retainer removal tool in the system unit (see Figure 2-27 in topic 2.13.14.1). Unlatch the six inner frame retainers with the retainer unlatch tool. The retainers are self storing.

12. Remove the inner frame by lifting it in the direction of the arrow in Figure 2-24 in topic 2.13.13.2.

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2.13.13.2 Replacing the Inner Frame

1. Ensure power is **OFF** on the 4684 system unit.

2. Replace the two system board screws.

3. Replace the inner frame by lowering it in the opposite direction of the arrow in Figure 2-24.

4. Press the six inner frame retainers downward to latch in the six locations indicated by arrows in Figure 2-27 in topic 2.13.14.1.

5. Replace the third system board screw and the two rear screws as shown in Figure 2-26 in topic 2.13.14.1.

6. Replace the system board interposers by lowering them into the locations indicated by arrows in Figure 2-25 in topic 2.13.14.1.

7. Reconnect the system unit cooling fan. See "Replacing the System Unit Cooling Fan" in topic 2.13.5.2.

8. Replace any Option Adapters. See "Replacing an Option Adapter" in topic 2.13.9.2.

9. Replace the fixed disk drive. See "Replacing the Fixed Disk Drive" in topic 2.13.8.2.

10. Replace the fan guard. See "Removing and Replacing the 4684 System Unit Cooling Fan" in topic 2.13.5.

11. Replace the diskette drive. See "Replacing the Diskette Drive" in topic 2.13.7.2.

12. Replace the power supply. See "Replacing the System Unit Power Supply" in topic 2.13.6.2.

PICTURE 45

Figure 2-24. Removing System Board Inner Frame

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2.13.14 Removing and Replacing the 4684 System Board and Side Card

CAUTION:
The card assembly contains lithium batteries which may present a fire, explosion, or severe burn risk. Do not disassemble, heat above 100 degrees Celsius (212 degrees Fahrenheit), incinerate, or expose the battery contents to water.

Subtopics

2.13.14.1 Removing the System Board and Side Card
2.13.14.2 Replacing the System Board and Side Card

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¦*2.13.14.1 Removing the System Board and Side Card*

¦**"Replacing the System Board and Side Card" is in topic** 2.13.14.2

¦**Note:** If your 4684 terminal is attached to a store loop, disconnect the ¦store loop cable at the store loop receptacle, at the wall or at the ¦wiring panel before disconnecting the cable from the terminal base unit.

¦1. Remove the 4684 system unit from the terminal. See "Removing the ¦ System Unit" in topic 2.13.1.1.

¦2. Remove the system unit cover. See "Removing the System Unit Cover" in ¦ topic 2.13.4.1.

¦3. Remove the power supply. See "Removing the System Unit Power Supply" ¦ in topic 2.13.6.1.

¦4. Remove the diskette drive. See "Removing the Diskette Drive" in ¦ topic 2.13.7.1.

¦5. Remove the fan guard. See "Removing and Replacing the 4684 System ¦ Unit Cooling Fan" in topic 2.13.5.

¦6. Remove the fixed disk drive. See "Removing the Fixed Disk Drive" in ¦ topic 2.13.8.1.

¦7. Note their locations and remove all Option Adapter cards. See ¦ "Removing an Option Adapter" in topic 2.13.9.1.

¦8. Disconnect the 4684 system unit cooling fan. See "Removing and ¦ Replacing the 4684 System Unit Cooling Fan" in topic 2.13.5.

¦9. Remove the system board interposers by lifting them in the direction ¦ of the arrow in Figure 2-25.

¦10. Remove the 4684 Feature Card Expansion or the 4684 Feature Card and ¦ Memory Expansion Adapter (if present).

¦11. Disconnect the 2-wire system unit cooling fan cable from the connector ¦ on the system board.

¦12. Locate the retainer removal tool in the system unit (see Figure 2-27). ¦ Unlatch the six inner frame retainers with the retainer unlatch tool. ¦ The retainers are self storing.

¦13. Remove the inner frame by lifting it in the direction of the arrow in ¦ Figure 2-24 in topic 2.13.13.2.

¦14. Remove the system board screws as shown in Figure 2-28.

¦15. Lift the system board out of the system unit as shown in Figure 2-29.

¦ **Note:** There is an alignment hole in the system board that fits ¦ tightly onto a guide post in the system unit base. This guide post is ¦ located near the back corner of the system unit base at the side that ¦ would contain the Option Adapters. Carefully place your fingers under ¦ the system board near the guide post and lift straight up on the ¦ system board to clear top of the guide post.

¦16. If you are replacing only the system side card, continue at step 18. ¦ If you are replacing the system board, continue with the next step.

¦17. The replacement system board will not be supplied with the system ¦ board memory installed. Therefore, you must remove the memory module ¦ or modules (there may be two present) from the board being replaced ¦ and install them on the replacement board. See Figure 2-9 in ¦ topic 2.10 for the memory module locations.

¦18. Remove the metal faceplate by removing the connector mounting screws. ¦ See Figure 2-30.

¦19. Unplug the system side card (if present). See Figure 2-30.

[3]PICTURE 46

¦Figure 2-25. Removing System Board Interposers

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³PICTURE 47

¦Figure 2-26. Removing System Board Screw

³PICTURE 48

¦Figure 2-27. Removing Inner Frame Retainers with Retainer Removal Tool

³PICTURE 49

¦Figure 2-28. Removing System Board Screws

³PICTURE 50

¦Figure 2-29. Lifting System Board from System Unit

³PICTURE 51

¦Figure 2-30. Removing System Board Metal Faceplate and Side Card

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2.13.14.2 Replacing the System Board and Side Card

"Removing the System Board and Side Card" is in topic 2.13.14.1

1. Plug the system side card (if present) onto the system board.

2. If you are replacing only the system side card, continue at step 5.

3. If you are replacing the system board, continue at the next step.

4. Install the memory module(s) removed from the system board being replaced onto the new board. See Figure 2-9 in topic 2.10 for memory module location.

5. Replace the metal faceplate. See Figure 2-30 in topic 2.13.14.1.

6. Record the EC number of the system board. This number will be needed later to enter into Vital Product Data.

   - **For 4684 Model 1*xx* and 200:**

     The EC number is located on the left edge of the system board near the rear of the board.

   - **For 4684 Model 300:**

     The EC number is located on the left edge of the system board near the memory module connectors.

7. Lower the system board into the system unit in the opposite direction of the arrow as shown in Figure 2-29 in topic 2.13.14.1.

   Note: There is an alignment hole in the system board that must fit tightly onto a guide post in the system unit base. This guide post is located near the back corner of the system unit base at the side that would contain the Option Adapters. Carefully place your fingers on the system board near the guide post and push straight down on the system board to seat the system board onto the guide post.

8. Replace the system board screws as shown in Figure 2-28 in topic 2.13.14.1.

9. Replace the inner frame by lowering it in the opposite direction of the arrow as shown in Figure 2-24 in topic 2.13.13.2.

10. Connect the 2-wire fan cable to the 3-pin connector on the system board.

11. Press the six inner frame retainers downward to latch in the six locations indicated by arrows in Figure 2-27 in topic 2.13.14.1.

12. Replace the 4684 Feature Card Expansion **or** the 4684 Feature Card and Memory Expansion Adapter (if present) by lowering them into the locations indicated in Figure 2-9 in topic 2.10.

13. Replace the system board interposers by inserting them in the opposite direction of the arrow in Figure 2-25 in topic 2.13.14.1.

14. Replace all Option Adapter cards. See "Replacing an Option Adapter" in topic 2.13.9.2.

15. Replace the fixed disk drive. See "Replacing the Fixed Disk Drive" in topic 2.13.8.2.

16. Replace the fan guard. See "Removing and Replacing the 4684 System Unit Cooling Fan" in topic 2.13.5.

17. Replace the diskette drive. See "Replacing the Diskette Drive" in topic 2.13.7.2.

18. Replace the power supply. See "Replacing the System Unit Power Supply" in topic 2.13.6.2.

19. Replace the system unit cover. See "Replacing the System Unit Cover" in topic 2.13.4.2.

20. Replace the system unit on the terminal. See "Replacing the System Unit" in topic 2.13.1.2.

21. See "Running 4684 Tests Using the Reference Diskette" in topic 2.14 for instructions on testing the unit after replacement.

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22. After testing, go to "Entering Vital Product Data Using the 4684 Reference Diskette" in topic 2.16 and enter the EC number of the system board.

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2.14 Running 4684 Tests Using the Reference Diskette

Subtopics

2.14.1 Test Introduction
2.14.2 Flow Chart of Test Menus
2.14.3 Preparing to Run Tests
2.14.4 Running Verification Tests
2.14.5 Running System Unit Tests
2.14.6 4684 Baseband Network Tests
2.14.7 4684 Baseband Network Adapter Test
2.14.8 4684 Transmit/Receive Verification Test
2.14.9 4684 Baseband Network Adapter Status
2.14.10 4684 Display Network Utilization Test
2.14.11 4684 Display Network Unit ID Number
2.14.12 Running the 4684 Token Ring Network Adapter Test
2.14.13 Running the X.25 Interface Co-Processor/2 Test
2.14.14 Logging Errors
2.14.15 Running POS Device Tests

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2.14.1 Test Introduction

Subtopics
2.14.1.1 Power-on Self Tests
2.14.1.2 Verification Tests
2.14.1.3 POS (Point of Sale) Device Tests
2.14.1.4 System Unit Tests
2.14.1.5 Baseband Network Tests

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2.14.1.1 Power-on Self Tests

These tests run automatically when power is switched ON. They test all the basic functions of the system unit.

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2.14.1.2 Verification Tests

These tests can be used by the operator or service personnel. They test the basic functions of both the 4684 and the 4683 with a minimum amount of operator intervention. Use these tests to help determine which device is failing. The tests are also useful in testing the 4684 or 4683 after exchanging a failing device. For more thorough testing, there are more advanced tests described below that require a broader knowledge of the 4684 and 4683 terminals.

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2.14.1.3 POS (Point of Sale) Device Tests

These tests are designed for use by customer or service personnel. They test each of the point-of-sale devices attached to the 4684 system unit or to the 4683 base unit.

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2.14.1.4 System Unit Tests

These tests are designed primarily for use by service personnel. They test each device within the 4684 system unit, such as the diskette drive, the fixed disk drive, and the optional adapters.

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2.14.1.5 Baseband Network Tests

These tests are designed to be used by the customer or service personnel. They contain a Baseband Adapter test and a test that checks other network functions (Reference Diskette Version 2.02 and earlier).

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2.14.2 Flow Chart of Test Menus

PICTURE 52

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2.14.3 Preparing to Run Tests

Read the following test sequence before beginning. Some of the events happen quickly. Be careful not to miss them if you are reading the book as the test proceeds.

1. Use your store procedures to stop any application programs that are running.

2. Do the following to IPL (Initial Program Load):

   a. Switch **POWER OFF** at the 4684.

      WARNING
      Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

   b. Insert the Reference Diskette in the 4684 diskette drive.

   c. Switch power ON at the 4683 (if attached).

   d. Switch power ON at the 4684.

3. Power-on self tests start automatically when power is switched ON. The messages that **NORMALLY** display during the IPL process are:

   a. Characters representing the memory test progress.

   b. A series of Unnn messages representing the progress of the IPL.

   c. A Reference Diskette Copyright message.

   d. Message M0001 PRESS THE 1 KEY (on the alphanumeric display only).

4. If M0001 PRESS THE 1 KEY is displayed, continue at step 8.

5. If MENU-M1 is displayed, continue at step 8.

6. If the display(s) is blank or un-readable, see the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

7. If an error number is displayed, note it and then press **S1** (press ESC on the Enhanced A/N keyboard).

   Additional information or instructions are displayed to continue problem determination.

   - If the IPL does not continue after pressing **S1** or **ESC**, go to the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide* and follow the *User Response* for the message displayed.

8. Press **1** on the primary keyboard if prompted.

   MENU-M1 displays.

   - If MENU-M1 does not display, see "4684 System Unit Messages" in topic 2.2.

   When MENU-M1 is displayed, you are prepared to start testing.

+--+
| **To run Verification Tests**, see "Running Verification Tests" in topic 2.14.4. |
| **To run System Unit Device Tests**, see "Running System Unit Tests" in topic 2.14.5. |
| **To run POS Device Tests**, see the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*. |
| **To run Baseband Network Tests**, see "4684 Baseband Network Tests" in topic 2.14.6. |
+--+

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2.14.4 Running Verification Tests

To run these tests, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.

2. Select RUN VERIFICATION TESTS from MENU-T1.

3. Follow the instructions on the display.

Notes:

1. A high-density scratch diskette is required to run the verification tests. Ensure that the diskette is not write-protected. If an unformatted scratch diskette is used for this test, the test will format the diskette for use during the test but the diskette will not be fully formatted at the end of the test.

2. When the system unit verification tests are running, progress messages are displayed. For example, "Completed Testing Keyboard 3" is a progress message.

- If an error message displays, follow the instructions on the display.

- If a symptom indication is observed from one of the tests, follow the *Action Sequence* for the symptom in the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

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2.14.5 Running System Unit Tests

To run these tests, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.

2. Select RUN SYSTEM UNIT TESTS from MENU-T1.

3. Select TEST SYSTEM UNIT from MENU-T2.

4. Select RUN TESTS ONE TIME or RUN TESTS CONTINUOUSLY from MENU-T3.

   Note: If you select RUN TESTS CONTINUOUSLY, you can stop the tests by using one of the following methods:

   a. Switch **POWER OFF** at the 4684.
   b. Press Ctrl-C or Ctrl-Break if your primary keyboard is the Enhanced A/N Keyboard.

      However, if you are running the system board test, do not switch power OFF until the message "Completed Testing System Board 1" is displayed. You can power **OFF** any time during other tests.

5. Select the desired test from MENU-T4.

Table 2-12 **shows some of the items that can be displayed for MENU-T4. For the location of the IBM 4684 System Unit sockets, ports and devices, see** Table 2-13. **Your MENU-T4 contains *only* the devices that are configured for your system**.

If you have an Option Adapter that is installed and configured but does not appear in MENU-T4, exchange that adapter.

Table 2-12. MENU-T4

MENU ITEM
TEST ALL DEVICES
SYSTEM UNIT
xxxx Kb MEMORY
KEYBOARD PORT
PRINTER PORT (See Note 1)
DISKETTE DRIVE
SYSTEM BOARD ASYNC PORT (See Note 1)
FIXED DISK DRIVE
VIDEO GRAPHICS ARRAY
IBM 4684 DEVICE CHANNEL
MOUSE PORT
OTHER OPTIONAL ADAPTERS THAT ARE INSTALLED AND CONFIGURED

ACTION: Follow instructions on the display to run these tests.

Notes:

1. These tests require the use of wrap plug kit IBM P/N 96X5047. See Figure 2-34 in topic 2.14.11.1.

2. This test requires the use of the baseband network wrap plug IBM P/N 96X4974, and the baseband network terminator plug, IBM P/N 96X4975. See Figure 2-35 in topic 2.14.11.2.

3. This test may require the use of a 37-pin wrap plug. See Table 2-15 in topic 2.14.13.

4. This test may require the use of a wrap plug, IBM P/N 07F8989.

5. If you have an Option Adapter that is installed and configured but does not appear in MENU-T4, exchange that adapter.

Table 2-13. IBM 4684 System Unit Sockets, Ports and Devices. The 4684 ports are associated with devices that may be either on the system board (memory) or external to it (keyboards, displays). The port number is related to the error code that is displayed when the device or function

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fails. For example, the keyboard is connected to port 3 and the keyboard error code is 3*nn*. See "4684 System Unit Messages" in topic 2.2.

Socket Number	**Port Number**	**Device Name**	**Cable Number**
1A	30	Baseband Network	-
1B	30	Baseband Network	-
1B	166/167	Token Ring Network (side card, Model 300 only)	-
3A	-	Cash Drawer A or Remote Alarm A	3
3B	-	Cash Drawer B or Remote Alarm B	3
4A or 4B	-	Alphanumeric, Operator, or Shopper Display	4
5A	-	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Matrix Keyboard Combined Keyboard/Display, or Dual-Track MSR	5
5B	-	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Matrix Keyboard Combined Keyboard/Display, Dual-Track MSR, or 1520 Hand-Held Scanner Model A02	5
6	-	Single-Track Magnetic Stripe Reader (MSR) **Note:** Socket 6 is located on the 50-key keyboard.	None
7	-	Point-of-Sale Printer	7
9A	-	Alphanumeric, Operator, or Shopper Display, Hand-Held Bar Code Reader	-
9B	-	Alphanumeric, Operator, or Shopper Display, Hand-Held Bar Code Reader	-
11	-	4683-*xx*2	11
17	-	Checkout Scanner or Scanner/Scale	17
[1]	3	System Unit Keyboard	-
[2]	86	Pointing Device (Mouse)	-
[AA]	24	System Unit Video Display	-
[BB]	4	System Unit Printer	-
[CC]	11	System Unit Asynchronous Communications	-
[DD]	-	Dump Switch	-
Internal	1	System board functions	-
Internal	2	Memory	-
Internal	6	Diskette Drive	-

[3]PICTURE 53

Figure 2-31. IBM 4684 System Unit Back Panel

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2.14.6 4684 Baseband Network Tests

Note: These tests are only available on Reference diskette Version 2.02 and earlier.

To run these tests, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.
2. Select RUN BASEBAND NETWORK TESTS from MENU-T1.
3. Select the desired test from MENU-L1.
4. Follow the instructions on the display.

If an error message or symptom occurs, go to "MAP 2020: 4684 Baseband Network" in topic 2.4.

Table 2-14. MENU-L1

Menu Item	Action
BASEBAND NETWORK ADAPTER TEST	Follow instructions on the display.
TRANSMIT/RECEIVE VERIFICATION TEST	Follow instructions on the display.
DISPLAY NETWORK UTILIZATION TEST	Follow instructions on the display.
DISPLAY NETWORK UNIT ID NUMBER	Follow instructions on the display.
QUIT	Follow instructions on the display.

PICTURE 54

Figure 2-32. Testing the Baseband Network

PICTURE 55

Figure 2-33. Baseband Network Test Menus (flow chart)

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2.14.7 4684 Baseband Network Adapter Test

This test performs an internal test on the Baseband Network Adapter. A wrap plug and terminator are required for this test if the 4684 is not connected to a network.

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2.14.8 4684 Transmit/Receive Verification Test

This test is used to verify communication between two nodes within a network. Alphanumeric characters are sent and displayed by the transmitting node and received and displayed by the receiving node. This verifies that the communication link has been established between these two nodes. A manual intervention is required to end this test.

- Select TRANSMIT/RECEIVE VERIFICATION TEST from MENU-L1.

Notes:

1. Follow the same procedure to prepare both nodes.

2. The receiving node must be selected before the transmitting node.

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2.14.9 4684 Baseband Network Adapter Status

The status of the adapter can be viewed after the Transmit/Receive test has been stopped. The adapter status can be displayed only once. You will have to re-IPL the Baseband Network Test Diskette and restart the Transmit/Receive test each time you want to check the adapter status.

A description of the adapter status is described below:

UNIT ID NUMBER. The universally-administered address of the adapter.

REPORTING PERIOD IN MINUTES. The elapsed time since you started the PC Network Advanced Diagnostic Tests.

CRC ERRORS. The number of properly aligned frames received with a cyclic redundancy check (CRC) error.

ALIGNMENT ERRORS. The number of misaligned frames received with a CRC error. When excessive or missing bits occur during the reception of a frame, the frame is misaligned.

COLLISIONS. When a frame from a transmitting adapter encounters any other signal in its path (another frame, noise, or another type of signal), the adapter stops transmitting and a collision is registered.

RETRANSMISSIONS. If a preset time elapses, a retransmission is registered by the adapter. Also, a negative acknowledgment (NAK) frame can cause a retransmission to be registered by the adapter.

UNSUCCESSFUL TRANSMISSIONS. The adapter registers an unsuccessful transmission if either of the following conditions occurs:

- Transmission stops because of loss of the control signal in the adapter.
- Transmission stops because the system is not supplying data for transmission.

SUCCESSFUL TRANSMISSIONS. The number of frames successfully transmitted.

SUCCESSFUL RECEPTIONS. The number of frames successfully received.

EXHAUSTED RESOURCES. The number of frames discarded because the system could not accept frames as fast as the adapter received them.

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2.14.10 4684 Display Network Utilization Test

Use the Network Utilization test to diagnose network performance problems. Higher network utilization lowers network performance, but many other factors can have an effect on network performance, including:

- The number of active nodes
- The type of software being used
- The quality of the installation
- The distances between nodes
- The types of transmissions.

Therefore, no generalized statement can be made about the percentage of utilization and performance. The Network Utilization test shows the following information about network usage:

- Average use
- Present use
- Highest use
- Lowest use.

These figures change as the network usage changes. The percentages change to reflect the amount of usage.

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2.14.11 4684 Display Network Unit ID Number

This test displays the unique adapter network address.

Note: It may be necessary to provide this ID to your network administrator.

Subtopics
2.14.11.1 Wrap Kit, IBM P/N 96X5047
2.14.11.2 Wrap Plug, IBM P/N 96X4974 or Terminator Plug, IBM P/N 96X4975

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2.14.11.1 Wrap Kit, IBM P/N 96X5047

PICTURE 56

Figure 2-34. Wrap Kit

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2.14.11.2 Wrap Plug, IBM P/N 96X4974 or Terminator Plug, IBM P/N 96X4975

PICTURE 57

Figure 2-35. Baseband Network Wrap or Terminator Plug

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2.14.12 Running the 4684 Token Ring Network Adapter Test

To run these tests, begin at "Preparing to Run Tests" in topic 2.14.3.

1. IPL the 4684 using the Backup Reference Diskette.
2. When MENU-M1 displays, select VIEW ACTIVE CONFIGURATION from MENU-C1.
3. Select VIEW 4684 CONFIGURATION from MENU-C5.
4. Record the slot number and the network data rate (if present) for the Token Ring Network adapter.

   Note: If there is no data rate displayed such as 4MBPS or 16MBPS for the Token Ring Network Adapter, it is assumed to be 4MBPS.
5. Return to MENU-M1.

   a. Refer to the 4684 installation worksheet from the *IBM 4684 Point of Sale Terminal: Introduction and Planning Guide*, to ensure that the slot number and network data rate are correct. The adapter name (Token Ring Network Adapter) should appear beside the correct slot number.

      If the adapter name did not appear, *or* if the slot number and network data rate were not correct, ensure that all of the steps in the installation procedure were performed correctly. Then return to step 1 of this procedure.

      Service your system unit if:

      - The adapter name and slot number were still not correct after you repeated all the steps, or
      - The adapter data rate was not correct after you repeated all the steps.

6. Select START TESTS from MENU-M1.
7. Select RUN SYSTEM UNIT TEST from MENU-T1.
8. Select TEST SYSTEM UNIT TEST from MENU-T2.
9. Select RUN TESTS ONE TIME from MENU-T3.
10. Verify that the token-ring is in the list of installed devices. If it is not and it is installed, exchange the Token Ring Network Adapter.
11. Select TOKEN-RING NETWORK ADAPTER TEST from MENU-T4 and follow the instructions that appear on the display.

    Note: The test asks which type of cable is connected to the adapter. Refer to topic 2.14.12 to identify the correct cable.

    Note: This procedure does not verify that the data rate of the adapter matches the data rate of the token-ring network.
12. In the spaces provided, record the following parameters of the Token Ring Network Adapter:
    Slot number _____
    Adapter Parameters:
    Primary or Alternate adapter _____
    Adapter Data Rate _____
    ROM Address Range _____
    RAM Size and Address Range _____
    Interrupt Level _____

    Adapter address (1) _____
    Code level (2) _____
13. Ensure that the slot number and data rate are the same as those recorded earlier.
14. If the test returns a 166nn or 167nn error code, check the following before exchanging the Token Ring Adapter.
    - The cable or wrap plug is firmly attached to the adapter
    - The adapter is firmly seated in the option slot
    - You have correctly configured the adapter.

    If any of the previous conditions have not been met, correct any problems and rerun the test starting at "Running the 4684 Token Ring Network Adapter Test."

    If all the previous conditions have been met, go to "MAP 2060: 4684 Token Ring" in topic 2.8.
15. If the test does not return an error code, but you are having problems with the adapter, make sure that the data rate set for the adapter matches the network data rate. If you still have problems, contact your network administrator.

PICTURE 58

(1) Adapter address is the address of the Media Access Control Service Access Point (MSAP).

(2) Code level is the version of microcode on the adapter.

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2.14.13 Running the X.25 Interface Co-Processor/2 Test

To run these tests, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.

2. Select RUN SYSTEM UNIT TESTS from MENU-T1.

3. Select TEST SYSTEM UNIT from MENU-T2.

4. Select RUN TESTS ONE TIME from MENU-T3.

   Note: If RUN CONTINUOUSLY is selected and the 37-pin wrap plug is not connected to the adapter, error 4620 will display.

5. Select 1 MULTIPORT/2 OR X.25 /2 from MENU-T4.

6. You will be asked if you want to use a wrap plug to test the X.25 Adapter.

   Note: To test the X.25 Adapter completely, the wrap plug should be used. See Table 2-15.

   Regardless of your answer, you will be asked if you want to test the X.25 Adapter in the indicated slot. Answer YES or NO depending upon which slot the adapter you want to test is connected to. Normally you will have only one X.25 Adapter.

   - If you are not using a wrap plug, follow the instructions on the display. The test proceeds and the internal functions of the adapter are tested without the use of a wrap plug.
   - If you are using a wrap plug, continue to the next step.

7. Determine the type of cable that is attached to the X.25 Adapter. See Figure 2-36.

   Note: You may have one of three different IBM communication cables (X.21, V.24, or V.35) or a non-IBM communication cable attached to the X.25 Adapter. The IBM communication cables all have wrap plugs that are shipped with the cable. See Table 2-15.

8. You will be asked if an IBM communications cable is attached to the X.25 Adapter. Answer YES or NO according to what was determined in the previous step.

   - If an IBM communications cable is attached, you are asked to select the appropriate cable. You are instructed to connect the proper wrap plug to the end of the cable.
   - If a non-IBM communications cable is attached, you are instructed to connect the 37-pin wrap plug to the X.25 Adapter.

9. Follow the displayed instructions.

10. The test progress and results are displayed.

Table 2-15. X.25 Interface Co-Processor/2 Test Wrap Plugs

WRAP PLUG	IBM PART NUMBER	REORDER PART NUMBER
37-pin adapter wrap (US)	07F3132	16F1884
37-pin adapter wrap (EMEA)	07F3138	07F3138
X.21 cable wrap (US)	07F3153	16F1890
X.21 cable wrap (EMEA)	07F3153	07F3153
V.24 cable wrap (US)	07F3163	16F1891
V.24 cable wrap (EMEA)	07F3163	07F3163
V.35 cable wrap (US)	07F3173	16F1861
V.35 cable wrap (EMEA)	07F3173	07F3173

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V.35 cable wrap (FRANCE)	07F3177	07F3177

PICTURE 59

Figure 2-36. X.25 Interface Co-Processor/2 Cables

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2.14.14 Logging Errors

To start an error log, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.

2. Select RUN SYSTEM UNIT TESTS from MENU-T1.

3. Select TEST SYSTEM UNIT from MENU-T2.

4. Select LOG OR DISPLAY ERRORS from MENU-T3.

5. MENU-T5 allows several selections. Select the desired function.

6. Follow the instructions on the display.

Subtopics
2.14.14.1 To Log Errors to a Diskette During Tests
2.14.14.2 To Log Errors to a System Unit Printer During Tests
2.14.14.3 To Stop the Error Log
2.14.14.4 To View the Error Log
2.14.14.5 To Format the Fixed Disk

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2.14.14.1 To Log Errors to a Diskette During Tests

To start an error log, begin at "Preparing to Run Tests" in topic 2.14.3.

You can log errors only while running system unit tests continuously.

1. Select START TESTS from MENU-M1.

2. Select RUN SYSTEM UNIT TESTS from MENU-T1.

3. Select TEST SYSTEM UNIT from MENU-T2.

4. Select LOG OR DISPLAY ERRORS from MENU-T3.

5. Select ERROR LOG TO DISKETTE from MENU-T5.

   Note: When logging to the diskette, a maximum of thirty error records will be logged.

6. Make sure that the Reference Diskette is not write-protected.

7. Insert the Reference Diskette when you are instructed to insert a formatted diskette into drive A.

8. Follow the instructions on the display.

9. Select RUN TESTS CONTINUOUSLY from MENU-T3.

10. Select the devices you want to test from MENU-T4.

    Note: When using an Enhanced Keyboard, press Ctrl and then **C** to stop the test. Otherwise you must switch power OFF to stop the test.

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2.14.14.2 To Log Errors to a System Unit Printer During Tests

To start an error log, begin at "Preparing to Run Tests" in topic 2.14.3.

You can log errors only while running system unit tests continuously.

1. Select START TESTS from MENU-M1.

2. Select RUN SYSTEM UNIT TESTS from MENU-T1.

3. Select TEST SYSTEM UNIT from MENU-T2.

4. Select LOG OR DISPLAY ERRORS from MENU-T3.

5. Select ERROR LOG TO PRINTER from MENU-T5. Make sure that the system unit printer is ready.

   Note: Errors will not log to the point-of-sale printer.

6. Follow the instructions on the display.

7. Select RUN TESTS CONTINUOUSLY from MENU-T3.

8. Select the devices you want to test from MENU-T4.

   Note: When using an Enhanced Keyboard, press Ctrl and then C to stop the test. Otherwise you must switch power-**Off** to stop the test.

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2.14.14.3 To Stop the Error Log

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select LOG OR DISPLAY ERRORS from MENU-T3.
5. Select STOP ERROR LOG from MENU-T5.

   MENU-T3 is displayed.

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2.14.14.4 To View the Error Log

1. Select START TESTS from MENU-M1.
2. Select RUN SYSTEM UNIT TESTS from MENU-T1.
3. Select TEST SYSTEM UNIT from MENU-T2.
4. Select LOG OR DISPLAY ERRORS from MENU-T3.
5. Select VIEW ERROR LOG from MENU-T5.

   The diskette in drive A must have the error log file to view.

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2.14.14.5 To Format the Fixed Disk

Warning: You should run this procedure only when specifically instructed. It will destroy the data on the fixed disk.

To run this procedure, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.

2. Select RUN SYSTEM UNIT TESTS from MENU-T1.

3. Select FORMAT FIXED DISK from MENU-T2.

4. Follow the instructions on the display.

If an error message occurs, follow the *User Response* for the message in the *IBM 4680 Store System and 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

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2.14.15 Running POS Device Tests

To run these tests, begin at "Preparing to Run Tests" in topic 2.14.3.

1. Select START TESTS from MENU-M1.

2. Select RUN POS DEVICE TESTS from MENU-T1.

3. Select the desired test from MENU-T6.

4. Press **S1** (ESC on the Enhanced A/N Keyboard) when you are done and return to MENU-T1.

The following table shows the items that can be displayed for MENU-T6. Your MENU-T6 contains *only* the devices that are configured for your system.

Table 2-16. MENU-T6

MENU ITEM
KEYBOARD TEST
TOTALS RETENTION TEST
CHECKOUT SCANNER TEST
CASH DRAWER TEST
ALPHANUMERIC OR OPERATOR DISPLAY TEST
SHOPPER DISPLAY TEST
MAGNETIC STRIPE READER TEST
4680 PRINTER TEST
VIDEO DISPLAY TEST
HAND-HELD BAR CODE READER TEST

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2.15 Collecting Vital Product Data for the 4684

1. Use your store procedures to stop any application programs that are running on the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

2. Switch **POWER OFF** at the 4684.

3. Record the type, model, and serial number of the system unit.

   These numbers are printed on a label on the top of the system unit cover at the right rear corner.

4. Record the Engineering Change (EC) number of the system board installed in your system unit. This number is printed on the left edge of the system board near the rear of the board.

5. Record the EC number of the power supply installed in your system unit. This number is printed on a label on the right side of the power supply.

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2.16 Entering Vital Product Data Using the 4684 Reference Diskette

1. Use your store procedures to stop any application programs that are running on the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

2. Switch **POWER OFF** at the 4684.

3. Do the following to IPL (Initial Program Load) the 4684:

   a. Insert the Reference Diskette in the 4684 diskette drive.
   b. Switch power ON at the 4684. A Reference Diskette copyright message displays followed by message M0001 PRESS THE 1 KEY (alphanumeric display only).

4. Press **1** on the 4684 primary keyboard if prompted. MENU-M1 displays.

5. Select START UTILITIES from MENU-M1.

6. Select SET/PRINT VITAL PRODUCT DATA from MENU-U1.

7. Select ENTER 4684 VITAL PRODUCT DATA from MENU-U2.

   Note: To bypass an entry, press **S2** (or Enter on the Enhanced A/N Keyboard). The assignment of the alphabetic keys is shown on the following topic.

   Message T9801 displays.

8. Key in the 7-digit type and model number *excluding* the dash (-) and then press **S2** (or Enter).

   EXAMPLE: 4684131

   Message T9802 displays.

9. Key in the 7-digit serial number *including* the dash (-) and then press **S2** (or Enter).

   EXAMPLE: 23-12345

   Message T9803 displays.

10. Key in the EC number of the system board installed in your system unit and then press **S2** (or Enter). Message T9804 displays.

11. Key in the EC number of the power supply installed in your system unit and then press **S2** (or Enter).

    Note: To print and review the data just entered, see "Printing Vital Product Data Using the Reference Diskette" in topic 2.18.

PICTURE 60

Figure 2-37. 50-Key Keyboard Key Assignments and Combined Keyboard/Display Key Assignments

PICTURE 61

Figure 2-38. Matrix Keyboard Key Assignments

PICTURE 62

Figure 2-39. Alphanumeric Keyboard Key Assignments

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2.17 Entering Vital Product Data Using the 4680 Operating System

Description
This procedure is used to enter vital product data for the 4684. The data is stored in totals retention storage. Before starting this procedure, ensure that the store controller is running the 4680 operating system.

1. Start test mode by keying in **S1, 9, 1, S2**.

2. When message T0010 displays, key in **9, 8, S2**.

   Message T9801 displays.

3. Key in the serial number of the 4684 system unit including the dash (embossed on the system unit).

   The assignment of the alphabetic keys is shown on the following topic.

4. Press **S2**.

   One of the following messages displays:

   Message T9802
   - or -
   Message T9803

5. Key in the seven-character EC number of the system board installed in your system unit.

   If there are more than seven characters in the EC number, enter only the first seven characters and omit the dash (-), if present.

6. Press **S2**.

   Message T9804 displays.

7. Key in the EC number of the power supply installed in your system unit.

8. Press **S2**.

   Message T9805, then message T0010, displays.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

9. Switch **POWER OFF** at the system unit, wait 5 seconds, and switch power ON again.

   Note: To print and review the data just entered, see "Printing Vital Product Data Using the 4680 Operating System" in topic 2.19.

PICTURE 63

Figure 2-40. 50-Key Keyboard Key Assignments and Combined Keyboard/Display Key Assignments

PICTURE 64

Figure 2-41. Matrix Keyboard Key Assignments

PICTURE 65

Figure 2-42. Alphanumeric Keyboard Key Assignments

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2.18 Printing Vital Product Data Using the Reference Diskette

Use this procedure to print the 4684 vital product data.

1. Use your store procedures to stop any application programs that are running on the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

2. Switch **POWER OFF** at the 4684.

3. Do the following to IPL (Initial Program Load) the 4684:

   a. Insert the Reference Diskette in the 4684 diskette drive.
   b. Switch power ON at the 4684. A Reference Diskette copyright message displays followed by message M0001 PRESS THE 1 KEY (alphanumeric display only).

4. Press **1** on the 4684 primary keyboard if prompted. MENU-M1 displays.

5. Select START UTILITIES from MENU-M1.

6. Select SET/PRINT VITAL PRODUCT DATA from MENU-U1.

7. Select PRINT 4684 VITAL PRODUCT DATA from MENU-U2. The vital product data is printed at the receipt station on the 4680 printer attached to the 4684.

   The vital product data is printed one item per line. Each item represents a segment of the vital product data for the selected terminal.

   The first four lines list:

   Terminal type
   Terminal serial number
   EC number of the system board
   EC number of the power supply.

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2.19 Printing Vital Product Data Using the 4680 Operating System

1. Switch power ON and wait for the terminal to complete the IPL.

2. Start Test Mode by keying in **S1, 9, 1, S2**.

3. When message T0010 displays, key in **9, 7, S2**.

   Message T9701 displays.

4. Key in the 3-digit terminal number.

5. Press **S2**.

   - If message T9702 displays, the terminal number entered was the wrong length. Re-enter the 3-digit terminal number.

   - If message T9703 displays, the number was not valid or was not found. Re-enter a valid terminal number.

6. The vital product data for the selected terminal is printed at the receipt station.

   The vital product data is printed one item per line. Each item represents a segment of the vital product data for the selected terminal.

   The first three lines list the terminal number, type and model, and serial number.

   The next three lines list the EC number for the system board, the power supply, and the system board Read Only Storage (ROS) module.

   The remainder of the lines lists the EC number of the microprocessor modules for each device that is connected.

   Message T9701 displays when printing is finished.

7. Vital product data for additional terminals can be printed by entering a new number.

8. To end this procedure, key in **0, S2**.

   Message T0010 displays.

9. To end Test Mode, key in **9, 9, S2**.

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3.0 Chapter 3. Repairing the 4683/4684 Cash Drawer

This chapter contains repair information for the cash drawer.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment to it or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

Subtopics

3.1 Cash Drawer Messages
3.2 Cash Drawer Symptoms
3.3 Removing and Replacing the Drawer
3.4 Removing and Replacing the Top Cover
3.5 Removing and Replacing the Slide Assembly
3.6 Removing and Replacing the Latch and Sensor Assembly
3.7 Removing and Replacing the Cam
3.8 Removing and Replacing the Keylock Assembly
3.9 Cash Drawer Test Using the 4680 Operating System
3.10 Cash Drawer Test Using the Reference Diskette

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3.1 Cash Drawer Messages

Use the following table to determine the cause of a cash drawer message.

Table 3-1. Cash Drawer Messages

Message	**Repair Actions Listed in Most Likely Order of Failure**
T3151 on a 4683	1. Exchange the 4683 base card. See "Removing and Replacing the 4683 Base Card" in topic 1.4.1. 2. Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6.
T3151 on a 4684	1. Exchange the 4684 system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14. 2. Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6.
T3153	Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6.
T3163	Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6.

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3.2 Cash Drawer Symptoms

Use the following table to determine the cause of a cash drawer symptom.

Table 3-2. Cash Drawer Symptoms

Symptom	**Repair Actions Listed in Most Likely Order of Failure**
The **cash drawer** will not open when the cash drawer key is turned to the left (open) position.	1. Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6. 2. Exchange the slide assembly. See "Removing and Replacing the Slide Assembly" in topic 3.5. 3. Exchange the cam. See "Removing and Replacing the Cam" in topic 3.7. 4. Exchange the keylock. See "Removing and Replacing the Keylock Assembly" in topic 3.8.
The **cash drawer** will not open when doing store transactions or running cash drawer tests but it will open when the cash drawer key is turned to the left (open) position.	Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6. □ **For a 4683:** Exchange the base card. See "Removing and Replacing the 4683 Base Card" in topic 1.4.1. □ **For a 4684:** Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
The **cash drawer** will not stay closed.	Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6. **4683** Exchange the base card. See "Removing and Replacing the 4683 Base Card" in topic 1.4.1. **4684** Exchange the power supply. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6. Exchange the system board. See "Removing and Replacing the 4684 System Board and Side Card" in topic 2.13.14.
The status displayed by the cash drawer tests does not match the physical status of the cash drawer being tested. **Example:** Cash drawer tests say CD A IS CLOSED when actually cash drawer A is OPEN.	Exchange the latch and sensor assembly. See "Removing and Replacing the Latch and Sensor Assembly" in topic 3.6.

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3.3 Removing and Replacing the Drawer

Subtopics
3.3.1 Removing the Drawer
3.3.2 Replacing the Drawer

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3.3.1 Removing the Drawer

1. Open the drawer and insert a screwdriver as shown.
2. To release the drawer from the slide, pry on the latch and lift up on the drawer.
3. Repeat this action to release the other side.
4. Lift the drawer out.

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3.3.2 Replacing the Drawer

1. Position the drawer in the slides as shown.
2. Press down until the latches lock into place.

PICTURE 66

Figure 3-1. Removing and Replacing the Drawer

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3.4 Removing and Replacing the Top Cover

Subtopics
3.4.1 Removing the Top Cover
3.4.2 Replacing the Top Cover

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3.4.1 Removing the Top Cover

1. Remove the drawer. See "Removing the Drawer" in topic 3.3.1.
2. To separate the top cover from the base, pull the tabs [1] inward and push up on the cover.

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3.4.2 Replacing the Top Cover

1. Place the top cover over the base, interlocking the front of the top cover with the rear of the base.
2. Slide the top cover forward until the tabs [1] lock into place.
3. Replace the drawer. See "Replacing the Drawer" in topic 3.3.2.

PICTURE 67

Figure 3-2. Removing and Replacing the Top Cover

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3.5 Removing and Replacing the Slide Assembly

Subtopics
3.5.1 Removing the Slide Assembly
3.5.2 Replacing the Slide Assembly

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3.5.1 Removing the Slide Assembly

1. Remove the drawer. See "Removing the Drawer" in topic 3.3.1.
2. Separate the top cover from the base. See "Removing the Top Cover" in topic 3.4.1.
3. Pry the wedges [2] up and remove them. The wedges are at the front and rear of the slide assembly.
4. Lift the slide assembly [1] out of the frame.

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3.5.2 Replacing the Slide Assembly

1. Place the slide assembly [1] into the frame.
2. Put the wedges [2] in the slots and press them down to lock them in place. The wedge slots are at the front and rear of the slide assembly.
3. Replace the top cover. See "Replacing the Top Cover" in topic 3.4.2.
4. Replace the drawer. See "Replacing the Drawer" in topic 3.3.2.

PICTURE 68

Figure 3-3. Removing and Replacing the Slide Assembly

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3.6 Removing and Replacing the Latch and Sensor Assembly

Subtopics
3.6.1 Removing the Latch and Sensor Assembly
3.6.2 Replacing the Latch and Sensor Assembly

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3.6.1 Removing the Latch and Sensor Assembly

1. Remove the drawer. See "Removing the Drawer" in topic 3.3.1.
2. Separate the top cover from the base. See "Removing the Top Cover" in topic 3.4.1.
3. Pry out on the latches [7] one at a time to free them.
4. Lift the assembly [6] out of the base.

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3.6.2 Replacing the Latch and Sensor Assembly

1. Position the assembly [6] in the base.
2. Press down until the latches [7] lock into place.
3. Replace the top cover. See "Replacing the Top Cover" in topic 3.4.2.
4. Replace the drawer. See "Replacing the Drawer" in topic 3.3.2.

PICTURE 69

Figure 3-4. Removing and Replacing the Latch and Sensor Assembly

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3.7 Removing and Replacing the Cam

Subtopics
3.7.1 Removing the Cam
3.7.2 Replacing the Cam

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3.7.1 Removing the Cam

1. Remove the drawer. See "Removing the Drawer" in topic 3.3.1.
2. Separate the top cover from the base. See "Removing the Top Cover" in topic 3.4.1.
3. Remove the spring attached to the cam [1].
4. Pry out on the latches [2].
5. Lift the cam off the pivot post.

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3.7.2 Replacing the Cam

1. Position the cam [1] over the pivot post.
2. Press down until the latches [2] lock into place.
3. Replace the spring on the cam.
4. Replace the top cover. See "Replacing the Top Cover" in topic 3.4.2.
5. Replace the drawer. See "Replacing the Drawer" in topic 3.3.2.

PICTURE 70

Figure 3-5. Removing and Replacing the Cam

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3.8 Removing and Replacing the Keylock Assembly

Subtopics
3.8.1 Removing the Keylock Assembly
3.8.2 Replacing the Keylock Assembly

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3.8.1 Removing the Keylock Assembly

1. Remove the drawer. See "Removing the Drawer" in topic 3.3.1.
2. Release the latches [4] on both sides of the locking cam and remove it.
3. Remove the clip [5].
4. Slide the lock assembly out of the drawer.

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3.8.2 Replacing the Keylock Assembly

1. Slide the lock assembly into the drawer.
2. Replace the clip [5].
3. Push the locking cam onto the shaft until the latches [6] lock into place.
4. Replace the drawer. See "Replacing the Drawer" in topic 3.3.2.

PICTURE 71

Figure 3-6. Removing and Replacing the Keylock Assembly

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3.9 Cash Drawer Test Using the 4680 Operating System

1. Start TEST MODE by keying in **S1, 9, 1, S2**.

2. When T0010 displays, key in **3, 1, S2** to start the cash drawer test.
   The current status of each cash drawer displays.

3. Open and close each drawer.

4. Turn the keyboard manager keylock.
   Key in **1, 1, S2** to open drawer A.
   Key in **2, 2, S2** to open drawer B.

   - If an error message displays, follow the *User Response* for the message in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

   - If a symptom is observed, follow the *Action* for the symptom in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

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3.10 Cash Drawer Test Using the Reference Diskette

1. Use your store procedures to stop any application programs that are running on the 4684.

2. Switch **POWER OFF** at the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

3. Do the following to IPL (Initial Program Load) the 4684:

   a. Insert the Reference Diskette in the 4684 diskette drive.
   b. Switch power ON at the 4684. A Reference Diskette copyright message displays followed by message M0001 PRESS THE 1 KEY (alphanumeric display only).

4. Press **1** on the 4684 *primary* keyboard if prompted. MENU-M1 displays.

5. Select START TESTS from MENU-M1.

6. Select RUN POS DEVICE TESTS from MENU-T1.

7. Select the CASH DRAWER test from MENU-T6.

   Note: You must be authorized to run this test by opening the cash drawer(s) with a key or activating the Manager Keylock on the keyboard with a key.

8. Follow the instructions that are displayed during the test.

   - If an error message displays, follow the *User Response* for the message in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

   - If a symptom is observed, follow the *Action Sequence* for the symptom in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

9. Press **S1** (or ESC on the Enhanced A/N Keyboard) to return to MENU-T1 from MENU-T6.

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4.0 Chapter 4. Repairing the Keyboard

This chapter contains repair information for the 50-key keyboard, alphanumeric keyboard, ANPOS keyboard, and combined keyboard/display.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment to it or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

Subtopics

4.1 50-Key Keyboard Messages
4.2 50-Key Keyboard Symptoms
4.3 Removing and Replacing 50-Key Keyboard Components
4.4 Alphanumeric Keyboard Messages
4.5 Alphanumeric Keyboard Symptoms
4.6 Removing and Replacing Alphanumeric Keyboard Components
4.7 ANPOS Keyboard Messages
4.8 ANPOS Keyboard Symptoms
4.9 Removing and Replacing ANPOS Keyboard Components
4.10 Combined Keyboard/Display Messages
4.11 Combined Keyboard/Display Symptoms
4.12 Removing and Replacing Combined Keyboard/Display Components
4.13 Keyboard Test Using the 4680 Operating System
4.14 Keyboard Test Using the 4684 Reference Diskette

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4.1 50-Key Keyboard Messages

Use the following table to determine the cause of a 50-key keyboard message.

Table 4-1. 50-Key Keyboard Messages

Message	**Repair Actions Listed in Most Likely Order of Failure**
Keyboard Test Error Codes **T5151** **T5152** **T5153** **T5154** **T5155** **T5161** **T5162** **T5170**	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
4680 OS Keyboard Error Codes **W303** **W318**	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.

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4.2 50-Key Keyboard Symptoms

Use the following table to determine the cause of a 50-key keyboard symptom.

Table 4-2. 50-Key Keyboard Symptoms

Symptom	**Repair Actions Listed in Most Likely Order of Failure**
□ The **audible tone** symptom is: - The tone has changed from when it was working correctly. The change could be in tone, loudness, or duration. - The tone is *always* ON. - The tone *never* comes ON. □ The **keyboard lights** symptom is: - One or more keyboard lights are *always* ON. - One or more keyboard lights that should come ON *never* come ON. - One or more keyboard lights are blinking.	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
One or more **keys** cause: □ Extra character(s) to display. □ No character(s) to display. □ Wrong character(s) to display.	1. Exchange the keypad assembly. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3. 2. Exchange the keyboard logic board.
The **manager's keylock** turns with the key, but it is not detected by the application or the tests.	1. Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3. 2. Exchange the manager's keylock.
The **manager's keylock** will not turn with the key.	Exchange the manager's keylock. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The system or primary display is blank.	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- but -- The system or primary display is working correctly.	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
After the point-of-sale	Exchange the keyboard logic board. See

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terminal is powered-ON: All keyboard lights are ON. -- and -- The system or primary display is working correctly.	"Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
After the point-of-sale terminal is powered-ON: All keyboard lights are ON. -- and -- U001 is displayed.	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.
One of these messages is displayed: * OPERATION HALTED * KEYBOARD OFFLINE -- or -- * OPERATION HALTED * NO KEYBOARD FOUND	Exchange the keyboard logic board. See "Removing and Replacing 50-Key Keyboard Components" in topic 4.3.

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4.3 Removing and Replacing 50-Key Keyboard Components

Subtopics

4.3.1 Removing a 50-Key Keyboard Component
4.3.2 Replacing a 50-Key Keyboard Component

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4.3.1 Removing a 50-Key Keyboard Component

"Replacing a 50-key Keyboard Component" is in topic 4.3.2 .

Subtopics
4.3.1.1 Removing the Keyboard Cover
4.3.1.2 Removing the Keypad Assembly
4.3.1.3 Removing the Logic Board
4.3.1.4 Removing the Manager's Keylock

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4.3.1.1 Removing the Keyboard Cover

1. Set the manager keylock to the OFF (clockwise) position.

2. Press in on the back-center of the keyboard [1]. See Figure 4-1 in topic 4.3.1.4.

3. Lift up on the back of the keyboard cover, move it toward the front of the keyboard base, and lift it off.

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4.3.1.2 Removing the Keypad Assembly

1. Remove the keyboard cover.
2. Remove the grounding screw [5]. See Figure 4-1 in topic 4.3.1.4.
3. Lift the keypad [6] off the mounting posts [10].
4. Disconnect the cables and lift the keypad out of the keyboard base.

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4.3.1.3 Removing the Logic Board

1. Remove the keyboard cover.

2. Remove the keypad assembly.

3. Remove the screws [11]. See Figure 4-1 in topic 4.3.1.4.

4. Release the latches [7] at the front edge of the logic board.

5. Move the logic board from under the tabs [9] at the back of the keyboard base and lift it out of the base.

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4.3.1.4 Removing the Manager's Keylock

1. Remove the keyboard cover.

2. Remove the keylock retainer [4]. See Figure 4-1.

3. Lift the keylock [3] out of the keyboard cover.

PICTURE 72

Figure 4-1. Removing 50-Key a Keyboard Component

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4.3.2 Replacing a 50-Key Keyboard Component

"Removing a 50-key Keyboard Component" is in topic 4.3.1 .

Subtopics
4.3.2.1 Replacing the Keyboard Cover
4.3.2.2 Replacing the Keypad Assembly
4.3.2.3 Replacing the Logic Board
4.3.2.4 Replacing the Manager's Keylock

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4.3.2.1 Replacing the Keyboard Cover

1. Fit the slot along the front edge of the keyboard cover over the front edge of the keyboard base. See Figure 4-2 in topic 4.3.2.4.

2. Lower the cover into place and press down on the back of the cover until it latches onto the base.

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4.3.2.2 Replacing the Keypad Assembly

1. Connect each keypad cable to its adjacent connector.

2. Put the keypad on the mounting posts [10] in the keyboard base. See Figure 4-2 in topic 4.3.2.4.

3. Replace the grounding screw [5].

4. Replace the keyboard cover.

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4.3.2.3 Replacing the Logic Board

1. Put the back edge of the logic board under the tabs [9] at the back of the keyboard base. See Figure 4-2 in topic 4.3.2.4.

2. Press down on the front edge of the logic board until the latches [7] lock into place.

3. Replace the screws [11].

4. Replace the keypad assembly.

5. Replace the keyboard cover.

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4.3.2.4 Replacing the Manager's Keylock

1. Insert the keylock into the keyboard cover. See Figure 4-2.
2. Replace the keylock retainer [4].
3. Replace the keyboard cover.

PICTURE 73

Figure 4-2. Replacing a 50-Key Keyboard Component

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4.4 Alphanumeric Keyboard Messages

Use the following table to determine the cause (audible tone, keyboard lights, etc.) of an alphanumeric keyboard message.

Table 4-3. Alphanumeric Keyboard Messages

Message	**Repair Actions Listed in Most Likely Order of Failure**
Keyboard Test Error Codes **T5151** **T5152** **T5153** **T5154** **T5155** **T5161** **T5162** **T5170**	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
4680 OS -- Keyboard Error Codes **W303** **W318**	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.

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4.5 Alphanumeric Keyboard Symptoms

Use the following table to determine the cause (audible tone, keyboard lights, etc.) of an alphanumeric keyboard symptom.

Table 4-4. Alphanumeric Keyboard Symptoms

Symptom	**Repair Actions Listed in Most Likely Order of Failure**
The **audible tone** *never* comes ON.	1. Ensure that the speaker cable is connected to CN4 on the keyboard logic board. See Figure 4-4 in topic 4.6.1.6. 2. Exchange the keyboard speaker. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6. 3. Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
The **audible tone** symptom is: □ The tone has changed from when it was working correctly. The change could be in tone, loudness, or duration. □ The tone is *always* ON.	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
The **keyboard lights** symptom is: □ One or more keyboard lights are *always* ON. □ One or more keyboard lights that should come ON *never* come ON. □ One or more keyboard lights are blinking.	1. Ensure that the cable is connected between connector CN1 on the indicator light assembly and connector CN3 on the keyboard logic board. See Figure 4-3 in topic 4.6.1.2 and Figure 4-4 in topic 4.6.1.6. 2. Exchange the indicator light assembly. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.	
One or more **keys** cause: □ Extra character(s) to display. □ No character(s) to display. □ Wrong character(s) to display.	1. Exchange the keypad assembly. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6. 2. Exchange the keyboard logic board.
The **manager's keylock** turns with the key, but it is not detected by the application or the tests.	1. Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6. 2. Exchange the manager's keylock.
The **manager's keylock** will not turn with the key.	Exchange the manager's keylock. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The system or primary display is blank.	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.

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After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- but -- The system or primary display is working correctly.	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
After the point-of-sale terminal is powered-ON: All keyboard lights are ON. -- and -- The system or primary display is working correctly.	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
After the point-of-sale terminal is powered-ON: All keyboard lights are ON. -- and -- U001 is displayed.	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.
One of these messages is displayed: * OPERATION HALTED * KEYBOARD OFFLINE -- or -- * OPERATION HALTED * NO KEYBOARD FOUND	Exchange the keyboard logic board. See "Removing and Replacing Alphanumeric Keyboard Components" in topic 4.6.

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4.6 Removing and Replacing Alphanumeric Keyboard Components

Subtopics

4.6.1 Removing an Alphanumeric Keyboard Component
4.6.2 Replacing an Alphanumeric Keyboard Component

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4.6.1 Removing an Alphanumeric Keyboard Component

"Replacing an Alphanumeric Keyboard Component" begins in topic 4.6.2 .

Subtopics
4.6.1.1 Removing the Keyboard Cover
4.6.1.2 Removing the Indicator Light Assembly
4.6.1.3 Removing the Keypad Assembly
4.6.1.4 Removing the Manager's Keylock
4.6.1.5 Removing the Logic Board
4.6.1.6 Removing the Speaker

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4.6.1.1 Removing the Keyboard Cover

1. Press in on the two tabs [3] on the back of the keyboard. See Figure 4-4 in topic 4.6.1.6.

2. Lift up on the back of the keyboard cover, move it toward the front of the keyboard base, and lift it off.

3. Disconnect the cable from connector CN3 on the logic board. See Figure 4-4 in topic 4.6.1.6.

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4.6.1.2 Removing the Indicator Light Assembly

1. Remove the keyboard cover.

2. Release the holding tab and remove the indicator light assembly from the keyboard cover. See Figure 4-3.

3. Disconnect the cable from connector CN1 on the assembly.

PICTURE 74

Figure 4-3. Removing an Alphanumeric Keyboard Component

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4.6.1.3 Removing the Keypad Assembly

1. Remove the keyboard cover.
2. Release the two latches [1] at the back of the keypad. See Figure 4-4 in topic 4.6.1.6.
3. Lift up on the back of the keypad and slide it out of the three tabs [2] at the front of the keyboard base.
4. Disconnect the cables from connectors CN5 and CN6 on the logic board and lift the keypad out of the keyboard base.

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4.6.1.4 Removing the Manager's Keylock

1. Remove the keyboard cover.
2. Remove the keylock retainer. See Figure 4-3 in topic 4.6.1.2.
3. Lift the keylock out of the keyboard cover.

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4.6.1.5 Removing the Logic Board

1. Remove the keyboard cover.
2. Remove the keypad assembly.
3. Remove the screw [6]. See Figure 4-4 in topic 4.6.1.6.
4. Disconnect the cables from connectors CN4 and CN7 on the logic board.
5. Move the logic board from under the tabs [4] and lift it out of the keyboard base.

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4.6.1.6 Removing the Speaker

1. Remove the keyboard cover.
2. Remove the keypad assembly.
3. Disconnect speaker cable from connector CN4 on the logic board. See Figure 4-4.
4. Slide the speaker toward the front and lift it out of the keyboard base.

PICTURE 75

Figure 4-4. Removing an Alphanumeric Keyboard Component

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4.6.2 Replacing an Alphanumeric Keyboard Component

"Removing an Alphanumeric Keyboard Component" begins in topic 4.6.1 .

Subtopics
4.6.2.1 Replacing the Keyboard Cover
4.6.2.2 Replacing the Indicator Light Assembly
4.6.2.3 Replacing the Keypad Assembly
4.6.2.4 Replacing the Manager's Keylock
4.6.2.5 Replacing the Logic Board
4.6.2.6 Replacing the Speaker

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4.6.2.1 Replacing the Keyboard Cover

1. Connect the cable on the indicator light assembly to connector CN3 to the logic board. See Figure 4-6 in topic 4.6.2.6.

2. Fit the slot along the front edge of the keyboard cover over the front edge of the keyboard base.

3. Lower the cover into place and press down on the back until it latches onto the base.

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4.6.2.2 Replacing the Indicator Light Assembly

1. Connect the cable to connector CN1 on the indicator light assembly.

2. Press the indicator light assembly into the holding tabs in the keyboard cover. See Figure 4-5.

3. Connect other end of the cable to connector CN3 on the logic board. See Figure 4-6 in topic 4.6.2.6.

4. Replace the keyboard cover.

PICTURE 76

Figure 4-5. Replacing an Alphanumeric Keyboard Component

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4.6.2.3 Replacing the Keypad Assembly

1. Hold the keypad assembly upside down and connect its cables to connectors CN5 and CN6 on the logic board. See Figure 4-6 in topic 4.6.2.6.
2. Put the front edge of keypad under the three tabs [2] at the front of the keyboard base.
3. Press down on the back edge of keypad until the latches [1] lock into place.
4. Replace the keyboard cover.

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4.6.2.4 Replacing the Manager's Keylock

1. Insert the keylock into the keyboard cover. See Figure 4-5 in topic 4.6.2.2.
2. Replace the keylock retainer. See Figure 4-5 in topic 4.6.2.2.
3. Replace the keyboard cover.

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4.6.2.5 Replacing the Logic Board

1. Put the front edge of the logic board under the tabs [4] and lower the back edge into the keyboard base. See Figure 4-6 in topic 4.6.2.6.
2. Replace the screw [6].
3. Connect the cables to connectors CN3, CN4, and CN7 on the logic board.
4. Replace the keypad assembly.
5. Replace the keyboard cover.

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4.6.2.6 Replacing the Speaker

1. Put the side edges of the speaker under the tabs [5] in the keyboard base and slide it toward the back of the base. See Figure 4-6.
2. Connect the cable to connector CN4 on the logic board.
3. Replace the keypad assembly.
4. Replace the keyboard cover.

PICTURE 77

Figure 4-6. Replacing an Alphanumeric Keyboard Component

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4.7 ANPOS Keyboard Messages

Use the following table to determine the cause of an ANPOS keyboard message.

Table 4-5. ANPOS Keyboard Messages

Message	**Repair Actions Listed in Most Likely Order of Failure**
Power-On Self Test Error Codes **301** **302** **303** **304** **631A** **631B** **6346** **6347** **639A** **639B** **63C6** **63C7** **14527** ***nn*301** (*n* = any number)	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
Keyboard Test Error Codes **M0001** **M0300** **M0320**	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
Keyboard Test Error Codes **T5151** **T5152** **T5153** **T5154** **T5155** **T5161** **T5162** **T5170**	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
MSR Test Error Codes **T6101** **T6184**	1. Exchange the MSR. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 2. Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
MSR Test Error Code **T6185**	1. Try another test card, IBM P/N 90X9640. 2. Clean the MSR using MSR cleaning card, IBM P/N 6019483. 3. Exchange the MSR. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 4. Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
MSR Test Error Codes **T6188** **T6189** **T6194** **T6195** **T6198** **T6199**	1. Exchange the MSR. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 2. Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
4680 OS -- Keyboard Error Codes **W303** **W318**	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.

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4.8 ANPOS Keyboard Symptoms

Use the following table to determine the cause of an ANPOS keyboard symptom.

Table 4-6. ANPOS Keyboard Symptoms

Symptom	**Repair Actions Listed in Most Likely Order of Failure**
The **audible tone** *never* comes ON.	1. Ensure that the keyboard speaker cable is connected to connector J7 on the keyboard logic board. See Figure 4-9 in topic 4.9.1.6. 2. Exchange the keyboard speaker. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 3. Exchange the keyboard logic board.
The **audible tone** symptom is: □ The tone has changed from when it was working correctly. The change could be in tone, loudness, or duration. □ The tone is *always* ON.	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
The **keyboard lights** symptom is: □ One or more keyboard lights are *always* ON. □ One or more keyboard lights that should come ON *never* come ON. □ One or more keyboard lights are blinking.	1. Ensure that the cables are connected between the keypad assembly and connectors J1, J2, and J3 on the keyboard logic board. See Figure 4-8 in topic 4.9.1.2. 2. Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 3. Exchange the keypad assembly.
One or more **keys** cause: □ Extra character(s) to display. □ No character(s) to display. □ Wrong character(s) to display.	1. Ensure that the cables are connected between the keypad assembly and connectors J1, J2, and J3 on the keyboard logic board. See Figure 4-8 in topic 4.9.1.2. 2. Exchange the keypad assembly. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 3. Exchange the keyboard logic board.
The **manager's keylock** turns with the key, but it is not detected by the application or the tests.	1. Exchange the manager's keylock switch. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 2. Exchange the keyboard logic board.
The **manager's keylock** will not turn with the key.	Exchange the manager's keylock. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
This symptom assumes that terminal power remains ON. After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The keyboard power LED (Light Emitting Diode) is OFF. The LED is visible through an opening in the back of the ANPOS	1. Exchange the keyboard cable. 2. Service the 4683 base unit or 4684 system unit. For service information, see Chapter 1, "Repairing the 4683 Base Unit" or Chapter 2, "Repairing the 4684 System Unit." 3. Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.

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keyboard. See Figure 4-7 in topic 4.9.1.1.	
This symptom assumes that terminal power remains ON. After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The keyboard power LED (Light Emitting Diode) is ON. The LED is visible through an opening in the back of the ANPOS keyboard. See Figure 4-7 in topic 4.9.1.1.	1. Ensure that the cables are connected between the keypad assembly and connectors J1, J2, and J3 on the keyboard logic board. See Figure 4-8 in topic 4.9.1.2. 2. Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9. 3. Exchange the keypad assembly.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The system or primary display is blank.	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- but -- The system or primary display is working correctly.	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
After the point-of-sale terminal is powered-ON, all keyboard lights are ON.	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
After the point-of-sale terminal is powered-ON: All keyboard lights are ON. -- and -- U001 is displayed.	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.
One of these messages is displayed: * OPERATION HALTED * KEYBOARD OFFLINE -- or -- * OPERATION HALTED * NO KEYBOARD FOUND	Exchange the keyboard logic board. See "Removing and Replacing ANPOS Keyboard Components" in topic 4.9.

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4.9 Removing and Replacing ANPOS Keyboard Components

Subtopics

4.9.1 Removing an ANPOS Keyboard Component
4.9.2 Replacing an ANPOS Keyboard Component
4.9.3 Removing and Replacing the ANPOS MSR or Filler Cover

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4.9.1 Removing an ANPOS Keyboard Component

"Replacing an ANPOS Keyboard Component" begins in topic 4.9.2 .

Subtopics
4.9.1.1 Removing the Keyboard Cover
4.9.1.2 Removing the Keypad Assembly
4.9.1.3 Removing the Logic Board
4.9.1.4 Removing the Manager's Keylock
4.9.1.5 Removing the Manager's Keylock Switch
4.9.1.6 Removing the Speaker

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4.9.1.1 Removing the Keyboard Cover

1. Remove the MSR or filler cover. See topic 4.9.3.1.

2. Unlatch keyboard cover tabs 1, 2, and 3, in that order. See Figure 4-7.

3. Lift up on the back of the cover, move it toward the front of the base, and lift it off.

PICTURE 78

Figure 4-7. Removing the ANPOS Keyboard Cover

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4.9.1.2 Removing the Keypad Assembly

1. Remove the MSR or filler cover. See topic 4.9.3.1.
2. Remove the keyboard cover.
3. Lift the keypad assembly and turn it over as shown in Figure 4-8.

   Note: The cable connected to connector J1 is a *flexible cable*.

4. To disconnect the cable at J1, gently lift up on the top of the connector as shown in [2]. This allows the connector to release the cable.
5. Pull the cable out of the connector as shown in [3].
6. Disconnect the cables from connectors J2 and J3.

PICTURE 79

Figure 4-8. Removing Keypad Assembly

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4.9.1.3 Removing the Logic Board

1. Remove the MSR or filler cover. See topic 4.9.3.1.

2. Remove the keyboard cover. See topic 4.9.1.1.

3. Remove the keypad assembly. See topic 4.9.1.2.

4. Remove the grounding screw [8]. It goes through the keyboard base and attaches to the logic board. See Figure 4-9 in topic 4.9.1.6.

5. Disconnect the cables from connectors J6 and J7.

6. Release the three logic board latches [7].

7. Move the logic board from under the tabs [9] and lift it out of the keyboard base.

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4.9.1.4 Removing the Manager's Keylock

1. Remove the MSR or filler cover. See topic 4.9.3.1.
2. Remove the keyboard cover. See topic 4.9.1.1.
3. Remove the keylock retainer [11]. See Figure 4-9 in topic 4.9.1.6.
4. Lift the keylock [12] out of the keyboard cover.

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4.9.1.5 Removing the Manager's Keylock Switch

1. Remove the MSR or filler cover. See topic 4.9.3.1.

2. Remove the keyboard cover. See topic 4.9.1.1.

3. Lift the keypad assembly and turn it over as shown in Figure 4-8 in topic 4.9.1.2.

4. Disconnect the cable on the manager's keylock switch [10] from connector J6. See Figure 4-9 in topic 4.9.1.6.

5. Unlatch the manager's keylock switch assembly and remove it.

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4.9.1.6 Removing the Speaker

1. Remove the MSR or filler cover. See topic 4.9.3.1.

2. Remove the keyboard cover. See topic 4.9.1.1.

3. Lift the keypad assembly and turn it over as shown in Figure 4-8 in topic 4.9.1.2.

4. Disconnect the cable on the speaker [3] from connector J7. See Figure 4-9.

5. Slide the speaker toward the front of the keyboard base and remove it

PICTURE 80

Figure 4-9. Removing an ANPOS Keyboard Component

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4.9.2 Replacing an ANPOS Keyboard Component

"Removing an ANPOS Keyboard Component" begins in topic 4.9.1 .

Subtopics
4.9.2.1 Replacing the Logic Board
4.9.2.2 Replacing the Manager's Keylock
4.9.2.3 Replacing the Manager's Keylock Switch
4.9.2.4 Replacing the Speaker
4.9.2.5 Replacing the Keypad Assembly
4.9.2.6 Replacing the Keyboard Cover

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4.9.2.1 Replacing the Logic Board

1. Put the back edge of the logic board under the tabs [9] at the back of the keyboard base. See Figure 4-10 in topic 4.9.2.4.

2. Lower the front edge of the logic board into the three latches [7] and push down until the latches lock into place.

3. Replace the grounding screw [8]. It goes through the keyboard base and attaches to the logic board.

4. Connect the cable on the manager's keylock switch [10] to connector J6.

5. Connect the cable on the speaker [3] to connector J7.

6. Replace the keypad assembly. See topic 4.9.2.5.

7. Replace the keyboard cover. See topic 4.9.2.6.

8. Replace the MSR or filler cover. See topic 4.9.3.2.

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4.9.2.2 Replacing the Manager's Keylock

1. Insert the keylock [12] into the keyboard cover. See Figure 4-10 in topic 4.9.2.4.

2. Replace the keylock retainer [11].

3. Replace the keyboard cover. See topic 4.9.2.6.

4. Replace the MSR or filler cover. See topic 4.9.3.2.

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4.9.2.3 Replacing the Manager's Keylock Switch

1. Put the manager's keylock switch [10] onto the switch posts in the keyboard base and press down until it locks into place. See Figure 4-10 in topic 4.9.2.4

2. Connect the cable on the manager's keylock switch to connector J6.

3. Position the keypad assembly in its upright position and lower it onto the four support posts on the keyboard base.

4. Replace the keyboard cover. See topic 4.9.2.6.

5. Replace the MSR or filler cover. See topic 4.9.3.2.

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4.9.2.4 Replacing the Speaker

1. Put the side edges of the speaker [3] under the tabs in the keyboard base and slide it toward the back of the base. See Figure 4-10

2. Connect the cable on the speaker to connector J7.

3. Position the keypad assembly in its upright position and lower it onto the four support posts on the keyboard base.

4. Replace the keyboard cover. See topic 4.9.2.6.

5. Replace the MSR or filler cover. See topic 4.9.3.2.

PICTURE 81

Figure 4-10. Replacing an ANPOS Keyboard Component

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4.9.2.5 Replacing the Keypad Assembly

1. Position the keypad assembly as shown in Figure 4-11.

2. Connect its cables to connectors J2 and J3.

   Note: The cable connected to connector J1 is a *flexible cable*.

3. To connect the cable to J1, gently lift up on the top of the connector as shown in [1]. This allows the connector to accept the cable.

4. With the top of the connector in its raised position, insert the cable into the connector as shown in [2].

5. Hold the cable in place and gently press down on the top of connector J1. Connector J1 should now hold the cable securely in place as shown in [3].

6. Pull lightly on the cable to ensure that it is held securely.

7. Position the keypad assembly in its upright position and lower it onto the four support posts on the keyboard base. See Figure 4-11.

8. Replace the keyboard cover. See topic 4.9.2.6.

9. Replace the MSR or filler cover. See topic 4.9.3.2.

PICTURE 82

Figure 4-11. Replacing the Keypad Assembly

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4.9.2.6 Replacing the Keyboard Cover

1. Fit the tabs in the front edge of the cover under the lip on the front edge of the keyboard base.

2. Lower the cover into place and press down on the back until tabs 1, 2, and 3 lock in place. See Figure 4-12.

3. Replace the MSR or MSR filler. See "Replacing the ANPOS MSR or Filler Cover" in topic 4.9.3.2.

PICTURE 83

Figure 4-12. Replacing the Keyboard Cover

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4.9.3 Removing and Replacing the ANPOS MSR or Filler Cover

Subtopics
4.9.3.1 Removing the ANPOS MSR or Filler Cover
4.9.3.2 Replacing the ANPOS MSR or Filler Cover

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4.9.3.1 Removing the ANPOS MSR or Filler Cover

1. Stand the keyboard on its front edge. See Figure 4-13.
2. Press and hold the MSR latch [1] on the bottom of the keyboard.
3. While pressing the latch, grasp the end of the MSR or filler cover nearest the center of the keyboard [2] and lift it away from the keyboard.
4. Continue lifting the MSR or filler cover until it is removed from the keyboard.

PICTURE 84

Figure 4-13. Removing the ANPOS MSR or Filler Cover

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4.9.3.2 Replacing the ANPOS MSR or Filler Cover

1. Line up the slides on the MSR or filler cover with the slots in the bottom cover. See Figure 4-14.

2. Slide the MSR into the keyboard until it latches into place.

PICTURE 85

Figure 4-14. Replacing the ANPOS MSR or Filler Cover

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4.10 Combined Keyboard/Display Messages

Use the following table to determine the cause of a combined keyboard/display message.

Table 4-7. Combined Keyboard/Display Messages

Message	**Repair Actions Listed in Most Likely Order of Failure**
Power-On Self Test Error Codes **6310** **6311** **6346** **6347**	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
6322 **6323**	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the display on the keyboard.
Display Test Error Codes **T4157** **T4158** **T4167** **T4168**	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the display on the keyboard.
Keyboard Test Error Codes **T5151** **T5152** **T5161** **T5162**	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
MSR Test Error Codes **T6185** **T6187** **T6197**	1. Exchange the MSR. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keyboard logic board.
MSR Test Error Codes **T6186** **T6196**	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the MSR.
4680 OS Keyboard Error Code **W303**	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
4680 OS Display Error Code **W306**	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the display on the keyboard.
4680 OS MSR Error Code **W308**	1. Exchange the MSR. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keyboard logic board.
4680 OS Keyboard Error Code **W318**	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.

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4.11 Combined Keyboard/Display Symptoms

Use the following table to determine the cause of a combined keyboard/display symptom.

Table 4-8. Combined Keyboard/Display Symptoms

Symptom	**Repair Actions Listed in Most Likely Order of Failure**
The **audible tone** *never* comes ON.	1. Exchange the keyboard speaker. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keyboard logic board.
The **audible tone** symptom is: □ The tone has changed from when it was working correctly. The change could be in tone, loudness, or duration. □ The tone is *always* ON.	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
The **keyboard lights** symptom is: □ One or more keyboard lights are *always* ON. □ One or more keyboard lights that should come ON *never* come ON. □ One or more keyboard lights are blinking.	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keypad assembly.
One or more **keys** cause: □ Extra character(s) to display. □ No character(s) to display. □ Wrong character(s) to display.	1. Exchange the keypad assembly. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keyboard logic board.
The **manager's keylock** turns with the key, but it is not detected by the application or the tests.	1. Exchange the manager's keylock switch. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the manager's keylock. 3. Exchange the keyboard logic board.
The **manager's keylock** will not turn with the key.	Exchange the manager's keylock. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
After the point-of-sale terminal is powered-ON: The display on the combined keyboard/display is blank or not working correctly. -- but -- The other displays on the point-of-sale terminal are working correctly.	1. Exchange the display on the keyboard. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keyboard logic board.
After the point-of-sale terminal is powered-ON: The display on the combined keyboard/display is	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the display on the keyboard.

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blank or not working correctly. -- but -- The keyboard is working correctly.	
This symptom assumes that terminal power remains ON. After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The system or primary display is blank. -- and -- The keyboard power LED (Light Emitting Diode) is OFF. The LED is visible through an opening in the back of the combined keyboard/display. See Figure 4-15 in topic 4.12.1.1 for the location of the LED.	1. Exchange the keyboard cable. 2. Service the 4683 base unit or 4684 system unit. For service information, see Chapter 1, "Repairing the 4683 Base Unit" or Chapter 2, "Repairing the 4684 System Unit." 3. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
This symptom assumes that terminal power remains ON. After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The system or primary display is blank. -- and -- The keyboard power LED (Light Emitting Diode) is ON. The LED is visible through an opening in the back of the combined keyboard/display. See Figure 4-15 in topic 4.12.1.1 for the location of the LED.	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- and -- The system or primary display is blank.	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
After the point-of-sale terminal is powered-ON: All keyboard lights are OFF or none seem to be working. -- but -- The system or primary display is working correctly.	1. Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12. 2. Exchange the keypad assembly.
After the point-of-sale terminal is powered-ON: All keyboard lights are ON.	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.

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-- and -- The system or primary display is working correctly.	
After the point-of-sale terminal is powered-ON: All keyboard lights are ON. -- and -- U001 is displayed.	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.
One of these messages is displayed: * OPERATION HALTED * KEYBOARD OFFLINE -- or -- * OPERATION HALTED * NO KEYBOARD FOUND	Exchange the keyboard logic board. See "Removing and Replacing Combined Keyboard/Display Components" in topic 4.12.

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4.12 Removing and Replacing Combined Keyboard/Display Components

Subtopics

4.12.1 Removing a Combined Keyboard/Display Component
4.12.2 Replacing a Combined Keyboard/Display Component
4.12.3 Removing and Replacing the Combined Keyboard/Display MSR or Filler Cover

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4.12.1 Removing a Combined Keyboard/Display Component

"Replacing a Combined Keyboard/Display Component" begins in topic 4.12.2 .

Subtopics
4.12.1.1 Removing the Keyboard Cover
4.12.1.2 Removing the Display Assembly
4.12.1.3 Removing the Keypad Assembly
4.12.1.4 Removing the Logic Board
4.12.1.5 Removing the Manager's Keylock
4.12.1.6 Removing the Manager's Keylock Switch
4.12.1.7 Removing the Speaker

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4.12.1.1 Removing the Keyboard Cover

1. Remove the MSR or filler cover. See topic 4.12.3.1.

2. Unlatch keyboard cover tabs 1, 2, and 3, in that order. See Figure 4-15.

3. Lift up on the back of the cover, move it toward the front of the keyboard, and lift it off.

PICTURE 86

Figure 4-15. Removing the Keyboard Cover

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4.12.1.2 Removing the Display Assembly

1. Remove the MSR or filler cover. See topic 4.12.3.1.
2. Remove the keyboard cover. See topic 4.12.1.1.
3. Disconnect the cable from the display. See Figure 4-16.
4. Lift the display from the display posts.

PICTURE 87

Figure 4-16. Removing the Display

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4.12.1.3 Removing the Keypad Assembly

1. Remove the MSR or filler cover. See topic 4.12.3.1.
2. Remove the keyboard cover. See topic 4.12.1.1.
3. Remove the grounding screw [18]. See Figure 4-18 in topic 4.12.1.7.
4. Lift the keypad assembly and turn it over as shown in Figure 4-17.
5. Disconnect the cables from connectors J4 and J7. See Figure 4-18 in topic 4.12.1.7.

PICTURE 88

Figure 4-17. Removing the Keypad

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4.12.1.4 Removing the Logic Board

1. Remove the MSR or filler cover. See topic 4.12.3.1.

2. Remove the keyboard cover. See topic 4.12.1.1.

3. Remove the keypad assembly. See topic 4.12.1.3.

4. Remove the display assembly. See topic 4.12.1.2.

5. Remove the grounding screw [17]. It goes through the keyboard base and attaches to the logic board. See Figure 4-18 in topic 4.12.1.7.

6. Disconnect the cables from connectors J1 and J5.

7. Release the three logic board latches [15].

8. Move the logic board from under the tabs [10] and lift it out of the keyboard base.

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4.12.1.5 Removing the Manager's Keylock

1. Remove the MSR or filler cover. See topic 4.12.3.1.

2. Remove the keyboard cover. See topic 4.12.1.1.

3. Remove the keylock retainer [3]. See Figure 4-18 in topic 4.12.1.7.

4. Lift the keylock [1] out of the keyboard cover.

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4.12.1.6 Removing the Manager's Keylock Switch

1. Remove the MSR or filler cover. See topic 4.12.3.1.

2. Remove the keyboard cover. See topic 4.12.1.1.

3. Lift the keypad assembly and turn it over as shown in Figure 4-18 in topic 4.12.1.7.

4. Disconnect the cable on the manager's keylock switch [9] from connector J1. See Figure 4-18 in topic 4.12.1.7.

5. Unlatch the manager's keylock switch assembly and remove it.

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4.12.1.7 Removing the Speaker

1. Remove the MSR or filler cover. See topic 4.12.3.1.

2. Remove the keyboard cover. See topic 4.12.1.1.

3. Remove the display assembly. See topic 4.12.1.2.

4. Remove the keypad assembly. See topic 4.12.1.3.

5. Remove the logic board.

6. Disconnect the cable on the speaker [7] from connector J5. See Figure 4-18.

7. Slide the speaker toward the back of the keyboard base and remove it.

PICTURE 89

Figure 4-18. Removing a Combined Keyboard/Display Component

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4.12.2 Replacing a Combined Keyboard/Display Component

"Removing a Combined Keyboard/Display Component" begins in topic 4.12.1 .

Subtopics
4.12.2.1 Replacing the Logic Board
4.12.2.2 Replacing the Manager's Keylock
4.12.2.3 Replacing the Manager's Keylock Switch
4.12.2.4 Replacing the Speaker
4.12.2.5 Replacing the Keypad Assembly
4.12.2.6 Replacing the Display Assembly
4.12.2.7 Replacing the Keyboard Cover

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4.12.2.1 Replacing the Logic Board

1. Put the back edge of the logic board under the tabs [10] at the back of the keyboard base. See Figure 4-19 in topic 4.12.2.4.

2. Lower the front edge of the logic board into the three latches [15] and push down until the latches lock into place.

3. Replace the grounding screw [17]. It goes through the keyboard base and attaches to the logic board.

4. Connect the cable on the manager's keylock switch [9] to connector J1.

5. Connect the cable on the speaker [7] to connector J5.

6. Replace the keypad assembly. See topic 4.12.2.5.

7. Replace the display. See topic 4.12.2.6.

8. Replace the keyboard cover. See topic 4.12.2.7.

9. Install the MSR or filler cover. See topic 4.12.3.2.

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4.12.2.2 Replacing the Manager's Keylock

1. Insert the keylock [1] into the keyboard cover. See Figure 4-19 in topic 4.12.2.4.

2. Install the keylock retainer [3].

3. Replace the keyboard cover. See topic 4.12.2.7.

4. Install the MSR or filler cover. See topic 4.12.3.2.

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4.12.2.3 Replacing the Manager's Keylock Switch

1. Put the manager's keylock switch [9] onto the switch posts in the keyboard base and press down until it locks into place. See Figure 4-19 in topic 4.12.2.4.

2. Connect the cable on the manager's keylock switch to connector J1.

3. Position the keypad assembly in its upright position and lower it onto the four support posts [19] in the keyboard base.

4. Replace the keyboard cover. See topic 4.12.2.7.

5. Install the MSR or filler cover. See topic 4.12.3.2.

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4.12.2.4 Replacing the Speaker

1. Put the side edges of the speaker [7] under the tabs in the keyboard base and slide it toward the front of the base. See Figure 4-19

2. Connect the cable on the speaker to connector J5.

3. Replace the logic board.

4. Replace the keypad assembly. See topic 4.12.2.5.

5. Replace the display. See topic 4.12.2.6.

6. Replace the keyboard cover. See topic 4.12.2.7.

7. Install the MSR or filler cover. See topic 4.12.3.2.

PICTURE 90

Figure 4-19. Replacing a Combined Keyboard/Display Component

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4.12.2.5 Replacing the Keypad Assembly

1. Position the keypad assembly as shown in Figure 4-21 in topic 4.12.2.6.
2. Connect its cables to connectors J4 and J7 on the logic board. See Figure 4-19 in topic 4.12.2.4.
3. Position the keypad assembly in its upright position and lower it onto the four support posts [19] in the keyboard base.
4. Replace the grounding screw [18]. See Figure 4-19 in topic 4.12.2.4.
5. Replace the keyboard cover. See topic 4.12.2.7.
6. Install the MSR or filler cover. See topic 4.12.3.2.

PICTURE 91

Figure 4-20. Replacing the Keypad

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4.12.2.6 Replacing the Display Assembly

1. Put the display into the display posts in the keyboard base. See Figure 4-20 in topic 4.12.2.5.
2. Connect the cable from J6 on the logic board to the display.
3. Replace the keyboard cover. See topic 4.12.2.7.
4. Install the MSR or filler cover. See topic 4.12.3.2.

PICTURE 92

Figure 4-21. Replacing the Display

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4.12.2.7 Replacing the Keyboard Cover

1. Fit the tabs in the front edge of the cover under the lip on the front edge of the keyboard base.

2. Lower the cover into place and press down on the back until tabs 1, 2, and 3 lock in place. See Figure 4-22.

3. Install the MSR or filler cover. See topic 4.12.3.2.

PICTURE 93

Figure 4-22. Replacing the Keyboard Cover

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4.12.3 Removing and Replacing the Combined Keyboard/Display MSR or Filler Cover

Subtopics
4.12.3.1 Removing the Combined Keyboard/Display MSR or Filler Cover
4.12.3.2 Replacing the Combined Keyboard/Display MSR or Filler Cover

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4.12.3.1 Removing the Combined Keyboard/Display MSR or Filler Cover

1. Stand the keyboard on its front edge. See Figure 4-23.
2. Press and hold the MSR latch [1] on the bottom of the keyboard.
3. While pressing the latch, grasp the end of the MSR or filler cover nearest the center of the keyboard [2] and lift it away from the keyboard.
4. Continue lifting the MSR or filler cover until it is removed from the keyboard.

PICTURE 94

Figure 4-23. Removing the Combined Keyboard/Display MSR or Filler Cover

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4.12.3.2 Replacing the Combined Keyboard/Display MSR or Filler Cover

1. Line up the slides on the MSR or filler cover with the slots in the bottom cover. See Figure 4-24.

2. Slide the MSR into the keyboard until it latches into place.

PICTURE 95

Figure 4-24. Replacing the Combined Keyboard/Display MSR or Filler Cover

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4.13 Keyboard Test Using the 4680 Operating System

This test procedure tests:

- **The 50-Key keyboard**
- **The Alphanumeric keyboard**
- **The ANPOS keyboard**
- **The Combined Keyboard/Display**

1. Start TEST MODE by keying in **S1, 9, 1, S2**.

2. When T0010 displays, key in **5, 1, S2** to start the keyboard test.

3. The keyboard TONE test runs, repeating until you press **S2** at the prompt.

4. The keyboard LIGHTS test runs, repeating until you press **S2** at the prompt.

5. The keyboard key test starts, allowing a visual check of each key and the manager's keylock.

   - If an error message displays, follow the *User Response* for the message in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

   - If a symptom is observed, follow the *Action* for the symptom in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

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4.14 Keyboard Test Using the 4684 Reference Diskette

This procedure tests:

- **The 50-Key keyboard**
- **The Alphanumeric keyboard**
- **The ANPOS keyboard**
- **The Combined Keyboard/Display.**

1. Use your store procedures to stop any application programs that are running on the 4684.

2. Switch **POWER OFF** at the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

3. Do the following to IPL (Initial Program Load) the 4684:

   a. Insert the *Reference Diskette* in the 4684 diskette drive.

   b. Switch power ON at the 4684. A Reference Diskette Copyright message displays followed by message M0001 PRESS THE 1 KEY (on an alphanumeric display only).

4. Press **1** on the 4684 *primary* keyboard.

5. MENU-M1 displays.

6. Select START TESTS from MENU-M1.

7. Select RUN POS DEVICE TESTS from MENU-T1.

8. Select KEYBOARD TEST from MENU-T6.

9. The KEYBOARD TONE TEST runs, repeating until you press **S2** at the prompt.

10. The KEYBOARD LIGHTS TEST runs, repeating until you press **S2** at the prompt.

11. The KEYBOARD KEY TEST starts, allowing a visual check of each key and the manager's keylock.

    - If an error message displays, follow the *User Response* for the message in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

    - If a symptom is observed, follow the *Action Sequence* for the symptom in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

12. Press **S1** (ESC on the Enhanced A/N Keyboard) to return to MENU-T1.

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5.0 Chapter 5. Repairing the Point of Sale Printer Model 1 or 2

This chapter contains in-depth repair information for the point-of-sale printer.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment to it or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

Subtopics

5.1 Printer Messages
5.2 Printer Symptoms
5.3 Procedures Recommended for Field Personnel
5.4 Procedures Not Recommended for Field Personnel
5.5 Printer Test Using the 4680 Operating System
5.6 Printer Test Using the Reference Diskette
5.7 Printer Sensor Checks

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5.1 Printer Messages

Use the following table to determine the cause of a printer message.

Table 5-1. Printer Messages

Printer Message	Repair Actions Listed in Most Likely Order of Failure
T7100	The printer test has started.
T7101	The printer test was stopped by pressing **S2** while the "IH" test pattern was printing at the customer receipt station. Press **S2** to continue the test.
T7110	The printer test is printing the "IH" test pattern at the customer receipt station. Observe the printing for correct operation.
T7120	The printer test is printing the "IH" test pattern at the journal station. Observe the printing for correct operation.
T7130	The printer test is printing the "IH" test pattern at the document insert station. Observe the printing for correct operation.
T7131	The printer test is ready to print the "IH" test pattern at the document insert station. Insert paper into the station and close the station by pressing the "I" button on the printer keypad.
T7132	The printer test has completed printing at the document insert station. Open the station by pressing the "I" button on the printer keypad and remove the document.
T7151	Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7152	1. Ensure that the print head preload spring is in position to hold the print head against the platen. To exchange the print head preload spring, see "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 2. Lubricate the carriage shaft, wear plate and print head guide rods with IBM #6 oil. Saturate the carrier oil wick with IBM #6 oil. 3. Exchange the print head carriage motor and check the motor pulley for cracks. See "Removing and Replacing the Print Head Carriage Motor" in topic 5.3.22. 4. Exchange the print head carriage drive belt. See "Removing and Replacing the Print Head Carriage Drive Belt" in topic 5.3.21. 5. Check the print head home sensor. See "Printer Sensor Checks" in topic 5.7. □ If the print head home sensor is failing, exchange it. See "Removing and Replacing the Print Head Home Sensor" in topic 5.4.8. □ If the print head home sensor is not failing, adjust it. See "Adjusting the Print Head Home Sensor" in topic 5.3.2. 6. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7153	1. Check the printer cover interlock

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	sensor. See "Printer Sensor Checks" in topic 5.7. If the printer cover interlock sensor is failing, exchange it. See "Removing and Replacing the Cover Interlock Sensor" in topic 5.3.6. 2. Ensure that the access cover interlock tab is not broken. If the access cover interlock tab is broken, exchange the access cover. See "Removing and Replacing the Access Cover" in topic 5.3.4. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7154	1. Check if the journal paper is jammed or loaded incorrectly. 2. Check the journal paper ribbon drive motor and belt. Pressing **III** on the printer keypad, which rotates the journal paper take-up spool, indicates the journal paper is not jammed or loaded incorrectly. 3. Check the journal paper motion emitter sensor. See "Printer Sensor Checks" in topic 5.7. If the journal paper motion emitter sensor is failing, exchange it. See "Removing and Replacing the Journal Paper Motion Emitter Sensor" in topic 5.3.11. 4. Ensure that the journal paper motion emitter shaft rotates freely. 5. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7155	1. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7156	1. Check the document insert paper sensor. See "Printer Sensor Checks" in topic 5.7. If the document insert paper sensor is failing, exchange it. See "Removing and Replacing the Document Insert Paper Sensor" in topic 5.4.5. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7157	1. Remove paper or other obstructions from the document insert paper sensor. 2. Check the document insert paper sensor. See "Printer Sensor Checks" in topic 5.7. If the document insert paper sensor is failing, exchange it. See "Removing and Replacing the Document Insert Paper Sensor" in topic 5.4.5. 3. Exchange the document insert paper guide. See "Removing and Replacing the Document Insert Paper Guide" in topic 5.3.7. 4. Exchange the platen. See "Removing and

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	Replacing the Platen and Paper Tear Guide" in topic 5.3.16. 5. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
T7158	1. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
W304	Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
W305	1. Ensure that the print head preload spring is in position to hold the print head against the platen. To exchange the print head preload spring, see "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 2. Lubricate the carriage shaft, wear plate and print head guide rods with IBM #6 oil. Saturate the carrier oil wick with IBM #6 oil. 3. Exchange the print head carriage motor and check the motor pulley for cracks. See "Removing and Replacing the Print Head Carriage Motor" in topic 5.3.22. 4. Exchange the print head carriage drive belt. See "Removing and Replacing the Print Head Carriage Drive Belt" in topic 5.3.21. 5. Check the print head home sensor. See "Printer Sensor Checks" in topic 5.7. □ If the print head home sensor is failing, exchange it. See "Removing and Replacing the Print Head Home Sensor" in topic 5.4.8. □ If the print head home sensor is not failing, adjust it. See "Adjusting the Print Head Home Sensor" in topic 5.3.2. 6. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.

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5.2 Printer Symptoms

Use the following table to determine the cause of a printer symptom.

Table 5-2. Printer Symptoms

Printer Symptom	**Repair Actions Listed in Most Likely Order of Failure**
The **document insert/customer receipt station** advances receipt paper continuously.	1. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23. 3. Exchange the document insert/customer receipt motor. See "Removing and Replacing the Document Insert/Customer Receipt Motor" in topic 5.4.6.
The **document insert/customer receipt station** does not advance inserted documents.	1. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23. 2. Exchange the toggle assembly. See "Removing and Replacing the Toggle Assembly" in topic 5.4.10. 3. Exchange the document insert/customer receipt motor. See "Removing and Replacing the Document Insert/Customer Receipt Motor" in topic 5.4.6. 4. Exchange the document insert backup roller. See "Removing and Replacing the Document Insert Backup Roller" in topic 5.4.3. 5. Check the document insert paper sensor. See "Printer Sensor Checks" in topic 5.7. If the document insert paper sensor is failing, exchange it. See "Removing and Replacing the Document Insert Paper Sensor" in topic 5.4.5.
The **document insert/customer receipt station** does not advance receipt paper.	1. Ensure that the receipt paper path is free of obstructions. 2. Check the document insert paper sensor. See "Printer Sensor Checks" in topic 5.7. Also check the document insert paper sensor for dust or paper scraps. If the document insert paper sensor is failing, exchange it. See "Removing and Replacing the Document Insert Paper Sensor" in topic 5.4.5. 3. Exchange the document insert/customer receipt motor. See "Removing and Replacing the Document Insert/Customer Receipt Motor" in topic 5.4.6. 4. Exchange the toggle assembly. See "Removing and Replacing the Toggle Assembly" in topic 5.4.10. 5. Exchange the document insert backup roller. See "Removing and Replacing the Document Insert Backup Roller" in topic 5.4.3. 6. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **document insert/customer receipt station** does not sense an inserted document - *or* - does not close on an inserted document.	1. Check the document insert paper sensor. See "Printer Sensor Checks" in topic 5.7. Also check the document insert paper sensor for dust or paper scraps. If the document insert paper sensor is failing, exchange it. See "Removing and Replacing the Document Insert Paper Sensor" in topic 5.4.5. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.

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The **document insert/customer receipt station** does not stop documents at the document insert gate.	1. Exchange the document insert gate spring. See "Removing and Replacing the Document Insert Gate" in topic 5.4.4. 2. Exchange the document insert gate. See "Removing and Replacing the Document Insert Gate" in topic 5.4.4.
The **document insert/customer receipt station** gets paper jams.	1. Exchange the paper tear guide. See "Removing and Replacing the Platen and Paper Tear Guide" in topic 5.3.16. 2. Exchange the document insert paper guide. See "Removing and Replacing the Document Insert Paper Guide" in topic 5.3.7. 3. Ensure that paper of the correct size is used and that it is installed correctly. 4. Exchange the toggle assembly. See "Removing and Replacing the Toggle Assembly" in topic 5.4.10. 5. Check for obstructions in the document insert/customer receipt station paper path. 6. Adjust the print head cam. See "Adjusting the Print Head Cam" in topic 5.3.1.
The **document insert/customer receipt station** is overprinting.	1. Check for obstructions in the document insert/customer receipt station paper path. Also, check for damage to the paper tear guide and the document insert guide. 2. Exchange the toggle assembly. See "Removing and Replacing the Toggle Assembly" in topic 5.4.10. 3. Exchange the document insert/customer receipt motor. See "Removing and Replacing the Document Insert/Customer Receipt Motor" in topic 5.4.6. 4. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **document insert/customer receipt station** printing is light.	1. Exchange the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 5.3.24. 2. Exchange the carriage wear shoe. See "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 3. Exchange the platen. See "Removing and Replacing the Platen and Paper Tear Guide" in topic 5.3.16. 4. Exchange the paper tear guide. See "Removing and Replacing the Platen and Paper Tear Guide" in topic 5.3.16. 5. Exchange the document insert paper guide. See "Removing and Replacing the Document Insert Paper Guide" in topic 5.3.7.
The **journal station** advances paper continuously.	1. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 2. Exchange the journal/ribbon motor. See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **journal station** does not advance paper.	1. Exchange the journal/ribbon motor. See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. 2. Exchange the journal spool and clutch. See "Removing and Replacing the Journal Spool and Clutch" in topic 5.3.13. 3. Exchange the journal drive belt. See "Removing and Replacing the Journal Drive Belt" in topic 5.3.9. 4. Exchange the journal motor pulley. See "Removing and Replacing the Journal Motor Pulley" in topic 5.3.10. 5. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.

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The **journal station** is overprinting.	1. Exchange the journal/ribbon motor. See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. 2. Exchange the journal spool and clutch. See "Removing and Replacing the Journal Spool and Clutch" in topic 5.3.13. 3. Exchange the journal drive belt. See "Removing and Replacing the Journal Drive Belt" in topic 5.3.9. 4. Exchange the journal motor pulley. See "Removing and Replacing the Journal Motor Pulley" in topic 5.3.10. 5. Ensure that the O-ring is properly connected to the journal paper motion emitter shaft. 6. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **journal station** printing is light.	1. Exchange the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 5.3.24. 2. Exchange the carriage wear shoe. See "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 3. Exchange the platen. See "Removing and Replacing the Platen and Paper Tear Guide" in topic 5.3.16.
The **keylock** does not work.	1. Remove the tumbler and lubricate with IBM #6 oil. 2. Exchange the keylock. See "Removing and Replacing the Keylock" in topic 5.3.14.
The **keypad** "T" (test) keybutton does not work.	1. Ensure that the keypad cable is properly connected to the printer card. 2. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **keypad** "I" keybutton does not work.	1. Ensure that the keypad cable is properly connected to the printer card. 2. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **keypad** "II" keybutton does not work.	1. Ensure that the keypad cable is properly connected to the printer card. 2. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **keypad** "III" keybutton does not work.	1. Ensure that the keypad cable is properly connected to the printer card. 2. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **keypad keybuttons** do not work.	1. Ensure that the keypad cable is properly connected to the printer card. 2. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **margins** are not correct.	1. Check the print head home sensor. See "Printer Sensor Checks" in topic 5.7. □ If the print head home sensor is failing, exchange it. See "Removing and Replacing the Print Head Home Sensor" in topic 5.4.8. □ If the print head home sensor is not failing, adjust it. See "Adjusting

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	the Print Head Home Sensor" in topic 5.3.2. 2. Ensure that the print head carriage motor pulley is functioning properly. See Figure 5-21 in topic 5.3.22.2. Lubricate the carriage shaft and print head guide rods with IBM #6 oil. Saturate the carriage oil wick with IBM #6 oil. 3. Ensure that the carriage drive belt and belt spring assembly is functioning properly. 4. Adjust or exchange the print head cam. See "Adjusting the Print Head Cam" in topic 5.3.1.
Printed characters are light.	1. Exchange the ribbon cartridge after checking the ribbon drive shaft to ensure that the ribbon is advancing properly. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 5.3.24. 2. Clean the print head. If this fails to correct the symptom, exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 3. Ensure that the print head preload spring is in position to hold the print head against the platen. To exchange the print head preload spring, see "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 4. Exchange the journal/ribbon motor. See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. 5. Exchange the print head carriage assembly. See "Removing and Replacing the Print Head Carriage and Shaft" in topic 5.3.19. 6. Exchange the platen. See "Removing and Replacing the Platen and Paper Tear Guide" in topic 5.3.16. 7. Exchange the carriage wear shoe. See "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 8. Exchange the ribbon drive shaft. See "Removing and Replacing the Ribbon Drive Shaft" in topic 5.4.9.
Printed characters are missing.	1. Ensure that the printer ribbon cartridge is properly seated. 2. Clean the print head. If this fails to correct the symptom, exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23. 4. Exchange the print head carriage drive belt. See "Removing and Replacing the Print Head Carriage Drive Belt" in topic 5.3.21. 5. Exchange the print head carriage motor. See "Removing and Replacing the Print Head Carriage Motor" in topic 5.3.22.
Printed characters are not spaced correctly.	1. Exchange the print head carriage drive belt. See "Removing and Replacing the Print Head Carriage Drive Belt" in topic 5.3.21. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23. 3. Exchange the print head carriage motor. See "Removing and Replacing the Print Head Carriage Motor" in topic 5.3.22.
Printed characters are smudged.	1. Exchange the document insert paper guide. See "Removing and Replacing the Document Insert Paper Guide" in topic 5.3.7. 2. Adjust or exchange the platen. See "Removing and Replacing the Platen and

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	Paper Tear Guide" in topic 5.3.16. 3. Exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 4. Adjust or exchange the print head wear shoe. See "Removing and Replacing the Print Head" in topic 5.3.18.
Printed characters have missing or extra dots.	1. Clean the print head and ensure that it is connected properly to the printer card. If this fails to correct the symptom, exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **printer** advances paper continuously.	1. Exchange the keypad. See "Removing and Replacing the Keypad" in topic 5.3.15. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **printer** causes the point-of-sale terminal display to go blank.	1. Exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23. 3. Exchange the printer capacitor. See "Removing and Replacing the Capacitor" in topic 5.4.2.
The **printer** causes the point-of-sale terminal power supply to shut down.	1. Exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23. 3. Exchange the platen grounding strap. See "Removing and Replacing the Platen Grounding Strap" in topic 5.3.17. 4. Exchange the printer capacitor. See "Removing and Replacing the Capacitor" in topic 5.4.2.
The **printer** does not print.	1. Ensure that the print head is properly connected to the printer card. 2. Exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 3. Ensure that the print head preload spring is in position to hold the print head against the platen. To exchange the print head preload spring, see "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. 4. Exchange the ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 5.3.24. 5. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **printer** makes a continuous grinding noise.	1. Exchange the print head carriage motor. See "Removing and Replacing the Print Head Carriage Motor" in topic 5.3.22. 2. Check the print head home sensor. See "Printer Sensor Checks" in topic 5.7. □ If the print head home sensor is failing, exchange it. See "Removing and Replacing the Print Head Home Sensor" in topic 5.4.8. □ If the print head home sensor is not failing, adjust it. See "Adjusting the Print Head Home Sensor" in topic 5.3.2. 3. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.

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The **ribbon** and the journal paper do not advance.	1. Exchange the journal/ribbon motor. See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. 2. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **ribbon** does not advance.	1. Exchange the ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 5.3.24. 2. Exchange the ribbon drive shaft. See "Removing and Replacing the Ribbon Drive Shaft" in topic 5.4.9. 3. Exchange the journal/ribbon motor. See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. 4. Exchange the printer card. See "Removing and Replacing the Printer Card" in topic 5.3.23.
The **ribbon** is damaged by the printer.	1. Exchange the print head. See "Removing and Replacing the Print Head" in topic 5.3.18. 2. Exchange the ribbon drive shaft. See "Removing and Replacing the Ribbon Drive Shaft" in topic 5.4.9. 3. Exchange the print head carriage assembly. See "Removing and Replacing the Print Head Carriage and Shaft" in topic 5.3.19.

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5.3 Procedures Recommended for Field Personnel

After replacing any printer part, run the printer test again to ensure that the failure is corrected.

Subtopics

5.3.1 Adjusting the Print Head Cam
5.3.2 Adjusting the Print Head Home Sensor
5.3.3 Cleaning the Print Head
5.3.4 Removing and Replacing the Access Cover
5.3.5 Removing and Replacing the Bottom Cover
5.3.6 Removing and Replacing the Cover Interlock Sensor
5.3.7 Removing and Replacing the Document Insert Paper Guide
5.3.8 Removing and Replacing the Journal Cover
5.3.9 Removing and Replacing the Journal Drive Belt
5.3.10 Removing and Replacing the Journal Motor Pulley
5.3.11 Removing and Replacing the Journal Paper Motion Emitter Sensor
5.3.12 Removing and Replacing the Journal/Ribbon Motor
5.3.13 Removing and Replacing the Journal Spool and Clutch
5.3.14 Removing and Replacing the Keylock
5.3.15 Removing and Replacing the Keypad
5.3.16 Removing and Replacing the Platen and Paper Tear Guide
5.3.17 Removing and Replacing the Platen Grounding Strap
5.3.18 Removing and Replacing the Print Head
5.3.19 Removing and Replacing the Print Head Carriage and Shaft
5.3.20 Removing and Replacing Print Head Carriage Components
5.3.21 Removing and Replacing the Print Head Carriage Drive Belt
5.3.22 Removing and Replacing the Print Head Carriage Motor
5.3.23 Removing and Replacing the Printer Card
5.3.24 Removing and Replacing the Printer Ribbon Cartridge
5.3.25 Removing and Replacing the Receipt Paper Backup Roller
5.3.26 Removing and Replacing the Top Cover
5.3.27 Replacing Customer Receipt Paper
5.3.28 Replacing Journal Station Paper

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5.3.1 Adjusting the Print Head Cam

1. Remove the document insert paper guide.

2. Loosen the screw [1].

3. Ensure that the end of the cam [2] is installed over the side frame rib.

4. Insert a 1.2 mm gauge [3] as shown in Figure 5-1.

5. Hold the gauge against the platen [4] and move the cam until it touches the gauge. Tighten the screw while applying a force down, back, and to the left. Remove the gauge. (After the screw is tightened, the gauge should fit tightly into the space between the platen and the cam. The cam should not move when the gauge is inserted or removed.)

6. Replace the document insert paper guide.

PICTURE 96

Figure 5-1. Adjusting the Print Head Cam. For illustration, the top cover has been removed. Removal of the cover is not necessary for this procedure.

Reference	**Topic**
Removing and Replacing the Document Insert Paper Guide	5.3.7

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5.3.2 Adjusting the Print Head Home Sensor

Note: The home sensor flag must be adjusted to set the document insert/customer receipt paper margin anytime the carriage or home sensor flag is exchanged.

1. Switch **POWER OFF** at the 4683 or 4684.
2. Remove the print head to gain access to the home sensor flag adjustment screw. Loosen the adjustment screw [1] and locate it in the center of the adjustment slot. Tighten the screw.
3. Replace the print head.
4. Switch the power ON again.
5. Press the "I" key to open the document insert station.
6. Put a sheet of paper into the station. Ensure that the paper is all the way to the right and against the right-hand paper guide.
7. Press the "I" key to close the station.
8. Press the "T" test key to start printing.
9. Measure the distance from the right edge of the paper to the right edge of the nearest printed "H". This measurement should be 5.5 ± .5 mm from the edge of the paper. If the measurement is LESS than 5.0 mm, loosen the adjustment screw and move the flag to the right. If the measurement is MORE than 6.0 mm, loosen the adjustment screw and move the flag to the left.
10. Return to Step 3 and repeat the steps until the measurement is correct.

PICTURE 97

Figure 5-2. Adjusting the Print Head Home Sensor. For illustration, the top cover has been removed. Removal of the cover is not necessary for this procedure.

Reference	**Topic**
Removing and Replacing the Print Head	5.3.18

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5.3.3 Cleaning the Print Head

This procedure removes dried ink from the wire guide and introduces a lubricant to the guide and wires. The process reduces wire drag in the guide and allows greater impact force against the ribbon and paper.

1. Switch **POWER OFF** at the 4683 or 4684.

2. Pull the print head preload spring toward the front of the printer and out of the notch on the side of the print head.

3. Move the spring to the right and release it. The large arrow shows the movement of the preload spring.

   The print head moves toward the front of the printer.

4. Remove the ribbon cartridge.

5. Release the print head latch and lift the right side of the print head assembly.

6. Move the print head to the left and out of the printer.

   Note: Do not drop the print head.

PICTURE 98

Figure 5-3. Cleaning the Print Head

7. With the print head pointed vertically down, (toward the bottom of the printer), apply 2 or 3 drops of the silicone lubricant, IBM P/N 96X4791, to the wire guide in the area shown.

   The silicone lubricant is available with field bill B/M 83X8273, (ECA 001).

8. With the print head pointed down and the terminal powered ON, press the test button "T" 3 or 4 times.

9. Use a clean tissue to wipe the excess ink and lubricant off the face of the wire guide.

10. Repeat the three previous steps until the liquid that appears on the face of the wire guide is light in color, (it should be almost clear). Do NOT try to remove ink stains from the wire guide.

    CAUTION:
    When the test button is pressed the print head carrier moves back and forth across the printer. Hold the print head above and out of the path of the carrier.

PICTURE 99

Figure 5-4. Cleaning the Print Head

11. Switch **POWER OFF** at the 4683 or 4684.

12. Put the slender shaft on the left side of the print head into the slots on the left side of the carriage.

13. Hold the print head toward the front of the printer.

14. Lower the right side of the print head until the print head latch locks into place over the slender shaft on the right.

15. Exchange the ribbon cartridge.

16. Push the print head toward the rear of the printer and hold it there.

17. Pull the print head preload spring toward the front of the printer.

18. Move the spring to the left and release it into the notch on the right side of the print head. The large arrow shows the movement of the preload spring.

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19. Switch power ON again.

20. Run the "Printer Tests" to verify that the printer is operating correctly. See the *IBM 4680 Store System: Problem Determination Guide* or the *IBM 4683/4684 Point of Sale Terminal: Problem Determination Guide*.

    If the printing is still unacceptable, repeat the cleaning procedure.

    If after repeating the cleaning procedure, the printing is still not acceptable, the print head should be replaced.

PICTURE 100

Figure 5-5. Cleaning the Print Head

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5.3.4 Removing and Replacing the Access Cover

Subtopics
5.3.4.1 Removing the Access Cover
5.3.4.2 Replacing the Access Cover

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5.3.4.1 Removing the Access Cover

1. Raise the access cover.

2. Move the holding tab [1] at one end of the cover toward the center of the printer and hold it there.

3. Push the cover back enough to raise the holding tab above its detent [2].

4. Do step 2 at the other end of the cover.

5. Push the cover back and off its hinge.

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5.3.4.2 Replacing the Access Cover

1. Put the access cover on the hinge [3].
2. Pull the cover forward until the hinge snaps into place.
3. Close the cover until the holding tab [1] touches its detent [2].
4. Move the holding tab at one end of the cover toward the center of the printer and release it onto its detent.
5. Do step 3 at the other end of the cover.

PICTURE 101

Figure 5-6. Access Cover

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5.3.5 Removing and Replacing the Bottom Cover

Subtopics
5.3.5.1 Removing the Bottom Cover
5.3.5.2 Replacing the Bottom Cover

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5.3.5.1 Removing the Bottom Cover

1. Disconnect the cable if present.

2. Loosen the thumb screw [1].

3. Move the bottom cover holding tabs [2] toward the center of the printer to release them, and at the same time, pull the bottom cover off the printer.

¦ Copyright IBM Corp. 1986, 1992

5.3.5.2 Replacing the Bottom Cover

1. Align the holding tabs [2] over their slots.

   The grounding straps should be centered in the hole for the thumb screw.

2. Push in on the cover until the tabs lock into place.

3. Tighten the thumb screw [1].

PICTURE 102

Figure 5-7. Bottom Cover

¦ Copyright IBM Corp. 1986, 1992

5.3.6 Removing and Replacing the Cover Interlock Sensor

Subtopics

5.3.6.1 Removing the Cover Interlock Sensor
5.3.6.2 Replacing the Cover Interlock Sensor

¦ Copyright IBM Corp. 1986, 1992

5.3.6.1 Removing the Cover Interlock Sensor

1. Remove the top cover assembly.

2. Disconnect the cover interlock sensor cable from printer card connector J3.

3. Release the sensor [1] from its holding tabs [2].

4. Lift the sensor out of the frame assembly.

¦ Copyright IBM Corp. 1986, 1992

5.3.6.2 Replacing the Cover Interlock Sensor

1. Put the sensor [1] into place.

2. Ensure that the holding tabs [2] lock into place.

3. Connect the cover interlock sensor cable to printer card connector J3.

4. Replace the top cover assembly.

Reference	**Topic**
Removing and Replacing the Top Cover	5.3.26

PICTURE 103

Figure 5-8. Cover Interlock Sensor

¦ Copyright IBM Corp. 1986, 1992

5.3.7 Removing and Replacing the Document Insert Paper Guide

Subtopics
5.3.7.1 Removing the Document Insert Paper Guide
5.3.7.2 Replacing the Document Insert Paper Guide

¦ Copyright IBM Corp. 1986, 1992

5.3.7.1 Removing the Document Insert Paper Guide

1. Put a piece of paper into the document insert station to hold the document insert gate toward the front of the printer.

2. Set the printer as shown in Figure 5-9 in topic 5.3.7.2

3. Gain access to the paper guide [1] through the document insert opening.

4. Lift the guide off the locating pads [2].

5. Move the guide toward the back of the printer until the holding tabs on the guide can be pulled out of the openings [3] in the frame.

6. Pull the guide down and out of the printer.

¦ Copyright IBM Corp. 1986, 1992

5.3.7.2 Replacing the Document Insert Paper Guide

1. Put a piece of paper into the document insert station to hold the document insert gate toward the front of the printer.

2. Set the printer as shown in Figure 5-9

3. Put the paper guide [1] into place through the document insert opening.

4. Push the holding tabs through the openings [3] in the frame assembly.

5. Remove the piece of paper.

6. Move the guide toward the front of the printer to lock the holding tabs in place.

7. Ensure that the guide is installed over the locating pads [2] and all four holding tabs are in place (the guide is against the bottom of the frame).

CAUTION:
The edge of the guide is sharp. Use care when removing and installing it.

PICTURE 104

Figure 5-9. Document Insert Paper Guide

¦ Copyright IBM Corp. 1986, 1992

5.3.8 Removing and Replacing the Journal Cover

Subtopics
5.3.8.1 Removing the Journal Cover
5.3.8.2 Replacing the Journal Cover

¦ Copyright IBM Corp. 1986, 1992

5.3.8.1 Removing the Journal Cover

1. Remove the access cover.
2. Raise the journal cover.
3. Push the cover back and off its hinge.

¦ Copyright IBM Corp. 1986, 1992

5.3.8.2 Replacing the Journal Cover

1. Put the journal cover on the hinge [1]. See Figure 5-10.

2. Pull the cover forward until the hinge snaps into place, and then close it.

3. Replace the access cover.

Reference	**Topic**
Removing and Replacing the Access Cover	5.3.4

PICTURE 105

Figure 5-10. Journal Cover

¦ Copyright IBM Corp. 1986, 1992

5.3.9 Removing and Replacing the Journal Drive Belt

See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12.
The printer journal drive belt is removed and replaced in this procedure.

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5.3.10 Removing and Replacing the Journal Motor Pulley

See "Removing and Replacing the Journal/Ribbon Motor" in topic 5.3.12. The printer journal motor pulley is removed and replaced in this procedure.

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5.3.11 Removing and Replacing the Journal Paper Motion Emitter Sensor

Subtopics
5.3.11.1 Removing the Journal Paper Motion Emitter Sensor
5.3.11.2 Replacing the Journal Paper Motion Emitter Sensor

¦ Copyright IBM Corp. 1986, 1992

5.3.11.1 Removing the Journal Paper Motion Emitter Sensor

1. Remove the bottom cover.
2. Disconnect the emitter sensor cable from printer card connector J8.
3. Remove the cable from its retainer [1].
4. Release the holding tabs [2].
5. Pull the sensor [3] out of the printer.

¦ Copyright IBM Corp. 1986, 1992

5.3.11.2 Replacing the Journal Paper Motion Emitter Sensor

1. Put the emitter sensor [3] into place.
2. Push in on the emitter until the holding tabs [2] lock into place.
3. Connect the emitter sensor cable to printer card connector J8.
4. Put the cable in its retainer [1].
5. Replace the bottom cover.

Reference	**Topic**
Removing and Replacing the Bottom Cover	5.3.5

PICTURE 106

Figure 5-11. Journal Paper Motion Emitter Sensor

¦ Copyright IBM Corp. 1986, 1992

5.3.12 Removing and Replacing the Journal/Ribbon Motor

Subtopics
5.3.12.1 Removing the Journal/Ribbon Motor
5.3.12.2 Replacing the Journal/Ribbon Motor

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5.3.12.1 Removing the Journal/Ribbon Motor

1. Take the belt off the journal paper spool [1].
2. Remove the bottom cover.
3. Release the drive shaft coupler [2] by removing the C-clip [3].
4. Pull the coupler off the motor shaft.
5. Remove the belt from the drive motor pulley [4].
6. Remove the pulley from the motor shaft.
7. Disconnect the drive motor cable from printer card connector J11.
8. Remove the cable from its retainer [5].
9. Move the motor toward the side of the printer and off its locating pad [6].
10. Pivot the motor toward the front of the printer and remove it from the printer.

¦ Copyright IBM Corp. 1986, 1992

5.3.12.2 Replacing the Journal/Ribbon Motor

1. Hold the drive motor toward the side of the printer as you put it into place.

2. Move the motor to the right into its locating pad [6].

3. Connect the motor cable to printer card connector J11.

4. Put the cable into its retainer [5].

5. Put the pulley [4] on the motor shaft.

6. Put the drive belt on the motor pulley and up toward the journal paper spool.

7. Connect the ribbon drive shaft coupler [2] to the motor shaft.

8. Attach the coupler to the shaft with the C-clip [3].

9. Put the drive belt on the journal paper spool [1].

10. Replace the bottom cover assembly.

Reference	**Topic**
Removing and Replacing the Bottom Cover	5.3.5

PICTURE 107

Figure 5-12. Journal Paper/Ribbon Motor. For illustration, the top cover has been removed. Removal of the cover is not necessary for this procedure.

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5.3.13 Removing and Replacing the Journal Spool and Clutch

Subtopics
5.3.13.1 Removing the Journal Spool and Clutch
5.3.13.2 Replacing the Journal Spool and Clutch

¦ Copyright IBM Corp. 1986, 1992

5.3.13.1 Removing the Journal Spool and Clutch

1. Remove the journal station paper.
2. Remove the access cover.
3. Remove the journal cover.
4. Take the belt off the journal paper spool [1].
5. Remove the bottom cover.
6. Release the paper spool and clutch assembly holding tab [2].
7. Push the assembly away from the holding tab.
8. Pull the spool and clutch assembly [1] straight up and out of the printer.

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5.3.13.2 Replacing the Journal Spool and Clutch

1. Put the paper spool and clutch assembly [1] into the slot shown in Figure 5-14.

2. Push the assembly down until the holding tab locks into place.

3. Put the belt on the journal paper spool.

4. Replace the bottom cover.

5. Replace the access cover.

6. Replace the journal cover.

Reference	**Topic**
Removing and Replacing the Access Cover	5.3.4
Removing and Replacing the Bottom Cover	5.3.5
Removing and Replacing the Journal Cover	5.3.8

PICTURE 108

Figure 5-13. Journal Paper Spool and Clutch

PICTURE 109

Figure 5-14. Journal Paper Spool and Clutch. For illustration, the top cover has been removed. Removal of the cover is not necessary for this procedure.

¦ Copyright IBM Corp. 1986, 1992

5.3.14 Removing and Replacing the Keylock

Subtopics
5.3.14.1 Removing the Keylock
5.3.14.2 Replacing the Keylock

¦ Copyright IBM Corp. 1986, 1992

5.3.14.1 Removing the Keylock

1. Remove the top cover assembly.

2. Ensure that the keylock is in the unlocked position.

3. Pull the retainer clip [1] down and toward the right side of the printer to release the keylock assembly [2].

4. Lift the assembly out of the printer.

   Note: It may be necessary to tilt the assembly to get it past the locking arm.

¦ Copyright IBM Corp. 1986, 1992

5.3.14.2 Replacing the Keylock

1. Put the keylock assembly [2] into the printer as shown in Figure 5-15.

   Note: It may be necessary to tilt the assembly to get it past the locking arm.

2. Push the keylock retainer clip [1] onto the keylock assembly.

3. Replace the top cover assembly.

Reference	**Topic**
Removing and Replacing the Top Cover	5.3.26

PICTURE 110

Figure 5-15. Keylock

¦ Copyright IBM Corp. 1986, 1992

5.3.15 Removing and Replacing the Keypad

Subtopics
5.3.15.1 Removing the Keypad
5.3.15.2 Replacing the Keypad

¦ Copyright IBM Corp. 1986, 1992

5.3.15.1 Removing the Keypad

1. Remove the top cover assembly.
2. Peel the operator keypad off the cover assembly.

   The pad is held to the cover with peel-and-stick adhesive.

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5.3.15.2 Replacing the Keypad

1. Clean the old glue off the top cover assembly with alcohol.
2. Put the cable through the slot in the cover.
3. Peel off the protective cover to expose the adhesive.
4. Press the new operator keypad in place.
5. Replace the top cover assembly.

Reference	**Topic**
Removing and Replacing the Top Cover	5.3.26

PICTURE 111

Figure 5-16. Keypad

¦ Copyright IBM Corp. 1986, 1992

5.3.16 Removing and Replacing the Platen and Paper Tear Guide

Subtopics
5.3.16.1 Removing the Platen and Paper Tear Guide
5.3.16.2 Replacing the Platen and Paper Tear Guide

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5.3.16.1 Removing the Platen and Paper Tear Guide

1. Remove the top cover assembly.

2. Remove the document insert paper guide.

3. Remove the paper from both print stations.

4. Put a piece of paper into the document insert station to hold the document insert gate toward the front of the printer.

5. Remove the platen retainers [1a]. See Figure 5-17 in topic 5.3.16.2.

6. Hold the platen assembly at the journal station and lift up until the top roller [2] can be removed.

7. When the roller has been removed, lift the platen straight up and out of the printer.

8. Remove the piece of paper from the document insert station.

9. Move the holding tabs [3] (back of the platen) toward each other to release the paper tear guide.

10. Push the tabs through the platen and remove the guide.

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5.3.16.2 Replacing the Platen and Paper Tear Guide

1. Put the paper tear guide on the platen with its holding tabs [3] as shown in Figure 5-17. Ensure that the sawtooth edge goes through the slot in the platen before the holding tabs lock into place.

2. Put a piece of paper into the document insert station.

3. Turn the large toggle gear down. This keeps the toggle assembly from interfering with the paper tear guide when the platen is installed.

4. Move the receipt paper backup roller and spacers to the center of their shaft to ensure that they do not interfere with the projections on the bottom of the platen.

5. Lubricate the rubber boots [5] with silicon grease, P/N 265390. Put the boots into their slots [1].

6. Push down on each end of the platen assembly until the boots are approximately halfway down.

   Note: Be careful to avoid damaging the paper guides and journal bail.

7. Replace the top roller [2].

8. Continue to push down on each end of the platen assembly until the boots are at the bottom of their slots. Ensure that the platen is parallel with the frame assembly at the points designated by [7]. Also, ensure that the platen boots are seated correctly by pushing them down in front of and behind the platen.

9. Replace the platen retainers [1a]. Hold the platen in the journal paper path area and rock the platen front to back several times. Push the platen back until the platen contacts the upper frame and then hold for one second.

10. Check to ensure that the platen grounding strap is properly seated under the platen. See Figure 5-18 in topic 5.3.17.2.

11. Remove the piece of paper.

12. Replace the top cover.

13. Replace the document insert paper guide.

14. Check the alignment between the platen and the print head. See topic 5.3.20.2

Reference	**Topic**
Removing and Replacing the Document Insert Paper Guide	5.3.7
Removing and Replacing the Top Cover	5.3.26

PICTURE 112

Figure 5-17. Platen and Paper Tear Guide

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5.3.17 Removing and Replacing the Platen Grounding Strap

Subtopics
5.3.17.1 Removing the Platen Grounding Strap
5.3.17.2 Replacing the Platen Grounding Strap

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5.3.17.1 Removing the Platen Grounding Strap

1. Pull the strap out from under the platen.

   Note: The platen may need to be lifted very slightly to accomplish this step.

2. Lift the strap out from the printer.

   Note: Some factory-installed straps are held in place by a tab that is located under the metal grounding plate in the printer. To remove this version, separate the printer frames and loosen the two screws [1] nearest to the strap. The strap can now be removed. Reassemble the printer.

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5.3.17.2 Replacing the Platen Grounding Strap

1. Position the strap so that it fits between the plastic wall and the grounding plate.

2. Lock the strap in place under the platen.

   Note: The platen may need to be lifted very slightly to allow this. Be sure that the platen has been seated correctly.

Reference	**Topic**
Separating the Upper and Lower Frame Assemblies	5.4.1
Joining the Upper and Lower Frame Assemblies	5.4.11

PICTURE 113

Figure 5-18. Platen Grounding Strap

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5.3.18 Removing and Replacing the Print Head

Subtopics
5.3.18.1 Removing the Print Head
5.3.18.2 Replacing the Print Head

¦ Copyright IBM Corp. 1986, 1992

5.3.18.1 Removing the Print Head

"Replacing the Print Head" is in topic 5.3.18.2**.**

1. Switch **POWER OFF** at the 4683 or 4684.

2. Pull the print head preload spring toward the front of the printer and out of the notch on the side of the print head.

3. Move the spring to the right and release it. The large arrow shows the movement of the preload spring.

   PICTURE 114

4. The print head moves toward the front of the printer.

5. Remove the ribbon cartridge. See "Removing the Ribbon Cartridge" in topic 5.3.24.1.

6. Unplug the print head cable connector from the printer card connector.

   PICTURE 115

7. Release the print head latch and lift the right side of the print head assembly.

   PICTURE 116

8. Move the print head to the left and out of the printer.

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5.3.18.2 Replacing the Print Head

"Removing the Print Head" is in topic 5.3.18.1**.**

1. Switch **POWER OFF** at the 4683 or 4684.

2. Put the slender shaft on the left side of the print head into the slots on the left side of the carriage.

3. Hold the print head toward the front of the printer.

4. Lower the right side of the print head until the print head latch locks into place over the slender shaft on the right.

   PICTURE 117

5. Plug the print head cable connector into the printer card connector.

   PICTURE 118

6. Exchange the ribbon cartridge. See "Replacing the Ribbon Cartridge" in topic 5.3.24.2.

7. Push the print head toward the rear of the printer and hold it there.

8. Pull the print head preload spring toward the front of the printer.

9. Move the spring to the left and release it into the notch on the right side of the print head. The large arrow shows the movement of the preload spring.

   PICTURE 119

10. Switch power ON again.

11. Run the printer test to verify that the print head is working correctly.

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5.3.19 Removing and Replacing the Print Head Carriage and Shaft

Subtopics

5.3.19.1 Removing the Print Head Carriage and Shaft
5.3.19.2 Replacing the Print Head Carriage and Shaft

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5.3.19.1 Removing the Print Head Carriage and Shaft

1. Remove the top cover assembly.

2. Remove the bottom cover.

3. Remove the printer card.

4. Remove the belt from the drive motor pulleys [1] and move the carriage to the left. Make sure that the belt spring does not fall off and get lost. See Figure 5-19 in topic 5.3.19.2.

5. Release the holding tab [2].

6. Lift the right end of the print head carriage shaft up and move it to the right.

7. Lift the print head carriage and shaft assembly out of the printer.

8. To remove the belt or any other component from the assembly, go to "Removing and Replacing Print Head Carriage Components" in topic 5.3.20.

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5.3.19.2 Replacing the Print Head Carriage and Shaft

1. To replace the belt or any other component on the assembly, go to "Removing and Replacing Print Head Carriage Components" in topic 5.3.20.

2. Put the left end of the print head carriage shaft into the opening [3] in the frame.

3. Push the holding tab [2] out of the way.

4. Lower the right end of the shaft into place and release the holding tab over it.

5. Move the carriage to the center of the printer.

6. Put the belt on the drive motor pulleys [1].

7. Move the carriage to the extreme left and then to the extreme right. The spring that connects the belt together must not touch either pulley.

8. Lubricate the shaft and carriage wiper [4] with IBM #6 oil.

9. Replace the printer card.

10. Replace the bottom cover.

11. Replace the top cover assembly.

Reference	**Topic**
Removing and Replacing the Bottom Cover	5.3.5
Removing and Replacing the Printer Card	5.3.23
Removing and Replacing Print Head Carriage Components	5.3.20
Removing and Replacing the Top Cover	5.3.26

PICTURE 120

Figure 5-19. Print Head Carriage and Shaft

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5.3.20 Removing and Replacing Print Head Carriage Components

Subtopics
5.3.20.1 Removing Print Head Carriage Components
5.3.20.2 Replacing Print Head Carriage Components

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5.3.20.1 Removing Print Head Carriage Components

1. To remove the assembly from the printer, go to "Removing and Replacing the Print Head Carriage and Shaft" in topic 5.3.19.

2. Remove the wear shoe [11] that the carriage rides on. See Figure 5-20 in topic 5.3.20.2.

3. Remove the shaft from the assembly. The retainer [1] and wiper [2] will fall from the assembly.

4. Remove the spring [3].

5. Push down on the belt clamp [4] and hold it there.

6. Remove the clamp holding pin [5].

7. Remove the belt.

8. Lift the clamp out of the assembly.

9. Remove the latch [6].

10. Pull the pin [7] out of the print head preload spring [8] and remove the preload spring.

11. Remove the screw [9] and the home sensor flag [10].

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5.3.20.2 Replacing Print Head Carriage Components

1. Replace the home sensor flag [10] and the screw [9].

2. Replace the print head preload spring [8] and pin [7].

3. Replace the latch [6].

4. Put the belt clamp [4] into the assembly.

5. Locate the belt under the clamp so that the spring on the belt is the same distance from each side of the clamp.

6. Replace the clamp holding pin [5].

7. Replace the spring [3].

8. Replace the wear shoe [11] (see **Note**).

9. Put the shaft into the assembly.

10. Replace the wiper [2] and retainer [1] on the shaft.

11. To put the assembly in the printer, go to "Removing and Replacing the Print Head Carriage and Shaft" in topic 5.3.19.

12. Adjust the home sensor flag.

Note: There may be two styles of wear shoes supplied with carriage assemblies.

1. One unmarked shoe for earlier printers
2. Five sizes of shoes for later printers.

If your wear shoe has an identifying mark on it, choose the shoe that appears the same as the original that you are replacing. The selection of these shoes determines the spacing between the print head and the paper. If, after reassembly and testing, your printer fails to print dots, choose a thicker shoe to move the head closer to the paper. If ribbon smudges appear on the paper, choose a thinner shoe to move the head further away from the paper.

Reference	**Topic**
Removing and Replacing the Print Head Carriage and Shaft	5.3.19
Adjusting the Print Head Home Sensor	5.3.2

PICTURE 121

Figure 5-20. Print Head Carriage Components

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5.3.21 Removing and Replacing the Print Head Carriage Drive Belt

See "Removing and Replacing Print Head Carriage Components" in topic 5.3.20. The print head carriage drive belt is removed and replaced in this procedure.

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5.3.22 Removing and Replacing the Print Head Carriage Motor

Subtopics
5.3.22.1 Removing the Print Head Carriage Motor
5.3.22.2 Replacing the Print Head Carriage Motor

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5.3.22.1 Removing the Print Head Carriage Motor

1. Remove the carriage drive belt from the motor pulley [1]. See Figure 5-21 in topic 5.3.22.2.

2. Remove the bottom cover.

3. Disconnect the motor cable from printer card connector J10.

4. Remove the motor cable from its retainers [2].

5. Remove the motor screws [3].

6. Pull the motor out the bottom of the printer.

¦ Copyright IBM Corp. 1986, 1992

5.3.22.2 Replacing the Print Head Carriage Motor

1. Put the carriage drive motor into place as shown in Figure 5-21

2. Replace the motor screws [3].

3. Put the motor cable into its retainers [2].

4. Connect the cable to printer card connector J10.

5. Move the carriage to the center of the printer.

6. Put the belt on the drive motor pulley [1].

7. Move the carriage to the extreme left and then to the extreme right. The spring that connects the belt must not touch either pulley.

8. Replace the bottom cover.

Reference	**Topic**
Removing and Replacing the Bottom Cover	5.3.5

PICTURE 122

Figure 5-21. Print Head Carriage Motor. For illustration, the top cover has been removed. Removal of the cover is not necessary for this procedure.

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5.3.23 Removing and Replacing the Printer Card

Subtopics
5.3.23.1 Removing the Printer Card
5.3.23.2 Replacing the Printer Card

¦ Copyright IBM Corp. 1986, 1992

5.3.23.1 Removing the Printer Card

1. Remove the top cover assembly.

2. Remove the bottom cover.

3. Disconnect the cables from the top and bottom of the printer card.

   Note: The cable connectors are keyed so they will only connect to their matching printer card connectors.

4. Remove the cables under the journal station from the holding clips, starting with the bottom cable.

5. Release the holding tabs [1].

6. Pull the printer card out through the bottom of the printer.

7. Remove the grounding strap from the card.

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5.3.23.2 Replacing the Printer Card

1. Attach the grounding strap to the printer card.

2. Put the printer card in through the bottom of the printer.

3. Push in until the tabs [1] lock into place.

4. Place the cables under the journal station into the holding clips, starting with the top cable.

5. Connect the cables to the card.

   Note: The cable connectors are keyed so they will only connect to their matching printer card connectors.

6. Replace the bottom cover assembly.

7. Replace the top cover assembly.

Reference	**Topic**
Removing and Replacing the Bottom Cover	5.3.5
Removing and Replacing the Top Cover	5.3.26

PICTURE 123

Figure 5-22. Printer Card Connectors

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5.3.24 Removing and Replacing the Printer Ribbon Cartridge

Subtopics
5.3.24.1 Removing the Ribbon Cartridge
5.3.24.2 Replacing the Ribbon Cartridge

¦ Copyright IBM Corp. 1986, 1992

5.3.24.1 Removing the Ribbon Cartridge

Note: Replacing the ribbon cartridge is in topic 5.3.24.2.

1. Hold the print head against the ribbon with your left hand and pull the preload spring toward the front of the printer and out of the notch on the side of the print head.

2. Move the spring to the right and release it. The large arrow shows the movement of the preload spring.

3. The print head moves toward the front of the printer.

4. Hold the print head away from the ribbon so it does not interfere with the ribbon cartridge removal.

   PICTURE 124

5. Remove the old ribbon cartridge by grasping it on each side and pulling up firmly until it is free.

   PICTURE 125

¦ Copyright IBM Corp. 1986, 1992

5.3.24.2 Replacing the Ribbon Cartridge

Note: Use ribbon cartridge P/N 4483015 or equivalent. Failure to do so may affect print head life and print quality. Replacing the ribbon cartridge is the user"s responsibility. Removing the ribbon cartridge is in topic 5.3.24.2.

1. Rotate the ribbon feed knob clockwise to take up any slack in the ribbon. The knob is located on the top right side of the ribbon cartridge.

   PICTURE 126

2. Line up the groove in the front center of the ribbon cartridge with the projection on the inside of the printer.

   PICTURE 127

3. Press both ends of the ribbon cartridge straight down while rotating the ribbon feed knob clockwise until the cartridge snaps into place.

   PICTURE 128

4. Ensure that the ribbon is between the print head and the two ribbon guides as shown in the following figure.

   PICTURE 129

5. Pull the print head preload spring toward the front of the printer.

6. Move the spring to the left and release it into the notch on the right side of the print head. The large arrow shows the movement of the preload spring.

   PICTURE 130

7. Ensure that the print head is properly latched in place. The printer will not function if the print head is not properly seated.

8. Press the test button "T" to run the printer test to ensure that the ribbon is seated properly. (Put paper in both stations before running the test.)

9. Tear the customer receipt paper against the tear bar. If the paper is not torn off before you close the printer cover, it will feed down into the machine instead of through the slot in the printer cover.

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5.3.25 Removing and Replacing the Receipt Paper Backup Roller

Subtopics
5.3.25.1 Removing the Receipt Paper Backup Roller
5.3.25.2 Replacing the Receipt Paper Backup Roller

¦ Copyright IBM Corp. 1986, 1992

5.3.25.1 Removing the Receipt Paper Backup Roller

1. Remove the top cover assembly.

2. Remove the platen assembly.

3. Slide the shaft to the left until the right side is free from the pivot.

4. Lift the receipt paper backup roller and shaft [1] with the spacers [2] out of the upper frame assembly.

¦ Copyright IBM Corp. 1986, 1992

5.3.25.2 Replacing the Receipt Paper Backup Roller

1. Put the receipt paper backup roller and shaft [1] with the spacers [2] into the upper frame assembly.

2. Replace the platen assembly.

3. Replace the top cover assembly.

Reference	**Topic**
Removing and Replacing the Platen and Paper Tear Guide	5.3.16
Removing and Replacing the Top Cover	5.3.26

PICTURE 131

Figure 5-23. Receipt Paper Backup Roller. To illustrate the backup roller, the printer has been disassembled. Only the top cover and the platen need to be removed for this procedure.

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5.3.26 Removing and Replacing the Top Cover

Subtopics
5.3.26.1 Removing the Top Cover
5.3.26.2 Replacing the Top Cover

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5.3.26.1 Removing the Top Cover

1. Raise the access cover and the journal station cover [1].

2. Pull out and up on the top cover assembly at each side of the document insert slot [2].

3. Lift the left end and pivot the top cover assembly to the right side of the printer.

4. Disconnect the operator keypad cable from printer card connector J2.

5. Lift the top cover assembly off the printer.

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5.3.26.2 Replacing the Top Cover

1. Turn the printer so that the left side faces you.

2. Set the assembly on the printer with the left end raised, as shown in Figure 5-24.

3. Connect the operator keypad cable to printer card connector J2.

4. Lower the left side of the top cover while aligning the tabs [3] over the openings.

5. Push down and in on each side of the document insert slot [2] until the tabs lock into place.

PICTURE 132

Figure 5-24. Top Cover

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5.3.27 Replacing Customer Receipt Paper

1. Remove the remaining parts of the old customer receipt paper roll and discard them.

   Note: Do not pull the customer receipt paper backward through the customer receipt station.

2. Cut or tear the end of the new paper loose from the roll.

3. Turn the paper roll so that the loose end of the paper comes toward you from the bottom of the roll.

4. Pull out several inches of paper to work with as shown.

   PICTURE 133

5. Place the paper roll in the customer receipt station.

6. Sharply fold back approximately 3 to 5 inches (7.5 to 13 cm) of the leading edge of the paper.

   PICTURE 134

7. Insert the folded edge of the paper between the roller and the narrow space just behind the tear bar. Be sure the paper is centered in the opening and that the left and right sides of the folded end are square with the opening.

   Push the paper downward until it stops. (Paper should not be seen coming out from below the tear bar.)

   PICTURE 135

8. Press and hold the customer receipt advance button "II" until the paper feeds through the rollers and comes up behind the tear bar.

   PICTURE 136

9. Press the test button "T" to run the printer test to ensure that the paper is loaded properly. (Put paper in both stations before running the test.)

10. Tear the customer receipt paper against the tear bar. If the paper is not torn off before you close the printer cover, it will feed down into the machine instead of through the slot in the printer cover.

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5.3.28 Replacing Journal Station Paper

1. Gently push the print head to the left wall of the printer.

2. Tear the journal paper between the platen and the take-up spool.

3. Firmly grasp the take-up spool flange (black wheel) with your left hand to keep it from rotating.

4. Grasp the take-up roll of paper with your right hand and pull it off the spool. Rotate it toward the back of the printer as you do so.

   PICTURE 137

5. Remove the remaining parts of the old journal station paper roll and discard them.

6. Cut or tear the end of the new paper loose from the roll.

7. Turn the paper roll so that the loose end of the paper comes toward you from the bottom of the roll.

8. Pull out several inches of paper to work with and fold the end of the paper sharply as shown.

   PICTURE 138

9. Place the paper roll in the journal station.

10. Point the leading edge of the paper down between the printer wall and the small roller just behind the wall. Be sure the paper is centered in the opening and that the left and right sides of the paper above the folded edge are square with the opening.

    PICTURE 139

11. Put your fingers behind the paper and hold the paper against the back of the wall.

    PICTURE 140

12. Use your fingers to repeatedly slide the paper down until it loops underneath and reappears in front.

13. Pull the paper straight up and toward you, about 8 inches.

14. Sharply fold back the leading edge of the paper approximately 1 to 2 inches as shown.

    PICTURE 141

15. Pull the paper over the top of the take-up spool.

16. Turn the paper fold down and slip the folded edge of the paper under the retainer (shown in the dotted lines) on the take-up spool.

    Turn the take-up spool toward the back of the printer to take the slack out of the paper. Gently push the paper toward the left side of the printer to keep the edge even as it loops around the take-up spool.

    PICTURE 142

17. When the paper is wound snugly around the spool, press and hold the journal paper advance button "III" for a few seconds.

18. Press the test button "T" to run the printer test to ensure that the paper is loaded properly. (Put paper in both stations before running the test.)

19. Tear the customer receipt paper against the tear bar. If the paper is not torn off before you close the printer cover, it will feed down into the machine instead of through the slot in the printer cover.

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5.4 Procedures Not Recommended for Field Personnel

Subtopics

5.4.1 Separating the Upper and Lower Printer Frame Assemblies
5.4.2 Removing and Replacing the Capacitor
5.4.3 Removing and Replacing the Document Insert Backup Roller
5.4.4 Removing and Replacing the Document Insert Gate
5.4.5 Removing and Replacing the Document Insert Paper Sensor
5.4.6 Removing and Replacing the Document Insert/Customer Receipt Motor
5.4.7 Removing and Replacing the Journal Paper Motion Emitter Shaft
5.4.8 Removing and Replacing the Print Head Home Sensor
5.4.9 Removing and Replacing the Ribbon Drive Shaft
5.4.10 Removing and Replacing the Toggle Assembly
5.4.11 Joining the Upper and Lower Printer Frame Assemblies

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5.4.1 Separating the Upper and Lower Printer Frame Assemblies

Note: It is not recommended that field service personnel separate the printer frame assemblies. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel. A special frame-separating tool, P/N 63X4985, is used to separate the upper and lower assemblies.

1. Set the printer as shown in Figure 5-25

2. Insert a piece of paper in the document insert station. Remove the document insert paper guide [1] by gaining access to it through the document insert opening.

3. Lift the guide off the locating pads [2].

4. Move the guide toward the back of the printer until the holding tabs on the guide can be pulled out of the openings [3] in the frame.

5. Pull the guide out of the printer.

CAUTION:
The edge of the guide is sharp. Use care when removing it.

PICTURE 143

Figure 5-25. Part 1. Removing the Document Insert Paper Guide

6. Raise the access cover and the journal station cover [4].

7. Remove the top cover assembly by pulling out and up on the assembly at each side of the document insert slot [5].

8. Lift the left end and pivot the top cover assembly to the right side of the printer.

9. Disconnect the operator keypad cable from printer card connector J2.

10. Lift the top cover assembly off the printer.

11. Remove the paper from both print stations.

12. Remove the ribbon cartridge.

13. Remove the print head.

Reference	**Topic**
Removing and Replacing the Print Head	5.3.18
Removing and Replacing the Ribbon Cartridge	5.3.24

PICTURE 144

Figure 5-26. Part 2. Removing the Top Cover

14. Remove the belt from the carriage drive motor pulley [6]. Make sure the belt spring is not lost.

15. Disconnect the remaining cables from the top of the printer card.

16. Loosen the thumb screw from the bottom cover [7].

17. Remove the bottom cover by moving the holding tabs [8] toward the center of the printer to release them, while at the same time pulling

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the bottom cover off the printer.

PICTURE 145

Figure 5-27. Part 3. Removing the Bottom Cover

18. Remove the bottom frame screw [1].

19. Disconnect the cables from the bottom of the printer card.

    Note: The cable connectors are keyed so they only connect to their matching printer card connectors.

20. Remove the cables under the journal station from the holding clips, starting with the bottom cable.

21. Remove the document insert sensor cable from the retainer. If you are removing a component that has a cable attached, remove that component's cable from its retainers [2].

22. Release the holding tabs [3].

23. Pull the printer card out through the bottom of the printer.

PICTURE 146

Figure 5-28. Part 4. Removing the Printer Card

24. Prepare to remove the platen by inserting a piece of paper into the document insert station.

25. Remove the platen retainers [12].

26. Check to ensure that the platen grounding strap is properly seated. See Figure 5-18 in topic 5.3.17.2.

27. Hold the platen assembly [13] at the journal station and lift up until the top roller [14] can be removed.

28. Continue lifting the platen up and out of the printer.

29. Remove the piece of paper from the document insert station.

PICTURE 147

Figure 5-29. Part 5. Removing the Platen

30. To release the tabs that lock the frame assemblies together, insert the frame separating tool, P/N 63X4985, into the tab that is just above the front opening of the document insert slot. With your other hand, pull up on the top half of the printer.

31. Push in on the tool just far enough to release the holding tab.

32. Lift and hold the upper frame to prevent the tabs from re-locking.

33. Continue inserting the tool counterclockwise around the base unit until the upper and lower frames are separated.

    Note: Pull the toggle shaft, see [18] in Figure 5-31 away from the Document Insert/Customer Receipt motor before you lift the upper frame assembly.

34. Lift the upper frame assembly far enough to prevent the locking tabs from re-locking.

PICTURE 148

Figure 5-30. Part 6. Using the Frame Separating Tool

35. Separate the upper frame assembly from the lower frame assembly. Use care not to damage the grounding strap.

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36. If you are here to remove the toggle assembly or the document insert sensor, continue.

37. Remove the toggle assembly [18] by sliding its shaft out of one of the pivot points.

38. Lift the end of the assembly and slide the shaft out of the other pivot point.

39. If you are here to remove the document insert sensor, continue.

40. Remove the sensor [16] by removing the retainer [17] and lifting the sensor out.

PICTURE 149

Figure 5-31. Part 7. Removing the Toggle Assembly and Document Sensor

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5.4.2 Removing and Replacing the Capacitor

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Subtopics
5.4.2.1 Removing the Capacitor
5.4.2.2 Replacing the Capacitor

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5.4.2.1 Removing the Capacitor

1. Separate the upper and lower frame assemblies.

2. To release the capacitor [1], push down on the end that has the wires attached.

3. Disconnect the capacitor from the card.

4. Lift the capacitor out of the frame assembly.

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5.4.2.2 Replacing the Capacitor

1. Put the wired end of the capacitor [1] into the frame and lower the capacitor into place.

2. Push the capacitor cable connector through the opening in the frame.

3. Connect the capacitor cable to the printer card connector J6 and reroute the cable through the cable tie.

4. Join the upper and lower frame assemblies.

Reference	**Topic**
Separating the Upper and Lower Frame Assemblies	5.4.1
Joining the Upper and Lower Frame Assemblies	5.4.11

PICTURE 150

Figure 5-32. Capacitor

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5.4.3 Removing and Replacing the Document Insert Backup Roller

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

See "Removing and Replacing the Document Insert Gate" in topic 5.4.4. The document insert backup roller is removed and replaced in this procedure.

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5.4.4 Removing and Replacing the Document Insert Gate

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Subtopics
5.4.4.1 Removing the Document Insert Gate
5.4.4.2 Replacing the Document Insert Gate

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5.4.4.1 Removing the Document Insert Gate

1. Separate the upper and lower frame assemblies.

2. Move the print head carriage to the right end of the frame assembly.

3. Remove the spring [1] from the insert gate [4].

4. Push the left end of the backup roller [2] toward the back of the frame. This moves the end of the backup roller shaft [3] out of its pivot point.

5. Pull the shaft out of the insert gate.

6. Remove the insert gate from the frame assembly.

7. Remove the backup roller and shaft.

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5.4.4.2 Replacing the Document Insert Gate

1. Insert the backup roller shaft [3] through the backup roller.

2. Move the print head carriage to the right end of the frame assembly.

3. Put the document insert gate [4] into the frame assembly and locate it as shown in Figure 5-33.

4. Locate the backup roller [2] and push the end of the shaft with the flat side into the document insert gate.

5. Push the opposite end of the shaft into its pivot point.

6. Replace the spring [1].

7. Join the upper and lower frame assemblies.

Reference	**Topic**
Separating the Upper and Lower Frame Assemblies	5.4.1
Joining the Upper and Lower Frame Assemblies	5.4.11

PICTURE 151

Figure 5-33. Document Insert Gate and Backup Roller. To illustrate the backup roller, the print head carriage assembly has been removed. Removal of this assembly is not necessary for this procedure.

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5.4.5 Removing and Replacing the Document Insert Paper Sensor

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Subtopics
5.4.5.1 Removing the Document Insert Paper Sensor
5.4.5.2 Replacing the Document Insert Paper Sensor

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5.4.5.1 Removing the Document Insert Paper Sensor

See "Separating the Upper and Lower Printer Frame Assemblies" in topic 5.4.1. The document insert paper sensor is removed in this procedure.

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5.4.5.2 Replacing the Document Insert Paper Sensor

See "Joining the Upper and Lower Printer Frame Assemblies" in topic 5.4.11. The document insert paper sensor is replaced in this procedure.

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5.4.6 Removing and Replacing the Document Insert/Customer Receipt Motor

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Subtopics

5.4.6.1 Removing the Document Insert/Customer Receipt Motor
5.4.6.2 Replacing the Document Insert/Customer Receipt Motor

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5.4.6.1 Removing the Document Insert/Customer Receipt Motor

1. Separate the upper and lower frame assemblies. See "Separating the Upper and Lower Printer Frame Assemblies" in topic 5.4.1.

2. Move the motor [1] away from the center of the frame to release it from its locating pad.

3. Pivot the motor toward you and lift it out of the frame.

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5.4.6.2 Replacing the Document Insert/Customer Receipt Motor

1. Hold the motor holding clip toward the frame as you put the motor in place.

2. Move the motor toward the center of the frame and into its locating pad.

3. Join the upper and lower frame assemblies. See "Joining the Upper and Lower Printer Frame Assemblies" in topic 5.4.11.

PICTURE 152

Figure 5-34. Document Insert/Customer Receipt Motor

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5.4.7 Removing and Replacing the Journal Paper Motion Emitter Shaft

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Subtopics
5.4.7.1 Removing the Journal Paper Motion Emitter Shaft
5.4.7.2 Replacing the Journal Paper Motion Emitter Shaft

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5.4.7.1 Removing the Journal Paper Motion Emitter Shaft

1. Separate the upper and lower frame assemblies.
2. Release the holding tab [1].
3. Lift the right end of the emitter shaft [2].
4. Move the shaft to the right and lift it out of the frame.

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5.4.7.2 Replacing the Journal Paper Motion Emitter Shaft

1. Ensure that the O-ring is in the center of the emitter shaft before putting the shaft in the printer.

2. Put the left end of the emitter shaft into place.

3. Move the holding tab [1] out of the way and lower the right end of the emitter shaft into place.

4. Join the upper and lower frame assemblies.

Reference	**Topic**
Separating the Upper and Lower Frame Assemblies	5.4.1
Joining the Upper and Lower Frame Assemblies	5.4.11

PICTURE 153

Figure 5-35. Journal Paper Motion Emitter Shaft

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5.4.8 Removing and Replacing the Print Head Home Sensor

Note: This removal and replacement procedure is not recommended for field service personnel. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Subtopics
5.4.8.1 Removing the Print Head Home Sensor
5.4.8.2 Replacing the Print Head Home Sensor

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5.4.8.1 Removing the Print Head Home Sensor

1. Separate the upper and lower frame assemblies.
2. Disconnect the sensor cable from printer card connector J5.
3. Lift the home sensor [1] out of the frame assembly.

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5.4.8.2 Replacing the Print Head Home Sensor

1. Put the home sensor [1] into place.

2. Push the sensor cable connector through the opening below the sensor.

3. Connect the cable to the printer card connector J5 and place the cable in its retainers.

4. Join the upper and lower frame assemblies.

5. Continue at "Adjusting the Print Head Home Sensor" in topic 5.3.2.

Reference	**Topic**
Separating the Upper and Lower Frame Assemblies	5.4.1
Joining the Upper and Lower Frame Assemblies	5.4.11

PICTURE 154

Figure 5-36. Print Head Home Sensor

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5.4.9 Removing and Replacing the Ribbon Drive Shaft

Note: This removal and replacement procedure should be done only by qualified service personnel.

Subtopics
5.4.9.1 Removing the Ribbon Drive Shaft
5.4.9.2 Replacing the Ribbon Drive Shaft

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5.4.9.1 Removing the Ribbon Drive Shaft

1. Separate the upper and lower frame assemblies.

2. Turn the shaft bearing [1] until the slot in the bearing aligns with the retainer [2].

3. Move the bearing to the left over the retainer and out of its mount.

4. Remove the bearing from the shaft by separating the parts [3] as shown in Figure 5-37 in topic 5.4.9.2.

   The bearing parts snap apart.

5. Release the drive shaft coupler [4] by removing the C-clip [5].

6. Pull the coupler off the motor shaft.

7. Remove the shaft from the printer.

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5.4.9.2 Replacing the Ribbon Drive Shaft

1. Push the bearing end of the shaft up through the opening below the bearing mount.

2. Put the bearing on the drive shaft by snapping the bearing parts together, as shown in Figure 5-37.

3. Align the slot [1] in the bearing over the retainer [2].

4. Move the bearing into its mount.

5. Turn the slot toward the rear of the printer and away from the retainer.

6. Connect the ribbon drive shaft coupler [3] to the motor shaft.

7. Attach the coupler to the shaft with the C-clip [3].

8. Join the upper and lower frame assemblies.

Reference	**Topic**
Separating the Upper and Lower Frame Assemblies	5.4.1
Joining the Upper and Lower Frame Assemblies	5.4.11

PICTURE 155

Figure 5-37. Ribbon Drive Shaft and Bearing

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5.4.10 Removing and Replacing the Toggle Assembly

Note: This removal and replacement procedure should be done only by qualified service personnel.

Subtopics
5.4.10.1 Removing the Toggle Assembly
5.4.10.2 Replacing the Toggle Assembly

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5.4.10.1 Removing the Toggle Assembly

To remove the toggle assembly continue at "Separating the Upper and Lower Printer Frame Assemblies" in topic 5.4.1.

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5.4.10.2 Replacing the Toggle Assembly

The toggle assembly is replaced in "Joining the Upper and Lower Printer Frame Assemblies" in topic 5.4.11.

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5.4.11 Joining the Upper and Lower Printer Frame Assemblies

Note: It is not recommended that field service personnel reassemble the printer frame assemblies. However, in some countries where on-site service is available, this procedure may be done by qualified service personnel.

Note: If the document insert sensor or the toggle assembly were removed after separating the frame, start at Step 1. Otherwise start at Step 6.

1. Put the document insert paper sensor [2] into the frame assembly as shown in Figure 5-38 and lock the sensor in place with the retainer [3].
2. Put the toggle assembly [1] into place with the large gear up and toward the side frame, and the rubber rolls toward the frame as shown.
3. Slide the shaft into one of the pivot points.
4. Align the toggle assembly and slide the shaft into the other pivot point.

PICTURE 156

Figure 5-38. Part 1. Installing the Toggle Shaft and Document Sensor

5. Align the document insert paper sensor cable and grounding strap so that they will go through the opening in the frame.
6. Align the upper frame assembly over the lower frame assembly so the two assemblies will install together as shown in Figure 5-39.
7. Use a spring-hook to pull the cable wires through the opening so they are not pinched when the assemblies are connected.
8. Lower the upper frame assembly and push down until the locking tabs lock into place.

   Note: The document insert/customer receipt motor should be moved slightly to allow the toggle shaft to lock into its alignment hole.

PICTURE 157

Figure 5-39. Part 2. Connecting Upper and Lower Frame Assemblies

9. Ensure that the sensor cable is not pinched.
10. Replace the bottom frame screw [1].
11. Replace the printer card in through the bottom of the printer.
12. Push the card in until the holding tabs [2] lock into place.
13. Place the cables under the journal station holding clips [3], starting with the top cable.
14. Connect the cables to the bottom of the card.

    Note: The cable connectors are keyed so they only connect to their matching printer card connectors.

PICTURE 158

Figure 5-40. Part 3. Installing the Printer Card

15. Move the carriage to the center of the printer.
16. Put the belt on the carriage drive pulleys [8].
17. Move the carriage to the extreme left and then to the extreme right. The spring that connects the belt together must not touch either

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pulley.

18. Connect the cover interlock sensor cable J3 to the top of the card.

19. Put a piece of paper into the document insert station.

20. Turn the large toggle gear down. This keeps the toggle assembly from interfering with the paper tear guide when the platen is installed.

PICTURE 159

Figure 5-41. Part 4. Installing the Carriage Belt and Sensor Cable

21. To replace the platen, lubricate the rubber boots [11] with silicon grease (P/N 265390).

22. Put the boots into their slots [12].

23. Move the receipt paper backup roller and spacers to the center of their shaft.

24. Push down on each end of the platen assembly until the boots are approximately halfway down.

25. Replace the top roller [14].

26. Continue to push down on each end of the platen assembly until the boots are at the bottom of their slots.

27. Check to ensure that the platen is parallel with the frame assembly at the points designated by [13] and replace the platen retainers [12a].

28. Check to ensure that the platen grounding strap is properly seated underneath the platen. See Figure 5-18 in topic 5.3.17.2.

29. Remove the piece of paper.

PICTURE 160

Figure 5-42. Part 5. Installing the Platen

30. To replace the top cover assembly, set the assembly on the printer with the left end raised as shown in Figure 5-43.

31. Connect the operator keypad cable to printer card connector J2.

32. Lower the left side of the top cover while aligning the holding tabs [15] over the openings [16] on each side of the document insert slot.

33. Push down and in on each side of the document insert slot until the tabs lock into place.

PICTURE 161

Figure 5-43. Part 6. Installing the Top Cover

34. To replace the bottom cover, align the bottom cover locking tabs [17] over their slots.

    The grounding straps should be centered in the hole for the thumb screw.

35. Push in on the bottom cover until the tabs lock into place.

36. Tighten the thumb screw [18].

PICTURE 162

Figure 5-44. Part 7. Installing the Bottom Cover

37. Set the printer as shown in Figure 5-45.

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38. To replace the document insert paper guide [19], insert a piece of paper into the document insert station.

39. Put the paper guide in through the document insert opening.

40. Push the holding tabs through the openings [20] in the frame assembly.

41. Remove the piece of paper.

42. Move the guide toward the front of the printer to lock the holding tabs in place.

43. Ensure that the guide is installed over the locating pads [21].

CAUTION:
The edge of the guide is sharp. Use care when installing it.

PICTURE 163

Figure 5-45. Part 8. Installing the Document Insert Guide

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5.5 Printer Test Using the 4680 Operating System

1. Start TEST MODE by keying in **S1, 9, 1, S2**.

2. When T0010 is displayed, key in **7, 1, S2** to start the printer test.

3. Press **S2** at the prompts to halt printing at the journal or receipt station.

   - If an error message displays, follow the *User Response* for the message in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

   - If a symptom is observed, follow the *Action* for the symptom in the *IBM 4680 Store System: Problem Determination Guide* after completion of the remaining verification tests.

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5.6 Printer Test Using the Reference Diskette

1. Use your store procedures to stop any application programs that are running on the 4684.

2. Switch **POWER OFF** at the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

3. Do the following to IPL (Initial Program Load) the 4684:

   a. Insert the Reference Diskette in the 4684 diskette drive.
   b. Switch power ON at the 4684.

4. A Reference Diskette Copyright message is displayed.

5. Message M0001 PRESS THE 1 KEY is displayed (on an alphanumeric display only.)

6. Press **1** on the 4684 primary keyboard.

7. MENU-M1 displays.

8. Select START TESTS from MENU-M1.

9. Select RUN POS DEVICE TESTS from MENU-T1.

10. Select PRINTER TEST from MENU-T6.

11. Press **S2** (or Enter on the Enhanced A/N keyboard) to advance to printing in the next print station.

    - If an error message displays, follow the *User Response* for the message in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

    - If a symptom is observed, follow the *Action Sequence* for the symptom in the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

12. Press **S1** (ESC on the Enhanced A/N Keyboard) to return to Menu-T1 from Menu T-6.

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5.7 Printer Sensor Checks

These tables provide the test points required to check the sensors in the point-of-sale printer.

Warning: An 8060A (Fluke) digital CE meter must be used to perform the following printer sensor checks. Other meters may damage the sensors.

Readings other than the expected voltages indicate a failing sensor.

Subtopics
5.7.1 Cover Interlock Sensor
5.7.2 Document Insert Paper Sensor
5.7.3 Print Head Home Sensor
5.7.4 Journal Paper Motion Emitter Sensor

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5.7.1 Cover Interlock Sensor

Meter Lead Connections to the Printer Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J3-3 (Green wire)	J3-1 (Black wire)	0.0 V to 0.4 V (sensor uncovered)
		2.5 V to 5.5 V (sensor covered)
J3-4 (White wire)	J3-1 (Black wire)	1.0 V to 1.5 V (sensor uncovered and covered)

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5.7.2 Document Insert Paper Sensor

Meter Lead Connections to the Printer Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J4-4 (Green wire)	J4-1 (Black wire)	0.0 V to 0.4 V (sensor uncovered)
		2.5 V to 5.5 V (sensor covered)
J4-5 (White wire)	J4-1 (Black wire)	1.0 V to 1.5 V (sensor uncovered and covered)

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5.7.3 Print Head Home Sensor

Meter Lead Connections to the Printer Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J5-4 (Green wire)	J5-1 (Black wire)	0.0 V to 0.4 V (sensor uncovered)
		2.5 V to 5.5 V (sensor covered)
J5-5 (White wire)	J5-1 (Black wire)	1.0 V to 1.5 V (sensor uncovered and covered)

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5.7.4 Journal Paper Motion Emitter Sensor

Note: Rotate the journal paper take-up slowly to see the voltage change.

Meter Lead Connections to the Printer Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J8-3 (Green wire)	J8-1 (Black wire)	0.0 V to 0.4 V (sensor uncovered)
		2.5 V to 5.5 V (sensor covered)
J8-5 (White wire)	J8-1 (Black wire)	1.0 V to 1.5 V (sensor uncovered and covered)

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6.0 Chapter 6. Repairing the Point of Sale Printer Model 3

This chapter contains repair information for the Point of Sale Printer Model 3.

Subtopics

6.1 Start Here
6.2 TEST 6000: Stand-Alone Printer Test
6.3 Printer Test Using the 4680 Operating System
6.4 Printer Test Using the 4684 Reference Diskette
6.5 Printer Messages
6.6 Printer Symptoms
6.7 MAP 6010: Customer Receipt or Journal Paper Advances Continuously
6.8 MAP 6020: Customer Receipt Paper Cutter Does Not Cut Properly
6.9 MAP 6030: Customer Receipt Paper Does Not Advance
6.10 MAP 6040: Customer Receipt Paper Jams
6.11 MAP 6050: Customer Receipt Station is Overprinting
6.12 MAP 6060: Document Insert Paper Advances Continuously
6.13 MAP 6070: Document Insert Station Does Not Feed Documents Correctly or Is Overprinting
6.14 MAP 6080: Home Errors
6.15 MAP 6090: Journal Paper Does Not Advance
6.16 MAP 6100: Journal Station Not Printing
6.17 MAP 6110: Journal Station is Overprinting
6.18 MAP 6120: Power Problems
6.19 MAP 6130: Printed Characters are Light
6.20 MAP 6140: Printed Characters Missing One or More Dot Rows
6.21 MAP 6150: Printed Characters are Smudged
6.22 MAP 6160: Printer Indicator Light Always ON or Comes On Randomly
6.23 MAP 6170: Printer Indicator Light Not ON
6.24 MAP 6180: Printer Indicator Light Not ON when Document Inserted
6.25 MAP 6190: Printer Not Printing Any Characters
6.26 MAP 6200: Ribbon Damaged by Printer
6.27 MAP 6210: Ribbon Does Not Advance
6.28 MAP 6220: T7152 - Home Errors
6.29 MAP 6230: W305 - Home Errors Running Customer Application
6.30 MAP 6240: Customer Receipt Motor Resistance Checks
6.31 MAP 6250: Customer Receipt Paper Cutter Motor Resistance Checks
6.32 MAP 6260: Document Insert Motor Resistance Checks
6.33 MAP 6270: Journal Motor Resistance Checks
6.34 MAP 6280: Print Head Resistance Checks
6.35 MAP 6290: Transport Motor Resistance Checks
6.36 Printer Sensor Checks
6.37 Printer Adjustments Using the 4680 Operating System
6.38 Printer Adjustments Using the 4684 Reference Diskette
6.39 Removal and Replacement Procedures

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6.1 Start Here

The test procedures are written in MAP format and will guide you through each test. The procedures help create a *symptom* that will direct you to a MAP or repair procedure.

If you have a symptom that was not generated by one of these procedures, see "Printer Messages" in topic 6.5 or "Printer Symptoms" in topic 6.6.

Note: Run "TEST 6000: Stand-Alone Printer Test" in topic 6.2 before progressing to "Printer Test Using the 4680 Operating System" in topic 6.3 or "Printer Test Using the 4684 Reference Diskette" in topic 6.4.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment to it or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

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6.2 TEST 6000: Stand-Alone Printer Test

Note: When the printer access cover is open, the ready button [3] functions as a test button. The other four buttons, when pressed individually, function as paper advance buttons. See Figure 6-1 for the location of the printer buttons.

PICTURE 164

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-1. Printer Buttons

001

Note: For safety when running the printer test, make sure personal articles such as ties, necklaces, or bracelets do not get caught in the moving print head.

- Open the cover on the Model 3 printer.

- Ensure the following conditions are met before running the stand-alone test:

  - There is no document inserted in the printer.

  - The paper is installed correctly in both print stations. For installation instructions, see "Replacing the Customer Receipt Paper" in topic 6.39.31 and "Replacing the Journal Station Paper" in topic 6.39.32.

  - The ribbon is in good working condition and it is seated correctly.

- Switch power ON at the point-of-sale terminal.

When the printer resets correctly, the printer indicator light next to ready button [3] comes on for a short time and the print head moves to the center position. See Figure 6-1 for the location of the buttons.

- While observing the printer indicator light, close the printer access cover.

Did the printer indicator light come ON?
Yes No

002

Follow "MAP 6170: Printer Indicator Light Not ON" in topic 6.23.

003

Did the printer indicator light go OFF after a short time?
Yes No

PICTURE 165

Figure 6-2. IH Test Pattern

004

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```
  ¦   +---+
  ¦
  ¦   Follow "MAP 6160:  Printer Indicator Light Always ON or Comes On
  ¦   Randomly" in topic 6.22.
  ¦
+---+
¦005¦
+---+
```

- Open the printer access cover.

Is the printer indicator light flickering?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦006¦
  ¦   +---+
  ¦
  ¦   - Continue at Step 008.
  ¦
+---+
¦007¦
+---+
```

Follow "MAP 6080: Home Errors" in topic 6.14.

```
+---+
¦008¦
+---+
```

(From step 006)

The following steps test the **customer receipt station**.

- Press customer receipt button [2] to advance paper at the customer receipt station.

Did the customer receipt paper advance?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦009¦
  ¦   +---+
  ¦
  ¦   Follow "MAP 6030:  Customer Receipt Paper Does Not Advance" in
  ¦   topic 6.9
  ¦
+---+
¦010¦
+---+
```

- Press and hold the ready button [3] and then press the customer receipt button [2] to start the printer test.

The test begins and prints 50 lines of 38 characters.

Allow at least 10 lines to print before stopping the test. You can stop the test at any time by pressing the ready button [3]. This will also cause the paper cutter to cut the paper.

Did anything print?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦011¦
  ¦   +---+
  ¦
  ¦   Follow "MAP 6190:  Printer Not Printing Any Characters" in topic 6.25
```

PICTURE 166

Figure 6-3. IH Pattern

```
  ¦
+---+
¦012¦
+---+
```

- Compare the printing at the customer receipt station with Figure 6-2 and Figure 6-3.

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Did all rows of dots print on the IH pattern?
Yes **No**

013

Follow "MAP 6140: Printed Characters Missing One or More Dot Rows" in topic 6.20

014

Did the IH pattern print correctly without overprinting?
Yes **No**

015

Follow "MAP 6050: Customer Receipt Station is Overprinting" in topic 6.11

016

The paper cutter should cut all but a small tab on the receipt paper.

Did the paper cutter cut the customer receipt paper correctly?
Yes **No**

017

Follow "MAP 6020: Customer Receipt Paper Cutter Does Not Cut Properly" in topic 6.8.

018

The following steps test the **journal station**.

- Press journal button [1] to advance paper at the journal station. See Figure 6-1.

Did the journal paper advance?
Yes **No**

019

Follow "MAP 6090: Journal Paper Does Not Advance" in topic 6.15.

020

- Press and hold the ready button [3] and then press the journal button [1] to start the printer test.

The test begins and prints 50 lines of 38 characters.

Note: If the journal paper movement sensor does not sense paper movement, the print head will move but print wires will not be activated.

Allow at least 10 lines to print before stopping the test. You can stop the test at any time by pressing the ready button [3].

Did anything print?
Yes **No**

021

Follow "MAP 6100: Journal Station Not Printing" in topic 6.16

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```
¦022¦
+---+
```

- Compare the printing at the journal station with Figure 6-2.

Did the IH pattern print correctly without overprinting?

```
Yes  No
 ¦    ¦
 ¦   +---+
 ¦   ¦023¦
 ¦   +---+
 ¦
 ¦   Follow "MAP 6110:  Journal Station is Overprinting" in topic 6.17.
 ¦
+---+
¦024¦
+---+
```

The following steps test the **document insert station**.

- Close the printer access cover.

- Insert a document into the front of the printer while observing the printer indicator light.

Did the printer indicator light come ON?

```
Yes  No
 ¦    ¦
 ¦   +---+
 ¦   ¦025¦
 ¦   +---+
 ¦
 ¦   Follow "MAP 6180:  Printer Indicator Light Not ON when Document
 ¦   Inserted" in topic 6.24.
 ¦
+---+
¦026¦
+---+
```

- Remove the document from the front of the printer and insert it into the top of the printer.

Did the printer indicator light come ON?

```
Yes  No
 ¦    ¦
 ¦   +---+
 ¦   ¦027¦
 ¦   +---+
 ¦
 ¦   Follow "MAP 6180:  Printer Indicator Light Not ON when Document
 ¦   Inserted" in topic 6.24.
 ¦
 ¦
+---+
¦028¦
+---+
```

- Press the ready button [3].

Did the document advance into the printer?

```
Yes  No
 ¦    ¦
 ¦   +---+
 ¦   ¦029¦
 ¦   +---+
 ¦
 ¦   The document is not inserted correctly.  Insert it again and return
 ¦   to Step 028.
 ¦
 ¦   - or -
 ¦
 ¦   Replace the printer card.  See "Removing and Replacing the Printer
 ¦   Card" in topic 6.39.29.
 ¦
+---+
¦030¦
+---+
```

- Press button the document insert up button [4], then press the document insert down button [5].

Did the document move up and then down in the printer?

```
Yes  No
 ¦    ¦
```

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```
  ¦   +---+
  ¦   ¦031¦
  ¦   +---+
  ¦
  ¦   Follow "MAP 6070:  Document Insert Station Does Not Feed Documents
  ¦   Correctly or Is Overprinting" in topic 6.13
  ¦
+---+
¦032¦
+---+
```

- Open the printer access cover.

- Press and hold the ready button [3] and then press the document insert down button [5] to start the printer test.

The test begins and prints lines of 38 characters for 50 lines or until the end of the document is reached.

Allow a few lines to print before stopping the test. You can stop the test at any time by pressing the ready button [3].

Did the printer print without overprinting?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦033¦
  ¦   +---+
  ¦   See "MAP 6070:  Document Insert Station Does Not Feed Documents
  ¦   Correctly or Is Overprinting" in topic 6.13.
  ¦
+---+
¦034¦
+---+
```

Stand-alone testing of the printer is complete. You can request a printer test using the 4680 Operating System or the 4684 Reference Diskette for further testing. See "Printer Test Using the 4680 Operating System" or "Printer Test Using the 4684 Reference Diskette" in topic 6.4.

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6.3 Printer Test Using the 4680 Operating System

1. Press **S1**, type **91**, and then press **S2** to start TEST MODE.

2. When T0010 displays, type **71** and then press **S2** to start the printer test.

3. Press **S2** to advance through the printer test steps.

   - If an error message displays, follow the Repair Action under "Printer Messages" in topic 6.5.

   - If a symptom is observed, follow the Repair Action under "Printer Symptoms" in topic 6.6.

4. Type **9 9** and then press **S2** to exit.

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6.4 Printer Test Using the 4684 Reference Diskette

1. Select START TESTS from MENU-M1.

   Note: If MENU-M1 is not displayed, go to "Running 4684 Tests Using the Reference Diskette" in topic 2.14.

2. Select RUN POS DEVICE TESTS from MENU-T1.

   Note: If you have a 4683 terminal attached to the 4684, MENU-T7 is displayed. From this menu, select the terminal whose printer you want to test.

3. Select PRINTER TEST from MENU-T6.

4. Press **S2** (**Enter** on the Enhanced A/N or ANPOS Keyboard) to advance through the printer test steps.

   - If an error message displays, follow the Repair Action under "Printer Messages" in topic 6.5.
   - If a symptom is observed, follow the Repair Action under "Printer Symptoms" in topic 6.6.
   - Press **S1** (**Esc** on the Enhanced A/N or ANPOS Keyboard) to return to the previous menu.

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6.5 Printer Messages

Use the following table to determine the cause of a printer message.

Table 6-1. Printer Messages

Printer Message	**Repair Action**
6334, 6338, 63B4, 63B8	Follow "Printer Test Using the 4680 Operating System" in topic 6.3 or "Printer Test Using the 4684 Reference Diskette" in topic 6.4.
T7151	□ Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29. □ Replace cable 7.
T7152	Follow "MAP 6220: T7152 - Home Errors" in topic 6.28.
T7153	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7154	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7155	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7156	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7157	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7159	Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7167	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
T7168	If printer stand-alone tests run OK, replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
W304	Follow "Printer Test Using the 4680 Operating System" in topic 6.3 or "Printer Test Using the 4684 Reference Diskette" in topic 6.4.
W305	Follow "MAP 6230: W305 - Home Errors Running Customer Application" in topic 6.29.
W354	Change the terminal device group buffer size for the terminal that logged this error.
W355	Place the same model printers on the 4683-*xx*1 and 4683-*xx*2, then re-IPL the 4683-*xx*1.

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6.6 Printer Symptoms

Use the following table to determine the cause of a printer symptom.

Table 6-2. Printer Symptoms

Printer Symptom	Repair Action
The **customer receipt paper cutter** does not cut correctly.	Follow "MAP 6020: Customer Receipt Paper Cutter Does Not Cut Properly" in topic 6.8.
The **customer receipt station** does not advance paper.	Follow "MAP 6030: Customer Receipt Paper Does Not Advance" in topic 6.9.
The **customer receipt station** advances paper continuously.	Follow "MAP 6010: Customer Receipt or Journal Paper Advances Continuously" in topic 6.7.
The **customer receipt station** gets paper jams.	Follow "MAP 6040: Customer Receipt Paper Jams" in topic 6.10.
The **customer receipt station** is overprinting.	Follow "MAP 6050: Customer Receipt Station is Overprinting" in topic 6.11.
The **document insert station** does not advance inserted documents.	Follow "MAP 6070: Document Insert Station Does Not Feed Documents Correctly or Is Overprinting" in topic 6.13.
The **document insert station** advances documents continuously.	Follow "MAP 6060: Document Insert Paper Advances Continuously" in topic 6.12.
The **document insert station** is overprinting.	Follow "MAP 6070: Document Insert Station Does Not Feed Documents Correctly or Is Overprinting" in topic 6.13.
The **journal paper spool** does not wind paper tightly.	Replace the journal pawl. See "Removing and Replacing the Journal Drive Gears and Pawl" in topic 6.39.17.
The **journal station** does not advance paper.	Follow "MAP 6090: Journal Paper Does Not Advance" in topic 6.15.
The **journal station** advances paper continuously.	Follow "MAP 6010: Customer Receipt or Journal Paper Advances Continuously" in topic 6.7.
The **journal station** gets paper jams.	Load the paper or take-up spool correctly or replace the journal assembly. See "Removing and Replacing the Journal Roller Holder Assembly and Frame" in topic 6.39.21.
The **journal station** does not print any characters.	Follow "MAP 6100: Journal Station Not Printing" in topic 6.16.
The **journal station** is overprinting.	Follow "MAP 6110: Journal Station is Overprinting" in topic 6.17.
The **keylock** does not work.	Replace the keylock. See "Removing and Replacing the Journal Cover Keylock" in topic 6.39.16.
The **print head** does not return to center home.	Follow "MAP 6220: T7152 - Home Errors" in topic 6.28. See "Removing and Replacing the Print Head Home Sensor Card" in topic 6.39.27.
The **printed characters** are not centered on the paper.	Adjust the print head home sensor card. See "Removing and Replacing the Print Head Home Sensor Card" in topic 6.39.27.
The **printed characters** are light.	Follow "MAP 6130: Printed Characters are Light" in topic 6.19.
The **printed characters** are not spaced correctly.	Replace the print head transport assembly. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

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The **printed characters** are missing one or more dot rows.	Follow "MAP 6140: Printed Characters Missing One or More Dot Rows" in topic 6.20.
The **printed characters** are smudged.	Follow "MAP 6150: Printed Characters are Smudged" in topic 6.21.
The **printed characters** have extra dots.	Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.
The **printer** does not print.	Follow "MAP 6190: Printer Not Printing Any Characters" in topic 6.25.
The **printer** does not power-ON.	Follow "MAP 6120: Power Problems" in topic 6.18.
The **printer** causes the point-of-sale terminal power supply to shut down.	Follow "MAP 6120: Power Problems" in topic 6.18.
The **printer** causes the point-of-sale terminal display to go blank.	Follow "MAP 6120: Power Problems" in topic 6.18.
The **printer** indicator light does not come ON when a document is inserted.	Follow "MAP 6180: Printer Indicator Light Not ON when Document Inserted" in topic 6.24.
The **printer** indicator light is flickering.	Follow "MAP 6080: Home Errors" in topic 6.14.
The **printer** indicator light is always ON.	Follow "MAP 6160: Printer Indicator Light Always ON or Comes On Randomly" in topic 6.22.
The **printer** indicator light never comes ON.	Follow "MAP 6170: Printer Indicator Light Not ON" in topic 6.23.
The **ribbon** does not advance.	Follow "MAP 6210: Ribbon Does Not Advance" in topic 6.27.
The **ribbon** is damaged by the printer.	Follow "MAP 6200: Ribbon Damaged by Printer" in topic 6.26.

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6.7 MAP 6010: Customer Receipt or Journal Paper Advances Continuously

Symptom Explanation	**Conditions That Could Cause This Symptom**
The journal or customer receipt station advances paper continuously.	□ The top button assembly is failing. □ The printer card is failing.

001

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Disconnect cable J8 from the printer card. Refer to Figure 6-4.

- Switch power ON at the terminal.

Did the paper stop advancing?

Yes — **No**

002

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

003

Replace the button assembly. See "Removing and Replacing the Button Assembly (Top)" in topic 6.39.5.

PICTURE 167

Figure 6-4. Printer Card Connections

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6.8 MAP 6020: Customer Receipt Paper Cutter Does Not Cut Properly

Symptom Explanation	**Conditions That Could Cause This Symptom**
The customer receipt paper cutter does not cut correctly.	□ The customer receipt paper cutter is jammed. □ The customer receipt paper cutter is failing.

PICTURE 168

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-5. Printer Buttons

001

Have you run the stand-alone printer test?

Yes — **No**

002

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Open the paper cutter cover by pulling up on the front of it.

- Check for objects or paper jammed between the cutter blades or jammed in the cutter mechanism.

Is the cutter mechanism clear?

Yes — **No**

004

Clear any jams and run the printer stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

005

At the end of the following customer receipt printer test, the paper cutter will cut the customer receipt paper:

- Switch power ON at the terminal.

- Press and hold the ready button [3]. See Figure 6-5.

- Press the customer receipt button [2].

- Release both buttons.

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- While observing the paper cutter, press the ready button [3]

The paper cutter gears, [1] in Figure 6-6, should move smoothly and the paper cutter blades should completely retract.

Did the paper cutter operate correctly?

Yes → **007**

No → **006**

Replace the paper cutter. See "Removing and Replacing the Customer Receipt Paper Cutter" in topic 6.39.10.

The paper cutter is working correctly.

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 169

Figure 6-6. Paper Cutter Drive Gears

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6.9 MAP 6030: Customer Receipt Paper Does Not Advance

Symptom Explanation	**Conditions That Could Cause This Symptom**
The paper in the customer receipt station does not advance.	□ There are obstructions in the customer receipt paper path. □ The customer receipt motor mount is failing. □ The customer receipt assembly is failing. □ The top button assembly is failing. □ The customer receipt motor is failing. □ The print head is failing. □ The document insert motor is failing. □ The printer card is failing.

PICTURE 170

Figure 6-7. Customer Receipt Motor Gear

001

- Switch **POWER OFF** at the terminal.

- Remove the paper from the customer receipt station and check for anything blocking the paper path.

Is the paper path clear of obstructions?
Yes **No**

002

Clear the paper path, load new paper and test the printer. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2 and run the stand-alone tests.

003

- Switch power ON at the terminal.

- Press the customer receipt button [2]. See Figure 6-8.

- Observe the gear [1] on the side of the station. See Figure 6-7.

Did the gear turn?
Yes **No**

004

- Continue at Step 010.

005

- Observe the other gears in the drive train.

Did the other gears turn?
Yes **No**

006

Replace the customer receipt motor mount. See "Removing and

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Replacing the Customer Receipt Motor Mount" in topic 6.39.9.

007

- Load paper into the customer receipt station. See "Replacing the Customer Receipt Paper" in topic 6.39.31.

Does the paper now advance?
Yes **No**

008

Replace the customer receipt assembly. See "Removing and Replacing the Customer Receipt Roller Holder Assembly and Frame" in topic 6.39.11.

PICTURE 171

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-8. Printer Buttons

PICTURE 172

Figure 6-9. Printer Card Connections

009

The customer receipt assembly is now working correctly.

010

(From step 004)

- Measure for +5 V dc between J8-2 (negative) and J8-1 (positive) on the printer card. Refer to Figure 6-9.

- Press the customer receipt button [2]. The voltage should drop to less than +0.5 V dc.

Did the voltage drop?
Yes **No**

011

Replace the top button assembly. See "Removing and Replacing the Button Assembly (Top)" in topic 6.39.5.

012

- Check the customer receipt motor. See "MAP 6240: Customer Receipt Motor Resistance Checks" in topic 6.30.

Is the customer receipt motor OK?
Yes **No**

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```
  ¦   ¦013¦
  ¦   +---+
  ¦
  ¦   Replace the customer receipt motor.  See "Removing and Replacing the
  ¦   Customer Receipt Motor" in topic 6.39.8.
  ¦
+---+
¦014¦
+---+
```

- Check the print head for electrical shorts. See "MAP 6280: Print Head Resistance Checks" in topic 6.34.

Is the print head OK?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦015¦
  ¦   +---+
  ¦
  ¦   Replace the print head.  See "Removing and Replacing the Print Head"
  ¦   in topic 6.39.26.
  ¦
+---+
¦016¦
+---+
```

- Check the document insert motor. See "MAP 6260: Document Insert Motor Resistance Checks" in topic 6.32.

Is the document insert motor OK?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦017¦
  ¦   +---+
  ¦
  ¦   Replace the document insert motor.  See "Removing and Replacing the
  ¦   Document Insert Motor" in topic 6.39.12.
  ¦
+---+
¦018¦
+---+
```

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

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6.10 MAP 6040: Customer Receipt Paper Jams

Symptom Explanation	**Conditions That Could Cause This Symptom**
The customer receipt paper jams.	□ The customer receipt paper cutter is jammed. □ The customer receipt paper cutter is failing. □ The customer receipt assembly is failing. □ The printer card is failing.

PICTURE 173

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-10. Printer Buttons

001

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Open the paper cutter cover by pulling up on the front of it.

- Ensure that the paper is correctly installed. For installation instructions, see "Replacing the Customer Receipt Paper" in topic 6.39.31.

- Check for objects or paper jammed between the paper cutter blades or in the paper cutter.

Is the paper cutter clear?
Yes No

002

Clear the paper cutter and run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

At the end of the following customer receipt printer test, the paper cutter will cut the customer receipt paper:

- Switch power ON at the terminal.

- Press and hold the ready button [3]. See Figure 6-5 in topic 6.8.

- Press the customer receipt button [2].

- Release both buttons.

- While observing the paper cutter, press the ready button [3].

The paper cutter gears, [1] in Figure 6-11, should move smoothly and the paper cutter blades should completely retract.

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Did the paper cutter operate correctly?

Yes — proceed to **005**

No — proceed to **004**

004

Replace the paper cutter. See "Removing and Replacing the Customer Receipt Paper Cutter" in topic 6.39.10.

005

Replace the customer receipt assembly. See "Removing and Replacing the Customer Receipt Roller Holder Assembly and Frame" in topic 6.39.11.

PICTURE 174

Figure 6-11. Paper Cutter Drive Gears

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6.11 MAP 6050: Customer Receipt Station is Overprinting

Symptom Explanation	Conditions That Could Cause This Symptom
The customer receipt station is overprinting.	□ The customer receipt station paper rollers are failing. □ The customer receipt paper is jammed. □ The customer receipt motor is failing. □ The customer receipt assembly is failing.

001

Have you run the stand-alone test?

Yes — **No**

002

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

- Lift the paper roll and check that the paper rollers in the bottom of the customer receipt station turn freely.

Did the paper rollers turn freely?

Yes — **No**

004

Replace the paper rollers. See "Removing and Replacing the Paper Rollers" in topic 6.39.24.

005

- Ensure that the paper is correctly installed and moves freely through the printer without jamming. For installation instructions, see "Replacing the Customer Receipt Paper" in topic 6.39.31.

Is the customer receipt paper moving freely through the printer?

Yes — **No**

006

See "MAP 6040: Customer Receipt Paper Jams" in topic 6.10.

007

- Check the customer receipt motor. See "MAP 6240: Customer Receipt Motor Resistance Checks" in topic 6.30.

Is the customer receipt motor OK?

Yes — **No**

008

Replace the customer receipt motor. See "Removing and Replacing the Customer Receipt Motor" in topic 6.39.8.

009

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Replace the customer receipt assembly. See "Removing and Replacing the Customer Receipt Roller Holder Assembly and Frame" in topic 6.39.11.

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6.12 MAP 6060: Document Insert Paper Advances Continuously

Symptom Explanation	**Conditions That Could Cause This Symptom**
The paper in the document insert station advances continuously.	□ The front button assembly is failing. □ The printer card is failing.

001

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Disconnect cable J9 from the printer card.

Did the paper stop advancing?

Yes → **No**

002

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

003

Replace the front button assembly. See "Removing and Replacing the Button Assembly (Front)" in topic 6.39.4.

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6.13 MAP 6070: Document Insert Station Does Not Feed Documents Correctly or Is Overprinting

Symptom Explanation	**Conditions That Could Cause This Symptom**
The document insert station does not advance paper in one or both directions.	□ The document insert gears are failing. □ The document insert motor is failing. □ The forms compensation hardware is failing. □ The printer card is failing. □ The front button assembly is failing.

PICTURE 175

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-12. Printer Buttons

PICTURE 176

Figure 6-13. Document Insert Gears

001

Have you run the stand-alone test?
Yes No

002

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Press the document insert up button [4].

- Observe that the gears, [1] in Figure 6-13, rotate and that there is no damage to their teeth.

- Ensure that the document insert shaft, [2] in Figure 6-13, is not slipping and rotating inside the gear.

- Check the same conditions as above while pressing the document insert down button [5].

Did at least one of the gears turn?
Yes No

004

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```
  ¦   - Continue at Step 012.
  ¦
+---+
¦005¦
+---+
```

Did all of the gears rotate?
Yes No

```
  ¦    ¦
  ¦   +---+
  ¦   ¦006¦
  ¦   +---+
  ¦   Replace the failing document insert gear.
  ¦
+---+
¦007¦
+---+
```

- Check the document insert motor. See "MAP 6260: Document Insert Motor Resistance Checks" in topic 6.32.

Is the motor OK?
Yes No

```
  ¦    ¦
  ¦   +---+
  ¦   ¦008¦
  ¦   +---+
  ¦
  ¦   Replace the document insert motor. See "Removing and Replacing the
  ¦   Document Insert Motor" in topic 6.39.12.
  ¦
+---+
¦009¦
+---+
```

- Pull the forms compensation shaft forward toward the front of the printer and then allow it to return to its original position. Move the forms compensation shaft using [2] in Figure 6-14.

- Slip a piece of paper under the four metal rollers on the shaft, [1] in Figure 6-14.

Does the paper slip under the paper rollers?
Yes No

PICTURE 177

Figure 6-14. Forms Compensation Hardware

```
  ¦    ¦
  ¦   +---+
  ¦   ¦010¦
  ¦   +---+
  ¦
  ¦   Check for objects that may be obstructing the paper rollers.
  ¦
  ¦   - or -
  ¦
  ¦   The forms compensation hardware is failing. Call the IBM Support
  ¦   Center.
  ¦
+---+
¦011¦
+---+
```

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

```
+---+
¦012¦
+---+
```

(From step 004)

- Measure the voltage between J9-4 (negative) and J9-1 (positive). Refer to Figure 6-15.

- Press the document insert down button [5]. The voltage should drop from +5 V dc to less than +0.5 V dc.

Did the voltage drop?
Yes No

```
  ¦    ¦
```

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```
  ¦   +---+
  ¦   ¦013¦
  ¦   +---+
  ¦
  ¦   Replace the front button assembly.  See "Removing and Replacing the
  ¦   Button Assembly (Front)" in topic 6.39.4.
  ¦
+---+
¦014¦
+---+
```

- Measure the voltage between J9-4 (negative) and J9-2 (positive).

- Press the document insert up button [4]. The voltage should drop from +5 V dc to less than +0.5 V dc.

Did the voltage drop?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦015¦
  ¦   +---+
  ¦
  ¦   Replace the front button assembly.  See "Removing and Replacing the
  ¦   Button Assembly (Front)" in topic 6.39.4.
  ¦
+---+
¦016¦
+---+
```

- Check the document insert motor. See "MAP 6260: Document Insert Motor Resistance Checks" in topic 6.32.

Is the motor OK?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦017¦
  ¦   +---+
  ¦
  ¦   Replace the document insert motor.  See "Removing and Replacing the
  ¦   Document Insert Motor" in topic 6.39.12.
  ¦
+---+
¦018¦
+---+
```

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

PICTURE 178

Figure 6-15. Printer Card Connections

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6.14 MAP 6080: Home Errors

Symptom Explanation	**Conditions That Could Cause This Symptom**
The print head is not reaching the center of the home sensor when expected or it reached the home sensor too soon.	□ The print head path is blocked. □ The home sensor card is failing. □ The transport motor is failing. □ The printer card is failing.

001

- Clean the sensors on the home sensor card. See "Home Sensor Card" in topic 6.36.6.2.

Does the printer still fail?

Yes → **002**

No

The printer is now running correctly.

003

- Ensure that the levers for the customer receipt station and the journal station are pushed toward the rear of the printer.

- Ensure that the printer ribbon cartridge is installed correctly and advances when the print head moves. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

- Check that the customer receipt or journal paper is not jammed.

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Ensure that the cable connecting the home sensor card to the printer card is plugged in correctly at both ends.

- Move the print head all the way to the left and to the right.

Did the print head move freely?

Yes → **004**

No

- Continue at Step 010.

005

- Switch power ON at the terminal.

- See Table 6-7 in topic 6.36.5 and perform the sensor check to verify that the sensor card is operating correctly.

Is the home sensor card OK?

Yes → **006**

No

Replace the home sensor card. See "Removing and Replacing the Print Head Home Sensor Card" in topic 6.39.27.

- or -

Replace the home sensor card cable.

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007

- Switch **POWER OFF** at the terminal.

- Remove the printer ribbon cartridge.

- Check the transport motor resistance. See "MAP 6290: Transport Motor Resistance Checks" in topic 6.35.

Are all the measurements correct?
Yes **No**

008

Replace the print head transport assembly. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

009

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

010

(From step 004)

- Check if the print head carriage is hitting a sensor on the home sensor card.

Is the print head carriage hitting a sensor on the home sensor card?
Yes **No**

011

Replace the print head transport assembly. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

012

Adjust the home sensor card so the carriage clears the sensors, [1] and [2] in Figure 6-16.

PICTURE 179

Figure 6-16. Print Head Home Sensor Card

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6.15 MAP 6090: Journal Paper Does Not Advance

Symptom Explanation	**Conditions That Could Cause This Symptom**
The paper in the journal station does not feed correctly	□ The journal drive gears are failing. □ The journal assembly is failing. □ The top button assembly is failing □ The journal motor is failing. □ The printer card is failing.

PICTURE 180

Figure 6-17. Journal Drive Gears

001

Have you run the stand-alone test?
Yes No

002

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Remove the paper from the journal station and check for anything blocking the paper path.

Is the paper path clear?
Yes No

PICTURE 181

Figure 6-18. Printer Card Connections

004

Clear the paper path, load new paper, and test the printer. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

005

- Switch power ON at the terminal.

- Press the journal paper button [1].

- Observe the gear attached to the journal motor.

Did the gear turn?
Yes No

006

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- Continue at Step 012.

007

- Observe the other gears in the drive train. Refer to Figure 6-17

Did the other gears turn?
Yes No

PICTURE 182

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-19. Printer Buttons

008

The journal drive gears are failing. See "Removing and Replacing the Journal Drive Gears and Pawl" in topic 6.39.17 and replace the assembly.

009

- Load paper into the journal station. See "Replacing the Journal Station Paper" in topic 6.39.32.

Does the paper now feed correctly?
Yes No

010

Replace the journal assembly. See "Removing and Replacing the Journal Roller Holder Assembly and Frame" in topic 6.39.21.

011

The journal station is working correctly.

012

(From step 006)

- Measure for +5 V dc between J8-2 (negative) and J8-3 (positive). Refer to Figure 6-18.

- Press the journal button [1]. See Figure 6-19 The voltage should drop to less than +0.5 V dc.

Did the voltage drop?
Yes No

013

Replace the top button assembly. See "Removing and Replacing the Button Assembly (Top)" in topic 6.39.5.

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014

- Check the journal motor for electrical shorts. See "MAP 6270: Journal Motor Resistance Checks" in topic 6.33.

Is the journal motor OK?

Yes — **No**

015

Replace the journal motor. See "Removing and Replacing the Journal Motor" in topic 6.39.18.

016

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

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6.16 MAP 6100: Journal Station Not Printing

Symptom Explanation	**Conditions That Could Cause This Symptom**
The journal station does not print. This is a paper movement error.	□ The journal paper sensor is failing. □ The emitter O-ring has come off of the emitter wheel rim. □ The printer card is failing. □ The journal assembly is failing. □ The journal paper is jammed.

001

Have you run the stand-alone test?

Yes — Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

No — **002**

003

- Switch **POWER OFF** at the terminal and remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Switch power ON at the terminal and press the journal paper button [1].

Did the journal paper advance?

Yes — Follow "MAP 6090: Journal Paper Does Not Advance" in topic 6.15.

No — **004**

PICTURE 183

Figure 6-20. Journal Assembly

005

- Check the journal paper sensor. See "Journal Paper Motion Emitter Sensor" in topic 6.36.3.

Is the sensor OK?

Yes — Replace the journal paper sensor. See "Removing and Replacing the Journal Roller Holder Assembly and Frame" in topic 6.39.21.

No — **006**

007

- Ensure that the O-ring [1] that turns the emitter wheel is on the emitter wheel rim.

Is the O-ring OK?

Yes

No

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```
  ¦   ¦008¦
  ¦   +---+
  ¦
  ¦   Put the O-ring back on the emitter wheel rim.  Refer to Figure 6-20.
  ¦
+---+
¦009¦
+---+
```

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

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6.17 MAP 6110: Journal Station is Overprinting

Symptom Explanation	**Conditions That Could Cause This Symptom**
The journal station is overprinting.	□ The journal station rollers are failing. □ The journal motor is failing. □ The journal assembly is failing.

001

Have you run the stand-alone test?

Yes **No**

002

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

- Lift the paper roll and check that the paper rollers in the bottom of the journal station turn freely.

Did the paper rollers turn freely?

Yes **No**

004

Replace the paper rollers. See "Removing and Replacing the Paper Rollers" in topic 6.39.24.

005

- Check the journal motor. See "MAP 6270: Journal Motor Resistance Checks" in topic 6.33.

Is the journal motor OK?

Yes **No**

006

Replace the journal motor. See "Removing and Replacing the Journal Motor" in topic 6.39.18.

007

Replace the journal assembly. See "Removing and Replacing the Journal Roller Holder Assembly and Frame" in topic 6.39.21.

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6.18 MAP 6120: Power Problems

Symptom Explanation	**Conditions That Could Cause This Symptom**
The printer does not power-ON or loses power when trying to print.	□ The terminal is powered-**OFF**. □ The terminal power supply is failing. □ Cable 7 is not connected. □ The print head or a motor is failing. □ The printer card is failing.

PICTURE 184

Figure 6-21. Printer Card Connections

001

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Switch power ON at the terminal.

Did the terminal power-ON?

Yes → **No**

002

- Continue at Step 018.

003

- Check for +34.5 to +41 V dc between printer card connector J10 pin 2 (positive) and pin 1 (negative). See Figure 6-21.

- Check for +4.75 to +5.25 V dc between printer card connector J9 pin 6 (positive) and pin-4 (negative). See Figure 6-21.

Are the voltages within range?

Yes → **No**

004

Exchange the power supply in the point-of-sale terminal. See "Removing and Replacing the 4684 System Unit Power Supply" in topic 2.13.6 for a 4684 **or** see "Removing and Replacing the 4683 Base Unit Power Supply" in topic 1.4.7.

- or -

Replace cable 7.

005

A shorted coil on the print head or shorted field on a motor can draw too much current and cause the power supply on the terminal to switch off.

- Check the print head for electrical shorts. See "MAP 6280: Print Head Resistance Checks" in topic 6.34.

Is the print head OK?

Yes → **No**

006

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Replace the print head. See "Removing and Replacing the Print Head" in topic 6.39.26.

007

- Check the customer receipt motor for electrical shorts. See "MAP 6240: Customer Receipt Motor Resistance Checks" in topic 6.30.

Is the customer receipt motor OK?

Yes **No**

008

Replace the customer receipt motor. See "Removing and Replacing the Customer Receipt Motor" in topic 6.39.8.

009

- Check the paper cutter motor for electrical shorts. See "MAP 6250: Customer Receipt Paper Cutter Motor Resistance Checks" in topic 6.31.

Is the paper cutter motor OK?

Yes **No**

010

Replace the paper cutter motor. See "Removing and Replacing the Customer Receipt Paper Cutter" in topic 6.39.10.

011

- Check the journal motor for electrical shorts. See "MAP 6270: Journal Motor Resistance Checks" in topic 6.33.

Is the journal motor OK?

Yes **No**

012

Replace the journal motor. See "Removing and Replacing the Journal Motor" in topic 6.39.18.

013

- Check the document insert motor for electrical shorts. See "MAP 6260: Document Insert Motor Resistance Checks" in topic 6.32.

Is the document insert motor OK?

Yes **No**

014

Replace the document insert motor. See "Removing and Replacing the Document Insert Motor" in topic 6.39.12.

015

- Check the transport motor for electrical shorts. See "MAP 6290: Transport Motor Resistance Checks" in topic 6.35.

Is the transport motor OK?

Yes **No**

016

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Replace the print head transport assembly. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

017

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

PICTURE 185

Figure 6-22. Printer Extension Card Connections

018

(From step 002)

- Switch **POWER OFF** at the terminal.

- Unplug cable 7 from the printer.

- Switch power ON at the terminal.

Does the terminal power-ON?
Yes **No**

019

For a 4683, continue at MAP 1020 step 027 in topic 1.2.

- or -

For a 4684, Continue at MAP 2090 step 001 in topic 2.11.

020

- Switch **POWER OFF** at the terminal.

- Unplug printer card connectors J2, J3, J4, J5, J6, J7, J8, J9, and J10.

- Reconnect cable 7 to the printer.

- Switch power ON at the terminal.

Does the terminal power-ON?
Yes **No**

021

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

022

- Switch **POWER OFF** at the terminal.

- Reconnect J2.

- Switch power ON at the terminal.

Does the terminal power-ON?
Yes **No**

023

- Continue at Step 027.

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024

One of the cables you disconnected is the cause of the problem.

- Switch **POWER OFF** at the terminal.

- Reconnect one of the following connectors : J3, J4, J5, J6, J7, J8, J9, and J10.

- Switch power ON at the terminal.

Does the terminal power-ON?

Yes → **026**

No → **025**

- Reconnect the remaining cables.

Replace the failing FRU connected to that cable.

026

- Return to Step 024 and reconnect another cable.

027

(From step 023)

- Switch **POWER OFF** at the terminal.

- Unplug the following printer card connectors from the extension card: J101, J102, J106, J107, J108, and J109. See Figure 6-22.

  Note: The cable in J103 is part of the card.

- Switch power ON at the terminal.

Does the terminal power-ON?

Yes → **029**

No → **028**

Replace the printer extension card. See "Removing and Replacing the Printer Extension Card" in topic 6.39.30.

029

One of the cables you disconnected is the cause of the problem.

- Switch **POWER OFF** at the terminal.

- Reconnect one of the following connectors : J101, J102, J106, J107, J108, and J109.

- Switch power ON at the terminal.

Does the terminal power-ON?

Yes → **031**

No → **030**

- Reconnect the remaining cables.

Replace the failing FRU connected to that cable.

031

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```
- Return to Step 029 and reconnect another cable.
-------------------------------------------------------------------------
```

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6.19 MAP 6130: Printed Characters are Light

Symptom Explanation	**Conditions That Could Cause This Symptom**
The printed characters are light.	□ The ribbon is not in good condition. □ The ribbon is not turning. □ The print head gap needs adjustment. □ The forms compensation hardware is failing.

PICTURE 186

[1] = Journal Button
[2] = Customer Receipt Button
[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.
[4] = Document Insert **up** Button.
[5] = Document Insert **down** Button.

Figure 6-23. Printer Buttons

001

Note: Ensure that the ribbon is in good condition.

- Switch **POWER OFF** at the terminal.

- Manually move the print head left to right and then right to left.

The ribbon should move only when the print head is moving from left to right.

Does the ribbon turn when the print head is moved?
Yes No

002

See "MAP 6210: Ribbon Does Not Advance" in topic 6.27 and continue problem isolation procedures.

003

- Take an 8 1/2 x 11 sheet of paper and run it back and forth through the document insert station using the document insert up button [4] and the document insert down button [5]. See Figure 6-23.

- Run the stand-alone printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

Did the stand-alone test run successfully?
Yes No

004

- Continue at Step 006.

005

The printer is now operating correctly.

006

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- Pull back on the forms compensation shaft and then let go of the shaft.
  Move the forms compensation shaft using [2] in Figure 6-24.

Did the shaft spring back on both ends?
Yes No

PICTURE 187

Figure 6-24. Forms Compensation Hardware

```
  ¦    ¦
  ¦   +---+
  ¦   ¦007¦
  ¦   +---+
  ¦
  ¦
  ¦   The forms compensation hardware is failing.  Call the IBM Support
  ¦   Center.
  ¦
+---+
¦008¦
+---+
```

Readjust the print head gap. See "Removing and Replacing the Print Head" in topic 6.39.26. and perform only the adjustment steps.

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6.20 MAP 6140: Printed Characters Missing One or More Dot Rows

Symptom Explanation	**Conditions That Could Cause This Symptom**
One or more wires are not firing on the print head.	□ The print head is failing. □ The printer card is failing. □ The customer receipt motor is failing. □ The customer receipt paper cutter motor is failing. □ The journal motor is failing. □ The document insert motor is failing.

001

- Check the print head resistance. See "MAP 6280: Print Head Resistance Checks" in topic 6.34.

Is the print head OK?

Yes → **No**

002

Was the resistance low?

Yes → **No**

003

Replace the print head. See "Removing and Replacing the Print Head" in topic 6.39.26.

004

Replace the print head. See "Removing and Replacing the Print Head" in topic 6.39.26.

- and -

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

005

- Check the customer receipt motor for electrical shorts. See "MAP 6240: Customer Receipt Motor Resistance Checks" in topic 6.30.

Is the customer receipt motor OK?

Yes → **No**

006

Replace the customer receipt motor. See "Removing and Replacing the Customer Receipt Motor" in topic 6.39.8.

007

- Check the paper cutter motor for electrical shorts. See "MAP 6250: Customer Receipt Paper Cutter Motor Resistance Checks" in topic 6.31.

Is the paper cutter motor OK?

Yes → **No**

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```
  ¦   ¦008¦
  ¦   +---+
  ¦
  ¦   Replace the paper cutter motor.  See "Removing and Replacing the
  ¦   Customer Receipt Paper Cutter" in topic 6.39.10.
  ¦
+---+
¦009¦
+---+
```

- Check the journal motor for electrical shorts. See "MAP 6270: Journal Motor Resistance Checks" in topic 6.33.

Is the journal motor OK?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦010¦
  ¦   +---+
  ¦
  ¦   Replace the journal motor.  See "Removing and Replacing the Journal
  ¦   Motor" in topic 6.39.18.
  ¦
+---+
¦011¦
+---+
```

- Check the document insert motor for electrical shorts. See "MAP 6260: Document Insert Motor Resistance Checks" in topic 6.32.

Is the document insert motor OK?

```
Yes  No
  ¦    ¦
  ¦   +---+
  ¦   ¦012¦
  ¦   +---+
  ¦
  ¦   Replace the document insert motor.  See "Removing and Replacing the
  ¦   Document Insert Motor" in topic 6.39.12.
  ¦
+---+
¦013¦
+---+
```

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

- or -

Replace the print head. See "Removing and Replacing the Print Head" in topic 6.39.26.

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6.21 MAP 6150: Printed Characters are Smudged

Symptom Explanation	**Conditions That Could Cause This Symptom**
The printed characters are smudged.	□ The print head gap needs adjustment. □ The print head is failing. □ The ribbon is failing. □ The forms compensation hardware is failing.

001

- Check the ribbon.

Is the ribbon OK?

Yes — **No**

002

- Replace the ribbon. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

003

- Check the print head gap. See "Removing and Replacing the Print Head" in topic 6.39.26 and perform the print head gap adjustment procedures.

Is the print head gap OK?

Yes — **No**

004

Adjust the print head gap. See "Removing and Replacing the Print Head" in topic 6.39.26.

005

Call the IBM Support Center.

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6.22 MAP 6160: Printer Indicator Light Always ON or Comes On Randomly

Symptom Explanation	**Conditions That Could Cause This Symptom**
The printer indicator light is always ON or comes ON randomly.	□ A document insert sensor is blocked or failing. □ The printer extension card is failing. □ The printer card is failing.

PICTURE 188

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-25. Printer Buttons

001

- Switch power ON at the terminal.

- Open the printer access cover.

- Check if paper is blocking a document insert sensor. See "Sensor Cleaning Procedures" in topic 6.36.6.

- Press and hold the ready button [3] and the document insert up and down buttons, [4] and [5] respectively, for a few seconds.

- Close the printer access cover.

- Release all of the buttons.

Did the printer indicator light stay ON or continue to come on randomly?

Yes — The printer is now operating correctly.

No → **002**

003

- Check the front document insert sensor. Refer to Table 6-4 in topic 6.36.2.

Is the sensor OK?

Yes — If the printer extension card is not receiving +5 V dc from the printer card, the printer extension card is failing. See "Removing and Replacing the Printer Extension Card" in topic 6.39.30.

- or -

Replace the front document insert sensor. See "Removing and Replacing the Document Insert Paper Sensor (Front)" in topic 6.39.13.

No → **004**

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005

- Check the upper document insert sensor. Refer to Table 6-3 in topic 6.36.1.

Is the sensor OK?

Yes **No**

006

If the printer extension card is not receiving +5 V dc from the printer card, the printer extension card is failing. See "Removing and Replacing the Printer Extension Card" in topic 6.39.30.

- or -

Replace the top document insert sensor. See "Removing and Replacing the Document Insert Paper Sensor (Top)" in topic 6.39.14.

007

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

- or -

Replace the printer extension card. See "Removing and Replacing the Printer Extension Card" in topic 6.39.30.

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6.23 MAP 6170: Printer Indicator Light Not ON

Symptom Explanation	Conditions That Could Cause This Symptom
The printer indicator light does not come ON.	□ The front button assembly is failing. □ The cover interlock sensor is failing. □ The printer card is failing.

001

The printer indicator light should go ON for a short time and the print head should move to the center when the printer resets.

- While observing the printer indicator light, open the printer access cover and then close it.

Did the printer indicator light come ON for a short time?

Yes No

002

Did the print head move?

Yes No

003

Continue at Step 006.

004

Continue at Step 009.

PICTURE 189

Figure 6-26. Printer Card Connections

005

Go to "TEST 6000: Stand-Alone Printer Test" in topic 6.2

006

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Disconnect cable J9 from the printer card.

- Measure the resistance of the printer indicator light between cable connector pins J9-5 and J9-6. The printer indicator light should give a reading of "OL" with the meter leads in one direction and a few million ohms with the leads reversed.

Is the printer indicator light OK?

Yes No

007

Replace the front button assembly. See "Removing and Replacing the Button Assembly (Front)" in topic 6.39.4.

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008

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

009

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Insert a piece of paper in the middle of the cover interlock sensor.

- Measure for +5 V dc between J7-3 (positive) and J7-1 (negative).

- Remove the paper from the cover interlock sensor.

- Measure for 0 V dc between J7-3 (positive) and J7-1 (negative).

Did the voltage drop with the paper removed?

Yes **No**

010

Replace the cover interlock sensor. See "Removing and Replacing the Cover Interlock Sensor" in topic 6.39.7.

011

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

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6.24 MAP 6180: Printer Indicator Light Not ON when Document Inserted

Symptom Explanation	**Conditions That Could Cause This Symptom**
One of the document sensors does not sense a document.	□ The front document insert sensor is failing. □ The printer card is failing. □ The printer extension card is failing. □ The top document insert sensor is failing.

001

- Switch power ON at the terminal.

- Open the printer access cover.

- Insert a piece of paper into the front of the printer until the paper stops.

Did the printer indicator light go ON?
Yes **No**

002

- Continue at Step 006.

003

- Insert a piece of paper into the top of the printer until the paper stops.

Did the printer indicator light go ON?
Yes **No**

004

- Continue at Step 009.

005

Go to "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

006

(From step 002)

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Switch power ON at the terminal.

- Refer to Table 6-4 in topic 6.36.2 and check that the front document insert sensor is operating correctly.

Is the sensor working correctly?
Yes **No**

007

Replace the front document insert sensor. See "Removing and Replacing the Document Insert Paper Sensor (Front)" in topic 6.39.13.

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008

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

- or -

Replace the printer extension card. See "Removing and Replacing the Printer Extension Card" in topic 6.39.30.

009

(From step 004)

- Switch **POWER OFF** at the terminal.

- Remove the main cover. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Refer to Table 6-3 in topic 6.36.1 and check that the front document insert sensor is operating correctly.

Is the sensor working correctly?

Yes — **No**

010

Replace the top document insert sensor. See "Removing and Replacing the Document Insert Paper Sensor (Top)" in topic 6.39.14.

011

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

- or -

Replace the printer extension card. See "Removing and Replacing the Printer Extension Card" in topic 6.39.30.

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6.25 MAP 6190: Printer Not Printing Any Characters

Symptom Explanation	**Conditions That Could Cause This Symptom**
The printer does not print any characters.	□ The print head cable is not connected. □ The print head gap is too large. □ The ribbon is failing or not turning. □ The printer card is failing.

001

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Check the print head cable to insure it is correctly installed in cable connector J5. See Figure 6-27.

- Adjust the print head gap. See "Removing and Replacing the Print Head" in topic 6.39.26 and do only the adjustments.

The ribbon should move left to right only when the print head is moving from left to right.

- Manually move the print head left to right and right to left.

Does the ribbon move left to right when the print head moves from left to right?

Yes **No**

002

See "MAP 6210: Ribbon Does Not Advance" in topic 6.27 and continue problem isolation procedures.

003

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

PICTURE 190

Figure 6-27. Printer Card Connections

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6.26 MAP 6200: Ribbon Damaged by Printer

Symptom Explanation	**Conditions That Could Cause This Symptom**
The ribbon is being damaged by the printer.	□ The printer ribbon cartridge is not turning. □ The print head gap is not set correctly. □ The print head is failing.

001

- Switch **POWER OFF** at the terminal.

The ribbon should move left to right only when the print head is moving from left to right.

- Manually move the print head left to right and right to left.

Does the ribbon move left to right when the print head moves from left to right?

Yes → **No**

002

See "MAP 6210: Ribbon Does Not Advance" in topic 6.27 and continue problem isolation procedures.

003

- Check the print head gap. See "Removing and Replacing the Print Head" in topic 6.39.26.

Is the print head gap set correctly?

Yes → **No**

004

- Adjust the print head gap. See "Removing and Replacing the Print Head" in topic 6.39.26.

005

Replace the print head. See "Removing and Replacing the Print Head" in topic 6.39.26.

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6.27 MAP 6210: Ribbon Does Not Advance

Symptom Explanation	**Conditions That Could Cause This Symptom**
The ribbon does not advance.	□ The printer ribbon cartridge is failing. □ The ribbon drive gears are failing. □ The ribbon drive clutch is failing.

001

- Switch **POWER OFF** at the terminal.

- Remove the main cover, leaving the three cables connected. See "Removing and Replacing the Main Cover" in topic 6.39.23.

- Remove the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

- Turn the knob on the printer ribbon cartridge in the direction of the arrow on the cartridge.

Did the ribbon move when the knob was turned?
Yes No

002

Replace the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

003

- Inspect the printer drive gears [1] for missing teeth. Refer to Figure 6-28.

Are the gears OK?
Yes No

PICTURE 191

Figure 6-28. Printer Ribbon Drive Gears

004

Replace the ribbon drive gear, the large gear in Figure 6-28. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

005

- Check that the large gear will turn counter-clockwise but will resist being turned clockwise.

Did the gears resist being turned clockwise?
Yes No

006

Replace the ribbon drive clutch, the small gear in Figure 6-28. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

007

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Replace the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

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6.28 MAP 6220: T7152 - Home Errors

Symptom Explanation	**Conditions That Could Cause This Symptom**
The print head is not reaching the center of the home sensor when expected or it reached the home sensor too soon.	□ The home sensor card is failing. □ The transport motor is failing. □ The printer card is failing.

001

Have you run the stand-alone test?

Yes — **No**

002

Run the stand-alone test and follow the procedure. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

Is this a solid failure?

Yes — **No**

004

Replace the home sensor card. See "Removing and Replacing the Print Head Home Sensor Card" in topic 6.39.27.

- or -

Replace the transport motor. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

005

Replace the printer card. See "Removing and Replacing the Printer Card" in topic 6.39.29.

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6.29 MAP 6230: W305 - Home Errors Running Customer Application

Symptom Explanation	**Conditions That Could Cause This Symptom**
The printer is getting home errors while running the customer application.	□ The home sensors are dirty. □ The home sensor card is failing. □ The print head transport assembly is failing.

001

Have you run the stand-alone test?

Yes **No**

002

Run the stand-alone test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

003

Replace the print head home sensor card. See "Removing and Replacing the Print Head Home Sensor Card" in topic 6.39.27.

- or -

Replace the print head transport assembly. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

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6.30 MAP 6240: Customer Receipt Motor Resistance Checks

Symptom Explanation	**Conditions That Could Cause This Symptom**
The customer receipt motor winding may be defective.	□ The customer receipt motor is failing. □ The printer card is failing.

Note: A short circuit in the motor winding can draw too much current and damage components on the printer card.

PICTURE 192

Figure 6-29. Printer Extension Card Cable Connector

001

- Switch **POWER OFF** at the terminal.

Verify that the resistances in the customer receipt motor are correct.

- Disconnect the printer extension card cable from J2 on the printer card. See Figure 6-36 in topic 6.36.5 for the locations of the printer card connections.

  Note: Refer to Figure 6-29 for the locations of the cable connector pins.

- At the cable connector, check for 111 to 129 ohms between pin 1 and:

  □ Pin 7
  □ Pin 8
  □ Pin 9
  □ Pin 10.

Was the resistance out of the given range?

Yes — **No**

002

The resistance values are within range.

Return to the MAP step that directed you to this MAP and continue with problem isolation.

003

Was the resistance above the given range?

Yes — **No**

004

The resistance was below the given range.

Replace the customer receipt motor and the printer card. See "Removing and Replacing the Customer Receipt Motor Mount" in topic 6.39.9 and "Removing and Replacing the Printer Card" in topic 6.39.29.

005

The resistance was above the given range.

Replace the customer receipt motor. See "Removing and Replacing the Customer Receipt Motor Mount" in topic 6.39.9.

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6.31 MAP 6250: Customer Receipt Paper Cutter Motor Resistance Checks

Symptom Explanation	**Conditions That Could Cause This Symptom**
The paper cutter motor windings may be defective.	□ The paper cutter motor is failing. □ The printer card is failing.

Note: A short circuit in the motor winding can draw too much current and damage components on the printer card.

PICTURE 193

Figure 6-30. Printer Extension Card Cable Connector

001

- Switch **POWER OFF** at the terminal.

Verify that the resistances in the paper cutter motor at the customer receipt station are correct.

- Disconnect the printer extension card cable from J2 on the printer card. See Figure 6-36 in topic 6.36.5 for the locations of the printer card connections.

  Note: Refer to Figure 6-30 for the locations of the cable connector pins.

- At the cable connector, check for 111 to 129 ohms between pin 2 and:

  □ Pin 3
  □ Pin 4
  □ Pin 5
  □ Pin 6.

Was the resistance out of the given range?

Yes

002

The resistance values are within range.

Return to the MAP step that directed you to this MAP and continue with problem isolation.

No

003

Was the resistance above the given range?

Yes

004

The resistance was below the given range.

Replace the paper cutter motor and the printer card. See "Removing and Replacing the Customer Receipt Paper Cutter" in topic 6.39.10 and "Removing and Replacing the Printer Card" in topic 6.39.29.

No

005

The resistance was above the given range.

Replace the paper cutter motor. See "Removing and Replacing the Customer Receipt Paper Cutter" in topic 6.39.10.

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6.32 MAP 6260: Document Insert Motor Resistance Checks

Symptom Explanation	**Conditions That Could Cause This Symptom**
The document insert motor may be defective.	□ The document insert motor is failing. □ The printer card is failing.

Note: A short circuit in a motor winding can draw too much current and damage components on the printer card.

001

- Switch **POWER OFF** at the terminal.

Verify that the resistances in the document insert motor are correct.

- Disconnect the document insert motor cable from J3 on the printer card. See Figure 6-36 in topic 6.36.5 for the locations of the printer card connections.

  Note: Refer to Figure 6-31 for the locations of the cable connector pins.

- At the cable connector, check for 111 to 129 ohms between pin 1 and:

  □ Pin 5
  □ Pin 7.

- Next, check for 111 to 129 ohms between pin 2 and:

  □ Pin 4
  □ Pin 6.

Was the resistance out of the given range?

Yes — **No**

002

The resistance values are within range.

Return to the MAP step that directed you to this MAP and continue with problem isolation.

003

Was the resistance above the given range?

Yes — **No**

004

The resistance was below the given range.

Replace the document insert motor and the printer card. See "Removing and Replacing the Document Insert Motor" in topic 6.39.12 and "Removing and Replacing the Printer Card" in topic 6.39.29.

005

The resistance was above the given range.

Replace the document insert motor. See "Removing and Replacing the Document Insert Motor" in topic 6.39.12.

PICTURE 194

Figure 6-31. Document Insert Motor Cable Connector

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6.33 MAP 6270: Journal Motor Resistance Checks

Symptom Explanation	**Conditions That Could Cause This Symptom**
The journal motor may be defective.	□ The journal motor is failing. □ The printer card is failing.

Note: A short circuit in a motor winding can draw too much current and damage components on the printer card.

PICTURE 195

Figure 6-32. Printer Extension Card Cable Connector

001

- Switch **POWER OFF** at the terminal.

Verify that the resistances in the journal motor are correct.

- Disconnect the printer extension card cable from J2 on the printer card. See Figure 6-36 in topic 6.36.5 for the locations of the printer card connections.

  Note: Refer to Figure 6-32 for the locations of the cable connector pins.

- At the cable connector, check for 111 to 129 ohms between pin 1 and:

  □ Pin 11
  □ Pin 12
  □ Pin 13
  □ Pin 14.

Was the resistance out of the given range?

Yes — **No**

002

The resistance values are within range.

Return to the MAP step that directed you to this MAP and continue with problem isolation.

003

Was the resistance above the given range?

Yes — **No**

004

The resistance was below the given range.

Replace the journal motor and the printer card. See "Removing and Replacing the Journal Motor" in topic 6.39.18 and "Removing and Replacing the Printer Card" in topic 6.39.29.

005

The resistance was above the given range.

Replace the journal motor. See "Removing and Replacing the Journal Motor" in topic 6.39.18.

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6.34 MAP 6280: Print Head Resistance Checks

Symptom Explanation	Conditions That Could Cause This Symptom
The print head may have an open or short.	□ The print head is failing. □ The printer card is failing.

Note: A short circuit in a print head coil can draw too much current and damage components on the printer card.

PICTURE 196

Figure 6-33. Print Head Cable Connector

001

- Switch **POWER OFF** at the terminal.

Verify that the resistances in the print head are correct.

- Disconnect the print head cable from J5 on the printer card. See Figure 6-36 in topic 6.36.5 for the locations of the printer card connections.

  Note: Refer to Figure 6-33 for the locations of the print head cable connector strips.

- At the end of the print head cable, check for 17.2 to 21.2 ohms between connector strip 6 and:

  □ Connector Strip 1
  □ Connector Strip 2
  □ Connector Strip 3
  □ Connector Strip 4
  □ Connector Strip 8
  □ Connector Strip 9
  □ Connector Strip 10
  □ Connector Strip 11
  □ Connector Strip 12.

Was the resistance above or below the given range?

Yes → **002**

The resistance values are within range.

Return to the MAP step that directed you to this MAP and continue with problem isolation.

No → **003**

Was the resistance above the given range?

Yes → **004**

The resistance was below the given range.

Replace the print head and the printer card. See "Removing and Replacing the Print Head" in topic 6.39.26 and "Removing and Replacing the Printer Card" in topic 6.39.29.

No → **005**

The resistance was above the given range.

Replace the print head. See "Removing and Replacing the Print Head" in topic 6.39.26.

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6.35 MAP 6290: Transport Motor Resistance Checks

Symptom Explanation	**Conditions That Could Cause This Symptom**
The transport motor may be defective.	□ The transport motor is failing. □ The printer card is failing.

Note: A short circuit in a motor winding can draw too much current and damage components on the printer card.

001

- Switch **POWER OFF** at the terminal.

Verify that the resistances in the print head transport motor are correct.

- Disconnect the print head transport motor cable from J4 on the printer card. See Figure 6-36 in topic 6.36.5 for the locations of the printer card connections.

  Note: Refer to Figure 6-34 for the locations of the cable connector pins.

- At the cable connector, check for 4.5 to 5.5 ohms between pin 1 and:

  □ Pin 3
  □ Pin 6.

- Next, check for 4.5 to 5.5 ohms between pin 2 and:

  □ Pin 4
  □ Pin 7.

Was the resistance out of the given range?

Yes

002

The resistance values are within range.

Return to the MAP step that directed you to this MAP and continue with problem isolation.

No

003

Was the resistance above the given range?

Yes

004

The resistance was below the given range.

Replace the print head transport motor and the printer card. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28 and "Removing and Replacing the Printer Card" in topic 6.39.29.

No

005

The resistance was above the given range.

Replace the print head transport motor. See "Removing and Replacing the Print Head Transport Assembly" in topic 6.39.28.

PICTURE 197

Figure 6-34. Transport Motor Cable Connector

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6.36 Printer Sensor Checks

These tables provide the test points required to check the sensors in the Model 3 Printer. Refer to Figure 6-35 in topic 6.36.3 and Figure 6-36 in topic 6.36.5 to locate the sensor card and the test points.

Switch **POWER OFF** at the terminal before performing the printer sensor checks.

Readings other than the expected voltages indicate a failing sensor.

Warning: Use an IBM 8060A (Fluke) Digital Multimeter to perform the following printer sensor checks.
Other meters may damage the sensors.

Subtopics
6.36.1 Top Document Insert Paper Sensor
6.36.2 Front Document Insert Paper Sensor
6.36.3 Journal Paper Motion Emitter Sensor
6.36.4 Cover Interlock Sensor Check
6.36.5 Print Head Home Sensor Check
6.36.6 Sensor Cleaning Procedures

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6.36.1 Top Document Insert Paper Sensor

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Table 6-3. Top Document Insert Sensor Check

Meter Lead Connections to the Printer Extension Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J109-1	J109-4	+5 V dc source from printer card
J109-3	J109-4	**Sensor Uncovered =** 0.0 V to +2.5 V **Sensor Covered =** At least 25% greater than the uncovered sensor but less than +5 V.

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6.36.2 Front Document Insert Paper Sensor

Table 6-4. Front Document Insert Sensor Check

Meter Lead Connections to the Printer Extension Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J108-4	J108-1	+5 V dc source from printer card
J108-2	J108-1	**Sensor Uncovered =** 0.0 V to +2.5 V
		Sensor Covered = At least 25% greater than the uncovered sensor but less than +5 V.

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6.36.3 Journal Paper Motion Emitter Sensor

Note: Rotate the journal paper emitter wheel very slowly to see the voltage change.

Table 6-5. Journal Paper Motion Sensor Check

Meter Lead Connections to the Printer Extension Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J106-2	J106-6	+5 V dc source from printer card
J106-3	J106-1	**Sensor Uncovered =** 0.0 V to +0.4 V **Sensor Covered =** +2.5 V to +5.5 V

PICTURE 198

Figure 6-35. Printer Extension Card Connections

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6.36.4 Cover Interlock Sensor Check

Table 6-6. Cover Interlock Sensor Check

Meter Lead Connections to the Printer Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J7-3	J7-1	**Cover Open =** 0.0 V to +0.8 V
		Cover Closed = +2.5 V to +5.5 V

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6.36.5 Print Head Home Sensor Check

Table 6-7. Print Head Home Sensor Check

Meter Lead Connections to the Printer Card		
Positive Lead	**Negative Lead**	**Expected Voltage (dc)**
J6-1	J6-2	**Left Sensor [1] Uncovered =** 0.0 V to +0.4 V
		Left Sensor [1] Covered = +2.5 V to +5.5 V
J6-5	J6-2	**Center Sensor [2] Uncovered =** 0.0 V to +0.4 V
		Center Sensor [2] Covered = +2.5 V to +5.5 V

PICTURE 199

Figure 6-36. Printer Card Connections

PICTURE 200

Figure 6-37. Print Head Home Sensor Card

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6.36.6 Sensor Cleaning Procedures

Clean the sensors any time that the printer is being serviced.

Subtopics
6.36.6.1 Document Insert Sensors
6.36.6.2 Home Sensor Card
6.36.6.3 Journal Paper Sensor

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6.36.6.1 Document Insert Sensors

1. Open the printer access cover.

2. Remove the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

3. Clean both the front and top document insert sensors with canned air. See Figure 6-57 in topic 6.39.13.2 or Figure 6-58 in topic 6.39.14.2 for an illustration of the document insert sensors.

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6.36.6.2 Home Sensor Card

1. Open the printer access cover.

2. Remove the printer ribbon cartridge. See "Removing and Replacing the Printer Ribbon Cartridge" in topic 6.39.33.

3. Push the print head all the way to the right.

4. Use a cotton swab dipped in isopropyl alcohol to clean the two home sensors. See [1] and [2] in Figure 6-37 in topic 6.36.5 for an illustration of the home sensors.

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6.36.6.3 Journal Paper Sensor

1. Open the printer access cover.

2. Open the journal cover.

3. Remove the journal paper spool and the journal paper.

4. Toggle the journal roller holder forward by pulling the journal lever toward you.

5. Clean both the sensor and the emitter wheel with canned air. See Figure 6-64 in topic 6.39.19.2 for an illustration of the sensor and of the emitter wheel.

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6.37 Printer Adjustments Using the 4680 Operating System

1. Start UTILITY MODE by pressing **S1**, typing **9 5**, and then pressing **S2**.

2. When "enter request" is displayed, enter the keying sequence from the table for the procedure you want to do.

3. Press **S2** to advance through the various parts of the printer adjustment steps.

4. Type **9 9** and then press **S2** to exit.

Table 6-8. Adjustment Procedures

Procedure	**Keying Sequence**
Print Current Adjustment Values - see Figure 6-38 in topic 6.38.	7, 2, 1, S2
Character Alignment Procedure - see Figure 6-39 in topic 6.38.	7, 2, 2, S2
Document Insert Front Load Print Line Adjustment - see Figure 6-40 in topic 6.38.	7, 2, 3, S2
Document Insert Top Load Print Line Adjustment - see Figure 6-41 in topic 6.38.	7, 2, 4, S2
Document Backlash Adjustment	7, 2, 5, S2
Document Re-Insertion Adjustment	7, 2, 6, S2
Engineering Use Only	7, 2, 7, S2

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6.38 Printer Adjustments Using the 4684 Reference Diskette

1. If MENU-M1 is not displayed, go to "Running 4684 Tests Using the Reference Diskette" in topic 2.14.

2. Select START TESTS from MENU-M1.

3. Select RUN POS DEVICE TESTS from MENU-T1.

4. If you have a 4683 terminal attached to the 4684, MENU-T7 is displayed. From this menu, select the terminal whose printer you want to test.

5. Select PRINTER ADJUSTMENTS from MENU-T6.

6. Select the adjustment you wish to make from the menu.

   - Print current adjustment values - see Figure 6-38.
   - Character alignment procedure - see Figure 6-39.
   - Document insert front load print line adjustment - see Figure 6-40.
   - Document insert top load print line adjustment - see Figure 6-41.
   - Document backlash adjustment
   - Document re-insertion adjustment
   - Engineering use only

7. Follow the instructions printed on the printer.

8. Press **S1** (**Esc** on the Enhanced A/N Keyboard) to return to the previous menu.

PICTURE 201

Figure 6-38. Current Adjustment Values

PICTURE 202

Figure 6-39. Character Alignment Procedure

PICTURE 203

Figure 6-40. Document Insert Front Load Print Line Adjustment

PICTURE 204

Figure 6-41. Document Insert Top Load Print Line Adjustment

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6.39 Removal and Replacement Procedures

After replacing any printer part, run the printer test to ensure that the failure is corrected. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

Use the following diagram to quickly determine the sequence necessary to remove a selected part:

Printer Assembly
+- Customer Receipt Paper (see topic 6.39.31)
+- Journal Paper (see topic 6.39.32)
+- Ribbon Cartridge (see topic 6.39.33)
+- Access Cover (see topic 6.39.2)
¦ +- Journal Cover (see topic 6.39.15)
+- Journal Paper Spool (see topic 6.39.20)
+- Main Cover (see topic 6.39.23)
  +- Printer Card (see topic 6.39.29)
  +- Print Head (see topic 6.39.26)
  +- Print Head Home Sensor Card (see topic 6.39.27)
  +- Cover Interlock Sensor (see topic 6.39.7)
  +- Button Assembly (Front) (see topic 6.39.4)
  +- Button Assembly (Top) (see topic 6.39.5)
  +- Document Insert Sensor (Top) (see topic 6.39.14)
  +- Document Insert Motor (see topic 6.39.12)
  +- Capacitor (see topic 6.39.6)
  +- Print Head Transport Assembly (see topic 6.39.28)
  +- Journal Cover Keylock (see topic 6.39.16)
  +- Journal Motor (see topic 6.39.18)
  ¦ +- Journal Drive Gears and Pawl (see topic 6.39.17)
  +- Journal Support Post (see topic 6.39.22)
  ¦ +- Paper Rollers (see topic 6.39.24)
  +- Bottom Cover (see topic 6.39.3)
  ¦ +- Journal Paper Motion Sensor (see topic 6.39.19)
  ¦ +- Document Insert Paper Sensor (Front) (see topic 6.39.13)
  ¦ +- Printer Extension Card (see topic 6.39.30)
  +- Customer Receipt Paper Cutter (see topic 6.39.10)
    +- Customer Receipt Motor Mount (see topic 6.39.9)
      +- Customer Receipt Motor (see topic 6.39.8)
      +- Platen Assembly (see topic 6.39.25)
        +- Journal Assembly (see topic 6.39.21)
        +- CR Assembly (see topic 6.39.11)

You will need to use special tools to perform some removal and replacement procedures. Refer to Table 6-9 for those tools.

Table 6-9. Special Tools

Tool	**IBM Part Number**
Number 2 Phillips bit	16F1664
Print Head Gap Setter	93F0419
Torque screwdriver	16F1661
T10 Torx bit	16F1617 or 39F8407 from kit P/N 39F8407

Subtopics
6.39.1 Printer Cards
6.39.2 Removing and Replacing the Access Cover
6.39.3 Removing and Replacing the Bottom Cover
6.39.4 Removing and Replacing the Button Assembly (Front)
6.39.5 Removing and Replacing the Button Assembly (Top)
6.39.6 Removing and Replacing the Capacitor
6.39.7 Removing and Replacing the Cover Interlock Sensor
6.39.8 Removing and Replacing the Customer Receipt Motor
6.39.9 Removing and Replacing the Customer Receipt Motor Mount
6.39.10 Removing and Replacing the Customer Receipt Paper Cutter
6.39.11 Removing and Replacing the Customer Receipt Roller Holder Assembly and Frame
6.39.12 Removing and Replacing the Document Insert Motor
6.39.13 Removing and Replacing the Document Insert Paper Sensor (Front)
6.39.14 Removing and Replacing the Document Insert Paper Sensor (Top)
6.39.15 Removing and Replacing the Journal Cover
6.39.16 Removing and Replacing the Journal Cover Keylock
6.39.17 Removing and Replacing the Journal Drive Gears and Pawl
6.39.18 Removing and Replacing the Journal Motor
6.39.19 Removing and Replacing the Journal Paper Motion Sensor
6.39.20 Removing and Replacing the Journal Paper Spool
6.39.21 Removing and Replacing the Journal Roller Holder Assembly and Frame

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6.39.22 Removing and Replacing the Journal Support Post
6.39.23 Removing and Replacing the Main Cover
6.39.24 Removing and Replacing the Paper Rollers
6.39.25 Removing and Replacing the Platen Assembly
6.39.26 Removing and Replacing the Print Head
6.39.27 Removing and Replacing the Print Head Home Sensor Card
6.39.28 Removing and Replacing the Print Head Transport Assembly
6.39.29 Removing and Replacing the Printer Card
6.39.30 Removing and Replacing the Printer Extension Card
6.39.31 Replacing the Customer Receipt Paper
6.39.32 Replacing the Journal Station Paper
6.39.33 Removing and Replacing the Printer Ribbon Cartridge

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6.39.1 Printer Cards

Use Figure 6-42 and Figure 6-43 as a guide when disconnecting and connecting cables. Refer to Table 6-10 to determine where a printer component connects to the printer cards.

Table 6-10. Printer Connectors and Components

Connecto	**Component**
J1	I/O Interface Cable
J2	Signal to Extension Card
J3	Document Insert Motor
J4	Transport Motor
J5	Print Head
J6	Home Sensor
J7	Cover Interlock Sensor
J8	Top Button Assembly
J9	Front Button Assembly
J10	Capacitor
J101	Paper Cutter Motor
J102	Customer Receipt Motor
J103	Signals to Printer Card
J106	Journal Paper Motion Sensor
J107	Journal Motor
J108	Front Document Insert Sensor
J109	Top Document Insert Sensor

PICTURE 205

Figure 6-42. Printer Card

PICTURE 206

Figure 6-43. Printer Extension Card

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6.39.2 Removing and Replacing the Access Cover

Subtopics
6.39.2.1 Removing the Access Cover
6.39.2.2 Replacing the Access Cover

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6.39.2.1 Removing the Access Cover

1. Raise the access cover.
2. Push the tabs on both sides of the access cover inward as shown.
3. Rotate the cover back and off its hinge.

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6.39.2.2 Replacing the Access Cover

1. Put the access cover on its hinge in a vertical position and snap it into place on the hinge.

2. While pushing the tabs on both sides of the access cover inward as shown, close the cover. Ensure that the access cover is correctly seated on its hinge and that it opens and closes correctly.

PICTURE 207

Figure 6-44. Access Cover

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6.39.3 Removing and Replacing the Bottom Cover

Subtopics
6.39.3.1 Removing the Bottom Cover
6.39.3.2 Replacing the Bottom Cover

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6.39.3.1 Removing the Bottom Cover

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal paper spool. See topic 6.39.20.

5. Disconnect all of the cables from the printer card. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card. Note how the cables are routed.

6. Rotate the printer onto its back with the bottom cover facing you as shown.

   Note: Do not rotate the printer so that it rests on its top.

7. Carefully release the two bottom cover tabs [1].

8. Carefully release the bottom cover holding tabs [2], [3], and [4].

9. Pull the bottom cover off the printer.

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6.39.3.2 Replacing the Bottom Cover

1. Place the bottom cover on a flat surface.

2. Align the holding tabs on the printer assembly over the corresponding receptacles in the bottom cover as shown in Figure 6-46. Carefully push on the printer until the bottom cover tabs lock into place.

   Note: Ensure that the front tabs [1] are latched in place.

3. Connect all of the cables to the printer card. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card. Route the cables as they were before.

4. Replace the journal paper spool. See topic 6.39.20.

5. Replace the main cover. See topic 6.39.23.

6. Connect the printer to the base or system unit.

7. Switch power ON at the base or system unit.

8. After replacing the bottom cover, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 208

Figure 6-45. Bottom Cover Tabs

PICTURE 209

Figure 6-46. Bottom Cover. The bottom cover has been disassembled beyond what is necessary to illustrate how it attaches to the printer frame.

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6.39.4 Removing and Replacing the Button Assembly (Front)

Subtopics
6.39.4.1 Removing the Front Buttons
6.39.4.2 Replacing the Front Buttons

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6.39.4.1 Removing the Front Buttons

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the front button assembly cable from printer card connector J9. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Remove the two front button assembly screws [1].

6. Remove the front button assembly.

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6.39.4.2 Replacing the Front Buttons

1. Attach the front button assembly to the main cover using the two screws [1]. Do not overtighten the screws.

2. Connect the front button assembly cable to printer card connector J9. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

3. Replace the main cover. See topic 6.39.23.

4. Connect the printer to the base or system unit.

5. Switch power ON at the base or system unit.

6. After replacing the button assembly, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 210

Figure 6-47. Button Assembly (Front)

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6.39.5 Removing and Replacing the Button Assembly (Top)

Subtopics
6.39.5.1 Removing the Top Buttons
6.39.5.2 Replacing the Top Button Assembly

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6.39.5.1 Removing the Top Buttons

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the top button assembly cable from printer card connector J8. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Release the three tabs [1] of the top button assembly cover.

6. Remove the top button assembly.

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6.39.5.2 Replacing the Top Button Assembly

1. Put the top button assembly cable through the slot in the top button assembly holder.

2. Lower the button assembly into place.

3. Place the top button assembly cover over the button assembly and press it until all three tabs click into place.

4. Connect the top button assembly cable to printer card connector J8. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Replace the main cover. See topic 6.39.23.

6. Connect the printer to the base or system unit.

7. Switch power ON at the base or system unit.

8. After replacing the top button assembly, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 211

Figure 6-48. Button Assembly (Top)

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6.39.6 Removing and Replacing the Capacitor

Subtopics
6.39.6.1 Removing the Capacitor
6.39.6.2 Replacing the Capacitor

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6.39.6.1 Removing the Capacitor

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the capacitor cable from printer card connector J10. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Remove the capacitor as shown.

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6.39.6.2 Replacing the Capacitor

1. Replace the capacitor as shown.

2. Connect the capacitor cable to printer card connector J10. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

3. Replace the main cover. See topic 6.39.23.

4. Connect the printer to the base or system unit.

5. Switch power ON at the base or system unit.

6. After replacing the capacitor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 212

Figure 6-49. Capacitor

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6.39.7 Removing and Replacing the Cover Interlock Sensor

Subtopics
6.39.7.1 Removing the Cover Interlock Sensor
6.39.7.2 Replacing the Cover Interlock Sensor

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6.39.7.1 Removing the Cover Interlock Sensor

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the cover interlock sensor cable from printer card connector J7. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Release the sensor from its holding tab and lift it out of the main cover.

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6.39.7.2 Replacing the Cover Interlock Sensor

1. Put the sensor into place, ensuring that the holding tabs lock into place.

2. Connect the cover interlock sensor cable to printer card connector J7. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

3. Replace the main cover. See topic 6.39.23.

4. Connect the printer to the base or system unit.

5. Switch power ON at the base or system unit.

6. After replacing the cover interlock sensor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 213

Figure 6-50. Cover Interlock Sensor

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6.39.8 Removing and Replacing the Customer Receipt Motor

Subtopics
6.39.8.1 Removing the CR Motor
6.39.8.2 Replacing the CR Motor

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6.39.8.1 Removing the CR Motor

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the customer receipt paper cutter. See topic 6.39.10.

5. Unlatch the customer receipt motor mount and tilt it up, but do not remove the motor mount. See step 5 in topic 6.39.9.1 under "Removing the CR Motor Mount" in topic 6.39.9.1.

6. Disconnect the motor cable from printer extension card connector J102. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Note how the cable is routed.

7. Insert a screwdriver into the customer receipt motor mount as shown and gently pry the metal flange on the motor in the direction shown until the motor is released from the tabs.

8. Slide the motor out of the mount.

   Note: Ensure that the two gears in the motor mount do not fall off of their posts.

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6.39.8.2 Replacing the CR Motor

1. Slide the customer receipt motor in the motor mount and turn the motor counter-clockwise until it clicks into place. Verify that the gears are correctly engaged.

2. Connect the motor cable to printer extension card connector J102. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Route the cable as it was before.

3. Press the customer receipt motor mount down until it clicks into place.

   Note: Ensure that the bearing is still in its slot in the motor mount.

4. Replace the customer receipt paper cutter. See topic 6.39.10.

5. Replace the main cover. See topic 6.39.23.

6. Connect the printer to the base or system unit.

7. Switch power ON at the base or system unit.

8. After replacing the customer receipt motor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 214

Figure 6-51. Customer Receipt Motor. The enlarged view has been turned to illustrate where to insert the screwdriver.

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6.39.9 Removing and Replacing the Customer Receipt Motor Mount

Subtopics
6.39.9.1 Removing the CR Motor Mount
6.39.9.2 Replacing the CR Motor Mount

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6.39.9.1 Removing the CR Motor Mount

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the customer receipt paper cutter. See topic 6.39.10.

5. Push the tab [1] on the customer receipt motor mount in the direction shown and raise the holder until it is free from the tab.

6. Disconnect the customer receipt motor cable from printer extension card connector J102. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Note how the cable is routed.

7. Remove the gear from the end of the customer receipt shaft and remove the customer receipt drive bearing.

8. Remove the customer receipt motor mount.

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6.39.9.2 Replacing the CR Motor Mount

1. Put the customer receipt motor mount on the platen assembly and replace the bearing and gear on the end of the customer receipt shaft as shown. Ensure that the gear snaps into place.

2. Connect the customer receipt motor cable to printer extension card connector J102. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Route the cable as it was before.

3. Press the motor mount down until the tab [1] clicks into place.

   Note: Ensure that the bearing is still in its slot in the motor mount.

4. Replace the customer receipt paper cutter. See topic 6.39.10.

5. Replace the main cover. See topic 6.39.23.

6. Connect the printer to the base or system unit.

7. Switch power ON at the base or system unit.

8. After replacing the customer receipt motor mount, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 215

Figure 6-52. Unlatching the Customer Receipt Motor Mount

PICTURE 216

Figure 6-53. Customer Receipt Motor Mount. The platen assembly is shown removed from the printer to illustrate how the motor mount attaches to it.

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6.39.10 Removing and Replacing the Customer Receipt Paper Cutter

Subtopics
6.39.10.1 Removing the Customer Receipt Paper Cutter
6.39.10.2 Replacing the Customer Receipt Paper Cutter

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6.39.10.1 Removing the Customer Receipt Paper Cutter

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the paper cutter motor cable from printer extension card connector J101. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Note how the cable is routed.

5. Remove the screw, washers, and locknut attaching the paper cutter to the side frame.

6. Gently rotate and lift the paper cutter frame as shown and remove it from the printer.

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6.39.10.2 Replacing the Customer Receipt Paper Cutter

1. Lower the customer receipt paper cutter into the platen and rotate as shown in Figure 6-54.

2. Replace the screw, washers, and locknut attaching the paper cutter to the side frame.

3. Connect the paper cutter motor cable to printer extension card connector J101. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Route the cable as it was before.

4. Replace the main cover. See topic 6.39.23.

5. Connect the printer to the base or system unit.

6. Switch power ON at the base or system unit.

7. After replacing the customer receipt paper cutter, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 217

Figure 6-54. Customer Receipt Paper Cutter

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6.39.11 Removing and Replacing the Customer Receipt Roller Holder Assembly and Frame

Subtopics
6.39.11.1 Removing the CR Assembly
6.39.11.2 Replacing the CR Assembly

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6.39.11.1 Removing the CR Assembly

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the customer receipt paper cutter. See topic 6.39.10.

5. Remove the platen assembly. See topic 6.39.25.

6. Remove the toggle spring retainer clip [3], then disengage the toggle spring [1] at its center attachment point.

7. Remove the roller holder leg retainer [4] then gently pry outward on the ends of the customer receipt roller holder assembly [2] until they are free of the posts on the customer receipt frame.

8. Remove the customer receipt roller holder assembly and note how it attaches to the frame.

9. Gently spread the top sides of the customer receipt frame one side at a time until they are loose from the platen and rotate the frame off of the platen as shown.

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6.39.11.2 Replacing the CR Assembly

1. Attach the bottom of the customer receipt frame to the platen and rotate it forward as shown until the top sides of the frame touch the platen. Gently spread the top sides one at a time and continue rotating the frame until it clicks into place.

2. Gently spread the arms of the roller holder to allow its holes to fit over the posts on the frame. Replace the roller holder leg retainer [4].

3. Attach the toggle spring [1] at its center attachment point then install the toggle spring retainer clip [3]. Ensure that the spring is correctly seated and that the roller holder moves back-and-forth correctly.

4. Replace the platen assembly. See topic 6.39.25.

5. Replace the customer receipt paper cutter. See topic 6.39.10.

6. Replace the main cover. See topic 6.39.23.

7. Connect the printer to the base or system unit.

8. Switch power ON at the base or system unit.

9. After replacing the customer receipt components, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 218

PICTURE 219

Figure 6-55. Customer Receipt Assembly

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6.39.12 Removing and Replacing the Document Insert Motor

Subtopics
6.39.12.1 Removing the DI Motor
6.39.12.2 Replacing the DI Motor

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6.39.12.1 Removing the DI Motor

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the motor cable from printer card connector J3. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card. Note how the cable is routed.

5. Insert a screwdriver into the document insert motor retaining tab and gently pry the metal flange on the motor in the direction shown until the motor is released from the tab. Rotate the motor clockwise to clear the retaining tabs.

6. Remove the motor from the printer.

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6.39.12.2 Replacing the DI Motor

1. Slide the document insert motor into the printer as shown and turn the motor counter-clockwise until it clicks into place.

2. Connect the motor cable to printer card connector J3. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card. Route the cable as it was before.

3. Replace the main cover. See topic 6.39.23.

4. Connect the printer to the base or system unit.

5. Switch power ON at the base or system unit.

6. After replacing the document insert motor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 220

Figure 6-56. Document Insert Motor

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6.39.13 Removing and Replacing the Document Insert Paper Sensor (Front)

Subtopics
6.39.13.1 Removing the Document Insert Paper Sensor (Front)
6.39.13.2 Replacing the Document Insert Paper Sensor (Front)

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6.39.13.1 Removing the Document Insert Paper Sensor (Front)

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal paper spool. See topic 6.39.20.

5. Disconnect the cables from the printer card. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

6. Remove the bottom cover from the printer. See topic 6.39.3.

7. Remove the printer extension card. See topic 6.39.30.

8. Using a spring hook as shown, release the sensor from the tab by gently lifting up.

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6.39.13.2 Replacing the Document Insert Paper Sensor (Front)

1. Attach the document insert paper sensor to the printer by gently pushing it until it snaps into place.

2. Replace the printer extension card. See topic 6.39.30.

3. Replace the bottom cover of the printer. See topic 6.39.3.

4. Connect the cables to the printer card. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Replace the journal paper spool. See topic 6.39.20.

6. Replace the main cover. See topic 6.39.23.

7. Connect the printer to the base or system unit.

8. Switch power ON at the base or system unit.

9. Press the ready button [3], the document insert up button [4], and the document insert down button [5] simultaneously. See Figure 6-81 in topic 6.39.31 for the location of these buttons.

10. Perform the Document Insert Top Load Print Line Adjustment under "Printer Adjustments Using the 4680 Operating System" in topic 6.37.

11. After replacing the document insert paper sensor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 221

Figure 6-57. Document Insert Paper Sensor (Front)

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6.39.14 Removing and Replacing the Document Insert Paper Sensor (Top)

Subtopics
6.39.14.1 Removing the Document Insert Paper Sensor (Top)
6.39.14.2 Replacing the Document Insert Paper Sensor (Top)

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6.39.14.1 Removing the Document Insert Paper Sensor (Top)

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the sensor cable from the printer extension card connector J109. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Note how the cable is routed.

5. Remove the screw [1].

6. Remove the document insert paper sensor from the right side frame, carefully threading the cable and connector out of the printer.

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6.39.14.2 Replacing the Document Insert Paper Sensor (Top)

1. Align the pins in the sensor with the holes in the right side frame.

2. Attach the document insert paper sensor to the right side frame using the screw [1].

3. Connect the sensor cable to the printer extension card connector J109. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Route the cable as it was before.

4. Replace the main cover. See topic 6.39.23.

5. Connect the printer to the base or system unit.

6. Switch power ON at the base or system unit.

7. Press the ready button [3], the document insert up button [4], and the document insert down button [5] simultaneously. See Figure 6-81 in topic 6.39.31 for the location of these buttons.

8. Perform the Document Insert Front Load Print Line Adjustment under "Printer Adjustments Using the 4680 Operating System" in topic 6.37.

9. After replacing the document insert paper sensor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 222

Figure 6-58. Document Insert Paper Sensor (Top)

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6.39.15 Removing and Replacing the Journal Cover

Subtopics
6.39.15.1 Removing the Journal Cover
6.39.15.2 Replacing the Journal Cover

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6.39.15.1 Removing the Journal Cover

1. Remove the access cover. See topic 6.39.2.

2. Unlock and raise the journal cover.

3. Rotate and pull the cover back and off its hinge.

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6.39.15.2 Replacing the Journal Cover

1. Put the journal cover on the hinge as shown. See Figure 6-59.

2. Pull the cover forward until the hinge snaps into place, and then close it. Ensure that the cover opens and closes correctly.

3. Replace the access cover. See topic 6.39.2.

PICTURE 223

Figure 6-59. Journal Cover

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6.39.16 Removing and Replacing the Journal Cover Keylock

Subtopics
6.39.16.1 Removing the Journal Keylock
6.39.16.2 Replacing the Journal Keylock

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6.39.16.1 Removing the Journal Keylock

1. Switch **POWER OFF** at the base or system unit.
2. Disconnect the printer from the base or system unit.
3. Remove the main cover. See topic 6.39.23.
4. Ensure that the keylock is in the unlocked position.
5. Pull the retainer clip [1] out of the printer to release the keylock assembly.
6. Lift the keylock assembly out of the printer.

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6.39.16.2 Replacing the Journal Keylock

1. Put the keylock assembly into the printer as shown.

2. Push the retainer clip [1] onto the keylock assembly.

3. Ensure that the keylock is operating correctly.

4. Replace the main cover. See topic 6.39.23.

5. Connect the printer to the base or system unit.

6. Switch power ON at the base or system unit.

7. After replacing the keylock, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 224

Figure 6-60. Journal Cover Keylock

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6.39.17 Removing and Replacing the Journal Drive Gears and Pawl

Subtopics
6.39.17.1 Removing the Drive Gears and Pawl
6.39.17.2 Replacing the Drive Gears and Pawl

¦ Copyright IBM Corp. 1986, 1992

6.39.17.1 Removing the Drive Gears and Pawl

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal motor. See topic 6.39.18.

5. Remove the journal drive gears by gently pulling them from their shaft. Note their orientation and the sequence with which you remove them.

6. Disengage the pawl spring [2] and remove it and the pawl [1], if required.

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6.39.17.2 Replacing the Drive Gears and Pawl

1. Connect the pawl spring [2] to the pawl [1] and attach them to the side frame. Connect and attach the pawl spring and pawl as shown in Figure 6-62.

2. Reassemble the journal drive gears as shown and ensure that they operate correctly.

3. Replace the journal motor. See topic 6.39.18.

4. Replace the main cover. See topic 6.39.23.

5. Connect the printer to the base or system unit.

6. Switch power ON at the base or system unit.

7. After replacing the pawl and drive gears, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 225

Figure 6-61. Journal Pawl and Drive Gears

PICTURE 226

Figure 6-62. Journal Pawl

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6.39.18 Removing and Replacing the Journal Motor

Subtopics
6.39.18.1 Removing the Journal Motor
6.39.18.2 Replacing the Journal Motor

¦ Copyright IBM Corp. 1986, 1992

6.39.18.1 Removing the Journal Motor

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the motor cable from printer extension card connector J107. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Note how the cable is routed.

5. Insert a screwdriver under the journal motor retaining tab as shown.

6. With the screwdriver gently pry the metal flange on the motor in the direction shown until the motor is released from the tabs. Rotate the motor clockwise to clear the retaining tabs.

7. Remove the motor from the printer.

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6.39.18.2 Replacing the Journal Motor

1. Slide the journal motor into the printer and turn the motor counter-clockwise until it clicks into place.

2. Connect the motor cable to printer extension card connector J107. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Route the cable as it was before.

3. Replace the main cover. See topic 6.39.23.

4. Connect the printer to the base or system unit.

5. Switch power ON at the base or system unit.

6. After replacing the journal motor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 227

Figure 6-63. Journal Motor

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6.39.19 Removing and Replacing the Journal Paper Motion Sensor

Subtopics
6.39.19.1 Removing the Journal Paper Sensor
6.39.19.2 Replacing the Journal Paper Sensor

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6.39.19.1 Removing the Journal Paper Sensor

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect all cables from the printer card. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

5. Remove the bottom cover. See topic 6.39.3.

6. Disconnect the journal sensor cable from printer extension card connector J106. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Note how the cable is routed.

7. Remove the journal emitter wheel shaft [1] by gently prying the shaft out of the journal frame at each end.

8. Remove the sensor clip by gently lifting the small end using a spring hook until the clip rotates out and allows the removal of the journal paper sensor.

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6.39.19.2 Replacing the Journal Paper Sensor

1. Replace the journal paper sensor and install the sensor clip by placing the large side of the clip against the sensor mount and rotating the small end through the sensor until it snaps into place. Ensure that the sensor is seated firmly.

2. Replace the journal emitter wheel [2] and shaft [1].

3. Connect the journal sensor cable to printer extension card connector J106. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card. Route the cable as it was before.

4. Replace the bottom cover. See topic 6.39.3.

5. Connect all cables to the printer card. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

6. Replace the main cover. See topic 6.39.23.

7. Connect the printer to the base or system unit.

8. Switch power ON at the base or system unit.

9. After replacing the journal paper sensor, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 228

Figure 6-64. The journal frame assembly has been isolated to illustrate how the journal paper sensor attaches to it. Do not remove the journal frame assembly when removing and replacing the journal paper sensor.

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6.39.20 Removing and Replacing the Journal Paper Spool

Subtopics
6.39.20.1 Removing the Journal Paper Spool
6.39.20.2 Replacing the Journal Paper Spool

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6.39.20.1 Removing the Journal Paper Spool

1. Switch **POWER OFF** at the base or system unit.

2. Raise the access cover.

3. Unlock and raise the journal cover.

4. Slide the journal paper spool slightly to the left, then lift the journal paper spool out of the printer as shown.

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6.39.20.2 Replacing the Journal Paper Spool

1. Lower the journal paper spool into the printer as shown.

   Note: See "Replacing the Journal Station Paper" in topic 6.39.32 if paper is to be installed in the printer.

2. Lower the journal cover and lock it, if required

3. Lower the access cover.

4. Switch power ON at the base or system unit.

5. After replacing the journal paper spool, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 229

Figure 6-65. Journal Paper Spool

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6.39.21 Removing and Replacing the Journal Roller Holder Assembly and Frame

Subtopics
6.39.21.1 Removing the Journal Assembly
6.39.21.2 Replacing the Journal Assembly

¦ Copyright IBM Corp. 1986, 1992

6.39.21.1 Removing the Journal Assembly

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the platen assembly. See topic 6.39.25.

5. Remove the toggle spring retainer clip [3] then disengage the spring toggle [1] at its center attachment point.

6. Disengage the O-ring shaft from the left leg of the roller holder and slide the right end of the shaft out of the hole in the right leg of the roller holder.

7. Remove the roller holder leg retainer [4] then gently pry outward on the ends of the journal roller holder assembly [2] until they are free of the posts on the journal frame. Remove the journal roller holder assembly and note how it attaches to the frame.

8. Gently spread the top sides of the journal frame one at a time until they are loose from the platen and rotate the frame off of the platen as shown.

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6.39.21.2 Replacing the Journal Assembly

1. Attach the bottom of the journal frame to the platen and rotate it forward as shown until the top sides of the frame touch the platen. Gently spread the top sides one at a time and continue rotating the frame forward until both sides click into place.

2. Gently spread the arms of the roller holder to allow the holes to fit over the posts on the frame. Replace the roller holder leg retainer [4].

3. Attach the toggle spring [1] at its center attachment point then install the toggle spring retainer clip [3]. Ensure that the spring is correctly seated and that the roller holder moves back-and-forth correctly.

4. Replace the O-ring shaft by inserting its right end in the hole in the right leg of the roller holder, then snapping the shaft into the left leg of the roller holder.

5. Replace the platen assembly. See topic 6.39.25.

6. Replace the main cover. See topic 6.39.20.

7. Connect the printer to the base or system unit.

8. Switch power ON at the base or system unit.

9. After replacing the journal components, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 230

Figure 6-66. Journal Frame (Disassembled)

PICTURE 231

PICTURE 232

Figure 6-67. Journal Assembly

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6.39.22 Removing and Replacing the Journal Support Post

Subtopics
6.39.22.1 Removing the Journal Support Post
6.39.22.2 Replacing the Journal Support Post

¦ Copyright IBM Corp. 1986, 1992

6.39.22.1 Removing the Journal Support Post

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal paper spool. See topic 6.39.20.

5. Mark the location of the journal spool post [1] ridges on the printer. These three ridges are located on the customer receipt side of the post.

6. Rotate the printer onto its back with the bottom cover facing you as shown.

   Note: Do not rotate the printer so that it rests on its top.

7. Remove the screws [2] and journal support plate from the bottom cover. Do not tilt the post sideways; this causes the two hex nuts to fall out of the post.

8. Rotate the printer so that it rests on the bottom cover.

9. Lift the journal support post from the printer.

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6.39.22.2 Replacing the Journal Support Post

1. Lower the journal support post [1] into the printer. Ensure that the two hex nuts are in the post.

2. While holding the journal support post in place, rotate the printer onto its back with the bottom cover facing you as shown.

   Note: Do not rotate the printer so that it rests on its top.

3. Replace the screws [2] and journal support plate, but do not completely tighten the screws. Tighten the screws so that the post will not move freely but can be adjusted.

4. Rotate the printer so that it rests on the bottom cover.

5. Adjust the post by aligning its ridges with the marks on the printer. These three ridges are located on the customer receipt side of the post.

6. Rotate the printer onto its back with the bottom cover facing you as shown.

7. Completely tighten the screws.

8. Rotate the printer so that it rests on the bottom cover.

9. Replace the journal paper spool. See topic 6.39.20.

10. Replace the main cover. See topic 6.39.23.

11. Connect the printer to the base or system unit.

12. Switch power ON at the base or system unit.

13. After replacing the journal support post, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 233

Figure 6-68. Journal Support Post

PICTURE 234

Figure 6-69. Journal Support Post Screws and Plate

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6.39.23 Removing and Replacing the Main Cover

Subtopics
6.39.23.1 Removing the Main Cover
6.39.23.2 Replacing the Main Cover

¦ Copyright IBM Corp. 1986, 1992

6.39.23.1 Removing the Main Cover

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Rotate the printer onto its back as shown.

   Note: Do not rotate the printer so that it rests on its top.

4. Move the four main cover holding tabs, [1] toward the center of the printer with a slotted screwdriver to release them as shown. Rotate the printer so that it rests on its base.

5. Remove the main cover from the printer by pivoting the cover onto its left side to prevent damage to the attached cables.

6. Disconnect the top and front keypad cables and the cover interlock sensor cable from printer card connectors J8, J9 and J7, respectively. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

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6.39.23.2 Replacing the Main Cover

1. Place the printer on a flat surface.

2. Place the main cover, resting on its left side, to the left of the printer.

3. Connect the top and front keypad cables and the cover interlock sensor cable to printer card connectors J8, J9 and J7, respectively. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

4. Align the holding tabs [1] over their slots. Ensure that all of the printer cables are within the main cover.

5. Push down on the main cover until the tabs lock into place. Ensure that all four tabs engage.

6. Connect the printer to the base or system unit.

7. Switch power ON at the base or system unit.

8. After replacing the main cover, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 235

Figure 6-70. Main Cover

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6.39.24 Removing and Replacing the Paper Rollers

Subtopics
6.39.24.1 Removing the Paper Rollers
6.39.24.2 Replacing the Paper Rollers

¦ Copyright IBM Corp. 1986, 1992

6.39.24.1 Removing the Paper Rollers

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal paper spool. See topic 6.39.20.

5. Remove the journal support post. See topic 6.39.22.

6. Remove the journal paper rollers [1] and the customer receipt rollers [2]. Begin lifting at the ends where the journal support post was.

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6.39.24.2 Replacing the Paper Rollers

1. Replace the journal paper rollers [1] and the customer receipt rollers [2]. Ensure that they roll freely and do not bind.

2. Replace the journal support post. See topic 6.39.22.

3. Replace the journal paper spool. See topic 6.39.20.

4. Replace the main cover. See topic 6.39.23.

5. Connect the printer to the base or system unit.

6. Switch power ON at the base or system unit.

7. After replacing the paper rollers, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 236

Figure 6-71. Paper Rollers

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6.39.25 Removing and Replacing the Platen Assembly

Subtopics
6.39.25.1 Removing the Platen Assembly
6.39.25.2 Replacing the Platen Assembly

¦ Copyright IBM Corp. 1986, 1992

6.39.25.1 Removing the Platen Assembly

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal paper spool. See topic 6.39.20.

5. Remove the customer receipt paper cutter. See topic 6.39.10.

6. Remove the customer receipt motor mount from the printer. Begin at step 5 in topic 6.39.9.1 under "Removing the CR Motor Mount" in topic 6.39.9.1.

7. Remove the two platen screws [1], flat washers, lock washers, and special nuts (using a magnetic tool to prevent the hardware from dropping into the printer).

8. Lift the platen assembly straight up from the printer.

9. Disconnect the journal emitter sensor cable from printer extension card connector J106. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card.

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6.39.25.2 Replacing the Platen Assembly

1. Lower the platen assembly into the printer as shown.

   Note: Ensure that the rubber O-ring is on its wheel and that the emitter shaft is seated correctly.

2. Connect the journal emitter sensor cable to printer extension card connector J106. See Figure 6-43 in topic 6.39.1 for an illustration of the printer extension card.

3. Replace the two platen screws [1], flat washers, lock washers, and special nuts. Torque both screws using a torque screwdriver set at 8 inch pounds.

   Note: Ensure that the nut is seated correctly in the side frame. A magnetic tool or needle nose pliers may be required to hold the nut in place while starting the platen screws.

4. Connect the customer receipt motor mount to the printer. See steps 2 in topic 6.39.9.2 and 3 in topic 6.39.9.2 under "Replacing the CR Motor Mount" in topic 6.39.9.2.

5. Replace the customer receipt paper cutter. See topic 6.39.10.

6. Replace the journal paper spool. See topic 6.39.20.

7. Replace the main cover. See topic 6.39.23.

8. Connect the printer to the base or system unit.

9. Switch power ON at the base or system unit.

10. After replacing the platen assembly, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 237

Figure 6-72. Platen Assembly

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6.39.26 Removing and Replacing the Print Head

Subtopics
6.39.26.1 Removing the Print Head
6.39.26.2 Replacing the Print Head

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6.39.26.1 Removing the Print Head

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the printer ribbon cartridge. See topic 6.39.33.

5. Remove the print head shield by gently spreading it at the bottom and lifting up.

6. Disconnect the print head cable from printer card connector J5. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

   Note: The print head cable is permanently attached to the print head.

7. Remove the two screws [1], lock washers, and special flat washers that attach the print head to the carrier assembly.

8. Pull the carrier away from the platen so the print head can slide forward off of its key.

9. Remove the print head and print head cable from the printer.

PICTURE 238

Figure 6-73. Print Head

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6.39.26.2 Replacing the Print Head

1. Center the carrier in the printer. Pull the carrier away from the platen to allow the print head to engage the key on the carrier.

2. Loosely screw the print head to the carrier using the screws, lock washers, and special flat washers as shown.

3. Use the gap setting tool [2] as shown in Figure 6-74 to set the correct gap between the print head and platen. Latch the tool in front of the print head as shown and move the print head forward on the carrier until the tool is flush with the platen.

4. Screw the print head onto the carrier as shown. Torque both screws using a torque screwdriver with a T10 Torx bit set at 6 inch pounds. **Do not overtighten the screws.** Remove the adjustment tool and replace the print head shield.

5. Tuck the print head cable under the rib on the carrier and move the carrier to the right side of the printer. See Figure 6-75. Slide the cable under the home sensor card assembly and then route it through the left side frame. The 90 degree bend in the cable should be flush with the slot in the left side frame. See Figure 6-75.

6. Connect the print head cable to printer card connector J5. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

7. Replace the printer ribbon cartridge. See topic 6.39.33.

8. Replace the main cover. See topic 6.39.23.

9. Connect the printer to the base or system unit.

10. Switch power ON at the base or system unit.

11. Press the ready button [3], the document insert up button [4], and the document insert down button [5] simultaneously. See Figure 6-81 in topic 6.39.31 for the location of these buttons.

12. After replacing the print head, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2. Also, perform the printer adjustments in topic 6.38.

PICTURE 239

Figure 6-74. Print Head Adjustment. The print head and its gap setting tool are shown on the right.

PICTURE 240

Figure 6-75. Print Head Cable Routing

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6.39.27 Removing and Replacing the Print Head Home Sensor Card

Subtopics
6.39.27.1 Removing the Print Head Home Sensor Card
6.39.27.2 Replacing the Print Head Home Sensor Card

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6.39.27.1 Removing the Print Head Home Sensor Card

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect the sensor cable from the home sensor card. The cable is located on the far left side of the card. Note how the cable is routed.

5. Mark the location of the two screws [1] on the upper forms guide to establish the location of the home sensor card.

6. Mark the notch in the edge of the upper forms guide [4] that is closest to the groove in the top edge of the home sensor card.

7. Remove the two screws [1], flat washers, and back-up nut plate.

8. Lift the home sensor card [3] out of the printer.

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6.39.27.2 Replacing the Print Head Home Sensor Card

1. Put the home sensor card [3] into place.

2. Adjust the home sensor card left to right using the groove in the card and the marked notch in the upper forms guide [4]. Adjust the home sensor card vertically by locating the mounting screws in the same location that was marked on the upper forms guide.

   Note: To adjust the printing, move the print head home sensor card in the direction you want the print to move.

3. Replace the two screws [1], flat washers, and back-up nut plate. Tighten both screws, making sure the left to right and vertical adjustments are maintained. Torque both screws using a torque screwdriver set at 6 inch pounds.

4. Connect the sensor cable [2] to the home sensor card. Route the cable as it was before.

5. Move the print head left and right to ensure that it does not hit either print head home sensor.

6. Replace the main cover. See topic 6.39.23.

7. Connect the printer to the base or system unit.

8. Switch power ON at the base or system unit.

9. After replacing the print head home sensor card, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 241

Figure 6-76. Print Head Home Sensor Card

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6.39.28 Removing and Replacing the Print Head Transport Assembly

Subtopics
6.39.28.1 Removing the Transport Assembly
6.39.28.2 Replacing the Transport Assembly

¦ Copyright IBM Corp. 1986, 1992

6.39.28.1 Removing the Transport Assembly

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the ribbon drive clutch attached to the print head transport assembly by prying the tabs attaching it to the transport assembly open with a screwdriver while pushing the drive clutch out with another screwdriver as shown.

   Note: Ensure that the spring is removed from the print head transport shaft.

5. Disconnect the transport motor cable from printer card connector J4. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

6. Turn the print head transport assembly clockwise and remove the assembly from the printer.

7. Pull the print head transport helix through the hole in the left side frame, disengaging the helix nut.

8. Move the print head to the right of the print head home sensor card. Remove the print head. See topic 6.39.26.

9. Remove the print head carrier bar [1] by gently releasing one end at a time from the side frames.

10. Raise the print head carrier and remove the helix nut.

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6.39.28.2 Replacing the Transport Assembly

1. Move the print head carrier to the right of the print head home sensor card. Raise the print head carrier and replace the helix nut.

2. Replace the print head carrier bar by gently pressing one end at a time into the side frames. Ensure that the carrier bushing is installed as shown.

3. Replace the print head. See topic 6.39.26.

4. Put the transport assembly, except for the drive gear and spring clutch, back into the printer and thread the helix through the helix nut as shown.

5. Turn the print head transport assembly motor counterclockwise to attach it to the left side frame.

   Note: Be careful not to fold or damage the rubber boot on the face of the motor.

6. Apply a film of lubricant (IBM P/N 93F0415) to the metal end of the transport assembly, to the outside of the spring clutch and to the tenon of the driver gear.

7. Push the spring clutch and drive gear onto the transport assembly until they snap into place.

8. Move the print head left and right to ensure that it is functioning correctly.

9. Connect the transport motor cable to printer card connector J4. See Figure 6-42 in topic 6.39.1 for an illustration of the printer card.

10. Replace the main cover. See topic 6.39.23.

11. Connect the printer to the base or system unit.

12. Switch power ON at the base or system unit.

13. After replacing the transport assembly, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 242

Figure 6-77. Print Head Transport Assembly

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6.39.29 Removing and Replacing the Printer Card

Note: A short in a print head coil or a motor winding can draw too much current and damage components on the printer card. To test the resistance of a print head coil or motor winding, see the resistance checks beginning in topic 6.30.

Warning: Follow IBM ESD procedures when handling static-sensitive components.

Subtopics

6.39.29.1 Removing the Printer Card
6.39.29.2 Replacing the Printer Card

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6.39.29.1 Removing the Printer Card

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Disconnect all of the cables from the printer card. Note how the cables are routed. See Figure 6-42 in topic 6.39.1 for a detailed illustration of the printer card.

5. Release the tab [1] holding the printer card in place. Carefully slide the printer card out of the printer.

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6.39.29.2 Replacing the Printer Card

1. Push the tab [1] back and carefully slide the printer card into the printer until the tab locks into place.

   Note: Ensure that the printer card slides under the hooks [1] and that the ground clip [2] is correctly positioned on the left side frame.

2. Connect the cables to the card. See Figure 6-42 in topic 6.39.1 for a detailed illustration of the printer card.

   Note: Connect J2, J6, and J7 first and be careful not to reverse J3 and J4. Route the cables as they were before.

3. Replace the main cover. See topic 6.39.23.

4. Connect the printer to the base or system unit.

5. Switch power ON at the base or system unit.

6. After replacing the printer card, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

7. Perform the printer adjustments. See "Printer Adjustments Using the 4680 Operating System" in topic 6.37 or "Printer Adjustments Using the 4684 Reference Diskette" in topic 6.38.

PICTURE 243

Figure 6-78. Printer Card

PICTURE 244

Figure 6-79. Printer Card Hooks. The bottom cover is shown without the printer attached to illustrate the printer card hooks.

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6.39.30 Removing and Replacing the Printer Extension Card

Subtopics
6.39.30.1 Removing the Printer Extension Card
6.39.30.2 Replacing the Printer Extension Card

¦ Copyright IBM Corp. 1986, 1992

6.39.30.1 Removing the Printer Extension Card

1. Switch **POWER OFF** at the base or system unit.

2. Disconnect the printer from the base or system unit.

3. Remove the main cover. See topic 6.39.23.

4. Remove the journal paper spool. See topic 6.39.20.

5. Remove the bottom cover. See topic 6.39.3.

6. Disconnect all of the cables from the printer extension card [1]. See Figure 6-43 in topic 6.39.1 for a detailed illustration of the printer extension card. Note how the cables are routed.

7. Release the printer extension card tabs on either side of the printer using a spring hook as shown.

8. Carefully lift the printer extension card and its cable out of the printer.

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6.39.30.2 Replacing the Printer Extension Card

1. Put the printer extension card back into place as shown, making sure the tabs on both sides lock into place.

   Warning: Do not orient the card differently than shown or you will damage the printer.

2. Connect the cables to the printer extension card. See Figure 6-43 in topic 6.39.1 for a detailed illustration of the printer extension card. Route the cables as they were before.

3. Replace the bottom cover. See topic 6.39.3.

4. Replace the journal paper spool. See topic 6.39.20.

5. Replace the main cover. See topic 6.39.23.

6. Connect the printer to the base or system unit.

7. Switch power ON at the base or system unit.

8. After replacing the printer extension card, run the printer test. See "TEST 6000: Stand-Alone Printer Test" in topic 6.2.

PICTURE 245

Figure 6-80. Printer Extension Card

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6.39.31 Replacing the Customer Receipt Paper

The printer cannot sense when the customer receipt paper is low. Therefore, you must check your paper roll often to avoid running out of paper during a transaction. The customer receipt paper is running low when the colored stripe on the paper begins to show.

1. Get a new roll of paper and cut or tear the end of the paper loose from the roll.

2. Turn the paper roll so that the loose end of the paper comes up toward you from the bottom of the roll and tear or cut the end of the paper as shown.

PICTURE 246

3. Open the printer access cover.

4. Tear off any remaining paper near the paper core. Feed the remaining short portion of paper through the customer receipt station using the customer receipt button, [2] on Figure 6-81.

5. Remove the remaining parts of the old paper roll and discard.

Do not pull the customer receipt paper backward through the customer receipt station.

6. Hold the paper roll as shown and put it in the holder, pulling out several inches of paper to work with.

PICTURE 247

7. Insert the leading edge of the paper into the top of the station. Be sure the paper is centered in the opening.

PICTURE 248

8. Push the paper downward until it stops.

The printer access cover has been removed to accommodate this view from the rear of the printer showing the correct placement of paper in the customer receipt station.

PICTURE 249

9. Move the customer receipt lever toward you.

PICTURE 250

10. Press and hold the customer receipt button, [2] on Figure 6-81, until the paper feeds through the upper rollers and arrives at the paper cutter.

PICTURE 251

11. Move the customer receipt lever away from you.

PICTURE 252

¦ Copyright IBM Corp. 1986, 1992

12. Press the customer receipt button, [2] on Figure 6-81, until several inches of paper have advanced through the paper cutter.

PICTURE 253

13. With the printer access cover open, hold the ready button [3] pressed and press the customer receipt button [2].

This will run a stand-alone printer test to make sure that the paper is loaded correctly.

Press the ready button [3] at any time to stop the test.

PICTURE 254

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-81. Printer Buttons

14. If necessary, tear off the paper even with the paper cutter before closing the printer access cover.

15. Close the printer access cover.

PICTURE 255

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6.39.32 Replacing the Journal Station Paper

1. Get a new roll of paper and cut or tear the end of the paper loose from the roll.

2. Turn the paper roll so that the loose end of the paper comes up toward you from the bottom of the roll and tear or cut the end of the paper as shown.

PICTURE 256

3. Open the printer access cover and the journal cover. The journal cover will have to be unlocked if it has a keylock.

PICTURE 257

4. Tear the journal paper between the writing ledge and the take-up spool.

5. Lift the spool out of the printer and remove the paper from it.

6. Tear off any remaining paper near the paper core. Feed the remaining short portion of paper through the journal station using the journal button, [1] on Figure 6-82.

7. Remove the remaining parts of the old paper roll and discard them.

When removing the journal paper, do not pull it backward through the journal station.

8. Put the paper roll in the holder, pulling out several inches of paper to work with.

PICTURE 258

9. Insert the leading edge of the paper over the small roller just behind the writing ledge. Ensure that the paper is centered in the opening.

PICTURE 259

10. Push the paper downward until it stops.

The printer access cover has been removed to accommodate this view from the rear of the printer showing the correct placement of paper in the journal station.

PICTURE 260

11. Move the journal station lever toward you.

PICTURE 261

12. Press and hold the journal button, [1] on Figure 6-82, until the paper feeds through the paper rollers.

PICTURE 262

13. Move the journal station lever away from you.

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PICTURE 263

14. Press the journal button, [1] on Figure 6-82, again until several inches of paper advance.

PICTURE 264

15. Attach the paper to the journal station take-up spool.

PICTURE 265

16. Wind the paper around the journal station take-up spool two turns in the direction shown.

PICTURE 266

17. Ensure that the journal station writing ledge [1] is upright, and put the spool back into the journal station.

PICTURE 267

18. Rotate the journal station take-up spool until there is no slack in the paper between the writing ledge and the take-up spool.

19. With the printer access cover open, press and hold the ready button [3] and press the journal button [1].

This will run a stand-alone printer test to make sure that the paper is loaded correctly and that the take-up spool turns.

Press the ready button [3] at any time to stop the test.

PICTURE 268

[1] = Journal Button

[2] = Customer Receipt Button

[3] = Ready Button. The ready (green) light next to this button comes ON when a document is inserted.

[4] = Document Insert **up** Button.

[5] = Document Insert **down** Button.

Figure 6-82. Printer Buttons

20. Lock the journal station if required.

21. Close the printer access cover.

PICTURE 269

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6.39.33 Removing and Replacing the Printer Ribbon Cartridge

The printer ribbon cartridge mounts inside the printer near the front and is stationary. You may need to replace the ribbon cartridge if printed characters come out very light instead of sharp and clear.

Note: Use printer ribbon cartridge IBM P/N 1040888 (black), IBM P/N 1040875 (purple), IBM P/N 1040900 (black auto-inking), or equivalent. Failure to do so may affect print head life and print quality.

Subtopics
6.39.33.1 Removing the Ribbon Cartridge
6.39.33.2 Replacing the Ribbon Cartridge

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6.39.33.1 Removing the Ribbon Cartridge

1. Open the printer access cover.

2. Unlatch the printer ribbon holder from the print head by squeezing together the tabs on either side of the print head.

PICTURE 270

3. Lift the ribbon holder straight up as shown.

PICTURE 271

4. Release the ribbon cartridge by lifting up on both sides as shown.

PICTURE 272

5. Lift the ribbon cartridge from the printer as shown.

PICTURE 273

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6.39.33.2 Replacing the Ribbon Cartridge

1. Discard the old cartridge and get a new one.

2. Release the ribbon holder from the ribbon cartridge by squeezing the ribbon holder tabs together and lifting the ribbon holder up as shown.

PICTURE 274

3. Set the ribbon cartridge into the printer as shown. Press the side of the ribbon cartridge nearest you down into the printer until it clicks into place.

PICTURE 275

4. Place the ribbon holder onto the print head posts as shown and press the ribbon holder down onto the print head until it clicks into place.

PICTURE 276

5. Press the side of the ribbon cartridge furthest away from you down into the printer until it clicks into place. Turn the ribbon feed knob clockwise to take up any slack in the ribbon. The knob is located on the right side of the ribbon cartridge.

PICTURE 277

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A.0 Appendix A. Reference Information

Subtopics

A.1 General Description of the IBM 4683 Point of Sale Terminal
A.2 General Description of the IBM 4684 Point of Sale Terminal
A.3 Special Tools
A.4 Expendable Supplies
A.5 IBM 4680 Store System Description
A.6 IBM 4680 Store Loop Description
A.7 IBM 4683 Serial Input/Output Channel (Device Channel)
A.8 IBM 4680 Initial Program Load (IPL) Description
A.9 IBM 4684 Initial Program Load (IPL) Description
A.10 Remote IPL (RIPL) for Token Ring and Baseband LAN
A.11 4684 Device Channel Adapter Failure Status Bytes

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A.1 General Description of the IBM 4683 Point of Sale Terminal

The following IBM 4683 Point of Sale Terminal models are available. The models are similar in appearance and can attach the same type of I/O devices. The basic terminal consists of a base unit, a keyboard, and a display. For a view of the 4683, see Appendix B, "Hardware Overview."

- **4683-P11**
  The 4683-P11 has 1 megabytes of memory and is functionally equivalent to the 4683-001. It can be programmed to perform the user's point-of-sale functions. To perform *all* available point-of-sale functions, the 4683-P11 must be connected to a store loop and it must be communicating with a store controller on the store loop. After the 4683-P11 has received a program load from the store controller, *some* point-of-sale functions can be performed without communication with the store controller. The 4683-P11 base card has pluggable memory modules that allow you to increase the base card memory by replacing the existing modules with larger capacity modules.

- **4683-P21**
  The 4683-P21 has 2 megabytes of memory and is functionally equivalent to the 4683-A01. Except for the additional memory, the 4683-P21 is the same as the 4683-P11.

- **4683-P41**
  The 4683-P41 has 4 megabytes of memory. Except for the additional memory, the 4683-P41 is the same as the 4683-P11.

- **4683-001**
  The 4683-001 has 1 megabytes of memory and is functionally equivalent to the 4683-P11. The memory on this model is fixed and cannot be changed.

- **4683-A01**
  The 4683-A01 has 2 megabytes of memory and is functionally equivalent to the 4683-P21. The memory on this model is fixed and cannot be changed.

- **4683-002**
  To perform the user's point-of-sale functions, each 4683-002 must be connected to a 4683-*xx*1 or a 4684 that is running the IBM 4680 Operating System, the RIPSS (Retail Industry Program Support Services) Operating System, or an independently developed Operating System.

- **4683-A02**
  The 4683-A02 is functionally equivalent to the 4683-002. Other than the addition of socket 9A, it is the same as the 4683-002.

  Note: In a 4680 Store System, a 4683-*xx*2 relies on a 4683-*xx*1 or 4684 for all of its processing and storage capability.

Subtopics
A.1.1 IBM 4683 Input Voltages

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A.1.1 IBM 4683 Input Voltages

The two input voltage options for the 4683 are:

- Low voltage: 100 to 125 V ac RMS (nominal), single phase, 50 or 60 Hz
- High voltage: 200 to 240 V ac RMS (nominal), single phase, 50 or 60 Hz.

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A.2 General Description of the IBM 4684 Point of Sale Terminal

The following IBM 4684 Point of Sale Terminal models are available. The models are similar in appearance and can attach the same type of I/O devices. All models can be programmed to perform the user's point-of-sale functions. Models 110, 130 and 160 are distributed by World Trade only. For a view of the 4684, see Appendix B, "Hardware Overview."

Model 110
- System Board *without* Baseband Network
- 1.44 Mb Diskette Drive.

Model 111
- System Board *with* Baseband Network
- 1.44 Mb Diskette Drive.

Model 130
- System Board *without* Baseband Network
- 30 Mb Fixed Disk
- 1.44 Mb Diskette Drive.

Model 131
- System Board *with* Baseband Network
- 30 Mb Fixed Disk
- 1.44 Mb Diskette Drive.

Model 160
- System Board *without* Baseband Network
- 60 Mb Fixed Disk
- 1.44 Mb Diskette Drive.

Model 161
- System Board *with* Baseband Network
- 60 Mb Fixed Disk
- 1.44 Mb Diskette Drive.

Model 300
- 80386SX Processor
- Can attach a side card to the system board for either a Baseband Network Adapter or a Token Ring Adapter
- Up to 8Mb of system board memory.

Subtopics
A.2.1 IBM 4684 Input Voltages

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A.2.1 IBM 4684 Input Voltages

The two input voltage options for the 4684 are:

- Low voltage: 100 to 125 V ac RMS (nominal), single phase, 50 or 60 Hz
- High voltage: 200 to 240 V ac RMS (nominal), single phase, 50 or 60 Hz.

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A.3 Special Tools

To maintain the IBM 4683 and 4684 Point of Sale Terminals, the service representative may need the following items not supplied in the tool kit:

- Keytop Puller, IBM P/N 1647720 (shipped with the keyboard)
- Lock Cylinder Alignment Key, Lock Installation-Removal Key, and Dummy Lock Insert Key, IBM P/N 4783922 (shipped with the store controller)
- Miniprobes (two), IBM P/N 453718
- Module Extractor, IBM P/N 9900764
- MSR Cleaning Card, IBM P/N 6019483
- Single-Track MSR Test Card, IBM P/N 4055210
- Dual-Track MSR Test Card, IBM P/N 90X9640
- Printer Frame Separating Tools (two), IBM P/N 63X4985
- RS-232-C Cable Wrap Plug, IBM P/N 6165746 (shipped with the RS232 cable)
- Current Loop Cable Wrap Plug, IBM P/N 6165745 (shipped with the current loop cable)
- Scanner Test Label, IBM P/N 6317966 (a scanner test label, IBM P/N 6317962 is shipped with the scanner)
- Store Loop Cable Test Plug, IBM P/N 61X3948 (shipped with the store loop cable)
- Store Loop Test Cable, IBM P/N 96X4967 (used when a non-IBM store loop cable is attached to the store controller)
- Wrap Plug Kit, IBM P/N 96X5047
- baseband network cable adapter, IBM P/N 96X5037
- Baseband Network Terminator Plug, IBM P/N 96X4975
- Baseband Network Wrap Plug, IBM P/N 96X4974
- X.25 Interface Co-Processor/2 Wrap Plug. See Table 2-15 in topic 2.14.13.

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A.4 Expendable Supplies

- Paper for the point-of-sale printer, IBM P/N 432768 (or equivalent)

- Print Ribbon for the point-of-sale printer, IBM P/N 4483015 (or equivalent)

  Note: Failure to use the recommended ribbon may affect print head life and print quality.

- 4683 Storage Retention Battery, IBM P/N 4783928 (or equivalent).
  CAUTION:
  The battery is a nickel cadmium battery. Dispose of defective batteries according to your local government regulations.

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A.5 IBM 4680 Store System Description

The IBM 4680 Store System includes a store controller and point-of-sale terminals. The 4683-*xx*1 terminals are connected to the store controller through the store loop. The 4683-*xx*2 terminals are directly connected to a 4683-*xx*1 or 4684.

PICTURE 278

Figure A-1. Example of a 4680 Store System. In this figure, the 4683-P can also be a 4683-001 or 4683-A01. The 4683-002 can also be a 4683-A02.

Subtopics
A.5.1 Store Controller Backup

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A.5.1 Store Controller Backup

The IBM 4680 Operating System gives support for a second Store Loop Adapter to allow store controller backup for the IBM 4683 terminals attached to a store loop. The operating system also gives support for store controller backup on a store controller with only one Store Loop Adapter. Store controller backup is a function in which a store controller monitors the activity on a store loop that is the primary responsibility of another store controller. See Figure A-3.

If the backup store controller detects that activity has stopped on that store loop, it can automatically take control and give store controller support to the IBM 4683 terminals attached to the monitored store loop. When the inactive store controller is restored to service, through operator intervention, the backup store controller returns to a monitor role for that store loop.

There are several options in connecting the store controllers and the store loops, depending on requirements. Figure A-2 shows four possible configurations. The four examples are:

- Two store controllers, with one having primary responsibility for a store loop and one serving in a backup capacity.
- Two store controllers, each one operating its own store loop and giving backup support for the other.
- Three store controllers, one has no primary responsibility for a store loop, but it gives backup support for the other two store controllers.
- Three or more store controllers, arranged so that each one controls its own store loop and gives backup support for one other.

PICTURE 279

Figure A-2. Examples of Configurations for Store Controller Backup

PICTURE 280

Notes:

- This illustration represents a typical store loop, using the IBM Loop Wiring Concentrator. Your stor
  like this, but the position of your 4683s on the loop and their relationship to the store controller
- The 4683-P can also be a 4683-001 or 4683-A01. The 4683-002 can also be a 4683-A02.
- The store controller transmits data to the first 4683 "down-loop' on the store loop. This 4683 recei
  passes it to the next 4683 "down-loop". This continues with each 4683 receiving data from the 4683 i
  "up-loop" from its position, and passing it on to the next 4683 "down-loop". The last 4683 "down-loo
  back to the store controller.

Figure A-3. Store Loop with Backup Store Controller

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A.6 IBM 4680 Store Loop Description

Notes:

1. This description is for IBM 4683 Point of Sale Terminals attached to the IBM 4680 Operating System. For other applications, see the documentation for your store system.

2. There is a store loop adapter for the PS/2 Store Controller and another for the 4684 Point of Sale Terminal. The following reference information pertains to the PS/2 Store Controller store loop adapter. For reference information about the 4684 Point of Sale Terminal store loop adapter, see the *IBM 4684 Store Loop Adapter/A: Installation, Testing, Problem Determination, and Technical Reference*.

The store loop is a cable over which data is transmitted between the store controller and the terminals of an IBM 4680 Store System.

The store controller manages the data flow on the store loop. The rules for sending and receiving data over the store loop are a subset of the Synchronous Data Link Control (SDLC) rules.

Subtopics
A.6.1 Store Loop Configuration
A.6.2 Store Loop Operation
A.6.3 Store Loop Message Format
A.6.4 Store Loop Message Checking
A.6.5 Store Loop Power-On Initialization
A.6.6 Store Loop Connection

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A.6.1 Store Loop Configuration

The physical store loop starts and ends at the store controller and connects the terminals in a serial or radial arrangement. The store loop wire is a shielded, twisted-pair cable that is installed by the user. This cable must meet the electrical and physical specifications outlined in *IBM 4680 Store System: Preparing Your Site*. The store loop can also be installed using the IBM Cabling System.

Several types of store loop configurations are possible, depending on the type of cable used. Two of these configurations are described here.

- **Serial Store Loop**
  Consists of a twisted-pair cable that connects the store controller's store loop transmitter to the first terminal's store loop receiver. Additional twisted-pair cables connect the store loop transmitter in each successive terminal to the store loop receiver in the next terminal. Finally, a twisted-pair cable completes the store loop by connecting the last terminal's store loop transmitter to the store controller's store loop receiver. See Figure A-4.

- **Radial Store Loop**
  Consists of a twisted-pair cable that runs from the store controller and each terminal to a centrally located Loop Wiring Concentrator (LWC). See Figure A-5 and Figure A-6.

Up to 64 4683-*xx*1 terminals can be connected to one store loop.

Note: System performance can be affected depending on the transaction rate.

Systems using a single store controller are limited to a single store loop. Store loops generally use two twisted pairs in a single jacket with a connection similar to the one shown in Figure A-5.

No remote store loops are supplied with this system.

PICTURE 281

Figure A-4. Store Loop using serial wiring. The 4683-P can also be a 4683-001 or 4683-A01. The 4683-002 can also be a 4683-A02.

PICTURE 282

Figure A-5. Store Loop using radial wiring. The 4683-P can also be a 4683-001 or 4683-A01. The 4683-002 can also be a 4683-A02.

PICTURE 283

Figure A-6. Wiring Diagram for a radial store loop. The 4683-P can also be a 4683-001 or 4683-A01.

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A.6.2 Store Loop Operation

Generally, the most demanding use of the store loop communication path is during the terminal load process when many blocks of data are transmitted from the store controller to the terminal. Only a few control messages are transmitted from the terminal to the store controller during this process. If the terminals are loaded properly (in a normal length of time), the store loop communication path is usually good. This path may include a variable number of terminals, depending on the store's operating practices with regard to turning power ON and loading the terminals at the start of the day. The Storage Retention in the terminal virtually does away with the need to load terminals each day if the user leaves power ON all the time at the terminal's wall receptacles. If a failure is noticed during a terminal load and the store loop communication path is suspected, the terminal configuration in use at the time of the failure may have to be analyzed. Store operating practices of switching terminal power ON in the morning and switching power **OFF** at night may also lead to some *expected normal* number of message errors being stored in the loop error log at these times. This situation should be kept in mind when analyzing store loop error logs.

Store operating procedures must be followed carefully to ensure that the distance limitation of 1220 m (4000 ft) between active terminals (those terminals with power ON and connected to the store loop) is not exceeded. Although the maximum distance allowed between active terminals is 1220 m (4000 ft), distances encountered in actual stores are usually much less. For example, a typical department store of three floors and 50 terminals with one store loop, using the wiring configuration illustrated in Figure A-5 in topic A.6.1, might be 6700 m (22,000 ft) for an average of 134 m (440 ft) between terminals. As terminals are deactivated by switching power OFF, the distance between the remaining active terminals could increase until it exceeds 1220 m (4000 ft). This condition is normally controlled by leaving power ON at some terminals in key locations or by switching segments of the store loop cable out of the store loop from a central switch/patch panel.

One of the most important factors in reliable store loop operation is the quality of the original wiring installation. The following conditions are important:

- The cable and receptacles must be as specified in the *IBM 4680 Store System: Preparing Your Site*.
- The wiring connections at the data connectors and wiring panels must be tight.
- The insulation on the signal wires and the shield ground must be arranged so that there is no possibility of short circuits between the signal wires and shield ground anywhere in the system.

Once these conditions have been met, store loop MAPS and problem determination procedures are highly effective in isolating store loop problems.

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A.6.3 Store Loop Message Format

The message format is shown in Figure A-7. Control messages are mainly associated with store controller and terminal management of message traffic. Information messages are associated with the application being performed by the store controller and terminal.

The flag character (F) acts as a message delimiter. The address character (A) ensures that the message gets to the intended unit. The address character may be one or two bytes in length, letting every terminal in the store be uniquely addressed. Normally terminal-unique addresses are two bytes in length, and group addresses are one byte in length. The control character (C) gives a method of defining the action needed on a control message, such as the start of a poll cycle by the store controller. The terminal and the store controller each have a frame check sequence (FCS); that is, two Cyclic Redundancy Check (CRC) characters at the end of each message to check the validity of the message. The loop communication adapter hardware in both the store controller and the terminal ensures that the flag bit configuration (01111110) only occurs at the start and the end of the serial bit stream that makes up a message.

PICTURE 284

Figure A-7. Message Format (Terminal-to-Store Controller, Store Controller-to-Terminal)

Subtopics
A.6.3.1 Addressing
A.6.3.2 Polling
A.6.3.3 Data Bit Encoding

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A.6.3.1 Addressing

Messages transmitted by the terminals always flow from the terminal to the store controller. In terminal-to-store controller messages, the address character (A) identifies which terminal the message came from. Messages originating at the store controller are sent to a specific terminal by placing that terminal's address character (A) in the message following the flag character (F). The following types of addresses are placed in a message only by a store controller:

- An *All Parties* address is used to send a message to all terminals, regardless of terminal type, that are connected to the store loop, rather than to a specific terminal.

- A *Group* address is used to send a message to all terminals of a specific type on the store loop, but not necessarily all terminals on the store loop.

When the terminal is operational, it can recognize:

- Its own address
- The *All Parties* address
- The *Group* address.

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A.6.3.2 Polling

The store controller manages message flow on the store loop by sending a control message (polling) that lets the terminals transmit. A terminal cannot start to transmit unless it is polled by the store controller. The store controller starts message traffic on the store loop by polling all terminals at the same time with the *All Parties* address. Any terminal on the store loop that needs to send a message can send it after the poll has been transmitted. The serial store loop connection and store loop adapter hardware then allow an orderly transmission of terminal messages in the sequence of their physical position on the store loop. If a terminal does not transmit at the time the poll is transmitted, it must wait for the next poll to be transmitted by the store controller.

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A.6.3.3 Data Bit Encoding

Data transmitted on the store loop is converted from internal machine logic levels to phase-encoded bits by the store loop adapter hardware. The transmit signal level in the first half of a bit cell is approximately 4 volts peak to peak. The last half of the bit cell is inactive. Figure A-8 shows a representative transmit signal on a short lightly loaded line.

The store loop receiver can sense bits to a level of approximately 1.2 volts peak to peak (referenced to the first half of the bit cell). Figure A-9 shows the effects of line loss and capacitive current loading on a receive signal.

PICTURE 285

Figure A-8. Typical Store Loop Transmit Signal (Short Line)

PICTURE 286

Figure A-9. Typical Store Loop Receive Signal (Long Line)

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A.6.4 Store Loop Message Checking

The terminal uses a frame check sequence (FCS) to check the validity of each message it receives. An invalid message is discarded. When either the store controller or the terminal sends an information message, an acknowledgment is expected from the receiving end. If an acknowledgment is not received in a specific time-out period, the message is retransmitted.

Cyclic redundancy check (CRC) errors occur for several different reasons. The most common source of this type of error is switching the power ON at one terminal while the store controller is transmitting a message to another terminal. This interrupts the store loop for a short period until the bypass relay contacts close. Retransmitting the message usually corrects this error condition. If there are no transient interruptions of this type, and if all units connected to the store loop are operating normally, there should be very few CRC errors on a local store loop. Transient interruptions of this type are hardly noticed by operators using the terminals.

Subtopics
A.6.4.1 Message Error Reporting

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A.6.4.1 Message Error Reporting

The terminal does not report CRC errors that it detects. The store controller stores loop message errors once the error rate exceeds approximately 1% for a fixed period. When the error rate exceeds 1%, an error message displays at the store controller. The error information is also stored in the loop error log. The time period used for determining the error rate varies according to the amount of message traffic.

All entries in the store loop error log include a time stamp and the address of the associated terminal. The following types of message errors are stored:

- CRC errors
- Retransmit errors
- Sequence errors.

CRC errors are generally caused by a problem in the communication path between units connected to the store loop. The problem may be of short period, in which case the system recovers. For example, switching power OFF at a terminal might interrupt a message. The error may or may not be stored in the store loop error log, depending on the error rate the store controller is experiencing. A continuing problem may eventually exceed the error rate threshold. This causes an error message to be displayed at the store controller and error information to be stored in the loop error log. The procedure for printing the contents of the store loop error log is listed in the store controller maintenance documentation.

A retransmit error occurs when a terminal fails to answer a message from the store controller and the store controller must retransmit the message.

A sequence error most often occurs when the terminal must retransmit a message that the store controller failed to answer.

Retransmit and sequence errors may accompany CRC errors if a store loop communication path problem exists. However, retransmit and sequence errors may result from terminal or store controller procedural problems not related to the communication path. An error log printout that shows only retransmit and sequence errors with few, if any, CRC errors indicates a possibility of a procedural problem and should not be confused with store loop communication path problems.

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A.6.5 Store Loop Power-On Initialization

During each terminal power-on sequence, store loop adapter diagnostics run automatically. While diagnostics are running, the store loop relay is deactivated. The relay N/C contacts cause the store loop to be bypassed and supply a wrap path through the store loop adapter. See Figure A-10 in topic A.6.6. If the adapter diagnostics are successfully completed, the relay is activated and connects the terminal to the store loop.

If the terminal receives a poll frame in 2.5 seconds, it completes the adapter initialization and starts re-powering and re-clocking the store loop signal. If the terminal does not receive a poll frame, it transmits a beacon message (a special control message) to the store controller. The beacon message includes the address of the beaconing terminal. If this condition continues, the store controller displays an error message that contains the address of the beaconing terminal. If the terminal address has not been keyed in or if it was not saved from previous entry by the Totals Retention feature, the terminal does not beacon.

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A.6.6 Store Loop Connection

The 4683 store loop adapter transmit and receive circuits are transformer-coupled to the line. Transformer-coupling gives good noise rejection and some protection against high voltage transients that may be coupled onto the store loop transmission line. When the 4683 is operational on the store loop, its loop adapter re-clocks and re-powers the signal, thereby acting as a regenerative repeater. If the 4683 power is switched OFF, the store loop driver and store loop receiver circuits are automatically disconnected from the store loop. Figure A-10 shows the 4683 store loop adapter relay contacts and wiring that accomplish this function. If a 4683 is physically disconnected from the store loop, the data connector, which is the store loop receptacle, is self-shorting and maintains the continuity of the store loop.

The IBM Cabling System data connector is used to terminate the transmit and receive lines of the terminal. The same type of data connector is installed by the user at each 4683 store loop position. See Figure A-10 for the store loop wiring connections and wiring color codes. The store loop signals are polarized; therefore, the connections between the data connectors on the store loop must be as shown.

Note: The same type of data connectors are used in World Trade countries.

PICTURE 287

Figure A-10. 4683 Store Loop Cable and Adapter Relay Diagram

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A.7 IBM 4683 Serial Input/Output Channel (Device Channel)

The device channel is a communication channel that ties the associated input/output devices on an IBM 4683 Point of Sale Terminal (all models) to the microprocessor in the 4683-*xx*1. The microprocessor, with a shared RAM-attached microprocessor, controls the data flow on the device channel. The rules for sending and receiving data over the device channel are a subset of the Synchronous Data Link Control (SDLC) rules and the store loop rules.

Subtopics

A.7.1 Device Channel Configuration
A.7.2 Device Channel Interface
A.7.3 Device Channel Byte Format
A.7.4 Device Channel Message Format
A.7.5 Device Channel Message Checking
A.7.6 Device Channel Power-On Initialization

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A.7.1 Device Channel Configuration

The communication link connecting devices to the 4683 (all models) consists of land patterns on the base card in the base unit and device cables connecting the devices to the base unit rear panel.

The device channel connecting the 4683-002 to the 4683-*xx*1 can consist of either a single IBM-supplied cable connecting the two units or an IBM supplied cable for each unit, terminated with an IBM data connector that plugs into the wall. The cable in the wall is customer-provided and is limited to a length of 150 m (490 ft). This cable must be IBM Cabling System cable or comparable.

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A.7.2 Device Channel Interface

The transmit and receive circuits that connect to the device channel are transceivers. The driver is switched to transmit or set to a high impedance condition when the unit is not transmitting. The receiver is always enabled, passing to the unit its own transmitted data and any received data.

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A.7.3 Device Channel Byte Format

The device channel message frames are made up of twelve-bit characters. The meaning of these bits is as follows:

- Bit 1 = Start bit (zero)
- Bits 2 to 9 = Data bits 0 to 7
- Bit 10 = Address bit (one = framing byte; zero = non-framing byte)
- Bits 11 and 12 = Stop bits (one).

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A.7.4 Device Channel Message Format

The message format for device channel frames are defined as follows:

- Frames transmitted to the devices

  Message Frame |Address|Control| Data |CRC|CRC|Flag|

  Response Frame |Address|Control|CRC|CRC|Flag|

  Poll Frame |24 one bits|Address|24 one bits|Address|

- Frames transmitted from the devices

  Message Frame |Address|Control| Data |CRC|CRC|Flag|

  Response Frame |Address|Control|CRC|CRC|Flag|

  Poll Response (no data or status to transmit) |EOP|

The flag character acts as the ending delimiter for message and response frames. The address character sends the frame to the correct device or identifies the device from which a frame is received. The address byte, in other than a poll, has the high-order bit (Bit 9) set to zero. The control character gives a method of defining the type of frame being transmitted or received (data, response, or control). The terminal and the devices each have a frame check sequence (FCS); that is, two cyclic redundancy check (CRC) characters at the end of each frame to check the validity of the frame. A check is also made to ensure that no characters between the starting delimiter and the ending delimiter have the address bit (Bit 10) set to one.

Subtopics
A.7.4.1 Addressing
A.7.4.2 Polling

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A.7.4.1 Addressing

Messages transmitted by I/O devices always flow from the device to the 4683-*xx*1. The address character in these messages identifies which device originated the message. Messages originating at the 4683-*xx*1 are sent to a specific device by using that device address as the leading delimiter in the frame. The following types of addresses are placed in a message only by the 4683-*xx*1:

- A *broadcast* address is used to send a message to all devices, regardless of device type, that are connected to the device channel, rather than to a specific device. A message can be broadcast to all the devices attached to a 4683-*xx*1 or to all the devices attached to a 4683-002, but not to both groups at the same time.

- A *port* address is used by the operating system in the 4683-*xx*1 to send traffic to devices on the 4683-*xx*1 or to send traffic to devices on the 4683-002. The group address X'11' selects 4683-*xx*1 devices; X'22' selects 4683-002 devices. This address is not transmitted on the channel, but is only used by the master microprocessor to select the correct channel.

- A *poll* address is used to request messages from the specific device addressed. This address always has the high-order data bit set to one.

Any given device is capable of detecting its poll address, its receive address, and a broadcast address.

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A.7.4.2 Polling

The operating system manages message flow on the device channel by transmitting a poll frame that lets the device with that address transmit. A device cannot start to transmit unless it is polled by the master microprocessor in the 4683-*xx*1. The master microprocessor continuously polls, using a poll list given to it by the operating system. Any device on the channel that needs to send a message can send it after its specific poll has been detected. If a device does not have any data, response, or status to transmit when it detects its poll, the device must respond with an end of poll (EOP) character.

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A.7.5 Device Channel Message Checking

The terminal uses a frame check sequence (FCS) to check the validity of each message it receives. An invalid message is discarded. When either the operating system or the device sends an information message, an acknowledgment is expected from the receiving end. If an acknowledgment is not received in a specific time-out period, the message is retransmitted. If all units connected to the channel are operating normally, there should be very few CRC errors on the channel.

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A.7.6 Device Channel Power-On Initialization

During each terminal power-on sequence, diagnostics run automatically. While diagnostics are running, no devices on the channel are polled. When the ROS code in the terminal takes control, a check is made to determine if the diagnostics have uncovered any faults that would prevent the terminal from operating. If the ROS code determines that it can activate the terminal, polling is started by the master microprocessor when the ROS code passes a polling list to it and initializes operation.

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A.8 IBM 4680 Initial Program Load (IPL) Description

Subtopics

A.8.1 What an IPL Is
A.8.2 IPL from the IBM 4680 Store Controller to a Terminal
A.8.3 Where the IPL Originates From

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A.8.1 What an IPL Is

An initial program load (IPL) is a group of program and data components that are loaded into a terminal read/write random access memory (RAM). The user selects these components to make the hardware perform the tasks that are needed.

An IPL contains three major components:

- The system code
- The input/output (I/O) driver code
- The application code.

The system code is loaded by the code that resides in the read-only storage (ROS) at power-on time. The system code defines and controls the tasks requested by the application program.

The I/O driver code controls the specific I/O devices that are attached to the terminal. This code is selected by the user and a permanent record of which I/O code to load is kept in the system area of the non-volatile RAM. This code is loaded by the system code.

The application code establishes the procedures that the operator uses to do a job. The application program components do this by assigning tasks to the hardware and to the operator in an ordered structure. These components also supervise the interaction and information exchange between the operator tasks and the hardware tasks. This code is also loaded by the system code.

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A.8.2 IPL from the IBM 4680 Store Controller to a Terminal

The terminal requires active communication from the system, the I/O driver, and the application code immediately after the power-on diagnostics have run successfully. If storage retention was enabled, (4683-*xx*1 only) the storage contents are saved when the power is switched OFF. Therefore, while RAM is kept active by either the battery or a power receptacle, no IPL is needed. If storage retention was disabled, IPL the terminal when the power is switched ON.

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A.8.3 Where the IPL Originates From

All system, I/O driver, and application components reside in the store controller. When the terminal needs an IPL, it requests one through the store loop to the store controller. The store controller then transmits the system code to the terminal.

In an IBM 4680 Store System, the 4683-002 terminal IPL originates from the partner terminal that it is attached to. For other applications, the 4683-002 terminal IPL originates from its controlling device.

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A.9 IBM 4684 Initial Program Load (IPL) Description

Following is the sequence of events during the 4684 Initial Program Load (IPL) using the Reference Diskette.

The sequence is somewhat different depending upon whether your 4684 has a 40-Character A/N or a video as a primary display.

40 CHARACTER ALPHANUMERIC PRIMARY DISPLAY

1. Switch power ON.
2. U001 displays and diskette drive starts.
3. U003 displays.

   - If no errors are detected you hear one (1) tone and the sequence continues to U004.

   - If errors are detected, the error message displays and you hear two (2) tones. The bring up sequence stops at this point so that you can see the messages. These messages display again later in the sequence along with more detail about the cause. To continue press **S1** on the POS keyboard or the ESC key on the Enhanced A/N Keyboard.

4. U004 displays and diskette drive starts.
5. U006 displays.
6. U007 displays.
7. The copyright message displays.
8. M0001 PRESS THE 1 KEY message displays (alphanumeric display only).
9. Press **1**. This helps the program determine which type of keyboard is being used.

   - If no errors were detected, MENU-M1 displays. The bring up sequence is complete.

   - If errors were detected earlier they are now redisplayed along with additional information about the cause. You must press **S1** on the POS keyboard or the ESC key on the Enhanced A/N Keyboard to continue.

   - If one of the errors detected was a configuration error, the following question displays:

     M0101 A CONFIGURATION ERROR HAS OCCURRED. DO YOU WANT TO RUN CONFIGURATION?

   - If you have just added or removed a device you should answer YES and the configuration program will load and run. Otherwise answer NO.

VIDEO PRIMARY DISPLAY

1. Switch power ON.
2. The memory test progression displays at the top left of the screen and the diskette drive accesses.
3. U003 displays.

   - If no errors are detected you will hear one tone and the sequence continues to U004.

   - If errors are detected, the error message displays and you will hear two tones. The bring up sequence stops at this point so that you can see the messages. These messages display again later in the sequence along with more detail about the cause. To continue you must press **S1** on the POS keyboard or the ESC key on the Enhanced A/N Keyboard.

4. U004 displays and the diskette drive starts.
5. The display is cleared and then the RIPSS driver message displays.
6. The copyright message displays.
7. If no errors were detected, MENU-M1 displays. The bring up sequence is complete.

   - If errors were detected earlier they are now redisplayed along with additional information about the cause. You must press **S1** on the POS keyboard or the ESC key on the Enhanced A/N keyboard to continue to MENU-M1.

   - If one of the errors detected was a configuration error, the following question displays:

     M0101 A CONFIGURATION ERROR HAS OCCURRED. DO YOU WANT TO RUN

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CONFIGURATION?

- If you have just added or removed a device you should answer YES and the configuration program will load and run. Otherwise answer NO.

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A.10 Remote IPL (RIPL) for Token Ring and Baseband LAN

RIPL Support for Token Ring and Baseband LAN on a 4684 Model 1*xx*/200/300

RIPL support can be enabled by following the procedures outlined here.

Note: 4684 configurations without a VGA-attached video display and PS/2 Enhanced Keyboard cannot support the RIPL function without additional installation and maintenance considerations.

Subtopics

A.10.1 Installation and Maintenance
A.10.2 Hardware
A.10.3 Configuration
A.10.4 Installation Instructions
A.10.5 Operating Instructions
A.10.6 Theory of Operation

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A.10.1 Installation and Maintenance

RIPL can be installed and used on a 4684-1*xx*/200/300 if maintenance limitations are taken into consideration:

- Diskette drive required for 4684 Reference Diskette functions:

  - Configuration
  - Diagnostic tests

- PS/2 VGA/video display and PS/2 Enhanced Keyboard required for:

  - Token Ring RIPL progress indicators on video
  - RIPL failure problem determination via video/keyboard.

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A.10.2 Hardware

Hardware RIPL support for the 4684 differs depending on the 4684 model, the type of network adapter used, and the style of adapter used.

4684-1*xx*

- The 4684-1*x*0 models do **not** have Baseband LAN integrated on the system planar board.
- The 4684-1*x*1 models have Baseband LAN (including RIPL ROM) integrated on the system planar board.
- The 4684-1*x*0 and 4684-1*x*1 models can **not** have a Baseband LAN adapter installed in an option adapter slot.
- The 4684-1*x*0 and 4684-1*x*1 models can have one or two Token Ring adapters installed in the option adapter slots.

  If two Token Ring adapters are installed, only one of the adapters can have RIPL ROM.

4684-200

- The 4684-200 model is featured, at time of order, with or without Baseband LAN (including RIPL ROM) integrated on the system planar board.
- The 4684-200 model can **not** have a Baseband LAN adapter installed in an option adapter slot.
- The 4684-200 model can have one or two Token Ring adapters installed in the option adapter slots.

  If two Token Ring adapters are installed, only one of the adapters can have RIPL ROM.

4684-300

- 4684-300 model is featured, at time of order, with or without either one of the following optional system planar **side card** options:

  - Baseband LAN (including RIPL ROM) side card
  - Token Ring (including RIPL ROM) side card.

- The 4684-300 model that does not have a Baseband LAN side card can have one Baseband LAN adapter (including RIPL ROM) installed in an option adapter slot.
- The 4684-300 model can have one or two Token Ring adapters installed in the option adapter slots.

  If two Token Ring adapters are installed, only one of the adapters can have RIPL ROM.

Note: The 4684 supports only one (1) Baseband LAN adapter:

- Integrated on the system planar board
- Installed in an option adapter slot (model 300 only)
- Installed with a system planar **side card** (model 300 only).

Note: The 4684 supports up to two (2) Token Ring adapters:

- Installed in option adapter slot(s)
- Installed with a system planar **side card** (model 300 only)
- If two Token Ring adapters are installed, only one of the adapters can have RIPL ROM.

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A.10.3 Configuration

Use the following procedure to support RIPL on the 4684 Models 1*xx*/200/300 using Version 3.00 of the 4684 Reference Diskette. Version 3.00 supersedes all prior versions of the Reference Diskette for all models of the 4684.

1. Follow the installation and operation instructions listed below to personalize the CONFIG.SYS file on a backup copy of the Version 3.00 Reference Diskette (any language).

   For Baseband LAN configurations only, you can optionally personalize the @EFEF.ADF file on a backup copy of the Version 3.00 Reference Diskette (any language).

2. Enable the RIPL function for 4684 Token Ring or Baseband LAN by using the updated backup copy of the Version 3.00 Reference Diskette to configure the 4684.

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A.10.4 Installation Instructions

RIPL Configuration Driver Installation Instructions for the 4684 Model 1*xx*/200/300 Reference Diskette Version 3.00

□ For 4684 systems configured with Token Ring or Baseband LAN:

For each language you wish to support, edit the CONFIG.SYS file on a backup copy of the 4684 Version 3.00 Reference Diskette (root directory) and enable RIPL support by changing the RIPLDRVR.SYS entry from /N to /Y, per the following example.

```
SUB-DIRECTORY: A:\                            (diskette root directory)
         FILE: CONFIG.SYS                     (DOS configuration file)

        ENTRY: DEVICE=\4684\RIPLDRVR.SYS /Y   (enables RIPL)
         NOTE: ......................> /N    (disables RIPL)
```

□ For 4684 systems configured with a Baseband LAN (Only):

For each language you wish to support, edit the @EFEF.ADF file on a backup copy of the 4684 Version 3.00 Reference Diskette (root directory) and allow auto configuration to select Baseband RIPL as the default configuration choice, per the following example.

```
SUB-DIRECTORY: A:\                          (diskette root directory)
         FILE: @EFEF.ADF                    (baseband configuration file)

NOTE: Use an editor to relocate the desired default RIPL 'choice' from
      the 'choice' list to the first 'choice' position within the file.

      EXAMPLE: NamedItem
               Prompt "Type, Memory Location, Interrupt Level"

               choice "RPL, Mem 2, Int 2"
                           pos[0] = 1X10001Xb
                           io 0620h - 0627h
                           int 2
                           mem 0D0000h - 0D7FFFh
                           .
                           .
                           .
```

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A.10.5 Operating Instructions

When installing a 4684 Model 1*xx*/200/300 use the updated backup copy of the Version 3.00 Reference Diskette to configure the 4684.

1. IPL the 4684 using the updated backup copy of the Version 3.00 Reference Diskette.

2. Follow the menus to configure the 4684.

   This will automatically ENABLE the 4684 RIPL option.

3. Activate the new configuration when requested to do so.

   The 4684 will then restart (re-IPL) to activate the new configuration.

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A.10.6 Theory of Operation

Update a backup copy of the 4684 Reference Diskette, (Version 3.00 or higher, any language), by editing the CONFIG.SYS file (Token Ring and Baseband LAN) and @EFEF.ADF file (Baseband LAN ONLY) as noted earlier.

Each time the 4684 is configured using the updated backup copy of the Version 3.00 Reference Diskette, the RIPL configuration option will be enabled or disabled according to the parameters specified in the CONFIG.SYS file. The RIPL option will remain in effect until the next time the 4684 is reconfigured.

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A.11 4684 Device Channel Adapter Failure Status Bytes

The Device Channel Adapter Failure Status Bytes appear on the screen when the Advanced Diagnostics detect a failure.

XX represents a FAILURE STATUS BYTE. It may be any number depending on the type of adapter failure that occurred.

The Device Channel Adapter Failure Status Bytes are numbered as follows:

XX 0
XX 1
XX 2
XX 3
XX 4
XX 5
XX 6
XX 7
XX 8
XX 9

The tables on the following topics define the meaning of the Device Channel Adapter Failure Status Bytes. These bytes are displayed only when a failure is detected by the Device Channel Adapter tests.

Use this table to find information on the Device Channel Adapter Failure Status bytes.

For	**Go to**
Byte 0	"Device Channel Adapter Error Code" in topic A.11.2.
Byte 1	"Device Channel Adapter Microprocessor Status Codes" in topic A.11.4.
Byte 2 and Byte 3	"Shared Buffer Latch Error Codes and Extended Data" in topic A.11.6.
Byte 4 and Byte 5	"Shared Buffer Error Codes and Test Patterns" in topic A.11.8.
Byte 6	"CMOS Error Codes" in topic A.11.10.
Byte 7	"Dump Error Codes" in topic A.11.12.
Byte 8	Contains the EC level of the Device Channel Adapter Microprocessor.
Byte 9	Contains the EC level of the Device Channel Adapter Power-On Self Test Microcode in ROS.

Subtopics
A.11.1 Failure Status Byte 0
A.11.2 Device Channel Adapter Error Code
A.11.3 Failure Status Byte 1
A.11.4 Device Channel Adapter Microprocessor Status Codes
A.11.5 Failure Status Bytes 2 and 3
A.11.6 Shared Buffer Latch Error Codes and Extended Data
A.11.7 Failure Status Bytes 4 and 5
A.11.8 Shared Buffer Error Codes and Test Patterns
A.11.9 Failure Status Byte 6
A.11.10 CMOS Error Codes
A.11.11 Failure Status Byte 7
A.11.12 Dump Error Codes
A.11.13 Device Channel Adapter System Status Byte
A.11.14 Shared Buffer Request Byte
A.11.15 Shared Buffer Status Byte
A.11.16 Device Channel Adapter Interrupt Flag Byte
A.11.17 POST Test Device Channel Adapter Errors
A.11.18 IBM 4684 Memory Map
A.11.19 IBM 4684 and 4683 Point of Sale Configuration Record
A.11.20 Resetting the POS Configuration in the 4684
A.11.21 Resetting the System Unit Configuration in the 4684

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A.11.22 IBM 4684 Communication Adapters Port Assignments

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A.11.1 Failure Status Byte 0

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A.11.2 Device Channel Adapter Error Code

The following table defines the meaning of each bit of Failure Status Byte 0 of the Device Channel Adapter Failure Status Bytes.

Bit	Error	Values
7	Dump Switch	0 = Good 1 = Bad
6	Reserved	0 = Good 1 = Bad
5	ROS Scan Error	0 = Good 1 = Bad
4	Device Channel Adapter Microprocessor Status	0 = Good 1 = Bad
3	Shared Buffer Latch Test Error Code	0 = Good 1 = Bad
2	Shared Buffer Test Error Code	0 = Good 1 = Bad
1	CMOS Test Error Code	0 = Good 1 = Bad
0	Dump Switch Test Error Code	0 = Good 1 = Bad

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A.11.3 Failure Status Byte 1

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A.11.4 Device Channel Adapter Microprocessor Status Codes

The following table defines the meaning of Failure Status Byte 1 of the Device Channel Adapter Failure Status Bytes.

Table A-1. Device Channel Adapter Microprocessor Status Codes

Byte 1 Status Code	**Definition**
00	No errors occurred
10 thru 16	The Device Channel Adapter operational error
15 thru 17	Invalid
20 thru 23	Operational error
24 thru 70	Invalid
71 thru 76	Self-test error
77 thru 80	Invalid
81 thru 84	Self test error
86 thru 8F	Invalid
90	External wrap error
91 thru FF	Invalid

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A.11.5 Failure Status Bytes 2 and 3

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A.11.6 Shared Buffer Latch Error Codes and Extended Data

The following table defines the meaning of Failure Status Bytes 2 and 3 of the Device Channel Adapter Failure Status Bytes.

Table A-2. Shared Buffer Latch Error Codes and Extended Data

Byte 2 Error Code	**Byte 3 Extended Data**	**Definition**
00	00	No Errors Detected
01	Device Channel Adapter System Status Byte. See topic A.11.13.	The Device Channel Adapter Microprocessor was not at a "Ready and Not Enabled" condition after initial POR was complete.
02	Device Channel Adapter Interrupt Flag Byte. See topic A.11.16.	A level 7 software interrupt was not received when expected.
03	Device Channel Adapter System Status Byte. See topic A.11.13.	A level 7 hardware interrupt was not received when expected.
04	Shared Buffer Request Byte. See topic A.11.14.	The System Unit Microprocessor was unable to find the Shared Buffer after initial POR was complete.
05	Device Channel Adapter System Status Byte. See topic A.11.13.	The Device Channel Adapter Microprocessor was not at a "Ready and Not Enabled" condition after initial POR was complete.
06	Shared Buffer Request Byte. See topic A.11.14.	The System Unit Microprocessor was unable to return the Shared Buffer to the Device Channel Adapter Microprocessor after initial POR was complete.
07	Device Channel Adapter System Status Byte. See topic A.11.13.	The System Unit Microprocessor was unable to acquire the Shared Buffer for a software POR request.
08	Shared Buffer Request Byte. See topic A.11.14.	The System Unit Microprocessor was unable to find the Shared Buffer after acquiring it for a software POR request.
09	Device Channel	A level 7 hardware interrupt was not received from a software POR request.

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	Adapter System Status Byte. See topic A.11.13.	
0A	Device Channel Adapter System Status Byte. See topic A.11.13.	The Device Channel Adapter Microprocessor internal diagnostic test failed to complete during the software POR.
0B	Shared Buffer Error Codes. See topic A.11.8.	The Alternate Shared Buffer failed.
0C	Shared Buffer Error Codes. See topic A.11.8.	The Primary Shared Buffer failed.
10	Device Channel Adapter System Status Byte. See topic A.11.13.	The System Unit Microprocessor was unable to acquire the Shared Buffer for a software POR request.
11	Device Channel Adapter System Status Byte. See topic A.11.13.	The software POR request failed.
12	Device Channel Adapter System Status Byte. See topic A.11.13.	The System Unit Microprocessor was unable to acquire the Shared Buffer for a Read EC Level request.
13	Device Channel Adapter System Status Byte. See topic A.11.13.	The Read EC Level request failed.
20	Device Channel Adapter System Status Byte. See topic A.11.13.	Timeout while waiting for a level 7 hardware interrupt.
30	Device Channel Adapter System Status Byte. See topic A.11.13.	Timeout while waiting for a response from a request to acquire the Shared Buffer for a software POR request.

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31	Device Channel Adapter System Status Byte. See topic A.11.13.	Timeout while waiting for a response from a software POR request.
32	Device Channel Adapter System Status Byte. See topic A.11.13.	Timeout while waiting for a response from a request to acquire the Shared Buffer for a Read EC Level request.
33	Device Channel Adapter System Status Byte. See topic A.11.13.	Timeout while waiting for a response from a Read EC Level request.
40	Device Channel Adapter Interrupt Flag Byte. See topic A.11.16.	A level 7 interrupt was received with unexpected status.
80	Device Channel Adapter Interrupt Flag Byte. See topic A.11.16.	A level 7 interrupt was received when not expected.
90	Device Channel Adapter Interrupt Flag Byte. See topic A.11.16.	A level 7 interrupt was received when not expected.

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A.11.7 Failure Status Bytes 4 and 5

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A.11.8 Shared Buffer Error Codes and Test Patterns

The following table defines the meaning of Failure Status Bytes 4 and 5 of the Device Channel Adapter Failure Status Bytes.

Table A-3. Shared Buffer Error Codes and Test Patterns

Byte 4 Error Code	**Byte 5 Test Patter**	**Definition**
00	00	No errors detected
01	01	Data Test Pattern failed
02	02	Data Test Pattern failed
03	04	Data Test Pattern failed
04	08	Data Test Pattern failed
05	10	Data Test Pattern failed
06	20	Data Test Pattern failed
07	40	Data Test Pattern failed
08	80	Data Test Pattern failed
09	FE	Data Test Pattern failed
0A	FD	Data Test Pattern failed
0B	FB	Data Test Pattern failed
0C	F7	Data Test Pattern failed
0D	EF	Data Test Pattern failed
0E	DF	Data Test Pattern failed
0F	BF	Data Test Pattern failed
10	7F	Data Test Pattern failed
11	F1	Buffer Address 0400 failed
12	02	Buffer Address 0200 failed
13	F3	Buffer Address 0100 failed
14	04	Buffer Address 0080 failed
15	F5	Buffer Address 0040 failed
16	06	Buffer Address 0020 failed
17	F7	Buffer Address 0010 failed
18	08	Buffer Address 0008 failed
19	F9	Buffer Address 0004 failed
1A	0A	Buffer Address 0002 failed
1B	FB	Buffer Address 0001 failed
1C	0C	Buffer Address 0000 failed
1D	0E	Buffer Address 0400 failed
1E	FD	Buffer Address 0200 failed
1F	0C	Buffer Address 0100 failed
20	FB	Buffer Address 0080 failed
21	0A	Buffer Address 0040 failed
22	F9	Buffer Address 0020 failed

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23	08	Buffer Address 0010 failed
24	F7	Buffer Address 0008 failed
25	06	Buffer Address 0004 failed
26	F5	Buffer Address 0002 failed
27	04	Buffer Address 0001 failed
28	F3	Buffer Address 0000 failed

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A.11.9 Failure Status Byte 6

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A.11.10 CMOS Error Codes

The following table defines the meaning of Failure Status Byte 6 of the Device Channel Adapter Failure Status Bytes.

Table A-4. CMOS Error Codes

Byte 6 Error Code	**Definition**
00	No errors detected
01	Battery failure
02	Storage failure
04	Addressing failure
10	Restore "Save Area" failure
20	Save "Save Area" failure

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A.11.11 Failure Status Byte 7

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A.11.12 Dump Error Codes

The following table defines the meaning of Failure Status Byte 7 of the Device Channel Adapter Failure Status Bytes.

Table A-5. Dump Error Codes

Byte 7 Error Code	**Definition**
00	No errors detected
01	Software-invoked dump request error
02	Dump switch-invoked dump request error
04	Hardware "Dump Request Bit" error

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A.11.13 Device Channel Adapter System Status Byte

The following table describes the bits of the Device Channel Adapter System Status Byte (SSB). The values in the SSB represent the current state of the store loop adapter hardware.

Table A-6. Device Channel Adapter System Status Byte

Bit	**Definition**
Bit 7 (Read Only)	Reserved
Bit 6 (Read/Write)	**1 =** Generate(d) a Device Channel Adapter soft POR. **0 =** Reset the POR mechanism.
Bit 5 (Read/Write)	**1 =** Request(ed) a dump. **0 =** Reset the dump mechanism.
Bit 4 (Read Only)	Reserved
Bit 3 (Read/Write)	**1 =** Enable the interrupt mechanism. **0 =** Disable the interrupt mechanism.
Bit 2 (Read Only)	**1 =** Level 7 Interrupt is active. **0 =** Level 7 Interrupt is inactive.
Bit 1 (Read/Write)	**1 =** Shared Buffer Access is complete. **0 =** Shared Buffer Return is complete.
Bit 0 (Read/Write)	**1 =** Request(ed) Shared Buffer Access. **0 =** Shared Buffer Return is complete.

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A.11.14 Shared Buffer Request Byte

The following table describes the bits of the Shared Buffer Request Bytes. This byte is updated by the System Unit Microprocessor after each access of the message buffer.

Table A-7. Shared Buffer Request Byte

Bit	**Definition**
Bit 7	**1 =** Diagnostic Self Test Request.
Bit 6	**1 =** Read and process the "Timer Function" bytes.
Bit 5	**1 =** Read the Device Channel Function command byte.
Bit 4	**1 =** Process the "Transmit Message(s)" held in the Shared Buffer.
Bit 3	**1 =** New poll list.
Bit 2	**1 =** Device Channel Internal Storage Dump Request.
Bit 1	**1 =** Read EC Level Request.
Bit 0	**1 =** Reserved

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A.11.15 Shared Buffer Status Byte

The following table describes the bits of the Shared Buffer Status Byte. This byte is updated by the Device Channel Adapter Microprocessor before it interrupts the System Unit Microprocessor.

Table A-8. Shared Buffer Status Byte

Bit	**Definition**
Bit 7	**1 =** The Diagnostic Self Test is complete.
Bit 6	**1 =** Stress test is active.
Bit 5	Reserved
Bit 4	**1 =** Device Channel received.
Bit 3	**1 =** An Error Message is present.
Bit 2	**1 =** A Device Channel Internal Storage Dump is present.
Bit 1	**1 =** An EC Level Message is present.
Bit 0	Reserved

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A.11.16 Device Channel Adapter Interrupt Flag Byte

The following table describes the bits of the Device Channel Adapter Interrupt Flag Byte. This byte is updated by the software interrupt service routine when a level 7 hardware interrupt occurs.

Table A-9. Device Channel Adapter Interrupt Flag Byte

Bit	**Definition**
Bit 7	**1 =** The Level 7 interrupt is not from the Device Channel Adapter.
Bit 6	**1 =** An interrupt occurred when not expected (Bit 0 = 0).
Bit 5	**1 =** More than one interrupt occurred when only one was expected (Bit 0 = 1).
Bit 4	Not used, always zero (0).
Bit 3	Not used, always zero (0).
Bit 2	Not used, always zero (0).
Bit 1	**1 =** A Device Channel Adapter level 7 hardware interrupt has occurred.
Bit 0	**1 =** A Device Channel Adapter level 7 hardware interrupt is expected.

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A.11.17 POST Test Device Channel Adapter Errors

Press **F1** and continue with the test.

Table A-10. POST Device Channel Errors

Symptom	**Cause**
14517	Multiple Errors
14527	8051 POR Errors
14537	Latch Test Errors
14547	Shared Buffer Errors
14557	CMOS Test Errors
14567	Dump Latch Errors

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A.11.18 IBM 4684 Memory Map

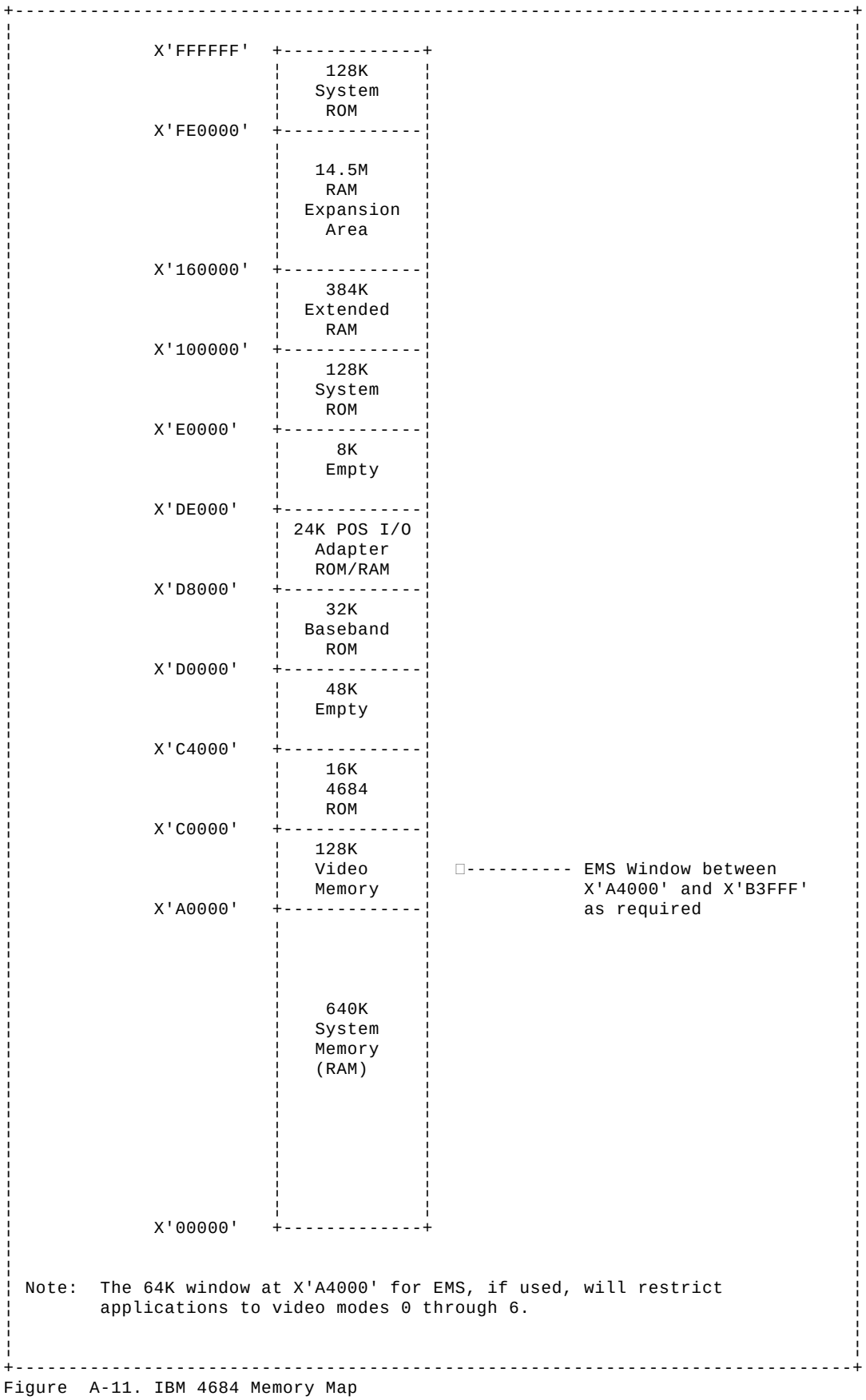

Figure A-11. IBM 4684 Memory Map

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A.11.19 IBM 4684 and 4683 Point of Sale Configuration Record

Subtopics

A.11.19.1 The Configuration Record
A.11.19.2 Create/Change Configuration
A.11.19.3 Activate New Configuration
A.11.19.4 Backup Configuration
A.11.19.5 Restore Configuration
A.11.19.6 Configuration Byte Bit Definition
A.11.19.7 Keyboard Configuration Record
A.11.19.8 Display Configuration Record
A.11.19.9 Printer Configuration Record
A.11.19.10 Reader and Scanner Configuration Record
A.11.19.11 Internal Device Configuration Record
A.11.19.12 External Device Configuration Record
A.11.19.13 Special Purpose Configuration Record

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A.11.19.1 The Configuration Record

As part of the configuration process, the 4684 terminal creates a record that identifies each attached device and the sockets that are used. If you also have a 4683 terminal, the configuration process creates a similar record for that terminal. Both configuration records are stored in the 4684 terminal. When you switch the power ON, the terminal uses this information as it performs the power-on self test. For more information on configuration, refer to the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

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A.11.19.2 Create/Change Configuration

This option of the configuration process *automatically* configures both the system unit's internal devices and options as well as it's external point-of-sale devices. It creates the configuration data record that reflects the hardware configuration.

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A.11.19.3 Activate New Configuration

This option *activates* the new or changed configuration by saving the new or changed configuration data in the 4684 terminal memory.

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A.11.19.4 Backup Configuration

This option allows you to *save* the 4684 and 4683 configuration data by writing the current configuration in the 4684 memory to the Backup Reference Diskette. A copy of the configuration data is written to a binary image file called 4684CONF on the Backup Reference Diskette.

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A.11.19.5 Restore Configuration

This option allows you to *retrieve* the 4684 and 4683 configuration data from the Backup Reference Diskette and make it the current configuration. The configuration data is saved in the 4684CONF file by the backup configuration process.

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A.11.19.6 Configuration Byte Bit Definition

```
+-------------------------------------------------------------------------+
|                                                                         |
|         CONFIGURATION BYTE BIT DEFINITION (1 for each device)           |
|                                                                         |
|         Non-volatile memory map location for 4684                       |
|         DDEF:0000-006F = 4684                                           |
|         DDEF:0070-00DF = 4683                                           |
|                                                                         |
|         BYTE LAYOUT FORMAT -7 6 5 4 3 2 1 0- (for byte offset 00 thru 67)|
|                                                                         |
|                                                                         |
|         7 - [P] device present (p.o.s.t)                                |
|                1 = present                                              |
|                0 = not present                                          |
|                                                                         |
|         6 - [C] device configured (config utilities)                    |
|                1 = configured                                           |
|                0 = not configured                                       |
|                                                                         |
|         5 - [L] keypad layout for POS keyboard                          |
|                1 = adding machine layout                                |
|                0 = touch tone layout (default)                          |
|                                                                         |
|         4 - [M] primary console device                                  |
|                1 = primary console device (keyboard or display only)    |
|                0 = non - primary device (default)                        |
|                                                                         |
|          3 - [S] slot                                                   |
|          2 - [S] slot                                                   |
|          1 - [S] slot                                                   |
|          0 - [S] slot                                                   |
|                                                                         |
|    [Displays]                          [Scanners]                       |
|                                                                         |
|    0000 = Display in slot 4A                 0000 = N/A                 |
|    0001 = Display in slot 4B,9A or 9B        0001 = HHBCR in slot 9A or 9B|
|    1000 = Combined Keyboard/Display                                     |
|     in 5A or 5B                                                         |
|    Operator Display on                                                  |
|     Combined Keyboard/Display (5A or 5B)                                |
|    MSR on Combined Keyboard/Display                                     |
|     (5A or 5B)                                                          |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+
```

```
+-------------------------------------------------------------------------+
|                                                                         |
|         BYTE LAYOUT FORMAT -7 6 5 4 3 2 1 0- (for byte offset 6B)       |
|                                                                         |
|                                                                         |
|         7 - workstation present bit (at least one device responded      |
|                                      to poll)                           |
|                1 = present                                              |
|                0 = not present                                          |
|                                                                         |
|         6 - workstation configured bit (at least one device was         |
|                                         configured)                     |
|                1 = configured                                           |
|                0 = not configured                                       |
|                                                                         |
|         0 - configuration deleted bit (bit 6 cleared for all devices)   |
|                1 = configuration deleted                                |
|                0 = configuration not deleted                            |
|                                                                         |
|                                                                         |
|         BYTE LAYOUT FORMAT -7 6 5 4 3 2 1 0- (for byte offset 6C)       |
|                                                                         |
|                                                                         |
|         7 - System unit video display present bit (w/s #1 only)         |
|                1 = present                                              |
|                0 = not present                                          |
|                                                                         |
|         6 - System unit video display configured bit (w/s #1 only)      |
|                1 = configured                                           |
|                0 = not configured                                       |
|                                                                         |
|                                                                         |
|         BYTE LAYOUT FORMAT -7 6 5 4 3 2 1 0- (for byte offset 6D)       |
```

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```
+-------------------------------------------------------------------------+
|                                                                         |
|                                                                         |
|         7 - Enhanced A/N keyboard present bit (w/s #1 only)             |
|                 1 = present                                             |
|                 0 = not present                                         |
|                                                                         |
|         6 - Enhanced A/N keyboard configured bit (w/s #1 only)          |
|                 1 = configured                                          |
|                 0 = not configured                                      |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+
```

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A.11.19.7 Keyboard Configuration Record

Offset	**Polling Address**	**Keyboards**
00	10	50-Key Keyboard or Combined Keyboard/Display in 5A L=0 touch tone keypad (default) L=1 data entry keypad SSSS=1000 keyboard/operator display in 5A
01	11	50-Key Keyboard or Combined Keyboard/Display in 5B L=0 touch tone keypad (default) L=1 adding machine keypad SSSS=1000 Combined Keyboard/Display in 5B
02	12	Alphanumeric Keyboard in 5A
03	13	Alphanumeric Keyboard in 5B
04	14	Unknown Device
05	15	Unknown Device
06	16	Matrix Keyboard in 5A L=0 touch tone keypad (default) L=1 data entry keypad
07	17	Matrix Keyboard in 5B L=0 touch tone keypad (default) L=1 data entry keypad
08	18	Unknown Device
09	19	Unknown Device
0A	1A	Unknown Device
0B	1B	Unknown Device
0C	1C	Unknown Device
0D	1D	Unknown Device
0E	1E	Unknown Device
0F	1F	Unknown Device

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A.11.19.8 Display Configuration Record

Offset	**Polling Address**	**Displays**
10	20	A/N display in 4A
11	21	A/N Disp 4B,9A,9B SSSS=0000 N/A SSSS=0001 Display in slot 4B, 9A or 9B
12	22	Operator Display 4A SSSS=1000-Combined Keyboard/Display in 5A
13	23	Operator Display in 4B, 9A, 9B SSSS=0000 N/A SSSS=0001 Display in 4B, 9A or 9B SSSS=1000 Combined Keyboard/Display in 5B
14	24	Unknown Device
15	25	Unknown Device
16	26	Shopper Display 4A
17	27	Shopper Display 4B or 9A or 9B SSSS=0000 N/A SSSS=0001 Display in 4B, 9A or 9B
18	28	Video display 2A
19	29	Video display 2B
1A	2A	ANPOS Keyboard in 5A
1B	2B	ANPOS Keyboard in 5B
1C	2C	Unknown Device
1D	2D	Unknown Device
1E	2E	Unknown Device
1F	2F	Unknown Device

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A.11.19.9 Printer Configuration Record

Offset	**Polling Address**	**Printers**
20	30	4680 printer in 7
21	31	Unknown Device
22	32	Unknown Device
23	33	Unknown Device
24	34	Unknown Device
25	35	Unknown Device
26	36	Fiscal Printer (Italy only)
27	37	Unknown Device
28	38	Unknown Device
29	39	Unknown Device
2A	3A	Unknown Device
2B	3B	Unknown Device
2C	3C	Unknown Device
2D	3D	Unknown Device
2E	3E	Unknown Device
2F	3F	Unknown Device

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A.11.19.10 Reader and Scanner Configuration Record

Offset	**Polling Address**	**Readers**
30	40	Single-track MSR 5A
31	41	Single-track MSR 5B
32	42	Unknown Device
33	43	Unknown Device
34	44	Device 44
35	45	Device 45
36	46	Dual-track MSR 5A or Combined Keyboard/Display MSR SSSS=1000 Combined Keyboard/Display in 5A
37	47	Dual-track MSR 5B or Combined Keyboard/Display MSR SSSS=1000 Combined Keyboard/Display in 5B
38	48	Unknown Device
39	49	Unknown Device
3A	4A	Point-of-Sale Scanner in 17
3B	4B	Hand Held Bar Code Reader 9A or 9B SSSS=0000 N/A SSSS=0001 Hand-Held Bar Code Reader in 9B (default)
3C	4C	Device 4C
3D	4D	Device 4D
3E	4E	Unknown Device
3F	4F	Unknown Device

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A.11.19.11 Internal Device Configuration Record

Offset	**Polling Address**	**Internal Devices**
40	50	Totals Retention
41	51	Unknown Device
42	52	Unknown Device
43	53	Unknown Device
44	54	Cash drawer 3A/3B
45	55	Unknown Device
46	56	Unknown Device
47	57	Unknown Device
48	58	Unknown Device
49	59	Unknown Device
4A	5A	Unknown Device
4B	5B	Unknown Device
4C	5C	Unknown Device
4D	5D	Unknown Device
4E	5E	Unknown Device
4F	5F	Unknown Device

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A.11.19.12 External Device Configuration Record

Offset	**Polling Address**	**External Devices**
50	60	Device 60
51	61	Device 61
52	62	Unknown Device
53	63	Unknown Device
54	64	Device 64 or Feature Card 2A
55	65	Device 65 or Feature Card 2B
56	66	Unknown Device
57	67	Unknown Device
58	68	Device 68 or Feature Card 2A
59	69	Device 69 or Feature Card 2B
5A	6A	Device 6A
5B	6B	Device 6B
5C	6C	Unknown Device
5D	6D	Unknown Device
5E	6E	4687-2 Scanner/Scale
5F	6F	Unknown Device
60	70	Unknown Device
61	71	Unknown Device
62	72	Unknown Device
63	73	Unknown Device
64	74	Unknown Device
65	75	Unknown Device
66	76	Unknown Device
67	77	Unknown Device

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A.11.19.13 Special Purpose Configuration Record

Offset	**Polling Address**	**Special Purpose**
68	78	Reserved
69	79	Reserved
6A	7A	Reserved
6B	7B	Workstation status
6C	7C	4684 Video Display (4684 ONLY)
6D	7D	Enhanced A/N Keyboard (4684 ONLY)
6E	7E	Workstation ID (01 = 4684) (02 = 4683)
6F	7F	Workstation configuration record check sum

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A.11.20 Resetting the POS Configuration in the 4684

This procedure should only be used when:

- A POS configuration conflict or problem cannot be resolved with the normal configuration process.
- You are adding a new POS option or feature to the 4684 system unit.

This procedure resets the configuration data, allowing you to configure only those devices attached to the 4684 or the 4683.

If you have not had an error detected during the power-on self test, this procedure will not work. You know if an error is detected during power-on self test (POST) if you hear two short tones. If no errors are detected, you hear only one tone.

If you hear the two short tones during the POST, continue at step 1.

If no errors are detected during the POST, do the following:

a. Switch **POWER OFF** at the 4684.

WARNING
Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

b. Unplug one of the keyboards to cause an error.

c. Continue to the next step.

1. Switch **POWER OFF** at the 4684 and insert the Backup Reference Diskette.

2. Switch power ON at the 4683 (if attached).

3. Switch power ON at the 4684. Wait for two tones.

4. Locate the dump switch at the rear of the 4684 system unit, press it momentarily and then release it. You hear a tone and U004 will display.

5. Switch **POWER OFF** at the 4684.

6. Reconnect the keyboard if you unplugged it to create an error. Wait five seconds.

7. Switch the 4684 power ON.

   One or more error messages display and you should hear two tones.

8. Press **S1** (ESC on the Enhanced A/N Keyboard).

9. If message *M0001 Press the 1 key* displays, press **1**.

   Each error that was detected displays along with additional information about the error. Press **S1** (ESC on the Enhanced A/N Keyboard) for each that displays.

   The following message displays:

   ```
   M0101 A Configuration Error has occurred.
         Do you want to run configuration?
   ```

10. Answer "YES" to this question. The system unit devices and point-of-sale devices that are attached are automatically configured. Depending upon the devices that are attached, you may be asked additional questions.

11. Select ACTIVATE NEW CONFIGURATION and follow the instructions on the display.

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A.11.21 Resetting the System Unit Configuration in the 4684

This procedure should only be used when:

- A system unit configuration conflict or problem cannot be resolved with the normal configuration process.
- You are adding a new system unit option or feature to the 4684.

This procedure resets the configuration data, allowing you to configure only those devices attached to the 4684.

If you have not had an error detected during the power-on self test, this procedure will not work. You know if an error is detected during power-on self test (POST) if you hear two short tones. If no errors are detected, you hear only one tone.

If you hear two short tones during the POST, continue at step 1.

If no errors are detected during the POST, do the following:

a. Switch **POWER OFF** at the 4684.

   WARNING
   Switching **POWER OFF** at a 4684 affects operations at all point-of-sale terminals attached to it.

b. Unplug one of the feature option cards or any POS device to cause an error.

c. Continue to the next step.

1. Switch **POWER OFF** at the 4684 and insert the Backup Reference Diskette.

2. Switch power ON at the 4683 (if attached).

3. Switch power ON at the 4684. Wait for the two tones.

4. Locate the dump switch at the rear of the 4684 system unit, press it momentarily and then release it. You hear a tone and U004 displays.

5. If message *M0001 Press the 1 key* displays, press **1**.

   Each error that was detected displays along with additional information about the error. press **S1** (ESC on the Enhanced A/N Keyboard) for each error that displays.

   If the following message displays:

   ```
   M0101 A Configuration Error has occurred.
         Do you want to run configuration?
   ```

   answer "YES" to this question. MENU-C2 displays following automatic configuration.

6. Switch **POWER OFF** at the 4684.

7. If you unplugged any feature option card or POS device to cause an error, reconnect it.

8. Switch 4684 power ON.

9. When you hear two tones, press **S1** (ESC on the Enhanced A/N Keyboard).

10. If message *M0001 Press the 1 key* displays, press **1**.

    Each error that was detected displays along with additional information about the error. Press **S1** (or ESC) for each error that displays.

    The following message displays:

    ```
    M0101 A Configuration Error has occurred.
          Do you want to run configuration?
    ```

11. Answer "YES" to this question. The system unit devices and point-of-sale devices that are attached are automatically configured.

12. Depending upon the devices that are attached, you may be asked additional questions.

13. Select ACTIVATE NEW CONFIGURATION and follow the instructions on the display.

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A.11.22 IBM 4684 Communication Adapters Port Assignments

Subtopics
A.11.22.1 4684 Asynchronous Adapter (System Board)
A.11.22.2 IBM Dual Asynchronous Adapter
A.11.22.3 IBM Multi-Protocol Communication Adapter

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A.11.22.1 4684 Asynchronous Adapter (System Board)

Default: This port is assigned as a serial port.

Serial_1

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A.11.22.2 IBM Dual Asynchronous Adapter

The connectors on the IBM Dual Asynchronous Adapter are automatically assigned by the automatic configuration program.

One card installed

"Connector 1"

Default: This connector is assigned to the following serial port if one Dual Asynchronous Adapter is present.

Serial_2 (connector # 1 on the Dual Asynchronous Adapter)

"Connector 2"

Default: This connector is assigned to the following serial port if one Dual Asynchronous Adapter is present.

Serial_3 (connector # 2 on the Dual Asynchronous Adapter)

Two cards installed

"Connector 1"

Default: This connector is assigned to the following serial ports if two Dual Asynchronous Adapters are present.

Serial_2 (connector # 1 on 1st Dual Asynchronous Adapter)
Serial_4 (connector # 1 on 2nd Dual Asynchronous Adapter)

"Connector 2"

Default: This connector is assigned to the following serial ports if two Dual Asynchronous Adapters are present.

Serial_3 (connector # 2 on 1st Dual Asynchronous Adapter)
Serial_5 (connector # 2 on 2nd Dual Asynchronous Adapter)

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A.11.22.3 IBM Multi-Protocol Communication Adapter

If this adapter is defined as asynchronous, it is always assigned Serial 7 port.
If a second adapter is present and defined as asynchronous, it is always assigned Serial 8 port.

Default: This adapter is assigned to the following serial port:

	SDLC_1	(1st adapter - primary)
	SDLC_2	(2nd adapter - alternate)
OPTIONS:		
	Bisync_1	(1st adapter - primary)
	Bisync_2	(2nd adapter - alternate)
	Serial_7	(1st adapter - primary)
	Serial_8	(2nd adapter - alternate)

NOTE: The MPCA adapter installed in slot #1 is always the primary adapter if two MPCA adapters are present in the 4684.

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B.0 Appendix B. Hardware Overview

Subtopics

B.1 Front View of the IBM 4683
B.2 Rear View of the IBM 4683
B.3 Front View of the IBM 4684
B.4 Rear View of the IBM 4684
B.5 Optional Displays for the IBM 4683
B.6 Optional Displays for the IBM 4684
B.7 Optional Keyboards for the IBM 4683 and IBM 4684
B.8 IBM 4683 Base Unit Sockets and Devices
B.9 IBM 4684 System Unit Sockets and Devices

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B.1 Front View of the IBM 4683

PICTURE 288

Figure B-1. Front View of the IBM 4683

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B.2 Rear View of the IBM 4683

PICTURE 289

Figure B-2. Rear View of the IBM 4683

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B.3 Front View of the IBM 4684

PICTURE 290

Figure B-3. Front View of the IBM 4684

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B.4 Rear View of the IBM 4684

PICTURE 291

Figure B-4. Rear View of the IBM 4684

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B.5 Optional Displays for the IBM 4683

PICTURE 292

Figure B-5. Optional Displays for the IBM 4683

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B.6 Optional Displays for the IBM 4684

PICTURE 293

Figure B-6. Optional Displays for the IBM 4684

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B.7 Optional Keyboards for the IBM 4683 and IBM 4684

PICTURE 294

Figure B-7. Optional Keyboards for the IBM 4683 and IBM 4684. Note: The Enhanced A/N Keyboard may only be used with the IBM 4684 terminal.

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B.8 IBM 4683 Base Unit Sockets and Devices

Table B-1. IBM 4683 Base Unit Sockets and Devices

Socket Number	**Device Name**	**Cable Number**
1	Store Loop	1
3A	Cash Drawer A	3
3B	Cash Drawer B or Remote Alarm	3
4A	Alphanumeric, Operator, or Shopper Display	4
4B	Alphanumeric, Operator, or Shopper Display	4
5A	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Combined Keyboard/Display, or Matrix Keyboard	5
5B	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Combined Keyboard/Display, Matrix Keyboard, 1520 Hand-Held Scanner Model A02, or Dual-Track MSR	5
6	Single-Track Magnetic Stripe Reader (MSR) **Note:** Socket 6 is located on the 50-key keyboard.	None
7	Printer	7
9A	Reserved	-
9B	Hand-Held Bar Code Reader	-
11	4683-*xx*2 **TO** 4683-*xx*1 or 4684	11
17	Checkout Scanner or Scanner/Scale	17
21	1520 Hand-Held Scanner Model A01, Optical Character Reader (OCR), or Scale	21
22	Reserved	-
23	RS-232 Device	23
25	RS-232 or Current Loop Device	25
26	Magnetic Wand	26
29	Coin Dispenser	29
81	Video Display	81
82	Video Display	82

- The Feature Expansion cards can be installed in location 2A (left) or 2B (right).
- A blank filler plate is installed to cover the opening when no card is installed.
- If you exchange a card, you must put its replacement in the same location.
- All models of the 4683 can have one or two Feature Expansion cards.

PICTURE 295

Figure B-8. IBM 4683 Base Unit Feature Expansion Cards and Back Panels. The back panels of the 4683-001 and 4683-A01 look the same as the 4683-P. The back panel of the 4683-A02 looks the same as the 4683-002 except the 4683-A02 has socket 9A.

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B.9 IBM 4684 System Unit Sockets and Devices

Table B-2. IBM 4684 System Unit Sockets and Devices

Socket Number	**Device Name**	**Cable Number**
1A	Baseband Network	1
1B	Baseband Network	1
1B	Token Ring Network (side card, Model 300 only)	-
3A	Cash Drawer A or Remote Alarm A	3
3B	Cash Drawer B or Remote Alarm B	3
4A or 4B	Alphanumeric, Operator, or Shopper Display	4
5A	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Combined Keyboard/Display, Matrix Keyboard, or Dual-Track MSR	5
5B	50-Key Keyboard, Alphanumeric Keyboard, ANPOS Keyboard, Combined Keyboard/Display, Matrix Keyboard, Dual-Track MSR, or 1520 Hand-Held Scanner Model A02	5
6	Single-Track Magnetic Stripe Reader (MSR) **Note:** Socket 6 is located on the 50-key keyboard.	None
7	Point of Sale Printer	7
9A	Alphanumeric, Operator, Shopper Display or Hand-Held Bar Code Reader	-
9B	Hand-Held Bar Code Reader	-
11	4683-*xx*2	11
17	Checkout Scanner or Scanner/Scale	17
[1]	System Unit Keyboard	-
[2]	Pointing Device (Mouse)	-
[AA]	System Unit Video Display	-
[BB]	System Unit Printer	-
[CC]	System Unit Asynchronous Communications	-
[DD]	Dump Switch	-

PICTURE 296

Figure B-9. IBM 4684 System Unit Back Panel

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C.0 Appendix C. Wiring Diagrams

This chapter contains wiring diagrams for the 4683 base unit power supply connectors, the 4680 printer card connectors, and the 4683/4684 cables.

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

Subtopics

C.1 Wiring Diagrams for the IBM 4683 and IBM 4684 Cables
C.2 Wiring Diagrams for the IBM 4683 Base Unit Power Supply Connectors
C.3 Wiring Diagrams for the Model 1 or 2 Printer Card Connectors
C.4 Wiring Diagrams for the Model 3 Printer Card Connectors

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C.1 Wiring Diagrams for the IBM 4683 and IBM 4684 Cables

Subtopics

C.1.1 Cash Drawer A Connector and Cable
C.1.2 Cash Drawer B Connector and Cable
C.1.3 Coin Dispenser Connector and Cable
C.1.4 Display A (Alphanumeric, Operator, or Shopper) Connector and Cable
C.1.5 Display B (Alphanumeric, Operator, or Shopper) Connector and Cable
C.1.6 Optical Character Reader (OCR) Connector and Cable
C.1.7 Point of Sale Keyboard A and B Connector and Long Cable
C.1.8 Point of Sale Keyboard A and B Connector and Short Cable
C.1.9 Enhanced A/N Keyboard Connector and Cable
C.1.10 RS-232-C Device Connector and Cable
C.1.11 RS-232-C or Current Loop Device Connector and Cable
C.1.12 RS-232-C Asynchronous/Communications Port
C.1.13 RS-232-C (Current Loop) Wrap Plug
C.1.14 RS-232-C (EIA) Wrap Plug
C.1.15 Scale Connector and Cable
C.1.16 Special Attachment Cable (Remote Alarm and Non-IBM Cash Drawer)
C.1.17 Special Attachment "Y" Cable (1520 Model A02 and Dual-Track MSR)
C.1.18 System Unit Printer Connector
C.1.19 3687 Point of Sale Scanner Model 002 Adapter Connector and Cable
C.1.20 Point of Sale Printer Model 1, 2 or 3 Connector and Cable
C.1.21 4680 Store Loop Connector and Cable
C.1.22 4683 Video Display (5-inch / Distributed) Connector and Cable
C.1.23 4683 Video Display (Except 5-Inch) Connector and Cable
C.1.24 4684 9-Inch Video Display Connector and Cable
C.1.25 Point of Sale Terminal Connector and Cable
C.1.26 Baseband Network Cable Adapter
C.1.27 Baseband Network Cable and Connectors
C.1.28 Baseband Network Cable and Data Connector
C.1.29 PS/2 Cable to Data Connector
C.1.30 PS/2 Baseband to 4684 Baseband Connector
C.1.31 4684 Baseband Network Wrap Plug
C.1.32 4684 Baseband Network Terminator Plug
C.1.33 X.25 Interface Co-Processor/2 Cable Wiring

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C.1.1 Cash Drawer A Connector and Cable

4683 or 4684 Connector	**Line Description**	**Cash Drawer A Connector**
3A-1	Switch	Pin 4
3A-2	Switch	Pin 3
3A-3	Signal	Pin 2
3A-4	+36 V dc	Pin 1

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C.1.2 Cash Drawer B Connector and Cable

4683 or 4684 Connector	**Line Description**	**Cash Drawer B Connector**
3B-1	Switch	Pin 4
3B-2	Switch	Pin 3
3B-3	Signal	Pin 2
3B-4	+36 V dc	Pin 1

PICTURE 297

Figure C-1. Cash Drawer Cable Wiring

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C.1.3 Coin Dispenser Connector and Cable

4683 Connector	**Line Description**	**Coin Dispenser Connector**
29-1	Coin data	Pin 1
29-2	Coin clock	Pin 2
29-3	Coin dispenser enable	Pin 3
29-4	+5 V dc return	Pin 4
	Not used	Pin 6
	Not used	Pin 7
	Not used	Pin 8
	Not used	Pin 9

PICTURE 298

Figure C-2. Coin Dispenser Cable Wiring

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C.1.4 Display A (Alphanumeric, Operator, or Shopper) Connector and Cable

4683 or 4684 Connector	**Line Description**	**Display A Connector**
4A-1	+12 V dc return	Pin 4
4A-2	Serial I/O A	Pin 3
4A-3	Serial I/O B	Pin 2
4A-4	+12 V dc	Pin 1

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C.1.5 Display B (Alphanumeric, Operator, or Shopper) Connector and Cable

4683 or 4684 Connector	**Line Description**	**Display B Connector**
4B-1	+12 V dc return	Pin 4
4B-2	Serial I/O B	Pin 3
4B-3	Serial I/O A	Pin 2
4B-4	+12 V dc	Pin 1

PICTURE 299

Figure C-3. Display Cable Wiring

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C.1.6 Optical Character Reader (OCR) Connector and Cable

4683 Connector	**Line Description**	**OCR Wand Connector**	**4683 Connector**	**Line Description**	**OCR Wand Connector**
21-1	Reserved	Pin 16	21-9	OCR EOT	Pin 8
21-2	OCR data 1	Pin 1	21-10	OCR data ready	Pin 9
21-3	OCR data 2	Pin 2	21-11	Reserved	Pin 18
21-4	OCR data 3	Pin 3	21-12	+5 V dc return	Pin 22
21-5	OCR data 4	Pin 4	21-13	OCR user ready	Pin 10
21-6	OCR data 5	Pin 5	21-14	Reserved	Pin 23
21-7	OCR data 6	Pin 6	21-15	Reserved	Pin 24
21-8	OCR edit check	Pin 7	21-16	Reserved	Pin 25

PICTURE 300

Figure C-4. OCR Wand Cable Wiring

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C.1.7 Point of Sale Keyboard A and B Connector and Long Cable

4683 or 4684 Connector	**Line Description**	**Keyboard A Connector**	**4683 or 4684 Connector**	**Line Description**	**Keyboard B Connector**
5A-1	Reserved	Pin 8	5B-1	Reserved	Pin 8
5A-2	+5 V dc	Pin 7	5B-2	+5 V dc	Pin 7
5A-3	+5 V dc return	Pin 6	5B-3	+5 V dc return	Pin 6
5A-4	Serial I/O B	Pin 5	5B-4	Serial I/O B	Pin 5
5A-5	Serial I/O A	Pin 4	5B-5	Serial I/O A	Pin 4
5A-6	+5 V dc	Pin 3	5B-6	+5 V dc	Pin 3
5A-7	+5 V dc return	Pin 2	5B-7	+5 V dc return	Pin 2
5A-8	Reserved	Pin 1	5B-8	Reserved	Pin 1

PICTURE 301

Figure C-5. Long Keyboard Cable Wiring

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C.1.8 Point of Sale Keyboard A and B Connector and Short Cable

4683 or 4684 Connector	**Line Description**	**Keyboard A Connector**	**4683 or 4684 Connector**	**Line Description**	**Keyboard B Connector**
5A-1	Reserved	Pin 8	5B-1	Reserved	Pin 8
5A-2	Reserved	Pin 7	5B-2	Reserved	Pin 7
5A-3	+5 V dc return	Pin 6	5B-3	+5 V dc return	Pin 6
5A-4	Serial I/O A	Pin 5	5B-4	Serial I/O B	Pin 5
5A-5	Serial I/O B	Pin 4	5B-5	Serial I/O A	Pin 4
5A-6	+5 V dc	Pin 3	5B-6	+5 V dc	Pin 3
5A-7	Reserved	Pin 2	5B-7	Reserved	Pin 2
5A-8	Reserved	Pin 1	5B-8	Reserved	Pin 1

PICTURE 302

Figure C-6. Short Keyboard Cable Wiring

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C.1.9 Enhanced A/N Keyboard Connector and Cable

PICTURE 303

Figure C-7. Enhanced A/N Keyboard Cable Continuity Check

PICTURE 304

Figure C-8. Enhanced A/N Keyboard Cable Pin Voltages

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C.1.10 RS-232-C Device Connector and Cable

4683 Connector	**Line Description**	**RS-232-C Connector**	**4683 Connector**	**Line Description**	**RS-232-C Connector**
23-1	Transmit Data	Pin 2	23-5	Ground	Pin 7
23-2	Reserved	Reserved	23-6	Clear to Send	Pin 5
23-3	Receive Data	Pin 3	23-7	Data Set Ready	Pin 6 & 8
23-4	Request to Send	Pin 4	23-8	Data Terminal Ready	Pin 20

PICTURE 305

Figure C-9. RS-232-C Cable Wiring

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C.1.11 RS-232-C or Current Loop Device Connector and Cable

4683 Connector	**Line Description**	**RS-232-C or Current Loop Device Connector**
25-1	Reserved	Not connected
25-2	Transmit Data	Pin 2
25-3	Reserved	Not connected
25-4	Receive Data	Pin 3
25-5	Reserved	Not connected
25-6	Request to Send	Pin 4
25-7	Reserved	Not connected
25-8	Clear to Send	Pin 5
25-9	+ Transmit Data (current loop)	Pin 18
25-10	Data Set Ready	Pin 6
25-11	Signal Ground	Pin 7
25-12	Data Terminal Ready	Pin 20
25-13	Data Carrier Detect	Pin 8
25-14	+ Receive Data (current loop)	Pin 9
25-15	- Receive Return (current loop)	Pin 11
25-16	- Transmit Return (current loop)	Pin 25

PICTURE 306

Figure C-10. RS-232-C or Current Loop Device Cable Wiring

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C.1.12 RS-232-C Asynchronous/Communications Port

Pin Number	**Signal Name**	**Pin Number**	**Signal Name**
1	Not Connected	14	Not Connected
2	Transmit Data	15	Not Connected
3	Receive Data	16	Not Connected
4	Request to Send	17	Not Connected
5	Clear to Send	18	Not Connected
6	Data Set Ready	19	Not Connected
7	Signal Ground	20	Data Terminal Ready
8	Data Carrier Detect	21	Not Connected
9	Not Connected	22	Ring Indicate
10	Not Connected	23	Not Connected
11	Not Connected	24	Not Connected
12	Not Connected	25	Not Connected
13	Not Connected		

PICTURE 307

Figure C-11. RS-232-C Asynchronous/Communications Connector Wiring

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C.1.13 RS-232-C (Current Loop) Wrap Plug

Pin 9 (+ Receive Data)	is connected to	Pin 18 (+ Transmit Data)
Pin 11 (- Receive Return)	is connected to	Pin 25 (- Transmit Return)

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C.1.14 RS-232-C (EIA) Wrap Plug

Pin 2 (Transmit Data)	is connected to	Pin 3 (Receive Data)
Pin 4 (Request to Send)	is connected to	Pin 5 (Clear to Send)
Pin 6 (Data Set Ready)	is connected to	Pin 20 (Data Terminal Ready)

PICTURE 308

Figure C-12. Wrap Plug Wiring

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C.1.15 Scale Connector and Cable

4683 Connector	**Line Description**	**Scale Connector**
21-1	Scale Inhibit	Pin 19
21-2	Scale Data 1	Pin 1
21-3	Scale Data 2	Pin 2
21-4	Scale Data 4	Pin 3
21-5	Scale Data 8	Pin 4
21-6	Reserved	Pin 22, 23, 24
21-7	Reserved	Pin 22, 23, 24
21-8	Reserved	Pin 22, 23, 24
21-9	Reserved	Pin 22, 23, 24
21-10	Reserved	Pin 22, 23, 24
21-11	Reserved	Pin 22, 23, 24
21-12	Signal Ground	Pin 22, 23, 24
21-13	Scale clock	Pin 11
21-14	Reserved	Pin 22, 23, 24
21-15	Reserved	Pin 22, 23, 24
21-16	Reserved	Pin 22, 23, 24

PICTURE 309

Figure C-13. Scale Cable Wiring

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C.1.16 Special Attachment Cable (Remote Alarm and Non-IBM Cash Drawer)

4683 or 4684 Connector	**Line Description**	**Special Attachment Connector**
	not used	Pin 1
	not used	Pin 2
	not used	Pin 3
	not used	Pin 4
	not used	Pin 5
3-1	DC ground	Pin 6
3-2	sensor	Pin 7
3-3	coil	Pin 8
3-4	36 V dc	Pin 9

PICTURE 310

Figure C-14. Special Attachment Cable Wiring. Remote Alarm and Non-IBM Cash Drawer

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C.1.17 Special Attachment "Y" Cable (1520 Model A02 and Dual-Track MSR)

4683 or 4684 Connector	**Line Description**	**Special Attachment Connector**
A-1	Reserved	B1-1 and B2-1
A-2	+5 V dc	B1-2 and B2-2
A-3	+5 V dc return	B1-3 and B2-3
A-4	Serial I/O A	B1-4 and B2-4
A-5	Serial I/O B	B1-5 and B2-5
A-6	+5 V dc	B1-6 and B2-6
A-7	+5 V dc return	B1-7 and B2-7
A-8	Reserved	B1-8 and B2-8

PICTURE 311

Figure C-15. Special Attachment Cable Wiring. This cable allows the Dual-Track MSR and the 1520 Model A02 to be attached to socket 5B at the same time.

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C.1.18 System Unit Printer Connector

Pin Number	**Signal Name**	**Pin Number**	**Signal Name**
1	STROBE	14	AUTO FEED XT
2	Data Bit 0	15	ERROR
3	Data Bit 1	16	INIT
4	Data Bit 2	17	SLCT IN
5	Data Bit 3	18	Ground
6	Data Bit 4	19	Ground
7	Data Bit 5	20	Ground
8	Data Bit 6	21	Ground
9	Data Bit 7	22	Ground
10	ACK	23	Ground
11	BUSY	24	Ground
12	PE	25	Ground
13	SLCT		

PICTURE 312

Figure C-16. System Unit Printer Connector Cable Wiring

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C.1.19 3687 Point of Sale Scanner Model 002 Adapter Connector and Cable

4683 or 4684 Connector	**Line Description**	**Scanner Connector**	**4683 or 4684 Connector**	**Line Description**	**Scanner Connector**
17-1	+5 V dc	17-16	17-9	Ground	17-8
17-2	+5 V dc return	17-15	17-10	+ 12 V	17-7
17-3	+5 V dc	17-14	17-11	Ground	17-6
17-4	+5 V dc return	17-13	17-12	+ 12 V	17-5
17-5	+5 V dc	17-12	17-13	Ground	17-4
17-6	+5 V dc return	17-11	17-14	+ 12 V	17-3
17-7	Serial I/O A	17-10	17-15	Ground	17-2
17-8	Serial I/O B	17-9	17-16	+ 12 V	17-1

PICTURE 313

Figure C-17. 3687 Point of Sale Scanner Model 002 Cable Wiring

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C.1.20 Point of Sale Printer Model 1, 2 or 3 Connector and Cable

4683 or 4684 Connector	**Line Description**	**IBM Printer Connector**	**4683 or 4684 Connector**	**Line Description**	**IBM Printer Connector**
7-1	+38 V dc	Pin 16	7-9	Serial I/O A	Pin 8
7-2	+38 V dc return	Pin 15	7-10	Serial I/O B	Pin 7
7-3	+38 V dc	Pin 14	7-11	+5 V dc return	Pin 6
7-4	+38 V dc return	Pin 13	7-12	+5 V dc	Pin 5
7-5	+38 V dc	Pin 12	7-13	+5 V dc return	Pin 4
7-6	+38 V dc return	Pin 11	7-14	+5 V dc	Pin 3
7-7	+38 V dc	Pin 10	7-15	+5 V dc return	Pin 2
7-8	+38 V dc return	Pin 9	7-16	+5 V dc	Pin 1

PICTURE 314

Figure C-18. Point of Sale Printer Model 1, 2 or 3 Connector and Cable

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C.1.21 4680 Store Loop Connector and Cable

4683 Connector	**Line Description**	**Store Loop Connector**
1-1	Receive signal A (black dot)	Pin 4
1-2	Receive signal B (orange dot)	Pin 3
1-3	Transmit signal A (green dot)	Pin 2
1-4	Transmit signal B (red dot)	Pin 1

PICTURE 315

Figure C-19. Store Loop Cable Wiring

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C.1.22 4683 Video Display (5-inch / Distributed) Connector and Cable

4683 Connector	Line Description	IBM Video Display Connector	4683 Connector	Line Description	IBM Video Display Connector
81-1	Horizontal return	Pin 1	81-14	Horizontal drive	Pin 14
81-2	Vertical return	Pin 2	81-15	Vertical drive	Pin 15
81-3	Dual intensity return	Pin 3	81-16	Dual intensity	Pin 16
81-4	Video return	Pin 4	81-17	Video	Pin 17
81-5	+12 V dc return	Pin 5	81-18	+12 V dc	Pin 18
81-6	+12 V dc return	Pin 6	81-19	+12 V dc	Pin 19
81-7	Sense	Pin 7	81-20	Reserved	Pin 20
81-8	Reserved	Pin 8	81-21	Reserved	Pin 21
81-9	Reserved	Pin 9	81-22	Reserved	Pin 22
81-10	Reserved	Pin 10	81-23	Reserved	Pin 23
81-11	Reserved	Pin 11	81-24	Reserved	Pin 24
81-12	Reserved	Pin 12	81-25	Reserved	Pin 25
81-13	Reserved	Pin 13			

PICTURE 316

Figure C-20. 5-Inch Video Distributed Display Cable Wiring

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C.1.23 4683 Video Display (Except 5-Inch) Connector and Cable

4683 Connector	Line Description	IBM Video Display Connector	4683 Connector	Line Description	IBM Video Display Connector
81-1	Ground	Pin 5	81-14	Horizontal Sync	Pin 13
81-2	Ground	Pin 10	81-15	Vertical Sync	Pin 14
81-3	N/A	N/A	81-16	N/A	N/A
81-4	N/A	N/A	81-17	N/A	N/A
81-5	N/A	N/A	81-18	N/A	N/A
81-6	N/A	N/A	81-19	N/A	N/A
81-7	N/A	N/A	81-20	N/A	N/A
81-8	N/A	N/A	81-21	Red Video	Pin 1
81-9	Red Return	Pin 6	81-22	Blue Video	Pin 3
81-10	Blue Return	Pin 8	81-23	Green Video	Pin 2
81-11	Green Return	Pin 7	81-24	N/A	N/A
81-12	N/A	N/A	81-25	N/A	N/A
81-13	Sense 2	Pin 12	N/A	Sense 1	Pin 11

PICTURE 317

Figure C-21. Other Video Display Cable Wiring

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C.1.24 4684 9-Inch Video Display Connector and Cable

4684 Connector Position Number	**Video Connector Position Number**	**Signal Name**
1	1	Red Video
6	6	Red Return
3	3	Blue Video
8	8	Blue Return
2	2	Green Video
7	7	Green Return
13	13	Horizontal Sync
14	14	Vertical Sync
11	--	Sense 1
12	12	Sense 2
5	5	Ground
10	10	Ground

PICTURE 318

Figure C-22. 4684 9-Inch Video Display Connector and Cable

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C.1.25 Point of Sale Terminal Connector and Cable

Table C-1. This table refers to the top cable on the following page.

4683-*xx*1	**Line Description**	**4683-*xx*2**
11-1	Serial I/O A	11-1
11-2	Serial I/O B	11-2
11-3	Serial I/O A	11-3
11-4	Serial I/O B	11-4

The top cable in Figure C-23 connects:

- A 4683-*xx*1 to a 4683-*xx*2
- A 4684 to a 4683-*xx*2.

The bottom cable in Figure C-23 connects:

- A 4683 or a 4684 to the loop wiring concentrator
- A 4683 or a 4684 to the store loop receptacle.

PICTURE 319

Figure C-23. Point of Sale Terminal Cable Wiring

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C.1.26 Baseband Network Cable Adapter

PICTURE 320

Figure C-24. Baseband Network Cable Adapter

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C.1.27 Baseband Network Cable and Connectors

Connector A Position	**Connector B Position**	**Signal Name**
1	1	- TX
6	6	+TX
9	9	+RX
5	5	- RX

PICTURE 321

Figure C-25. Baseband Network Cable and Connectors

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C.1.28 Baseband Network Cable and Data Connector

4684 Connector Position	**Data Connector Position**	**Signal Name**
1	Red	- TX
6	Green	+TX
9	Orange	+RX
5	Black	- RX

PICTURE 322

Figure C-26. Baseband Network Connector and Cable

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C.1.29 PS/2 Cable to Data Connector

Wire No.	Wire Color	Connector RJ11 Position	Data Connector Position	Signal Name
1	Orange	4	Green	+TX
T1	Orange/White	3	Red	-TX
2	Blue	5	Orange	+RX
T2	Blue/White	2	Black	-RX
Drain		1	Shield	Ground

PICTURE 323

Figure C-27. PS/2 Cable to Data Connector

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C.1.30 PS/2 Baseband to 4684 Baseband Connector

Wire No.	Wire Color	Connector RJ11 Position	4684 Connector Position	Signal Name
1	Orange	4	6	+TX
T1	Orange/White	3	1	-TX
2	Blue	5	9	+RX
T2	Blue/White	2	5	-RX
Drain		1	Shield	Ground

PICTURE 324

Figure C-28. PS/2 Baseband to 4684 Baseband Connector.

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C.1.31 4684 Baseband Network Wrap Plug

PICTURE 325

Figure C-29. 4684 Baseband Network Wrap Plug

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C.1.32 4684 Baseband Network Terminator Plug

PICTURE 326

Figure C-30. 4684 Baseband Network Terminator Plug

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C.1.33 X.25 Interface Co-Processor/2 Cable Wiring

PICTURE 327

Figure C-31. X.25 Interface Co-Processor/2 Cable Wiring

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C.2 Wiring Diagrams for the IBM 4683 Base Unit Power Supply Connectors

Subtopics

C.2.1 4683 Power Supply Connector P11
C.2.2 4683 Power Supply Connector P12
C.2.3 4683 Power Supply Connector P13
C.2.4 4683 Power Supply Connector P14

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C.2.1 4683 Power Supply Connector P11

Power Supply Connector	Line Description	Power Supply Connector	Line Description
P11-1	POR 1	P11-J	+5 V dc aux return
P11-A	POR 1	P11-9	+5 V dc internal return
P11-2	PDI	P11-K	+5 V dc internal
P11-B	PDI	P11-10	+5 V dc external return
P11-3	Save	P11-L	+5 V dc external return
P11-C	Save	P11-11	+5 V dc external
P11-4	Not connected	P11-M	+5 V dc external
P11-D	Battery enable	P11-12	+36 V dc printer return
P11-5	Polarization key	P11-N	+36 V dc printer return
P11-E	Polarization key	P11-13	+36 V dc
P11-6	Dump switch	P11-P	+36 V dc
P11-F	Battery disable	P11-14	+12 V dc return
P11-7	+5 V dc Aux	P11-R	+12 V dc return
P11-H	+5 V dc Aux	P11-15	+12 V dc
P11-8	+5 V dc Aux return	P11-S	+12 V dc

PICTURE 328

Figure C-32. Power Supply Connector P11 Wiring. Connector pins are numbered the same on P11, P12, P13, and P14.

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C.2.2 4683 Power Supply Connector P12

Power Supply Connector	Line Description	Power Supply Connector	Line Description
P12-1	+36 V dc solenoid return	P12-J	+12 V dc
P12-A	+36 V dc solenoid return	P12-9	-12 V dc
P12-2	+36 V dc solenoid	P12-K	-12 V dc
P12-B	+36 V dc solenoid	P12-10	+5 V dc internal
P12-3	+5 V dc external	P12-L	+5 V dc internal return
P12-C	+5 V dc external	P12-11	-12 V dc return
P12-4	+5 V dc external return	P12-M	+12 V dc return
P12-D	+5 V dc external return	P12-12	Jumper 'B'
P12-5	Polarization key	P12-N	Jumper 'A'
P12-E	Polarization key	P12-13	Jumper 'D'
P12-6	+12 V dc	P12-P	Jumper 'C'
P12-F	+12 V dc	P12-14	Jumper 'F'
P12-7	+12 V dc return	P12-R	Jumper 'E'
P12-H	+12 V dc return	P12-15	Jumper 'H'
P12-8	+12 V dc	P12-S	Jumper 'G'

PICTURE 329

Figure C-33. Power Supply Connector P12 Wiring. Connector pins are numbered the same on P11, P12, P13, and P14.

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C.2.3 4683 Power Supply Connector P13

Power Supply Connector	**Line Description**	**Power Supply Connector**	**Line Description**
P13-1	+5 V dc internal	P13-J	Reserved
P13-A	+5 V dc internal	P13-9	Reserved
P13-2	+5 V dc internal return	P13-K	Reserved
P13-B	+5 V dc internal return	P13-10	Reserved
P13-3	+12 V dc return	P13-L	Reserved
P13-C	+12 V dc return	P13-11	Address sense
P13-4	+12 V dc	P13-M	Reserved
P13-D	+12 V dc	P13-12	Reserved
P13-5	Polarization key	P13-N	Reserved
P13-E	Polarization key	P13-13	Master POR
P13-6	-12 V dc	P13-P	Master POR
P13-F	-12 V dc	P13-14	Jumper 'C'
P13-7	-12 V dc return	P13-R	Jumper 'D'
P13-H	-12 V dc return	P13-15	Jumper 'A'
P13-8	Reserved	P13-S	Jumper 'B'

PICTURE 330

Figure C-34. Power Supply Connector P13 Wiring. Connector pins are numbered the same on P11, P12, P13, and P14.

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C.2.4 4683 Power Supply Connector P14

Power Supply Connector	**Line Description**	**Power Supply Connector**	**Line Description**
P14-1	+5 V dc	P14-J	Reserved
P14-A	+5 V dc	P14-9	Reserved
P14-2	+5 V dc return	P14-K	Reserved
P14-B	+5 V dc return	P14-10	Reserved
P14-3	+12 V dc return	P14-L	Reserved
P14-C	+12 V dc return	P14-11	address sense
P14-4	+12 V dc	P14-M	Reserved
P14-D	+12 V dc	P14-12	Reserved
P14-5	Polarization key	P14-N	Reserved
P14-E	Polarization key	P14-13	Master POR
P14-6	-12 V dc	P14-P	Master POR
P14-F	-12 V dc	P14-14	Jumper 'G'
P14-7	-12 V dc return	P14-R	Jumper 'H'
P14-H	-12 V dc return	P14-15	Jumper 'E'
P14-8	Reserved	P14-S	Jumper 'F'

PICTURE 331

Figure C-35. Power Supply Connector P14 Wiring. Connector pins are numbered the same on P11, P12, P13, and P14.

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C.3 Wiring Diagrams for the Model 1 or 2 Printer Card Connectors

Subtopics

C.3.1 Model 1 or 2 Printer Card Connector J1 (Print Head)
C.3.2 Model 1 or 2 Printer Card Connector J2 (Operator Keypad)
C.3.3 Model 1 or 2 Printer Card Connector J3 (Cover Interlock Sensor)
C.3.4 Model 1 or 2 Printer Card Connector J4 (Document Insert Paper Sensor)
C.3.5 Model 1 or 2 Printer Card Connector J5 (Home Sensor)
C.3.6 Model 1 or 2 Printer Card Connector J6 (Capacitor)
C.3.7 Model 1 or 2 Printer Card Connector J7 (I/O Interface Cable)
C.3.8 Model 1 or 2 Printer Card Connector J8 (Journal Emitter Sensor)
C.3.9 Model 1 or 2 Printer Card Connector J9 (Customer Receipt/Document Insert Motor)
C.3.10 Model 1 or 2 Printer Card Connector J10 (Transport Motor)
C.3.11 Model 1 or 2 Printer Card Connector J11 (Journal/Ribbon Motor)
C.3.12 Model 1 or 2 Printer Card Connector J12
C.3.13 Model 1 or 2 Printer Card Connector J13

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C.3.1 Model 1 or 2 Printer Card Connector J1 (Print Head)

Printer Card Connector	Line Description	Printer Card Connector	Line Description
J1-1	Print wire 5	J1-7	+36 V dc
J1-2	Print wire 7	J1-8	+36 V dc
J1-3	Print wire 9	J1-9	Print wire 4
J1-4	Print wire 8	J1-10	Print wire 2
J1-5	Print wire 6	J1-11	Print wire 1
J1-6	+36 V dc	J1-12	Print wire 3

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C.3.2 Model 1 or 2 Printer Card Connector J2 (Operator Keypad)

J2 Printer Card Connector	**J2 Line Description**
J2-1	Customer receipt paper advance
J2-2	Journal paper advance
J2-3	+5 V dc return
J2-4	Document insert open/close
J2-5	Test

PICTURE 332

Figure C-36. Printer Card Connector Wiring. The polarization key is counted as a pin.

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C.3.3 Model 1 or 2 Printer Card Connector J3 (Cover Interlock Sensor)

Printer Card Connector	Line Description	Sensor Cable Wire
J3-1	+5 V dc return	Black
J3-2	+5 V dc	Blue
J3-3	Sensor	Green
J3-4	Sensor	White
J3-5	Polarization key	No wire
J3-6	+5 V dc return	Black

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C.3.4 Model 1 or 2 Printer Card Connector J4 (Document Insert Paper Sensor)

Printer Card Connector	Line Description	Sensor Cable Wire
J4-1	+5 V dc return	Black
J4-2	Polarization key	No wire
J4-3	+5 V dc	Blue
J4-4	Sensor	Green
J4-5	Sensor	White
J4-6	+5 V dc return	Black

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C.3.5 Model 1 or 2 Printer Card Connector J5 (Home Sensor)

Printer Card Connector	Line Description	Sensor Cable Wire
J5-1	+5 V dc return	Black
J5-2	+5 V dc	Blue
J5-3	Polarization key	No wire
J5-4	Sensor	Green
J5-5	Sensor	White
J5-6	+5 V dc return	Black

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C.3.6 Model 1 or 2 Printer Card Connector J6 (Capacitor)

Printer Card Connector	**Line Description**
J6-1	+36 V dc
J6-2	+36 V dc return
J6-3	Polarization key

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C.3.7 Model 1 or 2 Printer Card Connector J7 (I/O Interface Cable)

Printer Card Connector	**Line Description**	**Printer Card Connector**	**Line Description**
J7-1	+5 V dc	J7-9	+36 V dc return
J7-2	+5 V dc return	J7-10	+36 V dc
J7-3	+5 V dc	J7-11	+36 V dc return
J7-4	+5 V dc return	J7-12	+36 V dc
J7-5	+5 V dc	J7-13	+36 V dc return
J7-6	+5 V dc return	J7-14	+36 V dc
J7-7	Serial I/O B	J7-15	+ 36 V dc return
J7-8	Serial I/O A	J7-16	+36 V dc

PICTURE 333

Figure C-37. Printer Card Connector Wiring. The polarization key is counted as a pin.

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C.3.8 Model 1 or 2 Printer Card Connector J8 (Journal Emitter Sensor)

Printer Card Connector	**Line Description**	**Sensor Cable Wire**
J8-1	+5 V dc return	Black
J8-2	+5 V dc	Blue
J8-3	Sensor	Green
J8-4	Polarization key	No wire
J8-5	Sensor	White
J8-6	+5 V dc return	Black

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C.3.9 Model 1 or 2 Printer Card Connector J9 (Customer Receipt/Document Insert Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J9-1	+36 V dc	Green
J9-2	+36 V dc	Red
J9-3	Motor	Orange
J9-4	Polarization key	No wire
J9-5	Motor	Brown
J9-6	Motor	Yellow
J9-7	Motor	Black

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C.3.10 Model 1 or 2 Printer Card Connector J10 (Transport Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J10-1	Motor	Black
J10-2	Motor	White
J10-3	Motor	Red
J10-4	Motor	Green
J10-5	Polarization key	No wire
J10-6	Motor	Red/White
J10-7	Motor	Green/White

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C.3.11 Model 1 or 2 Printer Card Connector J11 (Journal/Ribbon Motor)

Printer Card Connector	Line Description	Motor Cable Wire	Printer Card Connector	Line Description	Motor Cable Wire
J11-1	+36 V dc	Green	J11-5	Motor	Brown
J11-2	+36 V dc	Red	J11-6	Motor	Yellow
J11-3	Polarization key	No wire	J11-7	Motor	Black
J11-4	Motor	Orange			

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C.3.12 Model 1 or 2 Printer Card Connector J12

Printer Card Connector	**Line Description**
J12-1	Polarization key
J12-2	+36 V dc
J12-3	Signal

PICTURE 334

Figure C-38. Printer Card Connector Wiring. The polarization key is counted as a pin.

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C.3.13 Model 1 or 2 Printer Card Connector J13

Printer Card Connector	**Line Description**	**Cable Wire**
J13-1	+5 V dc return	Black
J13-2	+5 V dc	Blue
J13-3	Sensor	Green
J13-4	Sensor	White
J13-5	+5 V dc return	Black
J13-6	Polarization key	No wire

PICTURE 335

Figure C-39. Printer Card Connector Wiring. The polarization key is counted as a pin.

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¦*C.4 Wiring Diagrams for the Model 3 Printer Card Connectors*

Subtopics

C.4.1 Model 3 Printer Card Connector J1 (I/O Interface Cable)
C.4.2 Model 3 Printer Card Connector J2 (Signals to Extension Card)
C.4.3 Model 3 Printer Card Connector J3 (Document Insert Motor)
C.4.4 Model 3 Printer Card Connector J4 (Print Head Transport Motor)
C.4.5 Model 3 Printer Card Connector J5 (Print Head)
C.4.6 Model 3 Printer Card Connector J6 (Print Head Home Sensor)
C.4.7 Model 3 Printer Card Connector J7 (Cover Interlock Sensor)
C.4.8 Model 3 Printer Card Connector J8 (Top Buttons)
C.4.9 Model 3 Printer Card Connector J9 (Front Buttons)
C.4.10 Model 3 Printer Card Connector J10 (Capacitor)
C.4.11 Model 3 Printer Extension Card Connector J101 (Paper Cutter Motor)
C.4.12 Model 3 Printer Extension Card Connector J102 (CR Motor)
C.4.13 Model 3 Printer Extension Card Connector J103 (Signals to Printer Card)
C.4.14 Model 3 Printer Extension Card Connector J106 (JNL Motion Sensor)
C.4.15 Model 3 Printer Extension Card Connector J107 (JNL Motor)
C.4.16 Model 3 Printer Extension Card Connector J108 (DI Front Sensor)
C.4.17 Model 3 Card Connector J109 (DI Top Sensor)

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C.4.1 Model 3 Printer Card Connector J1 (I/O Interface Cable)

Printer Card Connector	Line Description	Printer Card Connector	Line Description
J1-1	+5 V dc	J1-9	+36 V dc return
J1-2	+5 V dc return	J1-10	+36 V dc
J1-3	+5 V dc	J1-11	+36 V dc return
J1-4	+5 V dc return	J1-12	+36 V dc
J1-5	+5 V dc	J1-13	+36 V dc return
J1-6	+5 V dc return	J1-14	+36 V dc
J1-7	Serial I/O B	J1-15	+36 V dc return
J1-8	Serial I/O A	J1-16	+36 V dc

[3]PICTURE 336

Figure C-40. Printer Card Connector Wiring. The polarization key is counted as a pin.

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C.4.2 Model 3 Printer Card Connector J2 (Signals to Extension Card)

Printer Card Connector	Line Description	Printer Card Connector	Line Description
J2-1	+36 V dc to JNL and CR motor	J2-13	Journal motor signal
J2-2	+36 V dc to cutter motor	J2-14	Journal motor signal
J2-3	Cutter motor signal	J2-15	Polarization key
J2-4	Cutter motor signal	J2-16	unused
J2-5	Cutter motor signal	J2-17	+5 V dc
J2-6	Cutter motor signal	J2-18	+5 V dc return
J2-7	CR motor signal	J2-19	+ CR low sensor
J2-8	CR motor signal	J2-20	Polarization key
J2-9	CR motor signal	J2-21	Journal low sensor
J2-10	CR motor signal	J2-22	Journal motion sensor
J2-11	Journal motor signal	J2-23	DI top sensor
J2-12	Journal motor signal	J2-24	DI front sensor

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C.4.3 Model 3 Printer Card Connector J3 (Document Insert Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J3-1	+36 V dc	Black
J3-2	+36 V dc	Green
J3-3	Polarization key	No wire
J3-4	Motor	Brown
J3-5	Motor	Red
J3-6	Motor	Orange
J3-7	Motor	Yellow

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C.4.4 Model 3 Printer Card Connector J4 (Print Head Transport Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J4-1	+36 V dc	Black
J4-2	+36 V dc	White
J4-3	Motor	Red
J4-4	Motor	Green
J4-5	Polarization key	No wire
J4-6	Motor	Red/White
J4-7	Motor	Green/White

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C.4.5 Model 3 Printer Card Connector J5 (Print Head)

Printer Card Connector	Line Description	Printer Card Connector	Line Description
J5-1	Print wire 3	J5-7	+36 V dc
J5-2	Print wire 7	J5-8	Print wire 9
J5-3	Print wire 1	J5-9	Print wire 4
J5-4	Print wire 5	J5-10	Print wire 8
J5-5	+36 V dc	J5-11	Print wire 6
J5-6	+36 V dc	J5-12	Print wire 2

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C.4.6 Model 3 Printer Card Connector J6 (Print Head Home Sensor)

Printer Card Connector	Line Description	Sensor Cable Wire
J6-1	Left home sensor	Red
J6-2	+5 V dc return	Yellow
J6-3	+5 V dc	Blue
J6-4	Polarization key	No wire
J6-5	Center home sensor	Black

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C.4.7 Model 3 Printer Card Connector J7 (Cover Interlock Sensor)

Printer Card Connector	**Line Description**	**Sensor Cable Wire**
J7-1	+5 V dc return	Black
J7-2	+5 V dc	Blue
J7-3	Sensor to card	Green
J7-4	Polarization key	No wire
J7-5	Sensor from card	White
J7-6	+5 V dc return	Brown

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C.4.8 Model 3 Printer Card Connector J8 (Top Buttons)

J8 Printer Card Connector	**J8 Line Description**
J8-1	Customer receipt paper advance
J8-2	+5 V dc return
J8-3	Journal paper advance

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C.4.9 Model 3 Printer Card Connector J9 (Front Buttons)

J9 Printer Card Connector	**J9 Line Description**
J9-1	Document insert reverse advance
J9-2	Document insert forward advance
J9-3	Document insert ready button
J9-4	+5 V dc return
J9-5	Turn on printer indicator light
J9-6	+5 V dc

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C.4.10 Model 3 Printer Card Connector J10 (Capacitor)

Printer Card Connector	**Line Description**
J10-1	+36 V dc return
J10-2	+36 V dc
J10-3	Polarization key
J10-4	Blank

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C.4.11 Model 3 Printer Extension Card Connector J101 (Paper Cutter Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J101-1	+36 V dc	Black
J101-2	Polarization key	No wire
J101-3	+36 V dc	Green
J101-4	Motor	Brown
J101-5	Motor	Red
J101-6	Motor	Orange
J101-7	Motor	Yellow

[3]PICTURE 337

Figure C-41. Printer Extension Card Connector Wiring. The polarization key is counted as a pin.

Note: Printer extension card connectors J104 and J105 are reserved.

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C.4.12 Model 3 Printer Extension Card Connector J102 (CR Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J102-1	+36 V dc	Black
J102-2	+36 V dc	Green
J102-3	Polarization key	No wire
J102-4	Motor	Brown
J102-5	Motor	Red
J102-6	Motor	Orange
J102-7	Motor	Yellow

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C.4.13 Model 3 Printer Extension Card Connector J103 (Signals to Printer Card)

Printer Card Connector	Line Description	Printer Card Connector	Line Description
J103-1	+36 V dc to JNL and CR motor	J103-12	Journal motor signal
J103-2	+36 V dc to cutter motor	J103-13	Journal motor signal
J103-3	Cutter motor signal	J103-14	Journal motor signal
J103-4	Cutter motor signal	J103-15	Polarization key
J103-5	Cutter motor signal	J103-16	unused
J103-6	Cutter motor signal	J103-17	+5 V dc
J103-7	CR motor signal	J103-18	+5 V dc return
J103-8	CR motor signal	J103-19	CR low sensor
J103-9	CR motor signal	J103-20	Polarization key
J103-10	CR motor signal	J103-21	Journal low sensor
J103-11	Journal motor signal	J103-22	Journal motion sensor
J103-12	Journal motor signal	J103-23	DI top sensor
J103-13	Journal motor signal	J103-24	DI front sensor

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C.4.14 Model 3 Printer Extension Card Connector J106 (JNL Motion Sensor)

Printer Card Connector	**Line Description**	**Sensor Cable Wire**
J106-1	+5 V dc return	Black
J106-2	+5 V dc	Blue
J106-3	Sensor output	Green
J106-4	Polarization key	No wire
J106-5	Sensor input	White
J106-6	+5 V dc return	Brown

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C.4.15 Model 3 Printer Extension Card Connector J107 (JNL Motor)

Printer Card Connector	**Line Description**	**Motor Cable Wire**
J107-1	+36 V dc	Black
J107-2	+36 V dc	Green
J107-3	Polarization key	No wire
J107-4	Motor	Brown
J107-5	Motor	Red
J107-6	Motor	Orange
J107-7	Motor	Yellow

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C.4.16 Model 3 Printer Extension Card Connector J108 (DI Front Sensor)

Printer Card Connector	**Line Description**
J108-1	+5 V dc return
J108-2	Signal to card
J108-3	Polarization key
J108-4	+5 V dc

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C.4.17 Model 3 Card Connector J109 (DI Top Sensor)

Printer Card Connector	**Line Description**
J109-1	+5 V dc
J107-2	Polarization key
J107-3	Signal to card
J107-4	+5 V dc return

Note: Printer extension card connectors J104 and J105 are reserved.

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D.0 Appendix D. Packing Items for Shipment

Subtopics

D.1 Packing Instructions
D.2 Items to Remove Before Shipping

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D.1 Packing Instructions

Some devices must be packed and shipped in specific containers that are designed to safeguard them during handling and shipping. These devices are the *4683 Base Unit*, the *4683 Printer*, the *4683 Feature Expansion Cards, and the 4684 System Unit.*

You can ship a 4683 base unit, point-of-sale printer, 4683 Feature Expansion Card or 4684 system unit in its original shipping container. In addition, you can order materials from IBM for packaging and shipping these devices. The following part numbers include the appropriate containers, packaging materials, and instructions:

Shipping materials for the 4683 Base Unit IBM P/N 63X4810
Shipping materials for the 4680 Printer IBM P/N 63X4802
Shipping materials for 4683 Feature Expansion Cards IBM P/N 63X4815
Shipping materials for the 4684 System Unit IBM P/N 16F0179

Other devices require only that you package them carefully to guard against further damage during shipment. They do not require special shipping containers.

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D.2 Items to Remove Before Shipping

The following table lists the items you must remove from your failing devices before exchanging or shipping them. Label the items and keep them, according to your store's procedures, for later installation in the new devices.

Table D-1. Items to Remove Before Shipping or Exchanging

Failing Unit or Device	**Remove and Keep These Items**
4683 Base Unit	All cables Battery pack (applies to 4683-*xx*1 terminals only) Feature Expansion cards, if any are present **Note:** Install a filler plate to cover the opening caused by the removal of any Feature Expansion Card. Power cord Security base, if one is present
4684 System Unit	All cables Optional Device Adapters, if any are present **Note:** Install a filler plate to cover the opening caused by the removal of any Optional Device Adapter. Power cord Security Base, if one is present
Cash Drawer	Cash drawer cable Cash till Cash till cover, if one is present Keylock blank insert, if no lock is present Keylock insert and keys, if a lock is present Security base, if one is present
Display, Alphanumeric *- or -* Shopper	Display cable **Note:** You must separate the display from the post to remove the device cable. Slightly spread the arms of the yoke to release the display, and lift the display out of the yoke. Unplug and remove the cable from the display. Display post and yoke assembly Two plastic screws that secure the display post to the 4683 or 4684.
Display, Video	The 3.8 m (12 ft) distributed display cable, if one is present Security screw, if one is present (in the bottom of the display)
The 3.8 m (12 ft) distributed device cable	
Keyboard	Any special keybuttons, keytops, lens covers, shields, labels, or decals (The keyboard you receive will have all standard single keybuttons.) Keyboard cable Keylock blank insert, if no lock is present Keylock insert and keys, if a lock is present Magnetic Stripe Reader (MSR), if one is present Security screw, if one is present (in the bottom of the keyboard)
Magnetic Stripe Reader	MSR Cable
4680 Printer	Both rolls of paper Keylock blank insert, if no lock is present Keylock insert and keys, if a lock is present Print head Printer cable Ribbon cartridge Security screw, if one is present (in the bottom of the printer)
Point of Sale Scanner	The 4.6 m (15 ft) Scanner Cable number 17.

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E.0 Appendix E. Inspecting for Terminal Safety Hazards

CAUTION:
For your safety, you must connect the power cord of any equipment to a correctly wired and grounded receptacle. An incorrectly wired receptacle can place a hazardous voltage on accessible metal parts of the equipment. If you are unsure of the receptacle wiring, have a qualified electrician check the receptacle prior to connecting any equipment or working on any equipment connected to it.

DANGER

During periods of lightning activity, do not connect or disconnect any cables, or perform installation, maintenance, or reconfiguration.

How to Inspect for Safety Hazards

See *Electrical Safety for IBM Customer Engineers*, S229-8124.

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine was assembled with required safety items installed to protect users and servicers from injury. Good judgment should also be used to identify possible unsafe conditions that are not covered by the inspection guide.

If any unsafe conditions are present, a determination must be made on how serious the apparent hazard could be and whether you can proceed without first correcting the problem.

Check the following conditions and the hazards they present:

- ☐ Explosive hazards (a damaged CRT face)
- ☐ Electrical hazards (primary voltage on the frame can cause serious or lethal electrical shock)
- ☐ Mechanical hazards (loose, missing, worn, or broken hardware can cause serious injury)
- ☐ Use of chemicals and solvents other than those specified by IBM.

Safety Check List

All non-IBM devices and attachments must be removed from the unit before conducting the safety check.

See the *IBM 4680 Store System: Problem Determination Guide* or the *IBM 4684 Point of Sale Terminal: Problem Determination Guide*.

If your terminal is not attached to the IBM 4680 Store System, see the problem solving guide that came with your terminal.

- ☐ Switch the machine power off.
- ☐ Disconnect the line cord from the wall receptacle.
- ☐ Remove the battery access cover and the back cover from the base unit.

How to Inspect for Safety Hazards (continued)

Safety Check List (continued)

- ☐ Check the power cord for the following:

    1. Use a meter to measure third-wire ground continuity for 0.1 ohms or less between the external ground pin and the frame of the power supply. Access the power supply frame through the

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battery cover.

2. The power cord should not be frayed or damaged.

□ Check for non-IBM alterations. If any are present, has *R009 non-IBM Alterations/Attachments Survey* been completed?

□ Check for damaged or missing insulation on wires.

□ Check for exposed electrical connectors or terminals.

□ Check for the presence and condition of the following safety labels:

1. The safety label on the top of the power supply and on the outside surface of the monitor should read: "Hazardous voltage. Do not remove this cover. No serviceable parts inside."

2. The battery (if present) safety label should read: "Caution: Do not put in fire or mutilate; may release toxic materials. Do not short circuit; may cause burns."

   CAUTION:
   The storage retention battery is a nickel cadmium battery. Dispose of defective batteries according to your local government regulations.

□ Check the inside of the base unit for obvious unsafe conditions such as metal filings, contamination, water or other fluids, or marks of fire or smoke damage.

□ Ensure that the voltage specified on the voltage label (under the base unit) matches the voltage of the power cord.

□ Ensure that the fasteners that hold the top cover of the power supply are not missing and have not been changed.

□ For models with batteries, check the condition of the battery.

□ Ensure that the power switch is off and reinstall all machine covers.

□ Connect the power cord to a power receptacle and ensure that the machine will power on and off.

Subtopics
E.1 Terminal Grounding Path Diagram

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E.1 Terminal Grounding Path Diagram

PICTURE 338

Figure E-1. Terminal Grounding Path Diagram

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F.0 Appendix F. World Trade Differences

Subtopics

F.1 Power Requirements
F.2 Maintenance Philosophy

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F.1 Power Requirements

Power cords for world trade machines have two power conductors and a ground wire. Voltages are as follows:

Low voltage 90 to 137 V ac RMS
(100 to 127 V ac nominal)
50 ±3 Hz or 60 ±3 Hz

High voltage 180 to 259 V ac RMS
(200 to 240 V ac nominal)
50 ±3 Hz or 60 ±3 Hz

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F.2 Maintenance Philosophy

In some world trade countries, maintenance repairs to the 4683 base unit, 4684 system unit, cash drawer, 50-key keyboard, alphanumeric keyboard, and point-of-sale printer will only be made at the field replaceable unit (FRU) level.

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G.0 Appendix G. Removing and Replacing the Keylock

Subtopics

G.1 Removing and Replacing the Keylock Insert
G.2 Removing and Replacing the Keylock Blank Insert

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G.1 Removing and Replacing the Keylock Insert

Subtopics
G.1.1 Removing the Keylock Insert
G.1.2 Replacing the Keylock Insert

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G.1.1 Removing the Keylock Insert

"Replacing the Keylock Insert" is in topic G.1.2.

1. Unlock the keylock before proceeding.

2. Insert the lock installation-removal key into the lock insert. See Figure G-1.

   The installation-removal key is shipped with the store controller.

3. Pull the lock insert out of the cylinder. You may have to move the installation-removal tool from side-to-side to get the insert free of the cylinder.

PICTURE 339

Figure G-1. Keylock Insert

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G.1.2 Replacing the Keylock Insert

"Removing the Keylock Insert" is in topic G.1.1.

1. Insert the lock cylinder adjustment key into the keylock cylinder [A]. See Figure G-2.

   The lock cylinder adjustment key is shipped with the store controller.

2. Turn the adjustment key until you can feel it go into the slot in the bottom of the cylinder [B].

3. Turn the adjustment key until the arrow is pointing as shown for the device [C].

4. Remove the adjustment key from the lock cylinder.

PICTURE 340

Figure G-2. Keylock Insert

5. Insert the lock installation-removal key into the lock insert [D]. See Figure G-3.

6. Put the lock insert into the cylinder [E]. The lock installation-removal key must be pointing the same way as the arrow was on the adjustment key.

7. Push the lock insert into the cylinder until the top ring of the insert is even with the face of the cylinder.

8. Hold the lock insert in place and remove the installation-removal key [F].

9. Insert the key for this keylock and check for proper operation.

PICTURE 341

Figure G-3. Keylock Insert

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G.2 Removing and Replacing the Keylock Blank Insert

Subtopics
G.2.1 Removing the Blank Lock Insert
G.2.2 Replacing the Blank Lock Insert

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G.2.1 Removing the Blank Lock Insert

"Replacing the Blank Lock Insert" is in topic G.2.2.

1. Put the insert key into the locking screw of the blank lock insert. See Figure G-4.

2. Turn the insert key counterclockwise until it stops to unscrew the locking screw.

   The blank lock insert key is shipped with the store controller.

3. Remove the blank insert from the lock cylinder.

PICTURE 342

Figure G-4. Blank Lock Insert

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G.2.2 Replacing the Blank Lock Insert

"Removing the Blank Lock Insert" is in topic G.2.1.

1. Insert the lock cylinder adjustment key into the keylock cylinder [A]. See Figure G-5.

   The lock cylinder adjustment key is shipped with the store controller.

2. Turn the adjustment key until you can feel it go into the slot in the bottom of the cylinder [B].

3. Turn the adjustment key until the arrow is pointing as shown for the device [C].

4. Before removing the adjustment key from the lock cylinder, note the direction of the arrow on the key. You line up the lug on the blank lock insert in this same direction later in these steps.

5. Remove the adjustment key from the lock cylinder.

6. Line up the lug on the end of the blank lock insert in the same direction as the arrow on the adjustment key was pointing [D].

7. Push the blank lock insert into the lock cylinder until it is even with the top of the lock cylinder.

8. Insert the insert key into the locking screw in the blank lock insert [E].

9. Turn the insert key clockwise to turn the locking screw down until it reaches the bottom of the hole.

   Note: Do not overtighten the locking screw.

10. Remove the insert key.

PICTURE 343

Figure G-5. Blank Lock Insert

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H.0 Appendix H. 4683/4684 Preventive Maintenance

Subtopics

H.1 4683/4684 Preventive Maintenance Procedures

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H.1 4683/4684 Preventive Maintenance Procedures

Perform these preventive maintenance procedures once every twelve months:

Subtopics

H.1.1 Base Unit/System Unit
H.1.2 Cash Drawer
H.1.3 Display
H.1.4 Keyboard
H.1.5 Model 1 or 2 Printer

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H.1.1 Base Unit/System Unit

- Vacuum the vent grills.
- Check the cables at the back of the base card/system board for chafing or breaks.
- Install the store loop cable retainer (P/N 96X4783) if needed (consult RETAIN tip 29).

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H.1.2 Cash Drawer

Check the cash drawer rails. Use the rail repair kit if the rails are damaged (P/N 25F6269).

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H.1.3 Display

- Clean the display covers.
- Check for broken covers and missing mounting hardware. Replace if necessary.

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H.1.4 Keyboard

- Vacuum the keyboard.
- Run the keyboard test.
- Clean the keyboard cover and the keytops.

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H.1.5 Model 1 or 2 Printer

- □ Run the printer diagnostics.
- □ Vacuum the printer.
- □ Check the tear bar.
- □ Clean the home, document insert, journal and cover sensors using canned air (P/N 2648326).
- □ Clean the print head. See "Cleaning the Print Head" in topic 5.3.3.
- □ Lubricate the carriage shaft, wear shoe skid-plate and the print head guide rod shaft bearings with IBM #6 oil.
- ¦□ Clean the teeth of the toggle gear.
- ¦□ Replace the carriage shaft wiper and lubricate it with IBM #6 oil.

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GLOSSARY Glossary

This glossary defines terms and abbreviations used in this book. Consult the *IBM Dictionary of Computing*, SC20-1699, and the index of this book for terms that you do not find in this glossary.

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¦ **A** ¦
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access unit. A unit that allows multiple attaching devices access to a token-ring network at a central point such as a wiring closet or in an open work area.

acoustic coupler. A type of telecommunication equipment that permits use of a telephone handset as a connection to a telecommunication line for data transmission by means of sound transducers.

active. (1) Able to communicate on the network. A token-ring network adapter is active if it is able to transmit and receive on the network. (2) Operational. (3) Pertaining to a node or device that is connected or is available for connection to another node or device. (4) Currently transmitting or receiving.

adapter. (1) In the point-of-sale terminal, a circuit card that, with its associated software, enables the terminal to use a function or feature. (2) In a LAN, within a communicating device, a circuit card that, with its associated software and/or microcode, enables the device to communicate over the network.

adapter address. Twelve hexadecimal digits that identify a LAN adapter.

address. (1) In data communication, the IEEE-assigned unique code or the unique locally administered code assigned to each device or workstation connected to a network. (2) A character, group of characters, or a value that identifies a register, a particular part of storage, a data source, or a data sink. The value is represented by one or more characters. (3) To refer to a device or an item of data by its address. (4) The location in the storage of a computer where data is stored. (5) In word processing, the location, identified by the address code, of a specific section of the recording medium or storage. (6) In word processing, the location, identified by the address code, of a specific section of the recording medium or storage.

address space. The complete range of addresses that is available to a programmer.

addressing. (1) The assignment of addresses to the instructions of a program. (2) In data communication, the way the originator or control station selects the unit to send a message to.

alphanumeric. Pertaining to a character set containing letters, digits, and other characters, such as punctuation marks.

alternate adapter. In a personal computer that is used on a LAN and that supports installation of two network adapters, the adapter that uses alternate (not standard or default) mapping between adapter-shared RAM, adapter ROM, and designated computer memory segments. The alternate adapter is usually designated as adapter 1 in configuration parameters. Contrast with *primary adapter*.

analog. Pertaining to data consisting of continuously variable physical quantities. Contrast with *digital*.

ANPOS keyboard. The alphanumeric point-of-sale keyboard. This keyboard consists of a section of alphanumeric keys, a programmable set of point-of-sale keys, a numeric keypad, and system function keys.

application program. (1) A program written for or by a user that applies to the user's own work. (2) A program written for or by a user that applies to a particular application. (3) A program written for or by a

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user that is specific to the user's own application. (4) A program used to connect and communicate with stations in a network, enabling users to perform application-oriented activities.

array. An arrangement of elements in one or more dimensions.

asynchronous. (1) Pertaining to two or more processes that do not depend upon the occurrence of a specific event such as a common timing signal. (2) In Fiber Distributed Data Interface (FDDI) rings, a type of data traffic that does not need bounded access delay to the medium and guaranteed throughput.

attach. (1) To connect a device physically. (2) To make a device a part of a network logically.

attaching device. Any device that is physically connected to a network and can communicate over the network.

available memory. In a personal computer, the number of bytes of memory that can be used after memory requirements for the operating system, device drivers, and other application programs have been satisfied.

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backup. Pertaining to a system, device, file, or facility that can be used in the event of a malfunction or the loss of data.

backup copy. A copy, usually of a program or of a library member, that is kept in case the original or the working copy is unintentionally altered or destroyed.

baseband. (1) A frequency band that uses the complete bandwidth of a transmission medium. Contrast with *broadband, carrierband.*. (2) A method of data transmission that encodes, modulates, and impresses information on the transmission medium without shifting or altering the frequency of the information signal.

base unit. The part of the IBM 4683 Point of Sale terminal that contains the power supply and the interfaces.

BASIC. Beginner's All-purpose Symbolic Instruction Code. A programming language that uses common English words.

beacon. (1) A frame sent by an adapter on a ring network indicating a serious ring problem, such as a broken cable. It contains the addresses of the beaconing station and its nearest active upstream neighbor (NAUN). (2) To send beacon frames continuously. An adapter is *beaconing* if it is sending such a frame.

beaconing. An error-indicating function of token-ring adapters that assists in locating a problem causing a hard error on a token-ring network.

beaconing terminal. A terminal that is not receiving the normal signal from the store loop. Therefore, it transmits a "beacon" message.

binary. (1) Pertaining to a system of numbers to the base two; the binary digits are 0 and 1. (2) Pertaining to a selection, choice, or condition that has two possible different values or states.

bit. Either of the binary digits: a 0 or 1. zero or one.

broadband. A frequency band divisible into several narrower bands so that different kinds of transmissions such as voice, video, and data transmission can occur at the same time. Synonymous with *wideband*.

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Contrast with *baseband*.

broadcast. Simultaneous transmission of data to more than one destination.

buffer. (1) A portion of storage used to hold input or output data temporarily. (2) A routine or storage used to compensate for a difference in data rate or time of occurrence of events, when transferring data from one device to another.

bypass. To eliminate an attaching device or an access unit from a ring network by allowing the data to flow in a path around it.

byte. (1) A string that consists of a number of bits, treated as a unit, and representing a character. (2) A binary character operated upon as a unit and usually shorter than a computer word. (3) A string that consists of a particular number of bits, usually 8, that is treated as a unit, and that represents a character. (4) A group of 8 adjacent binary digits that represent one extended binary-coded decimal interchange code (EBCDIC). (5) See *n-bit byte*.

C

C. A high-level programming language designed to optimize run time, size, and efficiency.

cable loss (optical). The loss in an optical cable equals the attenuation coefficient for the cables fiber times the cable length.

cable segment. A section of cable between components or devices on a network. A segment may consist of a single patch cable, multiple patch cables connected together, or a combination of building cable and patch cables connected together. See *LAN segment, ring segment*.

carrier. A wave or pulse train that may be varied by a signal bearing information to be transmitted over a communication system.

carrierband. A frequency band in which the modulated signal is superimposed on a carrier signal (as differentiated from baseband), but only one channel is present on the medium. Contrast with *baseband, broadband.*

cash drawer. A drawer at a point-of-sale terminal that can be programmed to open automatically. See *till*.

cathode ray tube (CRT). A vacuum tube in which a beam of electrons can be moved to draw lines or to form characters or symbols on its luminescent screen.

CD. Corrective diskette.

channel. (1) A functional unit, controlled by a host computer, that handles the transfer of data between processor storage and local peripheral equipment. (2) A path along which signals can be sent. (3) The portion of a storage medium that is accessible to a given reading or writing station.

charge. A sales transaction in which a customer has the partial or total value of purchased merchandise added to an account for later payment.

circuit. (1) A logic device. (2) One or more conductors through which an electric current can flow.

clear. To delete data from a screen or from memory.

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collision. (1) An unwanted condition that results from concurrent transmissions on a channel. (2) When a frame from a transmitting adapter encounters any other signal in its path (frame, noise, or another type of signal), the adapter stops transmitting and a collision is registered.

command. (1) A request for performance of an operation or execution of a program. (2) A character string from a source external to a system that represents a request for system action.

communication adapter. A circuit card and its associated software that enable a device, such as a personal computer, to be connected to a network or another computer (examples include binary synchronous, asynchronous, modem, and LAN adapters).

communication channel. A path for transmitting information from one location to another.

communication link. A data communication line that connects the host processor to the store controller.

component. (1) Any part of a network other than an attaching device, such as an IBM 8228 Multistation Access Unit. (2) Hardware or software that is part of a functional unit.

concentrator. (1) In data transmission, a functional unit that permits a common transmission medium to serve more data sources than there are channels currently available within the transmission medium. (2) Any device that combines incoming messages into a single message (concentration) or extracts individual messages from the data sent in a single transmission sequence (deconcentration). (3) See also *access unit*, *wiring concentrator*.

configuration. (1) The group of devices, options, and programs that make up a data processing system or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term may refer to a hardware configuration or a software configuration. (2) See also *system configuration*.

connect. In a LAN, to physically join a cable from a station to an access unit or network connection point. Contrast with *attach*.

control character. A character whose occurrence in a particular context initiates, modifies, or stops a control operation. A control character may be recorded for use in a subsequent action, and it may have a graphic representation in some circumstances.

controller. A unit that controls input/output operations for one or more devices.

corrective diskette (CD). A set of diskettes that contain modules to replace the modules in the active program subdirectory. The first diskette of the set must contain a product control file that describes which product the modules are to be applied to and a list of all modules that are to be replaced.

coupler. A device that connects a modem to a telephone network. See also *acoustic coupler*.

CRC. Cyclic redundancy check.

CRT. Cathode ray tube.

CRU. Customer replaceable unit.

cursor. A movable point of light (or a short line) that indicates where the next character is to be entered on the display screen.

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customer receipt. An itemized list of merchandise purchased and paid for by the customer.

customer replaceable unit (CRU). An assembly or part that a customer can replace in its entirety when any of its components fail. Contrast with *field replaceable unit (FRU)*.

cyclic redundancy check (CRC). Synonym for *frame check sequence (FCS)*.

D

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (2) Any representations such as characters or analog quantities to which meaning is or might be assigned.

data file. A collection of related data records organized in a specific manner; for example, a payroll file (one record for each employee, showing such information as rate of pay and deductions) or an inventory file (one record for each inventory item, showing such information as cost, selling price, and number in stock.) See also *data set, file*.

data link. (1) Any physical link, such as a wire or a telephone circuit, that connects one or more remote terminals to a communication control unit, or connects one communication control unit with another. (2) The assembly of parts of two data terminal equipment (DTE) devices that are controlled by a link protocol, and the interconnecting data circuit, that enable data to be transferred from a data source to a data sink. (3) In SNA, see also *link*. **Note:** A telecommunication line is only the physical medium of transmission. A data link includes the physical medium of transmission, the protocol, and associated devices and programs; it is both physical and logical.

data processing system. A network, including computer systems and associated personnel, that accepts information, processes it according to a plan, and produces the desired results.

data rate. See *data transfer rate, line data rate*.

data set. Logically related records treated as a single unit. See also *file*.

data transfer rate. The average number of bits, characters, or blocks per unit of time passing between equipment in a data-transmission session. The rate is expressed in bits, characters, or blocks per second, minute, or hour.

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

delimiter. (1) A character used to indicate the beginning or end of a character string. (2) A bit pattern that defines the beginning or end of a frame or token on a LAN.

device. (1) A mechanical, electrical, or electronic contrivance with a specific purpose. (2) An input/output unit such as a terminal, display, or printer. See also *attaching device.*

device address. (1) The first subchannel address recognized by a channel-attached device. (2) In data communication, the identification of any device to which data can be sent or from which data can be received.

diagnostics. Modules or tests used by computer users and service personnel to diagnose hardware problems.

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digital. (1) Pertaining to data in the form of digits. Contrast with *analog*. (2) Pertaining to data consisting of numerical values or discrete units.

disabled. (1) Pertaining to a state of a processing unit that prevents the occurrence of certain types of interruptions. (2) Pertaining to the state in which a transmission control unit or audio response unit cannot accept incoming calls on a line.

disk. A round, flat plate coated with a magnetic substance on which computer data is stored. See also *integrated disk, fixed disk*.

diskette. A thin, flexible magnetic disk permanently enclosed in a protective jacket. A diskette is used to store information for processing.

diskette drive. The mechanism used to seek, read, and write data on diskettes.

Disk Operating System. An operating system for computer systems that use disks and diskettes for auxiliary storage of programs and data.

display. (1) A visual presentation of data. (2) A device that presents visual information to the point-of-sale terminal operator and to the customer, or to the display station operator.

distributed. Physically separate but connected by cables.

DOS. Disk Operating System.

down-loop. The position of a terminal or store controller on the store loop in relation to the direction of data flow on the store loop. For example, each terminal or store controller transmits loop data to the next terminal "down-loop" from its position on the store loop and it receives loop data from the next terminal "up-loop" from its position on the store loop. See *up-loop*.

driver. Software component that controls a device.

drop. A cable that leads from a faceplate to the distribution panel in a wiring closet. When the IBM Cabling System is used with the IBM Token-Ring Network, a drop may form part of a lobe. See also *lobe.*

dump. (1) To write at a particular instant the contents of storage, or part of storage, onto another data medium for the purpose of safeguarding or debugging the data. (2) Data that has been dumped.

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EIA. Electronic Industries Association. See *EIA interface*.

EIA interface. An industry-accepted interface for connecting devices having voltage related limits.

element. (1) In a set, an object, entity, or concept having the properties that define a set. (2) A parameter value in a list of parameter values.

enabled. (1) On a LAN, pertaining to an adapter or device that is active, operational, and able to receive frames from the network. (2) Pertaining to a state of a processing unit that allows the occurrence of certain types of interruptions. (3) Pertaining to the state in which a transmission control unit or an audio response unit can accept incoming calls on a line.

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error condition. The condition that results from an attempt to use instructions or data that are invalid.

error message. A message that is issued because an error has been detected.

expansion board. In an IBM personal computer, a panel containing microchips that a user can install in an expansion slot to add memory or special features. Synonymous with *expansion card*, *extender card*.

expansion card. Synonym for *expansion board*.

extender card. Synonym for *expansion board*.

F

faceplate. A wall-mounted or surface-mounted plate for connecting data and voice connectors to a cabling system.

fault. An accidental condition that causes a functional unit to fail to perform its required function.

feature. A part of an IBM product that may be ordered separately by the customer.

Feature Expansion. A card that plugs into an IBM 4683 Point of Sale Terminal and allows additional devices to be used.

field. On a data medium or a storage medium, a specified area used for a particular category of data; for example, a group of character positions used to enter or display wage rates on a panel.

field replaceable unit (FRU). An assembly that is replaced in its entirety when any one of its components fails. In some cases a FRU may contain other FRUs; for example, a brush and a brush block that can be replaced individually or as a single unit. Contrast with *customer replaceable unit (CRU)*.

file. A named set of records stored or processed as a unit. For example, an invoice may form a record and the complete set of such records may form a file. See also *data set, data file*.

fixed disk drive. In a personal computer system unit, a disk storage device that reads and writes on rigid magnetic disks. It is faster and has a larger storage capacity than a diskette and is permanently installed.

flag. A character or indicator that signals the occurrence of some condition, such as the setting of a switch, or the end of a word.

formatted diskette. A diskette on which track and sector control information has been written and that can be used by the computer to store data. **Note:** A diskette must be formatted before it can receive data.

frame. (1) The unit of transmission in some LANs, including the IBM Token-Ring Network and the IBM PC Network. It includes delimiters, control characters, information, and checking characters. On a token-ring network, a frame is created from a token when the token has data appended to it. On a token bus network (IBM PC Network), all frames including the token frame contain a preamble, start delimiter, control address, optional data and checking characters, end delimiter, and are followed by a minimum silence period. (2) A housing for machine elements. (3) In synchronous data link control (SDLC), the vehicle for every command, every response, and all information that is transmitted using SDLC procedures. Each frame begins and ends with a flag.

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frame check sequence (FCS). (1) A system of error checking performed at both the sending and receiving station after a block check character has been accumulated. (2) A numeric value derived from the bits in a message that is used to check for any bit errors in transmission. (3) A redundancy check in which the check key is generated by a cyclic algorithm. Synonymous with *cyclic redundancy check (CRC).*

FRU. Field replaceable unit.

function. (1) A specific purpose of an entity, or its characteristic action. (2) A subroutine that returns the value of a single variable. (3) In data communications, a machine action such as a carriage return or line feed.

G

group. (1) A set of related records that have the same value for a particular field in all records. (2) A collection of users who can share access authorities for protected resources. (3) A list of names that are known together by a single name.

group address. In a LAN, a locally administered address assigned to two or more adapters to allow the adapters to copy the same frame. Contrast *locally administered address* with *universally administered address*.

H

hardware. Physical equipment as opposed to programs, procedures, rules, and associated documentation.

header. The portion of a message that contains control information for the message such as one or more destination fields, name of the originating station, input sequence number, character string indicating the type of message, and priority level for the message.

hertz (Hz). A unit of frequency equal to one cycle per second. **Note:** In the United States, line frequency is 60Hz or a change in voltage polarity 120 times per second; in Europe, line frequency is 50Hz or a change in voltage polarity 100 times per second.

Hz. See *hertz*.

I

IBM Personal Computer Disk Operating System (DOS). A disk operating system based on MS-DOS (*)

impedance. The combined effect of resistance, inductance, and capacitance on a signal at a particular frequency.

inactive. (1) Not operational. (2) Pertaining to a node or device not connected or not available for connection to another node or device. (3) In the IBM Token-Ring Network, pertaining to a station that is only repeating frames or tokens, or both.

initial program load (IPL). The initialization procedure that causes an operating system to begin operation.

input/output (I/O). (1) Pertaining to a device whose parts can perform an input process and an output process at the same time. (2) Pertaining to a

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functional unit or channel involved in an input process, output process, or both, concurrently or not, and to the data involved in such a process.

insert. To make an attaching device an active part of a LAN.

integrated. Arranged together as one unit.

integrated disk. An integral part of the processor that is used for magnetically storing files, application programs, and diagnostics. Synonymous with *disk*.

interaction. A basic unit used to record system activity, consisting of the acceptance of a line of terminal input, processing of the line, and a response, if any.

interface. (1) A shared boundary between two functional units, defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics as appropriate. (2) A shared boundary. An interface may be a hardware component to link two devices or a portion of storage or registers accessed by two or more computer programs. (3) Hardware, software, or both, that links systems, programs, or devices.

interrupt. (1) A suspension of a process, such as execution of a computer program, caused by an external event and performed in such a way that the process can be resumed. (2) To stop a process in such a way that it can be resumed. (3) In data communication, to take an action at a receiving station that causes the sending station to end a transmission. (4) A means of passing processing control from one software or microcode module or routine to another, or of requesting a particular software, microcode, or hardware function.

interrupt level. The means of identifying the source of an interrupt, the function requested by an interrupt, or the code or feature that provides a function or service.

I/O. Input/output.

IPL. Initial program load.

item. (1) One member of a group. (2) In a store, one unit of a commodity, such as one box, one bag, or one can. Usually an item is the smallest unit of a commodity to be sold.

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jumper. A connector between two pins on a network adapter that enables or disables an adapter option, feature, or parameter value.

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K. When referring to storage capacity, a symbol that represents two to the tenth power, or 1024.

Kb. Kilobit

KB. Kilobyte

keyboard. A group of numeric keys, alphabetic keys, special character keys, or function keys used for entering information into the terminal and into the system.

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kilobit (Kb). One thousand binary digits.

kilobyte (KB). 1024 bytes for processor and data storage (memory) size; otherwise, 1000 bytes.

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label. Constant, either numeric or literal, that references a statement or function.

LAN segment. (1) Any portion of a LAN (for example, a single bus or ring) that can operate independently but is connected to other parts of the establishment network via bridges. (2) An entire ring or bus network without bridges. See *cable segment, ring segment*.

line. On a terminal, one or more characters entered before a return to the first printing or display position.

line data rate. The rate of data transmission over a telecommunications link.

link. (1) In the IBM 4680 Store System, the logical connection between nodes including the end-to-end link control procedures. (2) The combination of physical media, protocols, and programming that connects devices on a network. (3) In computer programming, the part of a program, in some cases a single instruction or an address, that passes control and parameters between separate portions of the computer program. (4) To interconnect items of data or portions of one or more computer programs. (5) In SNA, the combination of the link connection and link stations joining network nodes. See also *link connection*. **Note:** A link connection is the physical medium of transmission; for example, a telephone wire or a microwave beam. A link includes the physical medium of transmission, the protocol, and associated devices and programming; it is both logical and physical.

link connection. (1) All physical components and protocol machines that lie between the communicating link stations of a link. The link connection may include a switched or leased physical data circuit, a LAN, or an X.25 virtual circuit. (2) In SNA, the physical equipment providing two-way communication and error correction and detection between one link station and one or more other link stations. (3) In the IBM 4680 Store System, the logical link providing two-way communication of data from one network node to one or more other network nodes.

load. In computer programming, to enter data into memory or working registers.

lobe. In the IBM Token-Ring Network, the section of cable (which may consist of several segments) that connects an attaching device to an access unit.

lobe receptacle. In the IBM Token-Ring Network, an outlet on an access unit for connecting a lobe.

locally administered address. An adapter address that the user can assign to override the universally administered address. Contrast with *universally administered address*.

logging. The chronological recording of events occurring in a system or a subsystem for accounting or data collection purposes.

logon (n), log on (v). The procedure for starting up a point-of-sale terminal or store controller for normal sales operations by sequentially entering the correct security number and transaction number. Synonymous with *sign-on, sign on*.

loop. (1) A set of instructions that may be executed repeatedly while a

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certain condition prevails. See also *store loop*. (2) A closed unidirectional signal path connecting input/output devices to a network.

Loop Wiring Concentrator (LWC). A device that serves as a junction to connect the store loop cable from individual terminals to the store controller.

LWC. Loop Wiring Concentrator.

magnetic stripe. The magnetic material (similar to recording tape) on merchandise tickets, credit cards, and employee badges. Information is recorded on the stripe for later "reading" by the magnetic stripe reader (MSR) or magnetic wand reader attached to the point-of-sale terminal.

magnetic stripe reader (MSR). A device that reads coded information from a magnetic stripe on a card, such as a credit card, as it passes through a slot in the reader.

Maintenance Analysis Procedure (MAP). Deprecated term for *PROCEDURE*. See *PROCEDURE*.

Manufacturing Automated Protocol (MAP). A broadband LAN with a bus topology that passes tokens from adapter to adapter on a coaxial cable.

MAP. (1) Maintenance Analysis Procedure. (2) Manufacturing Automated Protocol.

Mb. Megabit

MB. Megabyte

megabit (Mb). A unit of measure for throughput. 1 megabit = 1,048,576 bits.

megabyte (MB). A unit of measure for data. 1 megabyte = 1,048,576 bytes.

memory. Program-addressable storage from which instructions and other data can be loaded directly into registers for subsequent execution or processing.

message. (1) An arbitrary amount of information whose beginning and end are defined or implied. (2) A group of characters and control bit sequences transferred as an entity. (3) In telecommunication, a combination of characters and symbols transmitted from one point to another. (4) A logical partition of the user device's data stream to and from the adapter. See also *error message, operator message*.

microcode. (1) One or more microinstructions. (2) A code, representing the instructions of an instruction set, that is implemented in a part of storage that is not program-addressable. (3) To design, write, and also test one or more microinstructions.

microprocessor. An integrated circuit that accepts coded instructions for execution. The instructions may be entered, integrated, or stored internally.

module. A program unit that is discrete and identifiable with respect to compiling, combining with other units, and load; for example, the input to, or output from, an assembler, compiler, linkage editor, or executive routine.

monitor. (1) A functional unit that observes and records selected

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activities for analysis within a data processing system. Possible uses are to show significant departures from the norm, or to determine levels of utilization of particular functional units. (2) Software or hardware that observes, supervises, controls, or verifies operations of a system.

MSAP. Medium access control (MAC) service access point.

MSR. Magnetic stripe reader.

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name. An alphanumeric term that identifies a data set, statement, program, or cataloged procedure.

n-bit byte. A string that consists of n bits.

network. (1) A configuration of data processing devices and software connected for information interchange. (2) An arrangement of nodes and connecting branches. Connections are made between data stations.

network administrator. A person who manages the use and maintenance of a network.

node. (1) Any device, attached to a network, that transmits and/or receives data. (2) An end point of a link, or a junction common to two or more links in a network. Nodes can be processors, controllers, or workstations. Nodes can vary in routing and other functional capabilities. (3) In a network, a point where one or more functional units interconnect transmission lines.

noise. (1) A disturbance that affects a signal and that can distort the information carried by the signal. (2) Random variations of one or more characteristics of any entity, such as voltage, current, or data. (3) Loosely, any disturbance tending to interfere with normal operation of a device or system.

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OCR. Optical character recognition.

offline. Operation of a functional unit without the control of a computer or control unit.

online. Operation of a functional unit that is under the continual control of a computer or control unit. The term also describes a user's access to a computer using a terminal.

open. (1) To make an adapter ready for use. (2) A break in an electrical circuit. (3) To make a file ready for use.

operating system. Software that controls the execution of programs. An operating system may provide services such as resource allocation, scheduling, input/output control, and data management. Examples are IBM PC DOS and IBM OS/2.

Operating System/2 (OS/2). A set of programs that control the operation of high-speed large-memory IBM personal computers (such as the IBM Personal System/2 computer, Models 50 and above), providing multitasking and the ability to address up to 16 MB of memory. Contrast with *Disk Operating System (DOS)*.

operation. (1) A defined action, namely, the act of obtaining a result from one or more operands in accordance with a rule that completely

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specifies the result for any permissible combination of operands. (2) A program step undertaken or executed by a computer. (3) An action performed on one or more data items, such as adding, multiplying, comparing, or moving.

operator. (1) A symbol that represents the action being performed in a mathematical operation. (2) A person who operates a machine.

operator message. A message from the operating system or a program telling the operator to perform a specific function or informing the operator of a specific condition within the system, such as an error condition.

optical character recognition (OCR). The machine identification of printed characters through the use of light-sensitive devices.

option. (1) A specification in a statement, a selection from a menu, or a setting of a switch, that may be used to influence the execution of a program. (2) A hardware or software function that may be selected or enabled as part of a configuration process. (3) A piece of hardware (such as a network adapter) that can be installed in a device to modify or enhance device function.

OS. Operating system.

OS/2. Operating System/2.

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packing. Method of conserving disk storage space by stripping the high-order nibbles from ASCII numerals and storing the remaining low-order nibbles two to a byte.

page. (1) The portion of a panel that is shown on a display surface at one time. (2) To move back and forth among the pages of a multiple-page panel. See also *scroll*. (3) In a virtual storage system, a fixed-length block that has a virtual address and is transferred as a unit between main storage and auxiliary storage.

panel. The complete set of formatted information that appears in a single display on a visual display unit.

parallel port. (1) A port that transmits the bits of a byte in parallel along the lines of the bus, one byte at a time, to an I/O device. (2) On a personal computer, it is used to connect a device that uses a parallel interface, such as a dot matrix printer, to the computer. Contrast with *serial port*.

parity check. (1) A redundancy check by which a recalculated parity bit is compared to the previously given parity bit. (2) A check that tests whether the number of ones (or zeros) in an array of binary digits is odd or even.

parity (even). A condition when the sum of all of the digits in an array of binary digits is even.

parity (odd). A condition when the sum of all of the digits in an array of binary digits is odd.

partner. See conversation partner.

partner terminal. The term used to describe the relationship of an IBM 4683-*xx*2 Point of Sale Terminal attached to an IBM 4683-*xx*1 Point of Sale Terminal **OR** an IBM 4683-*xx*1 Point of Sale Terminal attached to an IBM 4684 Point of Sale Terminal.

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patch panel. An organized concentration of cable terminations, usually mounted in a flat panel, that facilitates the interconnection of communication cables.

path. (1) Reference that specifies the location of a particular file within the various directories and subdirectories of a hierarchical file system. (2) In a network, any route between any two nodes. (3) The route traversed by the information exchanged between two attaching devices in a network. (4) A command in IBM PC DOS and IBM OS/2 that specifies directories to be searched for commands or batch files that are not found by a search of the current directory.

PC Network. An IBM broadband or baseband LAN with a bus topology in which messages are broadcast from PC Network adapter to PC Network adapter.

personal computer (PC). A desk-top, free-standing, or portable microcomputer that usually consists of a system unit, a display, a monitor, a keyboard, one or more diskette drives, internal fixed-disk storage, and an optional printer. PCs are designed primarily to give independent computing power to a single user and are inexpensively priced for purchase by individuals or small businesses. Examples include the various models of the IBM Personal Computers, and the IBM Personal System/2 computer.

phase. The relative timing (position) of periodic electrical signals.

plug. (1) A connector for attaching wires from a device to a cable, such as a store loop. A plug is inserted into a receptacle or plug. (2) To insert a connector into a receptacle or socket.

point-of-sale terminal. (1) The IBM 4683 Point of Sale Terminal: A unit that provides point-of-sale transaction, data collection, credit authorization, price look-up, and other inquiry and data entry functions. (2) The IBM 4684 Point of Sale Terminal: A unit that provides central processing, point-of-sale transaction, data collection, credit authorization, price look-up, and other inquiry and data entry functions.

polling. (1) Interrogation of devices for purposes such as to avoid contention, to determine operational status, or to determine readiness to send or receive data. (2) In data communication, the process of inviting data stations to transmit, one at a time. The polling process usually involves the sequential interrogation of several data stations.

polling characters (address). A set of characters specific to a terminal and the polling operation; response to these characters indicates to the computer whether the terminal has a message to enter.

port. (1) An access point for data entry or exit. See also *medium access port.* (2) A connector on a device to which cables for other devices such as display stations and printers are attached. Synonymous with *socket*.

post. (1) To affix to a usual place. (2) To provide items such as return code at the end of a command or function. (3) To define an appendage routine. (4) To note the occurrence of an event.

POST. Power-On Self Test.

Power-On Self Test (POST). A series of diagnostic tests that are run automatically each time the computer's power is switched on.

primary adapter. In a personal computer that is used on a LAN and that supports installation of two network adapters, the adapter that uses standard (or default) mapping between adapter shared RAM, adapter ROM, and designated computer memory segments. The primary adapter is usually designated as adapter 0 in configuration parameters. Contrast with *alternate adapter*.

printout. Any printed document produced by a point-of-sale terminal printer or by some other printer.

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problem determination. The process of determining the source of a problem as being a program component, a machine failure, a change in the environment, a common-carrier link, a user-supplied device, or a user error.

problem determination procedure. A prescribed sequence of steps taken to accomplish problem determination. Such procedures frequently include steps aimed at recovery from, or circumvention of, problem conditions.

PROCEDURE. (1) A sequenced set of statements that may be used at one or more points in one or more computer programs, and that usually has one or more input parameters and yields one or more output parameters. (2) A set of instructions that gives a service representative a step-by-step procedure for tracing a symptom to the cause of failure.

processor. In a computer, a functional unit that interprets and executes instructions.

prompt. A character or word displayed by the operating system to indicate that it is ready to accept input.

protocol. (1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components. (3) A specification for the format and relative timing of information exchanged between communicating parties.

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RAM. Random access memory.

RAM size. The amount of RAM that is directly mapped into the computer's memory map.

random access. An access mode in which specific logical records are obtained from or placed into a mass storage file in a nonsequential manner.

random-access memory (RAM). A computer's or adapter's volatile storage area into which data may be entered and retrieved in a nonsequential manner.

read. To acquire or to interpret data from a storage device, from a data medium, or from another source.

read-only memory (ROM). A computer's or adapter's storage area whose contents cannot be modified by the user except under special circumstances.

receive. To obtain and store information transmitted from a device.

receptacle. Electrically, a fitting equipped to receive a plug and used to complete a data connection or electrical path. See also *lobe receptacle.*

record. A collection of related items of data, treated as a unit; for example, in stock control, each invoice could constitute one record. A complete set of such records may form a file.

Reference Diskette. (1) A diskette shipped with the IBM Personal System/2 computers with Micro Channel architecture. The diskette contains code and files used for configuration of options and for hardware diagnostic testing. (2) A diskette shipped with the IBM 4684 Point of Sale Terminal.

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It contains code and files used for configuration of options and for hardware diagnostic testing.

remove. (1) To take an attaching device off a network. (2) To stop an adapter from participating in data passing on a network.

repeater. In a network, a device that amplifies or regenerates data signals in order to extend the distance between attaching devices.

response. The information the network control program sends to the access method, usually in answer to a request received from the access method. (Some responses, however, result from conditions occurring within the network control program, such as accumulation of error statistics.)

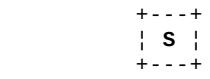
retransmit. To repeat the transmission of a message or a segment of a message.

ring network. A network configuration in which a series of attaching devices is connected by unidirectional transmission links to form a closed path. A ring of an IBM Token-Ring Network is referred to as a LAN segment or as a Token-Ring Network segment.

ring segment. Any section of a ring that can be isolated (by unplugging connectors) from the rest of the ring. A segment can consist of a single lobe, the cable between access units, or a combination of cables, lobes, and/or access units. See *cable segment, LAN segment*.

ROM. Read-only memory.

routine. Part of a program, or a sequence of instructions called by a program, that may have some general or frequent use.



scan. To pass an item over or through the scanner so that the encoded information is read. See also *wanding*.

scanner. A device that examines the bar code on merchandise tickets, credit cards, and employee badges and generates analog or digital signals corresponding to the bar code.

scroll. To move all or part of the display image vertically or horizontally to display data that cannot be observed within a single display image. See also *page (2)*.

SDLC. Synchronous Data Link Control.

segment. See *cable segment, LAN segment, ring segment*.

serial port. On personal computers, a port used to attach devices such as display devices, letter-quality printers, modems, plotters, and pointing devices such as light pens and mice; it transmits data one bit at a time. Contrast with *parallel port*.

service access point (SAP). (1) A logical point made available by an adapter where information can be received and transmitted. A single SAP can have many links terminating in it. (2) In Open Systems Interconnection (OSI) architecture, the logical point at which an n + 1-layer entity acquires the services of the n-layer. For LANs, the n-layer is assumed to be data link control (DLC). A single SAP can have many links terminating in it. These link "end-points" are represented in DLC by link stations.

shared RAM. Random-access memory on an adapter that is shared by the computer in which the adapter is installed.

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signal. (1) A time-dependent value attached to a physical phenomenon for conveying data. (2) A variation of a physical quantity, used to convey data.

socket. Synonym for *port (2)*.

source. The origin of any data involved in a data transfer.

state. See conversation state.

station. (1) A point-of-sale terminal that consists of a processing unit, a keyboard, and a display. It can also have input/output devices, such as a printer, a magnetic stripe reader or cash drawers. (2) A communication device attached to a network. The term used most often in LANs is an *attaching device* or *workstation*. (3) An input or output point of a system that uses telecommunication facilities; for example, one or more systems, computers, terminals, devices, and associated programs at a particular location that can send or receive data over a telecommunication line. See also *attaching device, workstation*.

store controller. A programmable unit in a network used to collect data, to direct inquiries, and to control communication within a system. In the IBM 4680 Store System, the store controller is an IBM Personal Computer AT or IBM PS/2 with a Store Loop Adapter feature installed.

store loop. In the IBM 4680 Store System, a cable over which data is transmitted between the store controller and the point-of-sale terminals.

Store Loop Adapter. A hardware component used to connect the loop to a control unit, such as the IBM Personal Computer AT.

switch. On an adapter, a mechanism used to select a value for, enable, or disable a configurable option or feature.

synchronous. (1) Pertaining to two or more processes that depend upon the occurrence of a specific event such as a common timing signal. (2) Occurring with a regular or predictable timing relationship.

synchronous data link control (SDLC). A discipline conforming to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute (ANSI) and High-level Data Link Control (HDLC) of the International Organization for Standardization, for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or nonswitched links. The configuration of the link connection may be point-to-point, multipoint, or loop.

system. In data processing, a collection of people, machines, and methods organized to accomplish a set of specific functions. See also *data processing system* and *operating system*.

system configuration. A process that specifies the devices and programs that form a particular data processing system.

system unit. (1) A part of a computer that contains the processing unit, and may contain devices such as disk and diskette drives. (2) In an IBM personal computer, the unit that contains the processor circuitry, read-only memory (ROM), random-access memory (RAM), and the I/O channel. It may have one or more disk or diskette drives. (3) In an IBM 4684 terminal, the part of the terminal that contains the processing unit, ROM, RAM, disk and diskette drives, and the I/O channel.

T

terminal. In data communication, a device, usually equipped with a

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keyboard and a display, capable of sending and receiving information over a communication channel.

terminal number. A number assigned to a terminal to identify it for addressing purposes.

terminator. A 75-ohm, resistive connector used on the end of a cable or an unused tap to minimize cable reflections.

threshold. (1) A level, point, or value above which something is true or will take place and below which it is not true or will not take place. (2) In IBM bridge programs, a value set for the maximum number of frames that are not forwarded across a bridge due to errors, before a "threshold exceeded" occurrence is counted and indicated to network management programs. (3) An initial value from which a counter is decremented from an initial value. When the counter reaches zero or the threshold value, a decision is made and/or an event occurs.

till. A tray in the cash drawer of the point-of-sale terminal, used to keep the different denominations of bills and coins separated and easily accessible.

time-out. (1) A time interval allotted for certain events to occur (such as a response to polling) before corrective error recovery action is taken. (2) A parameter related to an enforced event designed to occur at the conclusion of a predetermined elapsed time. A time-out condition can be canceled by the receipt of an appropriate time-out cancellation signal. (3) A time interval allotted for certain operations to occur; for example, response to polling or addressing before system operation is interrupted and must be restarted.

token. A sequence of bits passed from one device to another on the token-ring network that signifies permission to transmit over the network. It consists of a starting delimiter, an access control field, and an end delimiter. The frame control field contains a token bit that indicates to a receiving device that the token is ready to accept information. If a device has data to send along the network, it appends the data to the token. When data is appended, the token then becomes a frame. See *frame*.

token ring. A network with a ring topology that passes tokens from one attaching device (node) to another. A node that is ready to send can capture a token and insert data for transmission.

token-ring network. (1) A ring network that allows unidirectional data transmission between data stations by a token-passing procedure over one transmission medium so that the transmitted data returns to and is removed by the transmitting station. The IBM Token-Ring Network is a baseband LAN with a star-wired ring topology that passes tokens from network adapter to network adapter. (2) A network that uses a ring topology, in which tokens are passed in a circuit from node to node. A node that is ready to send can capture the token and insert data for transmission. (3) A group of interconnected token rings.

transaction. (1) The process of recording item sales, processing refunds, recording coupons, handling voids, verifying checks before tendering, and arriving at the amount to be paid by or to a customer. The receiving of payment for merchandise or service is also included in a transaction. (2) In an SNA network, an exchange between two programs that usually involves a specific set of initial input data that causes the execution of a specific task or job. Examples of transactions include the entry of a customer's deposit that results in the updating of the customer's balance, and the transfer of a message to one or more destination points.

transformer. A device used to transfer electrical energy, usually that of an alternating current, from one circuit to another.

transmission. The sending of data from one place for reception elsewhere.

transmit. To send information from one place for reception elsewhere.

transmitter. (1) A circuit used in data communication applications to

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send information from one place for reception elsewhere. (2) The device in which the transmission circuits are housed.

twisted pair. A transmission medium that consists of two insulated conductors twisted together to reduce noise.

U

universally administered address. The address permanently encoded in an adapter at the time of manufacture. All universally administered addresses are unique. Contrast with *locally administered address*.

up-loop. The position of a terminal or store controller on the store loop in relation to the direction of data flow on the store loop. For example, each terminal or store controller receives loop data from the next terminal "up-loop" from its position on the store loop and it transmits loop data to the next terminal "down-loop" from its position on the store loop. See *down-loop*.

user. (1) Category of identification defined for file access protection. (2) A person using a program or system.

V

variable. (1) A named entity that is used to refer to data and to which values can be assigned. Its attributes remain constant, but it can refer to different values at different times. (2) In computer programming, a character or group of characters that refers to a value and, in the execution of a computer program, corresponds to an address. (3) A quantity that can assume any of a given set of values.

version. A separate IBM-licensed program, based on an existing IBM-licensed program, that usually has significant new code or new function.

video display. (1) An electronic transaction display that presents visual information to the point-of-sale terminal operator and to the customer. (2) An electronic display screen that presents visual information to the display operator.

W

wand. A commercially available device used to read information encoded on merchandise tickets, credit cards, and employee badges.

wanding. Passing the tip of the wand reader over information encoded on a merchandise ticket, credit card, or employee badge.

wideband. Synonym for *broadband*.

wiring concentrator. A unit that allows multiple attaching devices access to the ring at a central point such as a wiring closet or in an open work area. A star-wired ring consists of one or more concentrators connected together to form a ring. See also *access unit*.

workstation. (1) An I/O device that allows either transmission of data or the reception of data (or both) from a host system, as needed to perform a job: for example, a display station or printer. (2) A configuration of I/O equipment at which an operator works. (3) A terminal or microcomputer, usually one connected to a mainframe or network, at which a user can perform tasks.

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world. Category of identification defined for file access protection.

4683-xx1. A point-of-sale terminal in the IBM 4680 Store System that loads and executes programs. A 4683-*xx*1 can be any of the following models: 4683-001, 4683-A01, 4683-P11, 4683-P21, 4683-P41.

4683-xx2. A point-of-sale terminal in the IBM 4680 Store System that does not load and execute programs, but attaches to a terminal that does. A 4683-*xx*2 can be either of the following models 4683-002, 4683-A02.

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