SIEMENS

9751 CBX
Release 9005/9006m

System Service Manual
Model 10, 40, 50

This document contains the following Field Service Notes, Field Alerts, and/or TNLs:

GN25-2784-00, FNCX5606	October 3, 1994
GN25-2844-00, FNCX5630	September 16, 1996
FNCX5642	July 18, 1997

Those notes containing replacement pages to the original document have been integrated into the document.

Those notes containing supplementary information can be found at the back of the document.

SIEMENS

System Service Manual

9751 CBX
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G281-0209-01

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June 1993
Revision 1: August 1994

Job No. 3884

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Contents

Summary of Changes

The following changes have been made to this manual since its original publication:

| Indicates changes listed in "Revision 1: August 1994."

a Indicates changes from *Field Service Note FNCX5606, 9751 CBX Models 40 and 50, Release 9005/9006m, System Service Manual Update, Power Entry Assembly*, GN25-2784-00—October 3, 1994.

Revision 1: August 1994

The following are the most current changes made to this manual.

Technical Newsletters Incorporated

The following technical newsletter (TNL) was incorporated:

- *Technical Newsletter, 9751 CBX Models 10, 40, and 50, Release 9005, System Service Manual Update, ROLMdial S100 and EPO Switch*, GN25-2756-00—November 22, 1993

Release 9005/9006m Technical Information

The following technical changes were made to this manual for Release 9005/9006m:

- Descriptions of the control packet network (CPN) and ROLM private digital network (RPDN) hardware required to support a CorNet-N link were added to Chapter 3, "Models 40 and 50 Hardware" and Chapter 4, "9751 CBX Cards."
- CorNet-N call processing information was added to Chapter 8, "Call Processing."
- Instructions to service and maintain CPN and RPDN hardware were added to Chapter 7, "Diagnostic Aids," Chapter 9, "Common Maintenance Procedures," and Chapter 11, "Removing and Replacing Cabinet FRUs."
- Model and part numbers were updated in Appendix A, "Parts and Assemblies Catalog."
- Descriptions of the following system features were updated in Appendix C, "System Features":
  - Message waiting
  - Paging
  - Trunk queuing

  A description of ROLMfax access was added.
- Descriptions of the following station features were updated in Appendix D, "Station Features":
  - Automatic camp-on
  - Callback camp-on
  - Executive override
  - Callback queuing (onhook trunk queuing)

Additional Technical Information

The following additional technical changes were made to this manual:

- The EIA-232-D cable was renamed the EIA/TIA-232-E cable.
- Federal Communications Commission (FCC) compliance information was updated in “FCC and Industry Canada Compliance.”
- The Canadian Department of Communications (DOC) was renamed Industry Canada in “FCC and Industry Canada Compliance.”
- The 9030A computer common control (CCC) shelf layouts were updated in Chapter 3, “Models 40 and 50 Hardware.”
- Procedures to manage the system software were updated in Chapter 6, “Managing System Software.”
- Procedures to reset the system were updated in Chapter 9, “Common Maintenance Procedures.”
- Procedures to remove and replace the following field replaceable units (FRUs) were updated in Chapter 11, “Removing and Replacing Cabinet FRUs”:
  - System monitor input/output card (SMIOC)
  - SMIOC interconnect box
  - Time-division multiplexing (TDM) card cage
  - T1 digital network (T1DN) card
- Procedures to remove and replace the following peripheral equipment FRUs were updated in Chapter 12, “Removing and Replacing Peripheral Equipment FRUs”:
  - 9751 CBX monitor
  - 9751 CBX monitor II modem
- The parts catalog was updated in Appendix A, “Parts and Assemblies Catalog.”

Information Not Applicable to Systems without EPO Switches

If the 9751 CBX does not have an emergency power-off (EPO) switch, ignore references to it that appear in the following sections:

- 2.2, “Cabinet Overview” on page 2-2
- 2.4, “Power System” on page 2-11

Original Publication

This manual is the consolidation of the following documents:

- *9751 CBX Model 10 Overview Manual*, G341-1507-01
- *9751 CBX Model 10 Service Guide*, G341-1506-01
- *9751 CBX Models 40 and 50 Overview Manual*, G341-1538-00
- *9751 CBX Models 40 and 50 Service Guide*, G341-1537-00
- *9751 CBX Models 40, 50, and 70 ISB Cable Routing Diagrams*, G281-0212-00
- *9751 CBX Model 10, 9751 CBX Monitor*, GN40-1133-00—March 11, 1991

- *9751 CBX Model 10, 9755 Attendant Console Installation Wire Gauge Specification Change*, GN40-1124-01—March 15, 1991
- *9751 CBX Models 40, 50, and 70, 9755 Attendant Console Installation Wire Gauge Specification Change*, GN40-1125-01—March 15, 1991
- *9751 CBX Models 40, 50, and 70, 9751 CBX Monitor*, GN40-1141-00—March 29, 1991
- *9751 CBX Model 10, Automatic Configuration Volume Backup*, GN40-1165-00—June 1, 1991
- *9751 CBX Models 40 and 50, Automatic Configuration Volume Backup*, GN40-1164-00—June 1, 1991
- *9751 CBX Model 10, 9751 CBX Monitor II, Release 9005.1.73*, GN40-1131-00—June 1, 1991
- *9751 CBX Models 40, 50, and 70, 9751 CBX Monitor II, Release 9005.1.73*, GN40-1116-00—June 1, 1991
- *9751 CBX Models 50 and 70, 9030A Memory Expansion Card*, GN40-1162-00—June 3, 1991
- *9751 CBX Model 10, Restricted Forced Authorization Code and Route Optimization III*, GN40-1167-00—June 21, 1991
- *9751 CBX Models 40, 50, and 70, Restricted Forced Authorization Code and Route Optimization III*, GN40-1166-00—June 21, 1991
- *9751 CBX Model 10, Enhanced Model 10, AC Power*, GN40-1090-00—September 30, 1991
- *9751 CBX Model 10, DC Power*, GN40-1134-00—October 31, 1991
- *9751 CBX Model 10, IPDN Card and Breakout Assembly*, GN40-1154-00—November 1, 1991
- *9751 CBX Models 40 and 50, IPDN Card and Breakout Assembly*, GN40-1155-00—November 1, 1991
- *9751 CBX Model 10, 9751 CBX Monitor II, Release 9005.1.73, Revised Parts List*, G281-0169-00—November 18, 1991
- *9751 CBX Models 40, 50, and 70, 9751 CBX Monitor II, Release 9005.1.73, Revised Parts List*, G281-0168-00—November 18, 1991
- *9751 CBX Model 10, Message Waiting 8-Channel Card*, GN40-1173-00—December 16, 1991
- *9751 CBX Models 40, 50, and 70, Message Waiting 8-Channel Card*, GN40-1174-00—December 16, 1991
- *9751 CBX Model 10, Release 9005.2.77 Overview Manual Update*, G281-0186-00—July 20, 1992
- *9751 CBX Model 10, Release 9005.2.77 Service Guide Update*, G281-0188-00—July 20, 1992
- *9751 CBX Models 40 and 50, Release 9005.2.77 Overview Manual Update*, G281-0189-00—July 20, 1992
- *9751 CBX Models 40 and 50, Release 9005.2.77 Service Guide Update*, G281-0191-00—July 20, 1992
- *9751 CBX Model 10, Release 9005.2.77 Overview Manual Update, Reduced Feature Mode*, GN25-2713-00—September 21, 1992

- *9751 CBX Model 10, Release 9005.2.77 Service Guide Update, Reduced Feature Mode*, GN25-2711-00—September 21, 1992
- *9751 CBX Models 40 and 50, Release 9005.2.77 Overview Manual Update, Reduced Feature Mode*, GN25-2714-00—September 21, 1992
- *9751 CBX Models 40 and 50, Release 9005.2.77 Service Guide Update, Reduced Feature Mode*, GN25-2712-00—September 21, 1992
- *9751 CBX Model 10, Field Alert FACX5161, 9751 CBX Monitor II Troubleshooting Procedures*, GN25-2719-00—October 20, 1992
- *9751 CBX Models 40, 50, and 70, Field Alert FACX5162, 9751 CBX Monitor II Troubleshooting Procedures*, GN25-2720-00—October 20, 1992
- *9751 CBX Model 10, Release 9005.2.78, Overview Manual Update*, GN25-2707-00—November 16, 1992
- *9751 CBX Model 10, Release 9005.2.78 Service Guide Update*, GN25-2705-00—November 16, 1992
- *9751 CBX Models 40 and 50, Release 9005.2.78, Overview Manual Update*, GN25-2708-00—November 16, 1992
- *9751 CBX Models 40 and 50, Release 9005.2.78, Service Guide Update*, GN25-2706-00—November 16, 1992

Safety

The following information is included in this publication for the use and safety of installation and maintenance personnel.

General Safety

- Do not attempt to lift objects that you think are too heavy for you.
- Do not wear loose clothing and tie back your hair while working on machines.
- Wear eye protection when you are working in any conditions that might be hazardous to your eyes.
- After maintenance, reinstall all safety devices such as shields, guards, labels, and ground wires. Replace worn safety devices.
- If you feel any action is unsafe, notify your manager before proceeding.
- Do not use a telephone to report a gas leak while in the vicinity of the leak.

Safety with Electricity

DANGER

Do not take chances with your life. Follow these safety guidelines carefully.

High Voltages

- Observe all safety regulations and read the warnings, cautions, and notes posted on equipment as you work with it.
- Find the switch to power off the cabinet. Read the posted instructions.
- If you determine that a machine can be powered from another source or controlled from a different circuit breaker or disconnecting switch, eliminate this hazard.
- When a procedure requires that you power off the system:
  - Lock the wall box-switch in the off position.
  - Attach a DO NOT OPERATE tag to the wall box-switch.
- ***Never assume*** that the power is turned off. Always check to ensure that a circuit does not have power.
- Do not work alone. Work with another person who knows the locations of the power-off switches, especially if you are working with *exposed* electrical circuits.
- Follow the instructions in the manual carefully, especially when working with circuits that are powered. Disconnect power when instructed in the procedures.
- Disconnect all power before working near power supplies unless specifically instructed differently by a maintenance procedure.

- Disconnect all power before installing changes in machine circuits unless specifically instructed differently by a maintenance procedure.
- High voltages capable of causing shock are used within this equipment. Be extremely careful when measuring high voltages and when servicing cards, panels, and boards while the system is powered on.
- Do not wear jewelry or other metal objects.
- When possible, work with one hand so that a circuit is not created. Keep the other hand in your pocket or behind your back.
- Use caution when installing or modifying telephone lines. Never install telephone wiring during an electrical storm.
- Never install a telephone jack where it can get wet unless the jack is specifically designed for wet conditions.
- Never touch uninsulated telephones wire or terminals unless the telephone line has been disconnected at the network interface.
- Avoid using a telephone (other than the cordless type) during an electrical storm due to the remote risk of shock from lightning.

Equipment Room

- Look for hazards in your area and eliminate them. Examples are moist floors, ungrounded power extension cables, power surges, and missing safety grounds.
- Rubber electrostatic mats will not protect you from electrical shock. Do not use them for this purpose. Stand on suitable rubber mats to insulate you from grounds such as metal floor strips and machine frames.
- Do not use tools covered with a soft material that does not insulate you when working with powered circuits. Use only tools and testers suitable for the job, approved by Siemens Rolm. Do not use worn or broken tools or testers. Inspect them regularly.
- Set controls on testers correctly and use approved probe leads and accessories intended for that tester.
- The surface of a mirror is conductive. Do not touch powered circuits with a mirror. To do so can cause personal injury and machine damage.
- Do not store combustible gases or flammable materials in cabinets near the site.

Emergencies

- Be familiar with first aid for electrical shock. This includes resuscitation methods, heartbeat restoration, and burn treatment.
- If an accident occurs, use caution. Disconnect the power before touching the victim.
- If you do not know how to disconnect the power, use a nonconductive object, such as a wooden rod, to push or pull the victim away from electrical contact.
- Administer resuscitation if the person is not breathing.
- If you are trained and certified, administer cardiac compression if the heart is not beating.

- Call a rescue group, an ambulance or a hospital immediately.

Reporting Accidents

- Report to your manager all accidents, near accidents, and possible hazards to ensure their causes are resolved as soon as possible.
- Report any electric shock, no matter how small.

FCC and Industry Canada Compliance

This section describes the requirements for compliance with Federal Communications Commission (FCC) Rules and Industry Canada rules.

FCC Compliance

If you experience problems with the computerized branch exchange (CBX), contact ROLM customer support at 1-800-TEL-ROLM for information on service or repairs. The telephone company can ask you to disconnect the equipment from the network until the problem is corrected or until you are sure that the equipment is not malfunctioning.

FCC Rules, Part 15

This equipment has been tested and complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, can cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's expense.

FCC Rules, Part 68

The ROLM 9751 CBX Models 10, 40, 50, and 70 comply with FCC Rules, Part 68. A label on the outside back of the cabinet identifies the FCC registration number, the ringer equivalence number (REN), and other information. If requested, this information must be given to the telephone company.

Disruption of the Network and T1

For 1.544 megabits per second (Mbps) T1 systems, notify the telephone company when the equipment is disconnected from the network. If the ROLM 9751 CBX disrupts the telephone network, the telephone company can discontinue your service temporarily. If possible, the telephone company will notify you in advance. If advance notice is not practical, they will notify you as soon as possible. You are also informed of your right to file a complaint with the FCC.

Telephone Company Facility Changes

The telephone company can make changes in its facilities, equipment, operations, or procedures that can affect the operation of your equipment. If they do, you should be notified in advance so you have an opportunity to maintain uninterrupted telephone service.

Nonlive Voice Equipment

Nonlive voice equipment such as music-on-hold devices and recorded announcers for systems must be approved by ROLM and registered in accordance with the rules and regulations of Subpart C of the FCC Rules, Part 68, or it must be connected through protective circuitry that is approved by ROLM and registered in accordance with the rules and regulations in Subpart C of the FCC Rules, Part 68.

REN

The REN is used to determine the number of devices that can be connected to a telephone line so that all the devices ring when that telephone number is called. In most areas, but not all, the sum of the RENs of all devices connected to a line should not exceed five. Contact the local telephone company to determine the maximum REN for your calling area.

Facility Interface Information

The following tables list facility interfaces, manufacturer's network interface port designations, RENs or service codes, and network jacks.

This table lists information for mobile telephone service (MTS) and wide-area telephone service (WATS) facility interfaces.

MTS/WATS Facility Interface	Manufacturing Network Interface Port Designation	REN	Network Jacks
02LS2	COT8	1.1 B	RJ21X
02GS2	COT8	1.1 B	RJ21X
02RV2-T	DID8	0.0 B	RJ21X
02RV2-T	DID	0.0 B	RJ21X
02LS2	Direct trunk	1.1 B	RJ21X
02GS2	Direct trunk	1.1 B	RJ21X

This table lists information for analog private line (PL) facility interfaces.

Analog PL Facility Interface	Manufacturing Network Interface Port Designation	Service Code	Network Jacks
OL13C	OPS8	9.0 F	RJ21X
OL13C	OPS	9.0 F	RJ21X
TL31M	TTI	9.0 F	RJ2GX
TL31E	TTI	9.0 F	RJ2GX
TL11M	2-wire tie	9.0 F	RJ2EX
TL12M	2-wire tie	9.0 F	RJ2FX
TL31M	4-wire tie	9.0 F	RJ2GX
TL31E	4-wire tie	9.0 F	RJ2GX

This table lists information for a digital facility interface.

Digital Facility Interface	Manufacturing Network Interface Port Designation	Service Code	Network Jacks
04U9-B	XDI	6.0 P	Refer to note
04U9-C	XDI	6.0 P	Refer to note
04DU9-B	T1DN	6.0 P	Refer to note
Note: Always use this product with network communications-terminated equipment, which specifies the jack to use.			

Newly Established Network Area and Exchange Codes

The least-cost routing (LCR) software features, which allow user access to the network, must be upgraded to recognize newly established network area codes and exchange codes as they are placed in service.

Failure to upgrade the premises systems or peripheral equipment to recognize the new codes as they are established restricts the customer and the customer's employees from gaining access to the network and to these codes.

Bell Communications Research (Bellcore) publishes North American Numbering Plan (NANP) information on paper, microfiche, and tape. An abbreviated summary of the newly established area codes and exchange codes is also available. Contact Bellcore at (201) 829-2592 to obtain the appropriate information to keep customer equipment upgraded.

Hearing-Aid Compatibility

Telephones for emergency use and telephones installed in common areas such as lobbies, hospital rooms, elevators, and hotel rooms must have handsets that are compatible with magnetically coupled hearing aids. Persons who are not in common areas must also be provided with hearing-aid compatible handsets, if needed.

ROLMphone Digital Telephones: For the hearing impaired, all ROLMphone telephones manufactured after August 16, 1989, are hearing-aid compatible and comply with FCC Rules, Part 68, Section 68.316.

Preprogrammed Dialer Features

When you program emergency numbers or make test calls to emergency numbers using ROLM products with preprogrammed dialer features, stay on the line and briefly explain to the dispatcher the reason for the call before hanging up. Perform these activities in off-peak hours, such as early morning or late evening.

Connecting Off-Premises Station Facilities

Customers who intend to connect off-premises station (OPS) facilities must inform the telephone company of the OPS class for which the equipment is registered and the connection desired.

Direct Inward Dialing (DID) Answer Supervision

Customers allowing ROLM 9751 CBX systems to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of the FCC rules.

Proper answer supervision is when:

- The ROLM 9751 CBX system returns answer supervision to the Public Switched Telephone Network (PSTN) when DID calls are:
  - Answered by the called station
  - Answered by the attendant
  - Routed to a recorded announcement that can be administered by the customer
- The ROLM 9751 CBX system returns answer supervision on all DID calls forwarded to the PSTN. Permissible exceptions are when:
  - A call is unanswered
  - A busy tone is received
  - A reorder tone is received

Equal Access Requirements

Call aggregators such as hotels, hospitals, airports, and so on must provide the end-user equal access codes to the carriers of the user's choice. The current equal access codes are 10XXX, 800 or 950.

The ROLM 9751 CBX system is capable of providing users access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities is a violation of the Telephone Operator Consumer Services Improvement Act of 1990 and Part 68 of the FCC Rules.

Industry Canada Compliance

The following paragraphs describe requirements for and present information based on the Industry Canada rules.

Load Number

The load number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

The load number 64 is assigned to the ROLM 9751 CBX Models 10, 40, 50, and 70 as a stand-alone device.

Equipment Attachment Limitations

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:
Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Preface

About this Manual

This manual provides overview information and procedures used to service and maintain the ROLM 9751 computerized branch exchange (CBX) Models 10, 40, and 50. These procedures include removing, replacing, and troubleshooting the hardware components and peripheral equipment. It also describes procedures needed to manage the system software.

This manual is intended for those who service and maintain the 9751 CBX.

Using this Manual

This manual permits easy information retrieval. There is a master table of contents for the entire manual. Also, each chapter and appendix has its own table of contents. At the end of the manual there is an abbreviations list, glossary, and index.

This manual contains the following:

- Chapter 1, “Introduction” describes the 9751 CBX Models 10, 40, and 50.
- Chapter 2, “Model 10 Hardware” describes the Model 10 and provides functional descriptions of how the subsystems work.
- Chapter 3, “Models 40 and 50 Hardware” describes the Models 40 and 50 and provides functional descriptions of how the subsystems work.
- Chapter 4, “9751 CBX Cards” describes, in alphabetical order, the cards in the 9751 CBX.
- Chapter 5, “Peripheral Equipment” describes, in alphabetical order, the station devices, desktop products, printers, terminals, and modems that connect to the 9751 CBX.
- Chapter 6, “Managing System Software” describes the procedures to manage the 9751 CBX system software.
- Chapter 7, “Diagnostic Aids” describes the tools that help diagnose 9751 CBX hardware and software failures.
- Chapter 8, “Call Processing” describes the principles of call processing in the 9751 CBX.
- Chapter 9, “Common Maintenance Procedures” describes the procedures that you routinely perform during system maintenance.
- Chapter 10, “Maintenance Analysis Procedures (MAPs)” describes the MAPs you use to troubleshoot the 9751 CBX and peripheral equipment problems.
- Chapter 11, “Removing and Replacing Cabinet FRUs” provides the cabinet field replaceable units (FRUs), in alphabetical order, and the procedures to remove and replace them.

- Chapter 12, “Removing and Replacing Peripheral Equipment FRUs” provides the peripheral equipment FRUs, in alphabetical order, and the procedures to remove and replace them.
- Appendix A, “Parts and Assemblies Catalog” provides an alphabetical list of the 9751 CBX hardware, including part and model numbers. It also provides figures and lists that show the part numbers for the 9751 CBX hardware.
- Appendix B, “Models 40 and 50 Intershelf Bus Cabling” provides intershelf bus (ISB) cable routing diagrams for the Models 40 and 50.
- Appendix C, “System Features” describes the 9751 CBX system features in alphabetical order.
- Appendix D, “Station Features” describes the 9751 CBX station features in alphabetical order.
- Appendix E, “Forms” contains forms useful when you service the 9751 CBX.

Prerequisite Publications

There are no prerequisite publications for this manual.

Related Publications

Related publications are as follows:

- *ROLM 9751 CBX, Release 9005/9006m, Data Communications User Guide*, G341-1510-01
- *ROLM 9750 Business Communications System and 9720 Redwood Business Communications System Secondary Protection Guide*, G281-0070-02
- *ROLM 9751 CBX, Release 9005/9006m, Automatic Call Distribution Supervisor Guide*, G341-1511-03
- *ROLM 9751 CBX, Release 9005/9006m, CLI Reference Manual*, GU20-0190-02
- *ROLM 9751 CBX, Release 9005/9006m, Configuration Manual*, G341-1505-04
- *ROLM 9751 CBX Trunk Diagnostics Guide*, G341-1535-00
- *ROLM 9751 CBX Model 10, Release 9005/9006m, AC Systems Power and Grounding Specifications*, G281-0229-00
- *ROLM 9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*, G281-0221-00
- *ROLM 9751 CBX Models 10, 40, 50, and 70, Release 9005/9006m, DC Systems Power and Grounding Specifications*, G281-0228-00
- *ROLM 9751 CBX Models 40, 50, and 70, Release 9005/9006m, AC Systems Power and Grounding Specifications*, G281-0230-00
- *ROLM CBX II 9000/9751 CBX System Site Log*, GU20-0060-00

- *ROLMdial S100 Installation and Troubleshooting Guide*, GU30-1559-00
- *ROLMphone User Guide*, GU30-0360-03
- *ROLMphone 244PC User's Manual*, GU26-5000-03
- *9751 CBX, Release 9005/9006m, ROLMphone 300/600 Series User Guide*, GU30-1545-00
- *9751 CBX, Release 9005/9006m, ROLMphone 600 Series with DCO User's Manual*, GU30-1546-01

Chapter 1. Introduction

This manual provides the information needed to service the 9751 computerized branch exchange (CBX) Models 10, 40, and 50, Release 9005/9006m, which are members of the ROLM 9750 Business Communications System (BCS) product family.

All models support peripheral equipment, such as single-line telephones, ROLMphone digital telephones, desktop devices, the ROLM 9755 Attendant Console (9755 ATC), the 9751 CBX monitor, and the 9751 CBX monitor II.

1.1 Model 10

The Model 10 is the smallest 9751 CBX. It is a voice and data controller that supports all the 9750 BCS features and applications available on the Models 40, 50, and 70.

The Model 10:

- Is a single-node system with a nonredundant processor
- Has a 9030 or a 9030A processor
- Is a fully configurable system that supports 50 to 600 lines
- Consists of up to three modular cabinets and can be installed in a normal office environment

  Note: In Model 10-specific information, cabinets are referred to as shelves.
- Uses Release 9005 software

1.2 Model 40

The Model 40 is a computer-controlled voice and data switching system that offers the latest system integration of voice and data, enhanced trunk diagnostics, increased call handling capacity, performance, and service.

The Model 40:

- Is a single-node system with a nonredundant processor
- Supports 720 to 3750 lines in one to five cabinets
- Can be configured to support all 9751 CBX software options
- Uses Release 9005 software
- Supports synchronous and asynchronous data communication

The following are the possible hardware combinations for the Model 40 systems:

- Hardware combination 1
  - 9030A processor
  - Expander IIIE (EXP IIIE) card
  - Message waiting interface district and message waiting 8-channel (MW8) interface card
  - Off-premises station 8-channel (OPS8) interface card

  - Time-division multiplexing (TDM) controller (TC) card
  - Turnaround standalone (TASA) card
- Hardware combination 2
  - 9030A processor
  - EXP IIIE card
  - Message waiting interface district and MW8 interface card
  - OPS8 interface card
  - TDM controller turnaround standalone (TCTASA) card

The Model 40 can use a CorNet-N link to connect to:

- Another 9751 CBX Release 9006m
- A 9751 CBX Release 9006.2 and above
- A 9200 CBX Release 3.2 and above

1.3 Model 50

The Model 50 is a computer-controlled voice and data switching system that offers the latest system integration of voice and data, enhanced trunk diagnostics, increased call handling capacity, performance, and service.

The Model 50:

- Is a single-node system with redundant processors
- Supports 720 to 3750 lines in one to five cabinets
- Uses Release 9005 software
- Supports synchronous and asynchronous data communication

Power redundancy on the processor shelf is necessary. Power redundancy for the TDM shelves is optional.

The following hardware is in the Model 50 systems:

- 9030A processor
- EXP IIIE card
- Message waiting interface district and MW8 card
- OPS8 interface card
- TCTASA card

The Model 50 can use a CorNet-N link to connect to:

- Another 9751 CBX Release 9006m
- A 9751 CBX Release 9006.2 and above
- A 9200 CBX Release 3.2 and above

1.4 Model 70

This manual does not describe the Model 70. Refer to the *ROLM 9751 CBX Model 70, Release 9005/9006m, System Service Manual Supplement*, G281-0260-00.

Chapter 2. Model 10 Hardware

This chapter describes the ROLM 9751 computerized branch exchange (CBX) Model 10 and provides functional descriptions of how the subsystems work.

2.1 Types of Model 10 Hardware

Model 10 cabinet hardware includes the following components:

Cooling system
Cools the cabinet equipment.

Power system
Distributes all the needed voltages to the hardware in the system.

9030 or 9030A computer common control (CCC) group
Provides supervisory and control functions for the system.

Time-division multiplexing (TDM) network control group
Provides communication between the processor and the cards on each shelf.

Peripheral device hardware
Manages all system software operations, such as storing system software, backing up system databases, and copying software volumes.

Integrated services digital network (ISDN) primary digital network (IPDN)
Permits the 9751 CBX to access the AT&T and MCI ISDNs. Depending on the firmware release of the IPDN card, the 9751 CBX can access additional carriers.

System monitor input/output card (SMIOC) interconnect box
Used with the SMIOC. Connects peripheral equipment, bypass connections, and external alarms to the system.

Chapter 4, “9751 CBX Cards” describes the 9751 CBX cards.

2.2 Cabinet Overview

This section is an overview of the cabinet layout, the backplane, and the hardware. It includes descriptions of the cabinet subsystems, their components, and their functions.

2.2.1 Layout

The Model 10 is a 1-shelf cabinet (Figure 2-1 on page 2-3). However, you can add a second and third shelf to the cabinet.

The cabinet′s front, back, and top covers are removable.

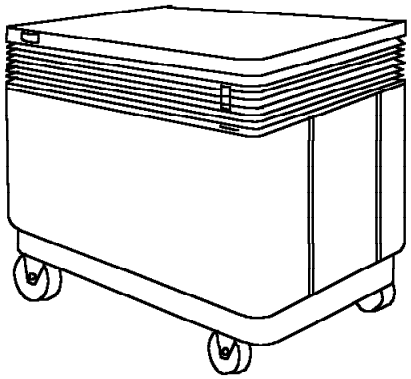

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Figure 2-1. 9751 CBX Model 10

On the front of the cabinet (Figure 2-2) there is an emergency power-off (EPO) switch. It powers off the cabinet.

A bank of five fans at the top of the cabinet cools the equipment. The fans draw in fresh air from the top of the cabinet and exhaust the warm air out the bottom of the cabinet.

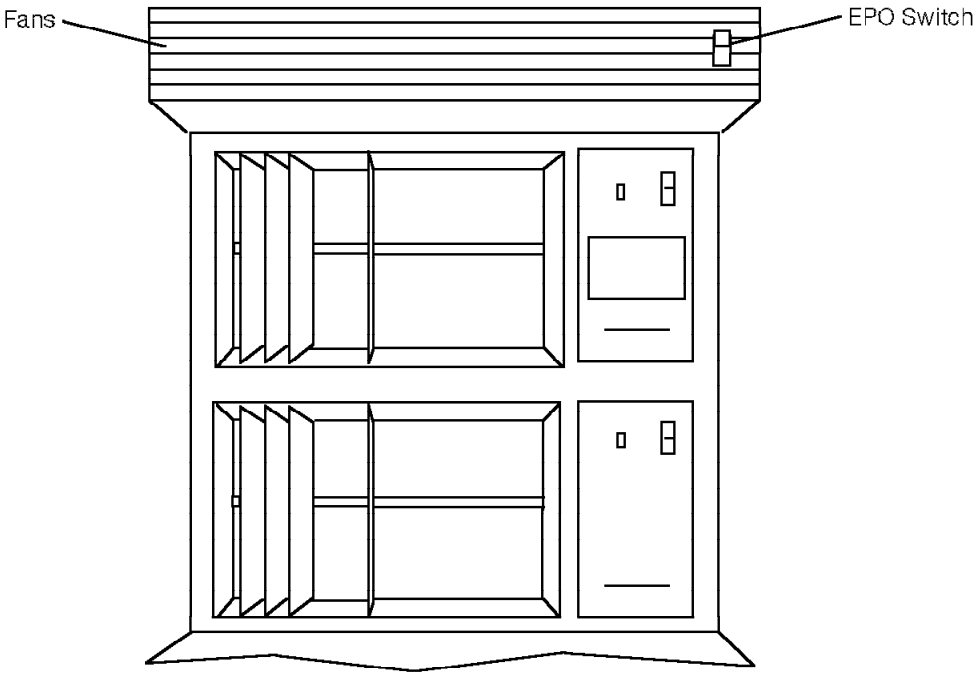

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Figure 2-2. Model 10 Cabinet Layout—Front View

The Model 10 shelves are numbered, from top to bottom, 3, 1, and 2 (Figure 2-3). Each shelf has 25 card slots that are numbered from left to right.

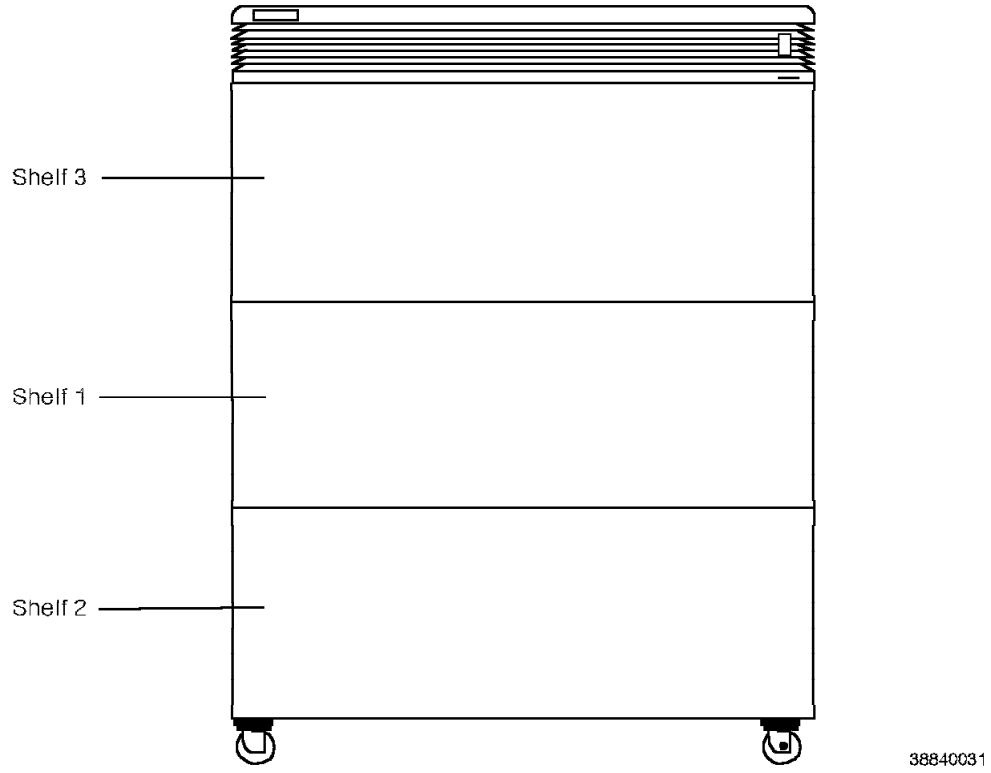


Figure 2-3. 3-Shelf Model 10—Front View

Use the card slots on shelf 1 (Figure 2-4) for TDM cards, CCC cards, and the dual drive assembly.

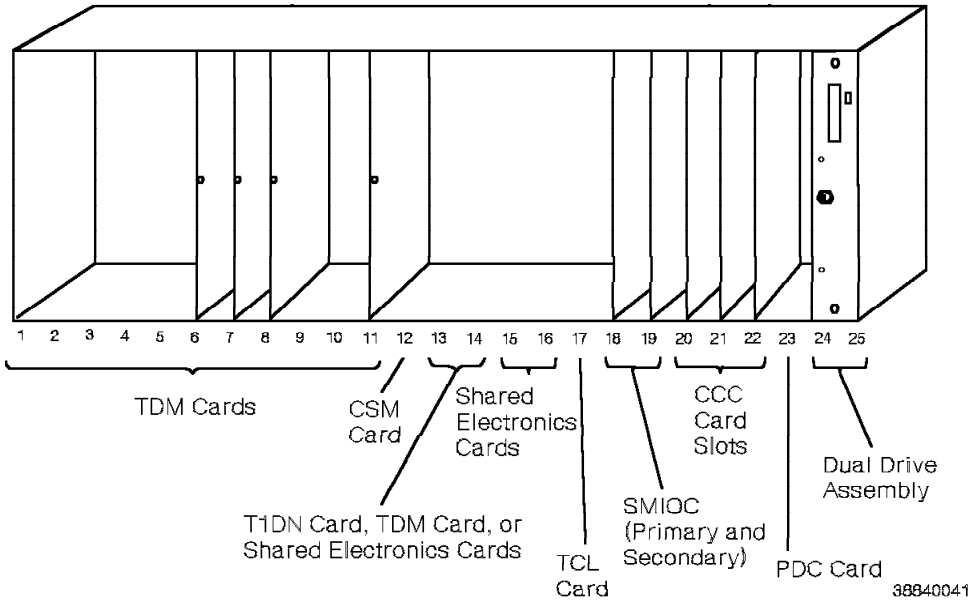


Figure 2-4. Model 10 Shelf 1 Slots

There are two types of CCC cards in the Model 10: 9030 or 9030A. The 9030 CCC group consists of the following FRUs:

- 9030 central processing unit (CPU) card
- Memory controller card
- Memory card
- Two front edge connectors

The 9030A CCC group consists of the 9030A CPU card and the political timer battery.

The shelf 1 slot assignments vary depending on the type of CCC cards in the system. Table 2-1 lists the possible slot assignments.

Table 2-1. Model 10 Shelf 1 Slot Assignments

Slot	Purpose (9030 CCC)	Purpose (9030A CCC)
1 - 11	TDM cards	TDM cards
12	Clock synchronization module (CSM) card	CSM card
13 and 14	T1 digital network (T1DN) card, TDM card, or shared electronics card	T1DN card, TDM card, or shared electronics card
15 and 16	Shared electronics cards	Shared electronics cards
17	Time-division multiplexing controller (TCL) card	TCL card
18	Primary SMIOC	Primary SMIOC
19	Secondary SMIOC	Secondary SMIOC
20	9030 CPU card	Vacant
21	Memory controller card	9030A CPU card
22	Memory card	Vacant
23	Peripheral device controller (PDC)	PDC
24 and 25	Dual drive assembly	Dual drive assembly

The slots on shelves 2 and 3 are identical. Use them only for TDM cards. Shelves 2 and 3 are organized as follows:

- Slots 1 through 24 are reserved for TDM cards.
- Slot 25 is reserved for the time-division multiplexing expander (TXP) card.

2.2.2 Backplane

Each shelf has a backplane that is the interface between the cards and the rest of the system. The backplane is an integral part of the card cage.

The shelf 1 backplane accommodates both CCC and TDM cards. The shelf 2 backplane and shelf 3 backplane accommodate only TDM cards.

On the front of the backplane are P1 and P2 connectors where the cards are installed.

The 9030A CCC backplane includes a connector behind the power supply for a political timer battery (Figure 2-5). Otherwise, it is identical to the front of the 9030 CCC backplane.

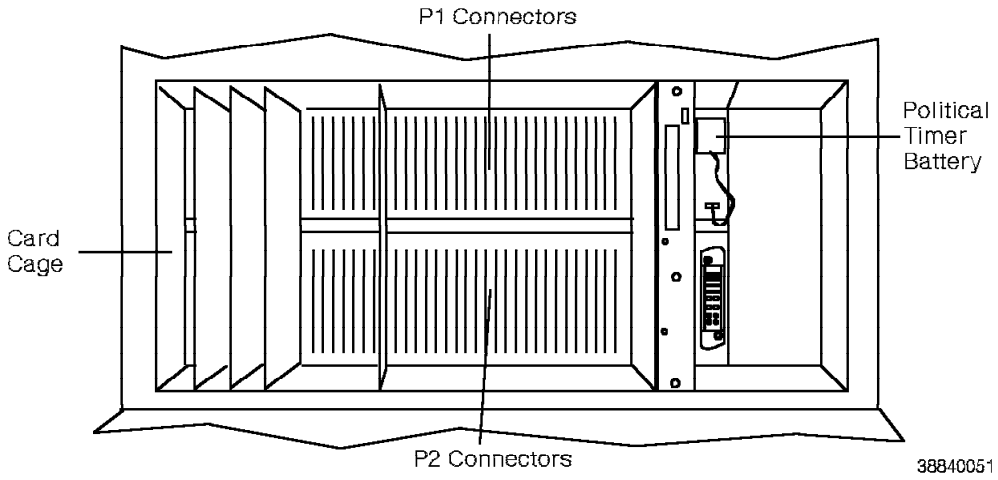


Figure 2-5. Model 10 9030A CCC Backplane—Front View

The political timer battery supplies power to the 9030A CPU card circuitry, which provides the current date and time for the system banner.

On the backplane there is one Amphenol connector per TDM slot (Figure 2-6) for cables to the main distribution frame (MDF). There is also a power bus bar that transmits power from the power supply to the cards.

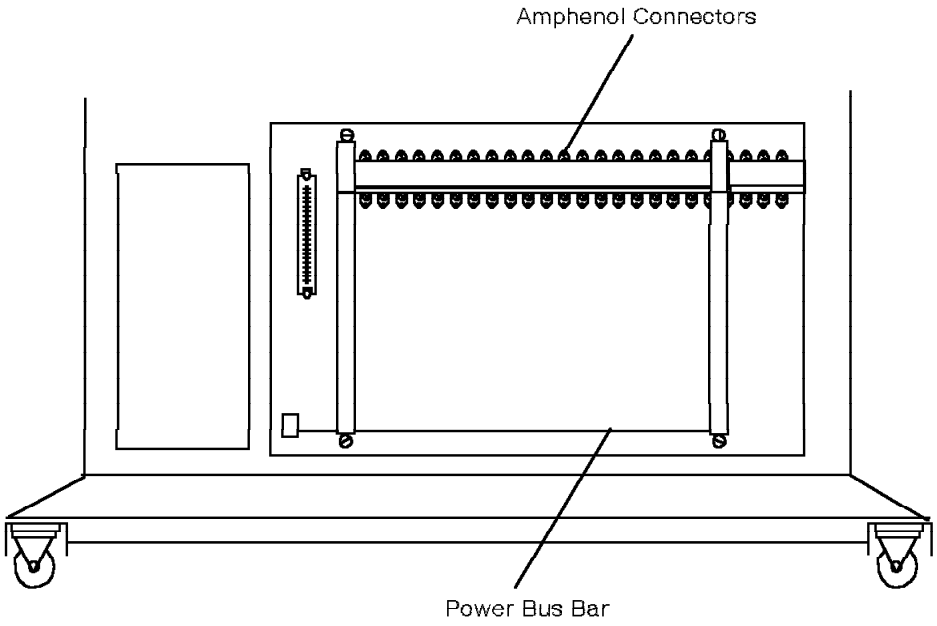


Figure 2-6. Model 10 Backplane

2.3 Cooling System

The cooling system in the Model 10 is a fan assembly. Each fan connects to the fan detector card.

The fans receive power from the power supply, draw fresh air in through the top of the cabinet, and push the fresh air through the card cage (Figure 2-7). Warm air is exhausted out the bottom of the cabinet.

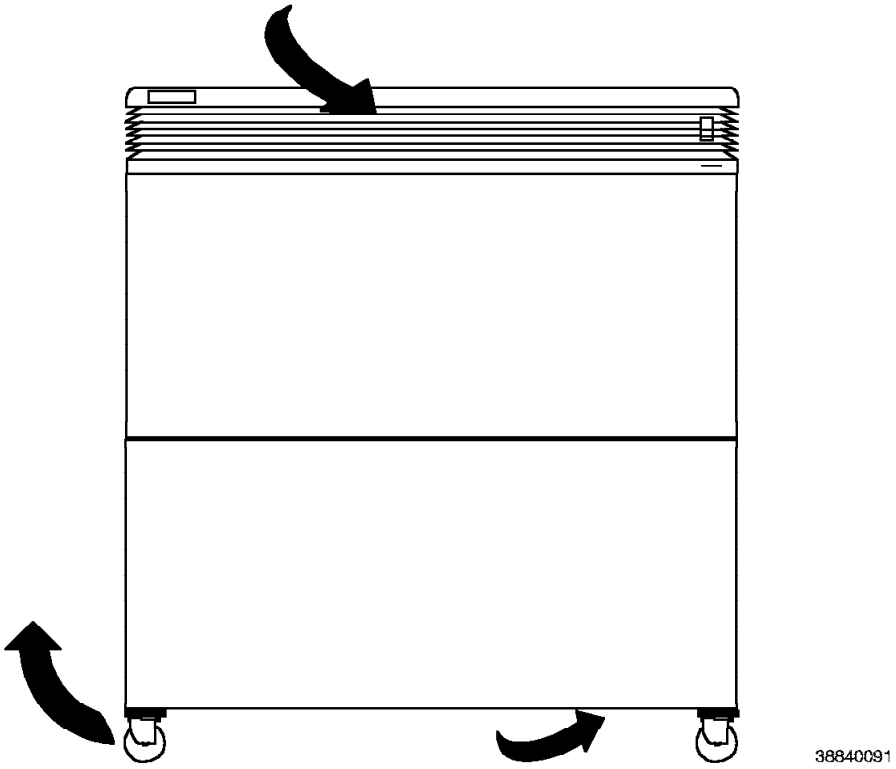


Figure 2-7. Air Flow through the Model 10 Cabinet

The Model 10 detects failing fans as follows:

1. A failing fan generates a signal that the fan detector card senses.
2. The fan detector card sends a signal to the power supply.
3. The power supply sends a signal to the SMIOC.
4. The signal causes the SMIOC's green DS8 light-emitting diode (LED) to turn off.

2.3.1 Fan Assembly

The fan assembly (Figure 2-8) consists of five fans and the fan detector card.

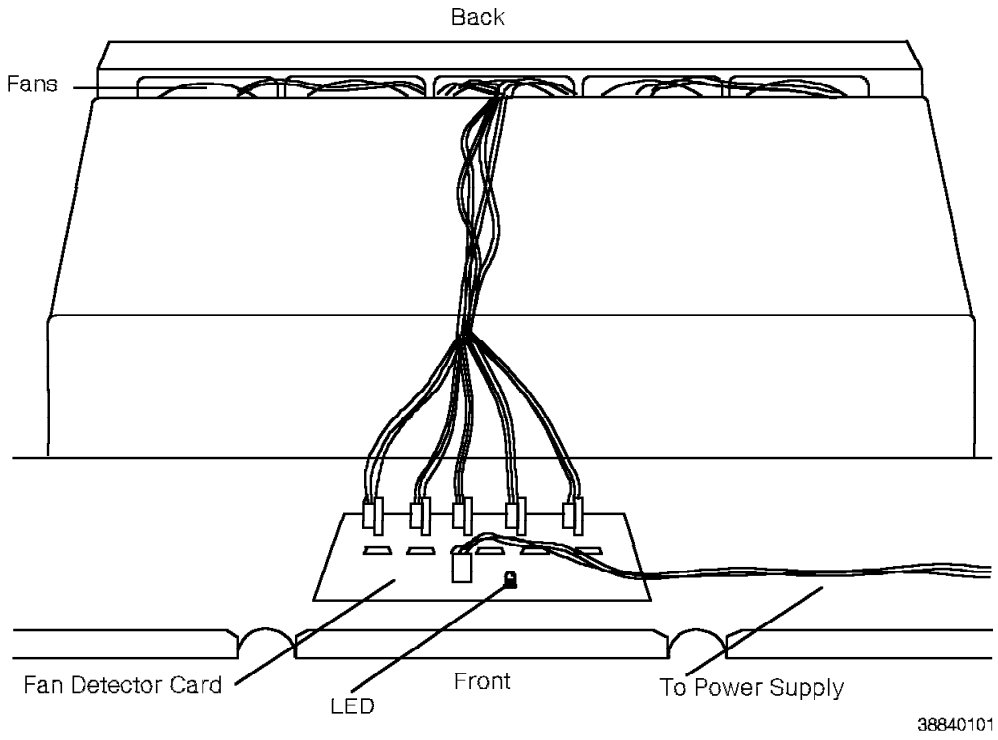


Figure 2-8. Model 10 Fan Assembly

2.3.2 Fan Detector Card

Refer to 4.17, “Fan Detector Card (Model 10)” on page 4-31.

2.4 Power System

The Model 10 power system consists of the following:

- Power entry assembly (PEA)
- Power supply
- Memory retention battery
- Power bus bar
- EPO switch

Note: The power bus bar is on the backplane and is *not* an FRU.

The power system supplies power to the Model 10 as follows:

1. Input power enters the cabinet through the PEA that is at the base of the cabinet (Figure 2-9).
2. Power is distributed to each shelf's power supply through the PEA.
3. The shelf power supply converts the alternating current (ac) or direct current (dc) input voltage into the voltages needed by the cards on the shelf.
4. The power is distributed to the various cards through the power bus bar.

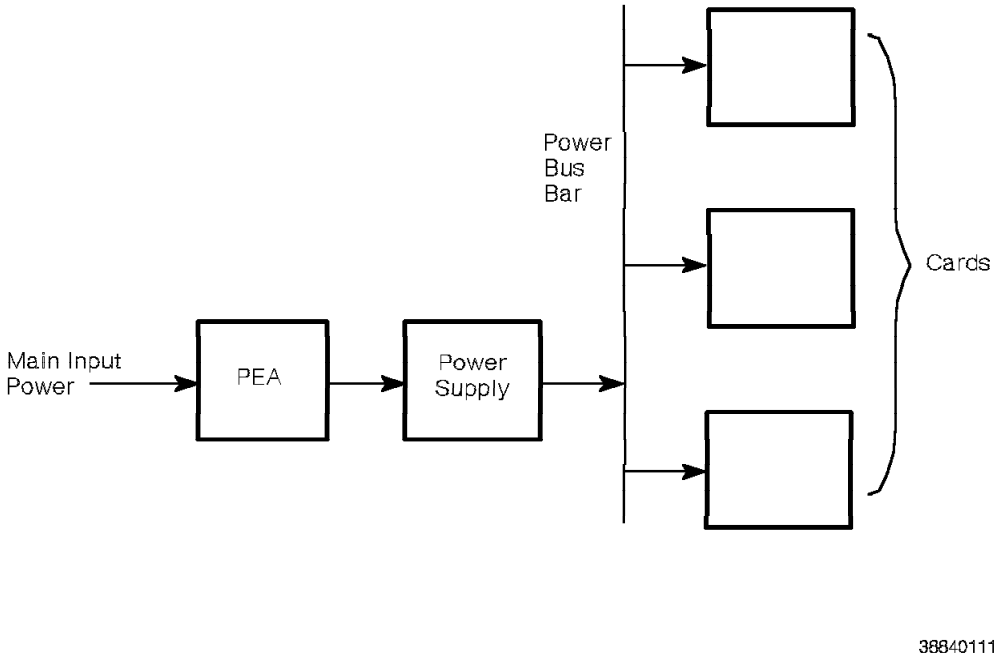


Figure 2-9. Model 10 Power System Functional Diagram

During power failures, the shelf 1 power supply's memory retention battery provides power to retain memory.

The Model 10 has an EPO switch on the front of the cabinet. Turning off the EPO switch removes output power from the PEA.

2.4.1 PEA

The PEA differs depending on whether the Model 10 uses ac or dc power.

2.4.1.1 AC PEA

The ac PEA (Figure 2-10) is the main power entry point to the Model 10. The Model 10 ac power system has the following types of PEAs:

- 120 Vac nominal
- 208/240 Vac nominal

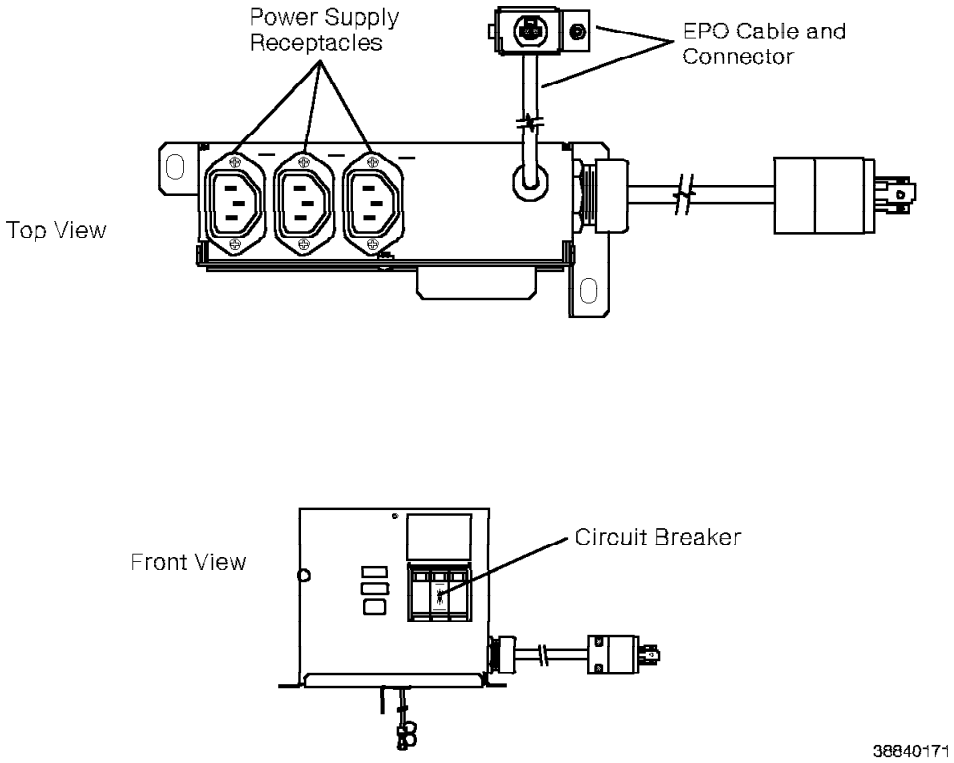


Figure 2-10. Model 10 AC PEA

The PEA is at the back of the cabinet on the cabinet frame. It consists of the following:

Power supply receptacles

Connects the shelf power supplies to the PEA.

In the 120 Vac cabinet, use only the leftmost receptacle.

In the 240 Vac cabinet, use one receptacle per shelf. There are no restrictions on which receptacle to use.

Circuit breaker

Removes power from all shelf power supplies.

EPO switch cable

Connects the EPO switch to the PEA circuit breaker.

2.4.1.2 DC PEA

The dc PEA (Figure 2-11) is the main power entry point to the dc-powered Model 10.

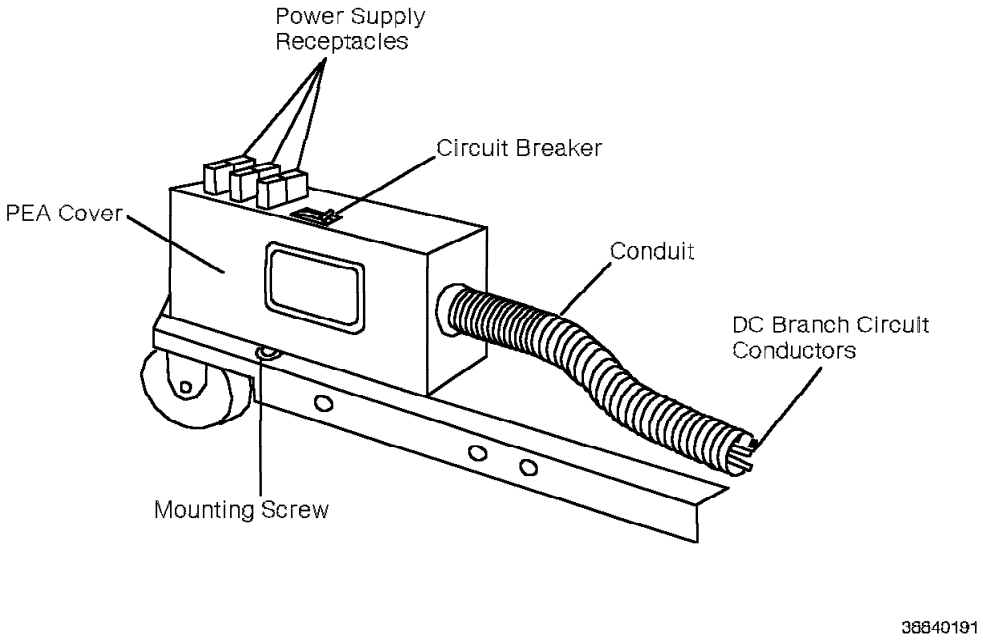


Figure 2-11. Model 10 DC PEA—Back View

The dc PEA is at the back of the Model 10 frame. It consists of the following:

Power supply receptacles
Used for plugging in the power supplies.

Circuit breaker
Removes power from all shelf power supplies.

2.4.2 Power Supply

The power supply differs depending on whether the Model 10 uses ac or dc power.

2.4.2.1 AC Power Supply

Each shelf has a power supply (Figure 2-12 on page 2-14) that connects to the power bus bar on the backplane. The power bus bar on the backplane distributes voltages from the power supply to the cards.

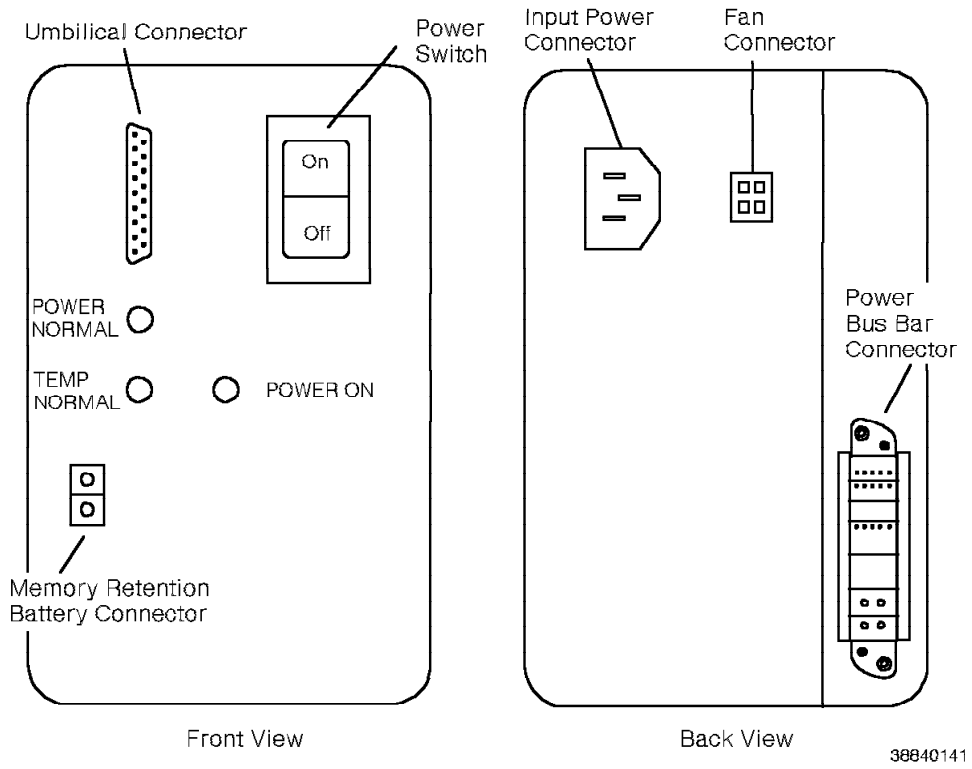


Figure 2-12. Model 10 AC Power Supply

The following appears on the front of the ac power supply:

Umbilical connector
Connects the umbilical cord to the power supply.

Power switch
Turns the power supply on and off.

POWER NORMAL LED
Lights when the output power is within acceptable limits.

TEMP NORMAL LED
Lights when the cabinet temperature is normal.

POWER ON LED
Lights when the input power is within acceptable limits.

Memory retention battery connector
Connects the memory retention battery to the power supply.

The following connectors appear on the back of the ac power supply:

Input power connector
Connects the cabinet input power to the power supply.

Fan connector
Connects a cable from the fan detector card to the power supply.

Power bus bar connector
Connects the power supply to the power bus bar on the backplane.

On the side of the power supply is a voltage switch.

2.4.2.2 DC Power Supply

The dc power supply (Figure 2-13) connects to the power bus bar on the backplane. The power bus bar on the backplane distributes voltages from the dc power supply to the cards.

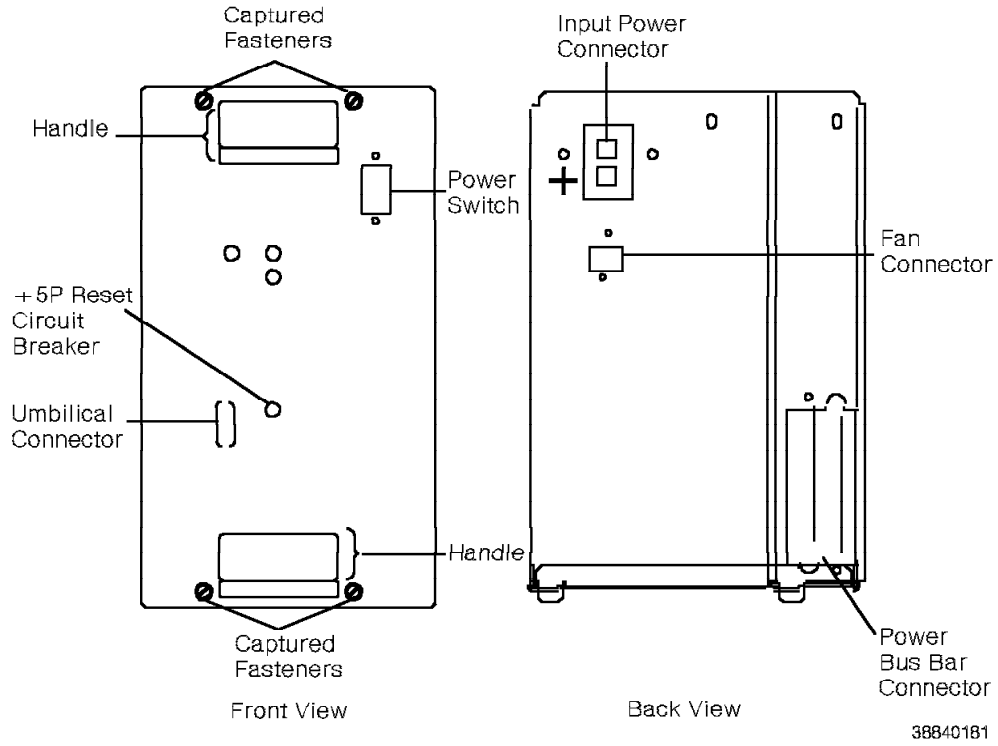


Figure 2-13. Model 10 DC Power Supply

The following appears on the front of the dc power supply:

POWER NORMAL LED
Lights when the output power is within acceptable limits.

TEMP NORMAL LED
Lights when the cabinet temperature is normal.

POWER ON LED
Lights when the input power is within acceptable limits.

Power switch
Turns the dc power supply on and off.

Umbilical connector
Connects the umbilical cord to the dc power supply.

+5P reset circuit breaker
Trips when there is a malfunction of the +5P circuit.

The following connectors appear on the back of the dc power supply:

Input connector
Connects the dc power supply to the PEA.

Fan connector
Connects a cable from the fan detector card to the dc power supply.

Power bus bar connector
Connects the dc power supply to the backplane.

2.4.3 Memory Retention Battery

The memory retention battery (Figure 2-14) is a sealed lead-acid type, 12 volts direct current (V dc) unit for ac systems only. The battery provides up to 12 minutes of backup power for the memory card during a power outage. When the battery has no charge, it recharges in approximately 24 hours.

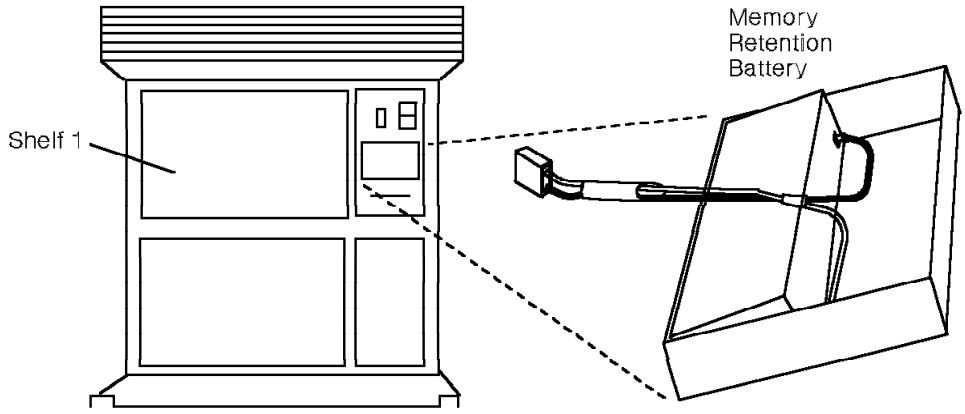


Figure 2-14. Model 10 Memory Retention Battery

The battery is on the front of the ac power supply on shelf 1.

2.5 9030 CCC Group

The 9030 CCC group provides supervisory and control functions for the Model 10. It consists of the following FRUs:

- 9030 CPU card
- Memory card
- Memory controller card
- Two front edge connectors

The 9030 CCC group communicates with the TDM network control group through the backplane (Figure 2-15) on shelf 1. On shelves 2 and 3, the 9030 CCC group communicates with the TDM network control group through the backplane, the TCL and TXP cards, and the intershelf bus (ISB).

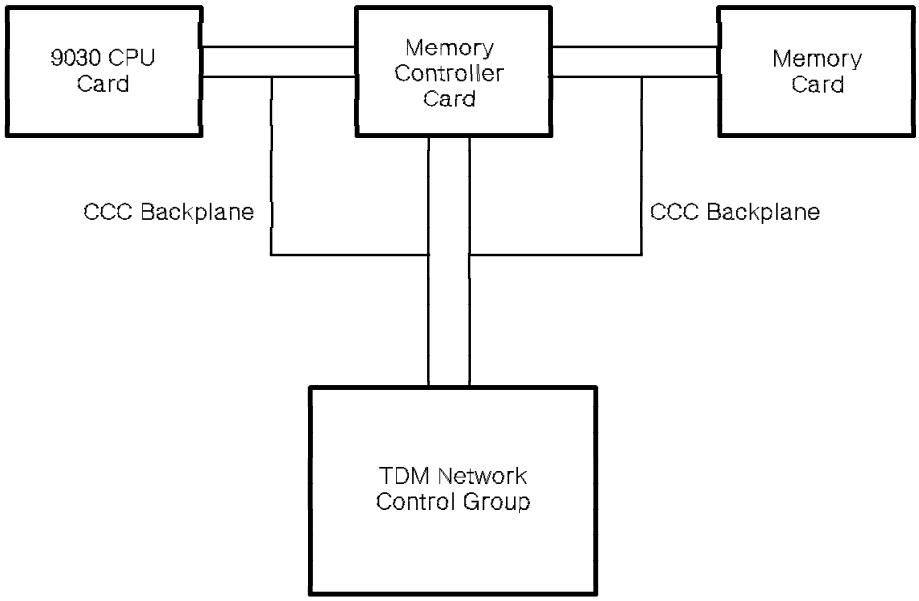


Figure 2-15. 9030 CCC Functional Diagram

2.5.1 9030 CPU Card

Refer to 4.47, “9030 CPU Card (Model 10)” on page 4-92.

2.5.2 Memory Card

Refer to 4.21, “Memory Card (Model 10)” on page 4-47.

2.5.3 Memory Controller Card

Refer to 4.22, “Memory Controller Card (Model 10)” on page 4-48.

2.6 9030A CCC Group

The 9030A CCC group provides supervisory and control functions for the 9751 CBX.

In the Model 10, the 9030A CCC group consists of the 9030A CPU card and the political timer battery. This card communicates with the TDM network control group through the shelf 1 backplane on shelf 1 (Figure 2-16). On shelves 2 and 3, the 9030A CPU card communicates with the TDM network control group through the backplane and the TCL card, the TXP card, and the ISB.

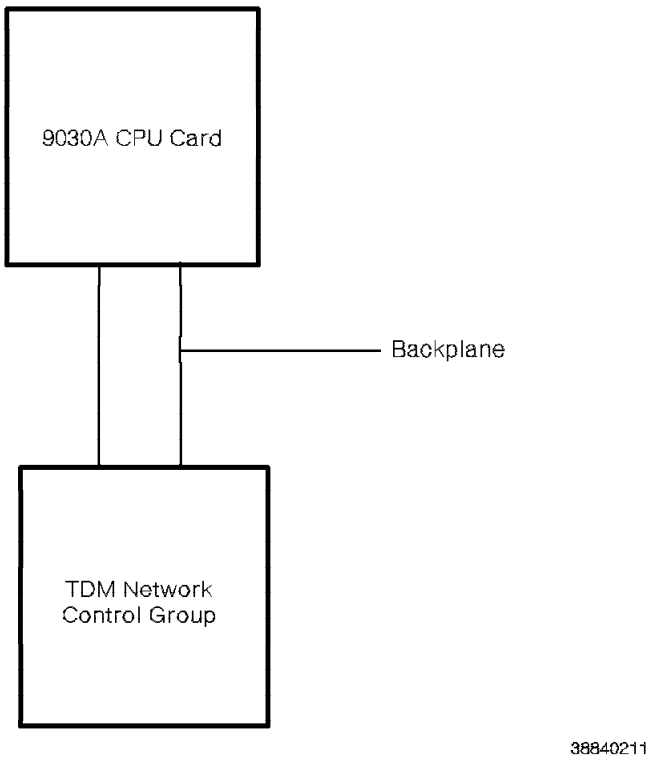


Figure 2-16. 9030A CCC Functional Diagram for the Model 10

2.6.1 9030A CPU Card

Refer to 4.48, “9030A CPU Card” on page 4-93.

2.6.2 Political Timer Battery

The political timer battery (Figure 2-17 on page 2-19) supplies power for the circuitry in the 9030A CPU card that provides the current date and time.

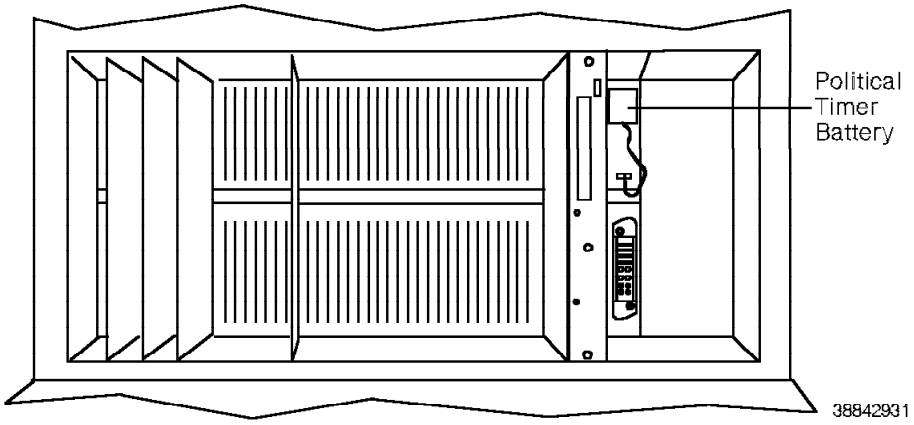


Figure 2-17. Model 10 Political Timer Battery

2.7 TDM Network Control Group

The TDM network control group connects the processor with the TDM cards in the cabinet (Figure 2-18). It communicates with the CCC group through the backplane.

In a 1-shelf system, the TDM network control group consists of the CSM and TCL cards. In a 2- or 3-shelf system, the group also requires TXP cards and an ISB cable.

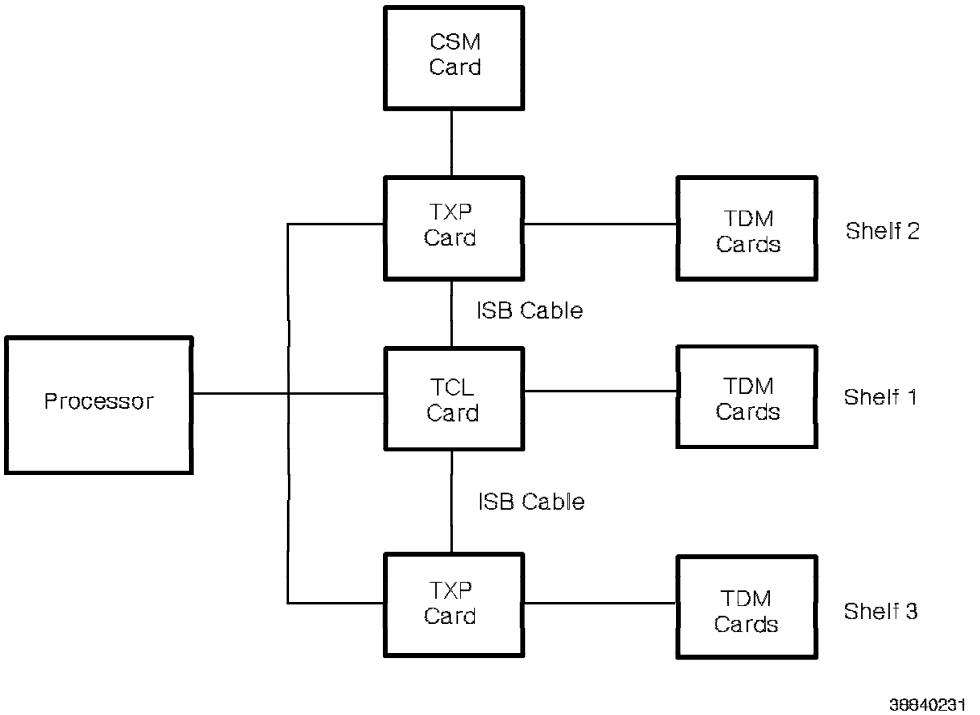


Figure 2-18. Model 10 TDM Network Functional Diagram

2.7.1 CSM Card

Refer to 4.12, “CSM Card” on page 4-21.

2.7.2 TCL Card

Refer to 4.41, “TCL Card (Model 10)” on page 4-82.

2.7.3 TXP Card

Refer to 4.45, “TXP Card (Model 10)” on page 4-88.

2.7.4 ISB Cable

Use the ISB cable (Figure 2-19) when there is more than one shelf in a cabinet. It carries data between the TCL card on shelf 1 and the TXP card on shelves 2 and 3.

The ISB cable is on the backplane.

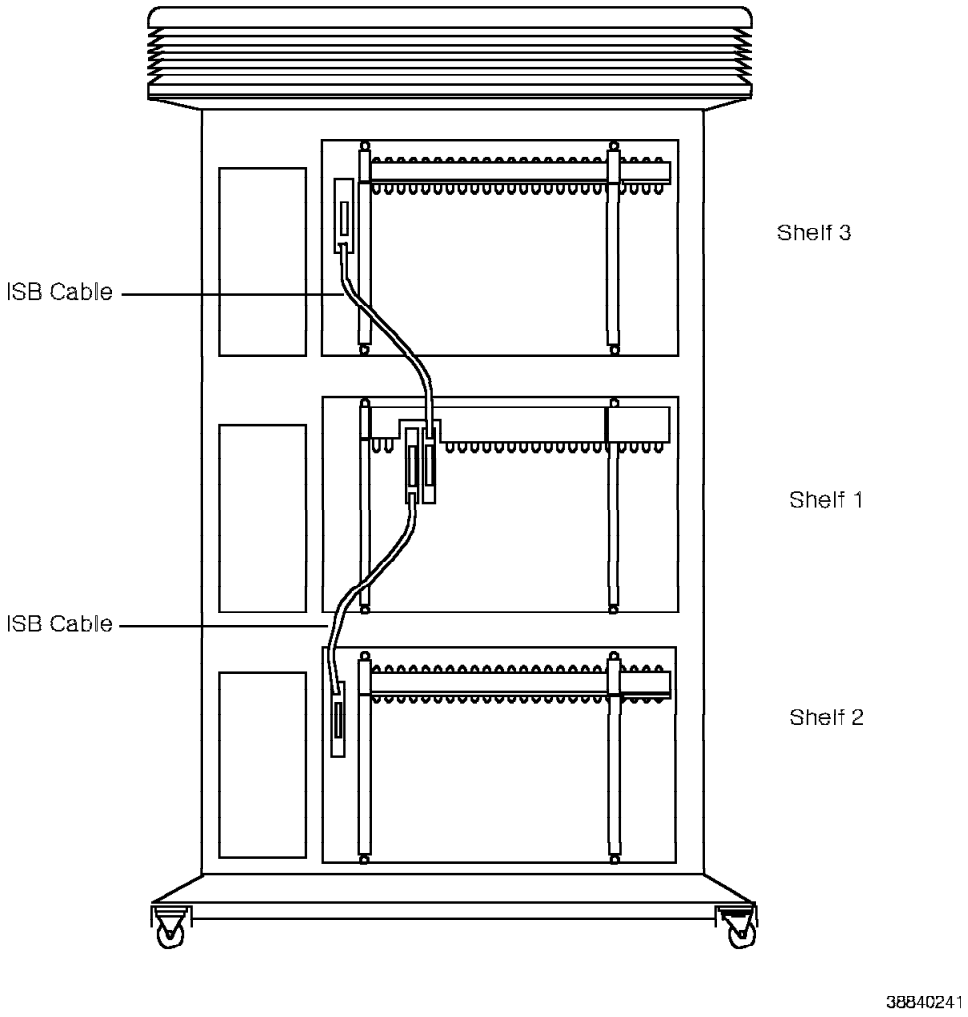


Figure 2-19. Model 10 ISB Cable

2.8 Peripheral Device Hardware

Peripheral device hardware manages all system software operations, such as storing system software, backing up system databases, and copying software volumes.

The Model 10 peripheral device hardware consists of the following:

- Dual drive assembly that consists of:
  - Dual drive assembly chassis
  - Diskette drive
  - Dual drive adapter card
  - Hard disk drive
- PDC card

Figure 2-20 shows the Model 10 disk system.

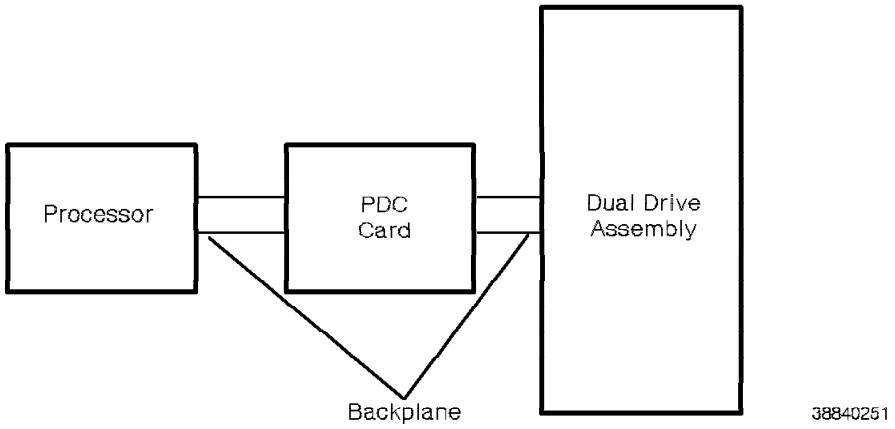


Figure 2-20. Model 10 Disk System Functional Diagram

When the Model 10 is installed at a site, the system software is already on the hard disk. When you power on the system, the green DS1 LED on the PDC card lights, indicating that the processor identified a load device (hard disk) and issued a command to load the system software.

After the Model 10 is powered on, the system software loads automatically from the hard disk. If the automatic load fails, or if the hard disk must be replaced, the system software loads from diskettes.

After the system is installed and operating at a customer site, the peripheral device hardware manages software operations, such as copying volumes from the hard disk to diskettes, backing up volumes from the hard disk to diskettes, or building volumes.

2.8.1 Dual Drive Assembly

The dual drive assembly (Figure 2-21 on page 2-22) consists of the following:

- Dual drive chassis
- Hard disk drive
- Diskette drive
- Dual drive adapter card

The dual drive assembly chassis mounts the dual drive assembly to the CCC card cage.

If any part of the dual drive assembly fails, the entire assembly must be replaced—for example, you cannot replace *only* the diskette drive.

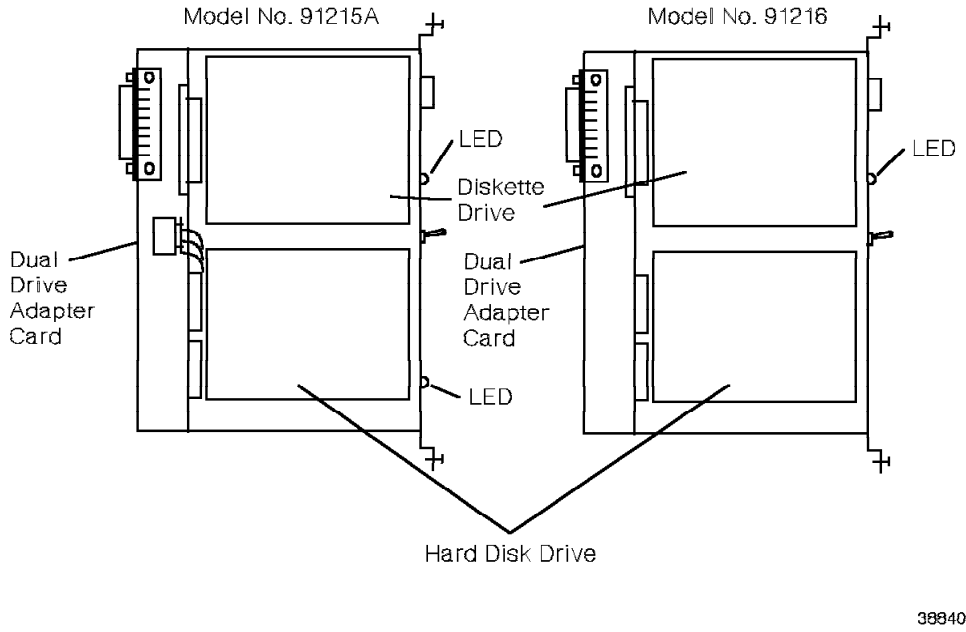


Figure 2-21. Model 10 Dual Drive Assembly

The dual drive assembly is in slots 24 and 25 on shelf 1 of the Model 10.

Table 2-2 lists the dual drive assembly LEDs and the conditions they indicate.

Table 2-2. Dual Drive Assembly LED Indicators

LED	Color	State	Indication
Diskette drive	Yellow or green	On	The diskette drive is being accessed.
		Off	The diskette drive is not being accessed.
Hard disk drive (Model no. 91215A only)	White	On	The hard disk drive is being accessed.
		Off	The hard disk drive is not being accessed.

2.8.1.1 Diskette Drive

The 3.5-inch diskette drive loads the software from diskette to hard disk. It also copies software updates from hard disk to diskettes to back up the current site database.

Important Note: You *must* use 3.5-inch, 2-megabyte (MB), double-sided, high-density diskettes. Although the system can read and write to 1MB low-density diskettes, it *cannot* load or boot from them.

The 9751 CBX supports one diskette drive.

The diskette drive is on the top of the dual drive assembly.

The LED that shows the status of the diskette drive is at the top of the dual drive assembly. Refer to Table 2-2 on page 2-22.

2.8.1.2 Hard Disk Drive

The hard disk drive for the Model 10 stores the system software. The software includes the core image and configuration information.

The hard disk drive is on the bottom of the dual drive assembly. It has a switch that turns power to the drive on and off.

The LED that shows the status of the model no. 91215A hard disk drive is at the bottom of the dual drive assembly. Refer to Table 2-2 on page 2-22.

2.8.1.3 Dual Drive Adapter Card

The dual drive adapter card is the interface between the hard disk drive, the diskette drive, and the backplane.

The dual drive adapter card is behind the diskette drive and the hard disk drive in the dual drive assembly. It also supplies the hard disk drive with power through its J1 connector.

2.8.2 PDC Card

Refer to 4.29, “PDC Card” on page 4-60.

2.9 IPDN

The IPDN consists of the following:

- IPDN card
- IPDN breakout assembly
- IPDN cable

2.9.1 IPDN Card

Refer to 4.19, “IPDN Card” on page 4-33.

2.9.2 IPDN Breakout Assembly

Figure 2-22 shows the IPDN breakout assembly.

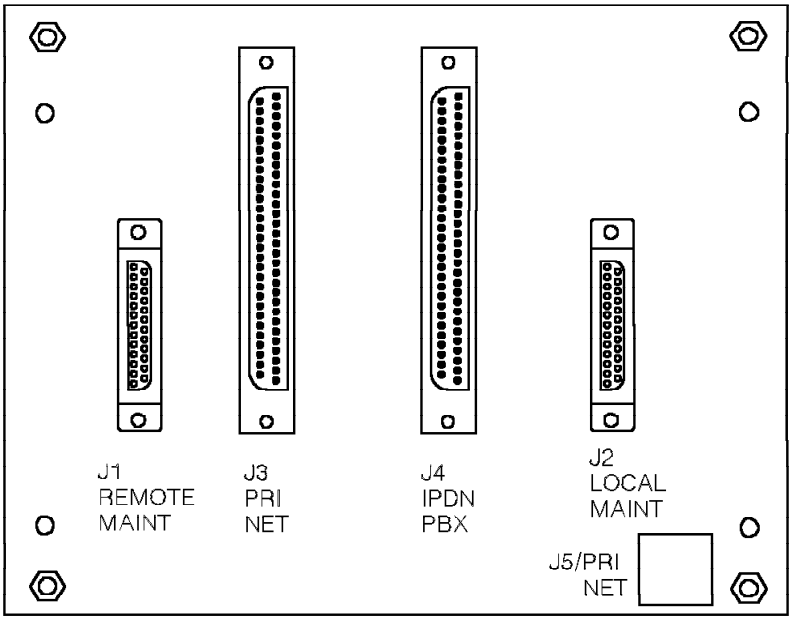


Figure 2-22. IPDN Breakout Assembly

Table 2-3 lists the IPDN breakout assembly J connectors and their purposes.

Table 2-3. IPDN Breakout Assembly Connectors

Connector	Purpose
J1	Not used.
J2	Provides the port for a modem or local maintenance terminal. If you use a local terminal, place a null modem cable between the terminal and the IPDN breakout assembly.
J3	Provides an Amphenol connector for a cable connection between the breakout assembly and the CSU to the ISDN network. This is the standard interface to the ISDN network.
J4	Provides an Amphenol connector for the J1 connector end of the IPDN cable. The cable routes to the IPDN and T1DN cards.
J5	Not used.

2.9.3 IPDN Cable

The Model 10 IPDN cable (Figure 2-23) connects the IPDN card, T1DN card, and IPDN breakout assembly.

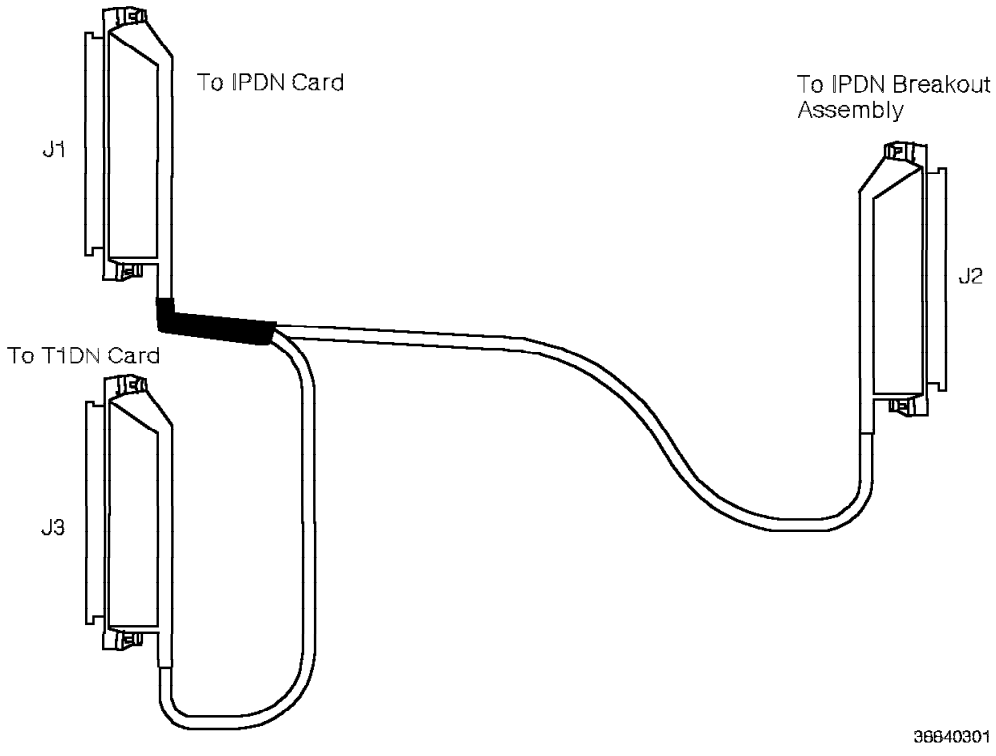


Figure 2-23. Model 10 IPDN Cable

Table 2-4 lists the Model 10 IPDN cable connectors and their purposes.

Table 2-4. Model 10 IPDN Cable Connectors

Connector	Purpose
J1	Attaches to the IPDN card.
J2	Connects to the J4 connector on the IPDN breakout assembly.
J3	Attaches to the T1DN card.

2.10 SMIOC and SMIOC Interconnect Box

The SMIOC and the SMIOC interconnect box connect peripheral equipment such as the 9751 CBX monitor, 9751 CBX monitor II, modems, terminals, and alarms to the 9751 CBX. An Amphenol cable connects the SMIOC to the SMIOC interconnect box on the MDF (Figure 2-24).

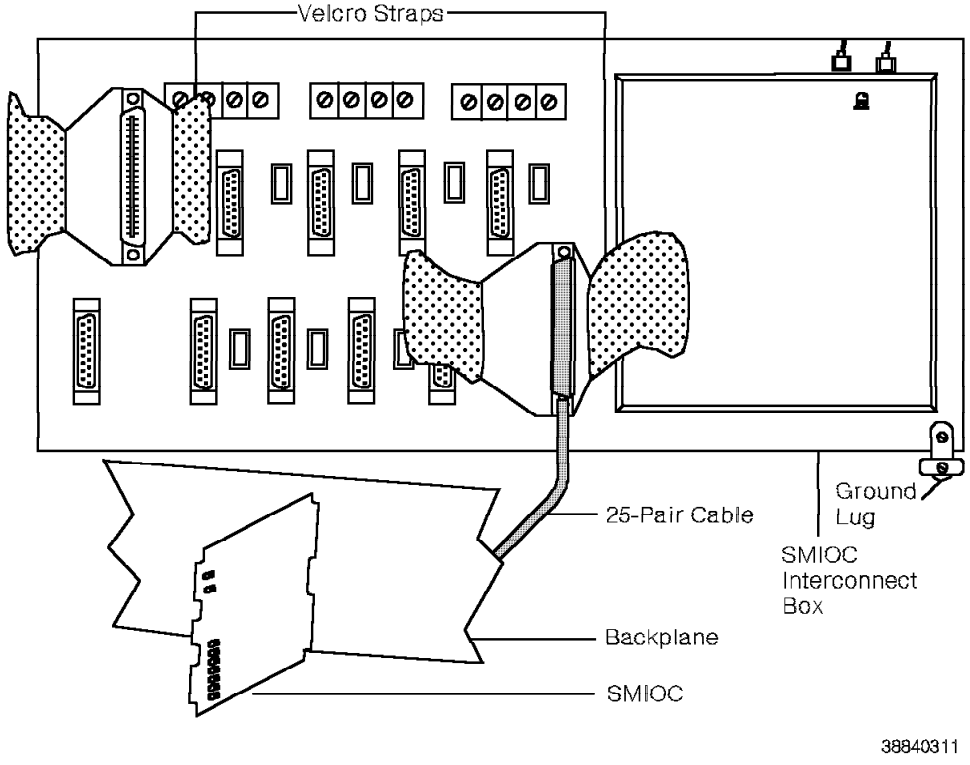


Figure 2-24. SMIOC and SMIOC Interconnect Box Functional Diagram

2.10.1 SMIOC

Refer to 4.38, “SMIOC” on page 4-77.

2.10.2 SMIOC Interconnect Box

Figure 2-25 shows the SMIOC interconnect box.

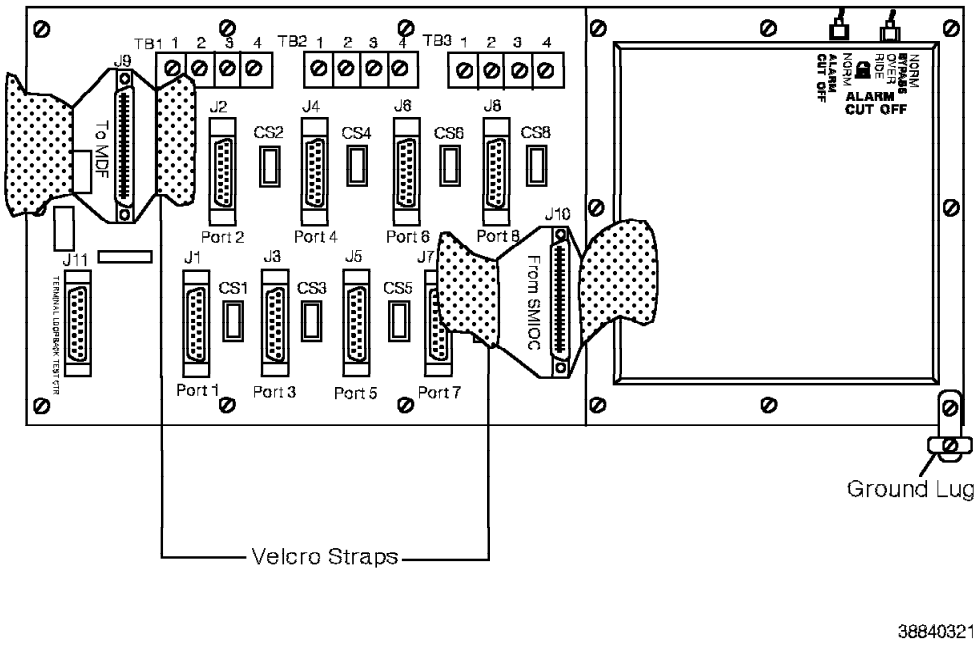


Figure 2-25. SMIOC Interconnect Box

The SMIOC interconnect box components are as follows:

Peripheral equipment connectors

Eight EIA/TIA-232-E connectors connect peripheral equipment, such as the call detail recording (CDR) list device, modems, and terminals to the eight ports on the SMIOC.

Each of the connectors has a data circuit-terminating (DTE) or data circuit-terminating equipment (DCE) plug associated with it.

Loopback test connector

One EIA/TIA-232-E connector tests the maintenance terminal.

MDF connector

One Amphenol connector to the MDF is provided for two system-bypass relays and additional customer alarms. The two relays act as on and off switches for the trunk bypass unit. During a 9751 CBX power failure, the bypass equipment provides emergency telephone connections to the public network.

Velcro fasteners

Velcro fasteners on the J9 and J10 connectors hold the connector cables in place.

Switches Two switches provide alarm cutoff and bypass cutoff.

Screw terminals

Each SMIOC interconnect box supports four pairs of customer device alarms and two pairs of external alarms (Figure 2-26 on page 2-28).

Customer alarms

Four customer devices, such as air conditioners or printers, can connect to the customer alarm screw terminals. If a customer requires more than four devices, cross-connect the additional devices at the MDF. When a device such as a heater fails, the device closes a contact, which short circuits the terminals and sends an alarm signal to the SMIOC. The SMIOC then records a major or minor error on the hardware error table.

Note: The devices you use with the interconnect box must close a normally open contact closure circuit when they fail.

External alarms

Two external alarm devices, such as bells or lights, can connect to the screw terminals. If a customer requires more than two external alarm devices, cross-connect the additional alarms at the MDF.

Note: ROLM provides external alarms if the SERVICE_PORT system parameter is OFF. Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* for more information.

When a minor error appears in the hardware error table, the minor customer alarm input relay closes the contact and the minor external alarm is activated. When a major error appears in the hardware error table, the major customer alarm input relay closes and the major external alarm is activated.

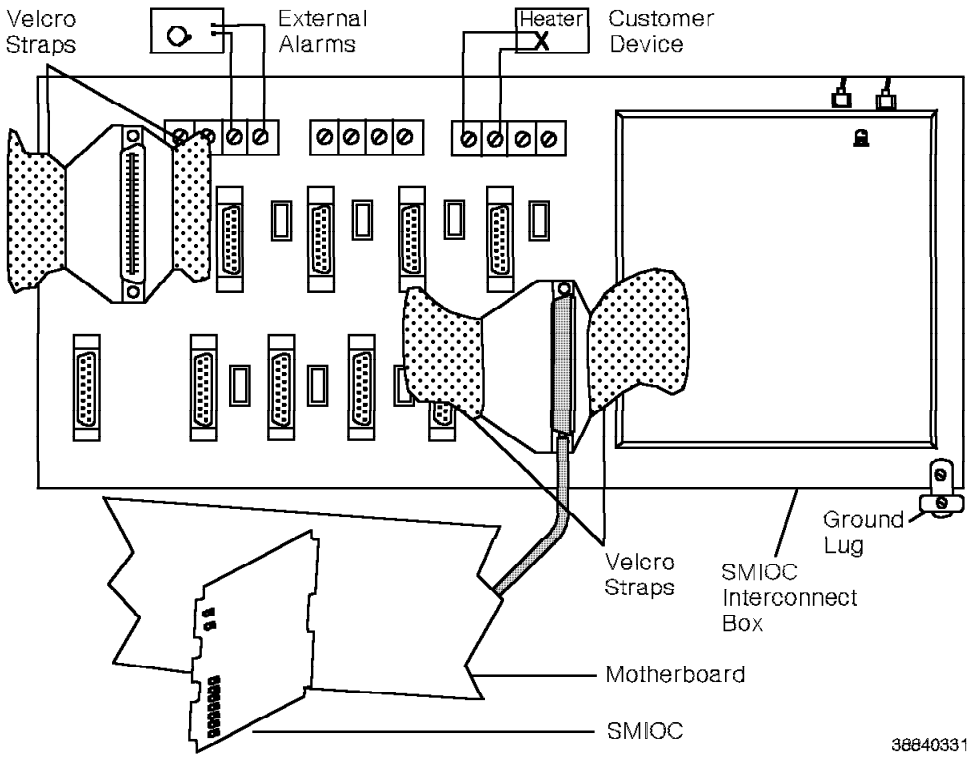


Figure 2-26. Customer and External Alarms Functional Diagram

For every SMIOC in the system, there is an SMIOC interconnect box. A 9751 CBX can have up to two of each. Mount the SMIOC interconnect box on the MDF or on the wall next to the MDF.

Table 2-5 lists the SMIOC interconnect box LED and the conditions it indicates.

Table 2-5. SMIOC Interconnect Box LED Indicator

Color	State	Indication
Red	On	The alarm cutoff switch is on.
	Off	The alarm cutoff switch is off.

Chapter 3. Models 40 and 50 Hardware

This chapter describes the 9751 computerized branch exchange (CBX) Models 40 and 50 and provides functional descriptions of how the subsystems work.

3.1 Types of Models 40 and 50 Hardware

In addition to hardware described in 2.1, “Types of Model 10 Hardware” on page 2-2, the following hardware appears in the Models 40 and 50:

Hardware status bus (HSB) network

Monitors the power, cooling, and temperature of the cabinet.

Control packet network (CPN)

Permits a host to transmit packets of call-processing information to another processor. The Model 40 or 50 uses CPN hardware as part of a CorNet-N link.

ROLM private digital network (RPDN)

Permits the Model 40 or 50 to use a CorNet-N link to connect to:

- Another 9751 CBX Release 9006m
- A 9751 CBX Release 9006.2 and above
- A 9200 CBX Release 3.2 and above

It converts integrated services digital network (ISDN) messaging to CPN protocol.

3.2 Cabinet Overview

The Models 40 and 50 are single-node systems (Figure 3-1) that are made up of one to five cabinets.

The shelves are numbered consecutively, from top to bottom and from left to right.

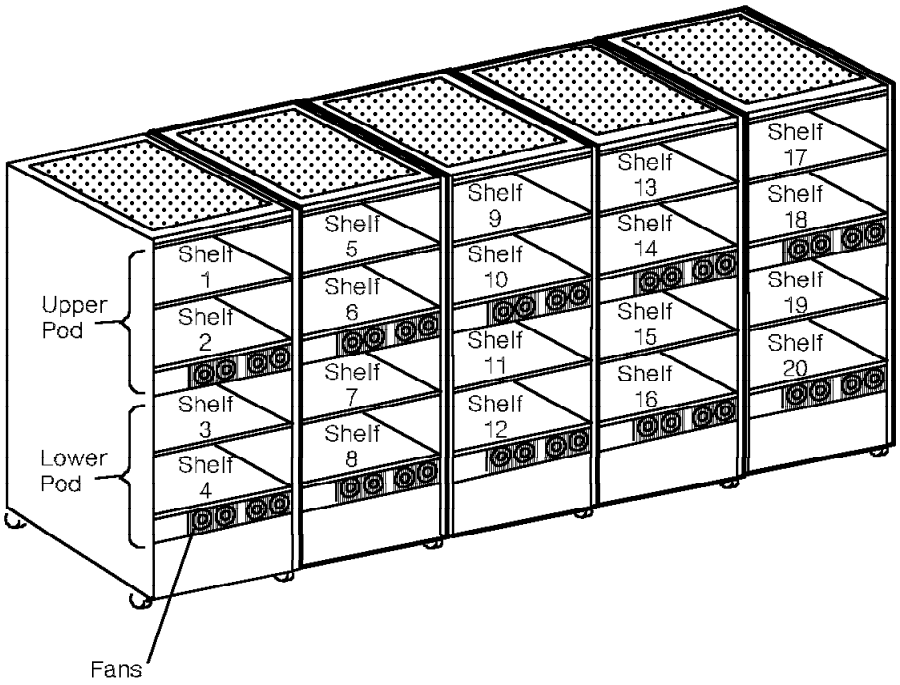


Figure 3-1. Model 40 or 50 Cabinet Layout—Front View

Each cabinet is made up of two pods: one upper pod and one lower pod. Each pod contains a fan assembly, two shelves, and shelf power modules.

Note: A pod is *not* a stand-alone unit.

Both the front and back of each cabinet have two key-locked doors (Figure 3-2). The sides of the cabinets have removable panels. In a multicabinet node, only the end cabinets have side panels.

Each cabinet has an emergency power-off (EPO) switch on the front of the cabinet. Turning off any EPO switch removes power from *every* shelf in *every* cabinet in the system.

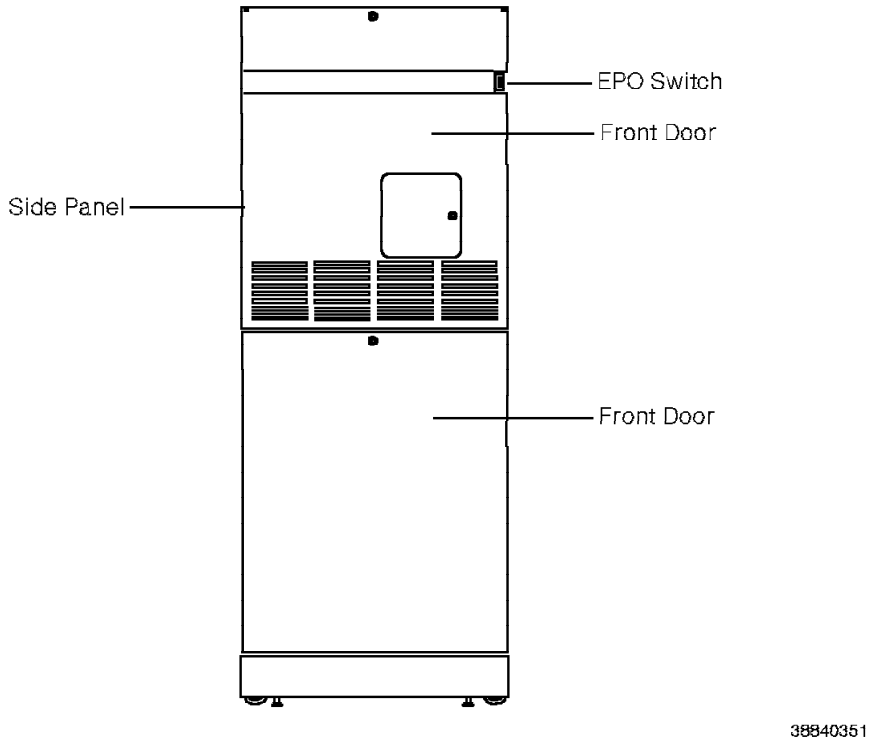


Figure 3-2. Model 40 or 50 Cabinet—Front View

3.2.1 Layout

The Models 40 and 50 have the following types of shelves (Figure 3-3):

- Computer common control (CCC)

  Shelf 2 is the CCC shelf.

- Time-division multiplexing (TDM)

  All shelves other than shelf 2 are TDM shelves.

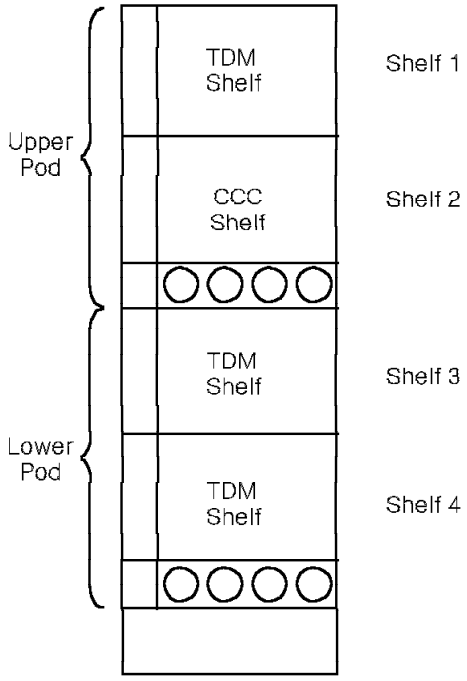


Figure 3-3. Cabinet 1 Shelf Layout for the Model 40 or 50

3.2.1.1 9030A CCC Shelf for the Model 40

Table 3-1 lists slot assignments for the 9030A CCC shelf (Figure 3-4) for the Model 40. You cannot use slots that are not designated.

Table 3-1. 9030A CCC Shelf Slot Assignments for the Model 40

Slot	Purpose
1	Turnaround standalone (TASA) card or time-division multiplexing controller turnaround standalone (TCTASA) card
3	TDM controller (TC) card (if applicable)
8	9030A CPU card in a system with a TCTASA card
10	9030A CPU card in a system with TC and TASA cards
14	Control packet network interface (CPNI) card, if applicable
16	9030A input/output (I/O) bus switch card in a system with TCTASA card
17	9030A I/O bus switch card in a system with TC and TASA cards
22 and 23	Primary and secondary system monitor input/output cards (SMIOCs)
24	Peripheral device controller (PDC) card
25	Diskette drive
28	Hard disk drive

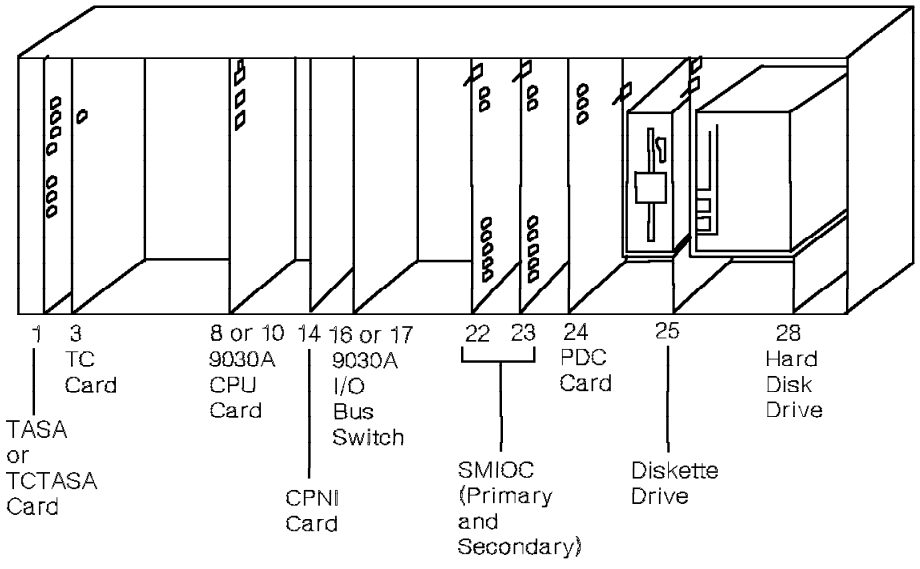


Figure 3-4. 9030A CCC Shelf for the Model 40

3.2.1.2 9030A CCC Shelf for the Model 50

Table 3-2 lists slot assignments for the 9030A CCC shelf (Figure 3-5) for the Model 50. You cannot use slots that are not designated.

Table 3-2. 9030A CCC Shelf Slot Assignments for the Model 50

Slot	Purpose
1 and 3	TCTASA card
6	9030A memory expansion card (side A)
8	9030A CPU card (side A)
10	9030A CPU card (side B)
12	9030A memory expansion card (side B), if applicable
14	CPNI card (side A), if applicable
16	9030A I/O bus switch card (side A)
17	9030A I/O bus switch card (side B)
19	CPNI card (side B), if applicable
22 and 23	Primary and secondary SMIOCs
24	PDC card
25	Diskette drive
28	Hard disk drive

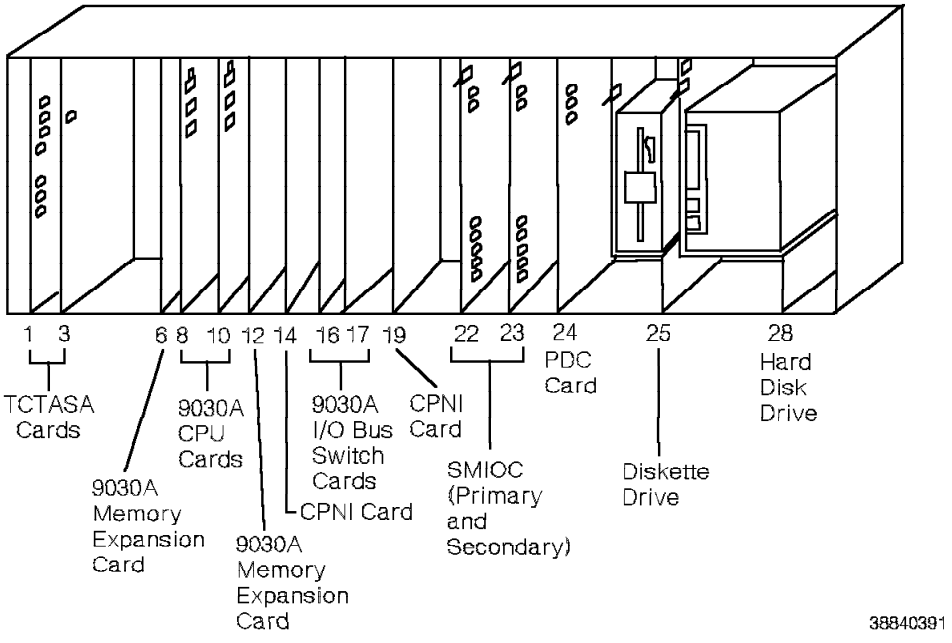


Figure 3-5. 9030A CCC Shelf for the Model 50

3.2.1.3 TDM Shelf for the Model 40

Table 3-3 lists slot assignments for the TDM shelf (Figure 3-6) for the Model 40.

Table 3-3. TDM Shelf Slot Assignments for the Model 40

Slot	Purpose
2 (cabinets 1, 3, and 5) -or- 4 (cabinets 2 and 4)	Expander card
7 through 29	Trunk cards, station cards, or shared electronics cards
6 (shelf 1 only)	Clock synchronization module (CSM) card
30	Local shelf monitor (LSM) card

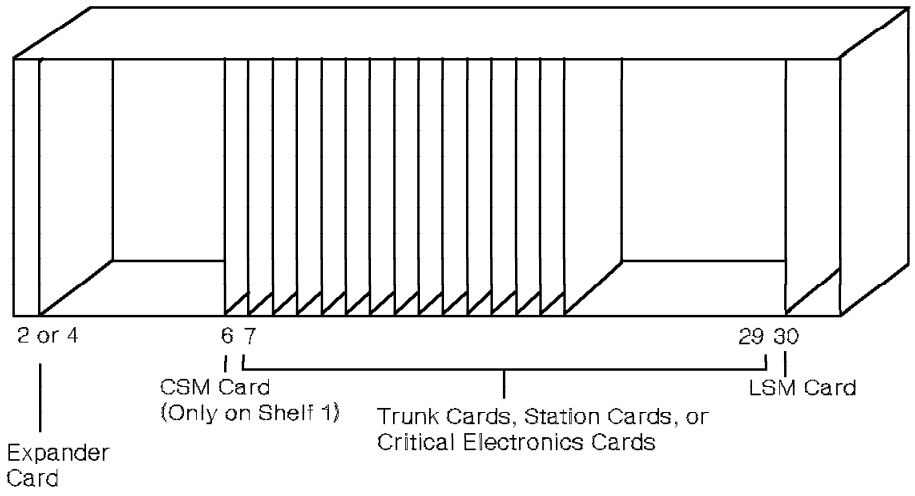


Figure 3-6. TDM Shelf for the Model 40

3.2.1.4 TDM Shelf for the Model 50

Table 3-4 lists slot assignments for the TDM shelf (Figure 3-7) for the Model 50.

Table 3-4. TDM Shelf Slot Assignments for the Model 50

Slot	Purpose
2 and 4	Expander cards
7 through 29	Trunk cards, station cards, or critical electronics cards
6 (shelves 1 and 3 only)	CSM card **Note:** The CSM can be a master clock synchronization module (MCSM) or a slave clock synchronization module (SCSM).
30	LSM card

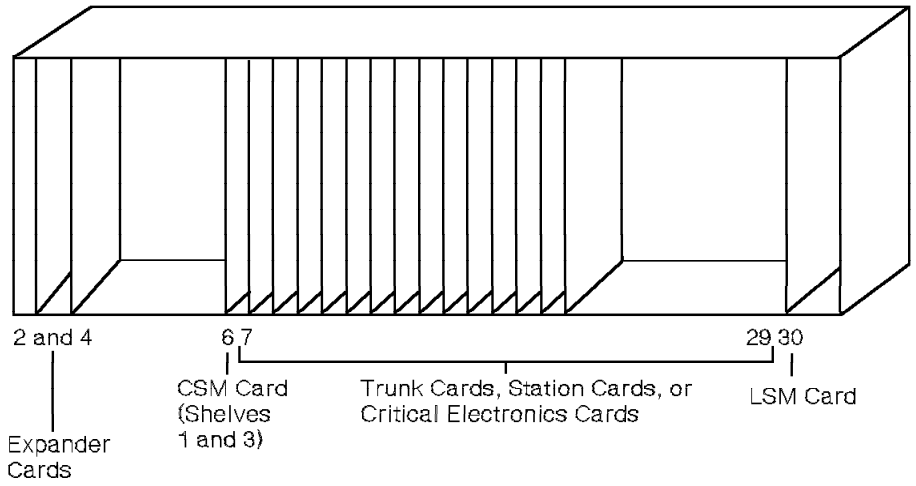


Figure 3-7. TDM Shelf for the Model 50

3.2.1.5 Motherboards

Every shelf has a motherboard. Table 3-5 lists the motherboards the Models 40 and 50 support.

Table 3-5. Models 40 and 50 Motherboards

Motherboard	Description
9030A CCC	The 9030A CCC motherboard is in shelf 2 of cabinet 1. The processor set, the memory cards, and the shared I/O hardware plug into them.
CSM	The CSM motherboard is in a configurable TDM shelf above the TDM backplane. The CSM card and the internal and external clock cables plug into it.
2x1x4 digital trunk	The 2x1x4 digital trunk motherboard is in a configurable TDM shelf above the TDM backplane. The T1 digital network (T1DN) card plugs into it when no slots are available on a universal motherboard.
• 6x3x1 message waiting interface • 4x2x2 ROLMbridge 5250 interface • 5x3x1 off-premises station (OPS) interface	Interface motherboards are in configurable TDM shelves above the TDM backplane. Interface cards and the codec card (where applicable) plug into them.
• 24x23x23 universal • 6x5x5 universal	Universal motherboards are in TDM shelves above the TDM backplane. Interface cards and shared electronics cards plug into them.
Control packet network junction (CPNJ)	The CPNJ motherboard is in a TDM shelf above the TDM backplane. The CPNJ card plugs into it.
2x1x1 RPDN	The 2x1x1 RPDN motherboard is in a configurable TDM shelf above the TDM backplane. The RPDN card plugs into it.

3.2.1.6 I/O Filter Panel

The I/O filter panel (Figure 3-8) reduces electromagnetic interference (EMI) to meet Federal Communications Commission (FCC) EMI requirements.

The I/O filter panel accommodates 23 cables per shelf. There are 25 cutouts for shelf 3, and 16 cutouts for shelves 1, 2, and 4. The large cutout on shelf 2 in cabinet 1 is for the +5P shelf power module. The large cutout on shelf 3 is for the ring shelf power module.

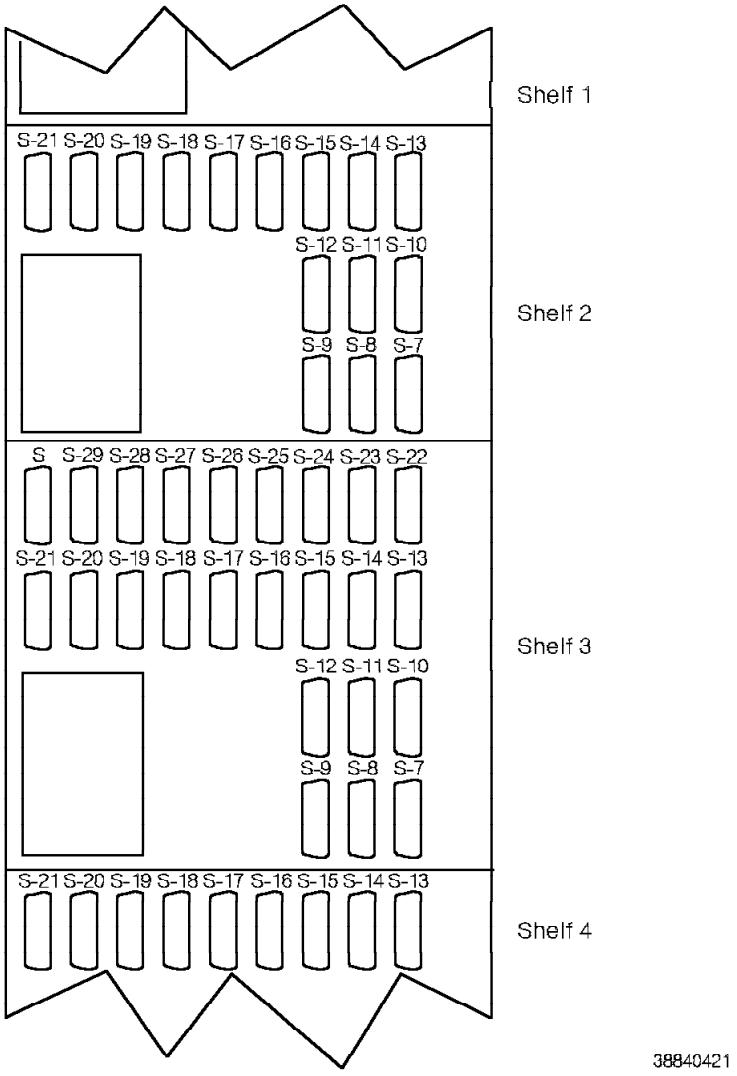


Figure 3-8. Model 40 or 50 I/O Filter Panel

The slot numbers for each shelf are labeled on the I/O filter panel from top to bottom and left to right. The cable attached to the back of the motherboard routes to the I/O filter panel connector. The connector (Figure 3-9) filters out the EMI and channels the signals to the main distribution frame (MDF) through a second cable. The filtered connector cutout is labeled with the corresponding slot number.

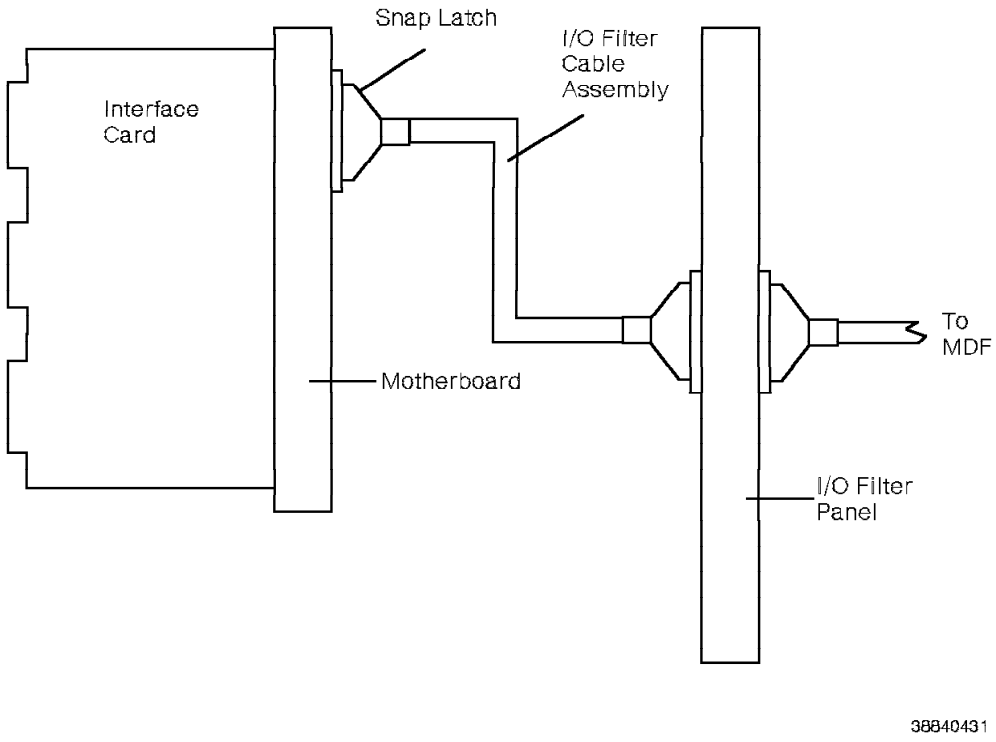


Figure 3-9. Model 40 or 50 I/O Filter Cable Assembly

3.3 Cooling System

The cooling system is a fan assembly.

A bank of four fans cools the equipment cards in the pod (Figure 3-10). The fans draw in fresh air from the front of the cabinet to cool the cards. Warm air from the top pod exhausts out the top of the cabinet. Warm air from the bottom pod exhausts out the back of the cabinet.

All shelves have a clear plastic air-flow guide that mounts in front of the shelf. This guide directs cooled air to the card cage area for maximum cooling.

Warning: Keep the top cover free of obstructions for correct cabinet cooling. Placing objects on the top cover could result in severe damage to the system components.

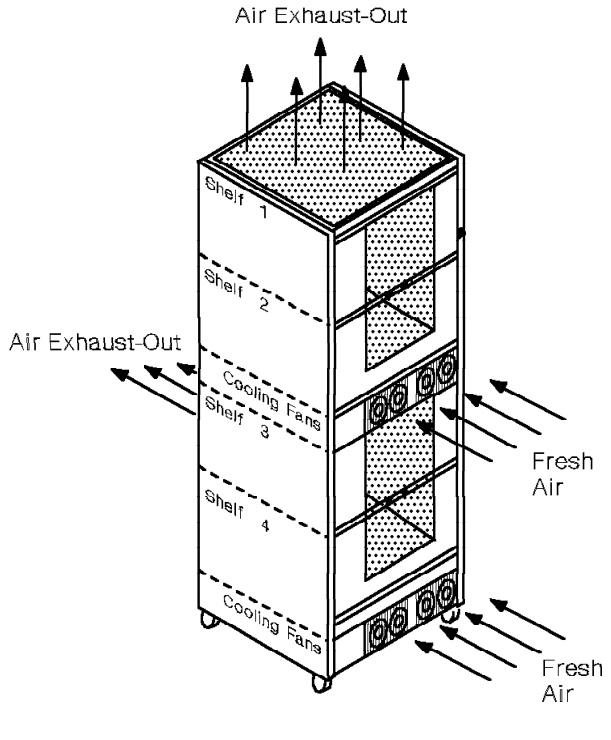


Figure 3-10. Air Flow Through the Model 40 or 50 Cabinet

3.3.1 Fan Assembly

The fan assembly (Figure 3-11) consists of the following:

- Four fans
- Fan wiring harness
- Air filter
- Air-flow sensor assembly that consists of:
  - One air-flow sail
  - Fan detector card

The fan assembly has one fuse. The line conditioning module (LCM) or battery input module (BIM) provide the −48 volts direct current (Vdc) required to power the fans. The fans receive this −48 Vdc power through the fan wiring harness.

The Model 40 or 50 detects failing fans as follows:

1. When a fan fails, the sail swings toward the failed fan.
2. The fan detector card detects the sail passing over it and generates an alarm signal.
3. The alarm signal goes through the fan wiring harness to the shelf's LSM.
4. The LSM reports the alarm and shelf identification (ID) to the SMIOC.
5. The signal turns off the SMIOC's green DS8 light-emitting diode (LED).

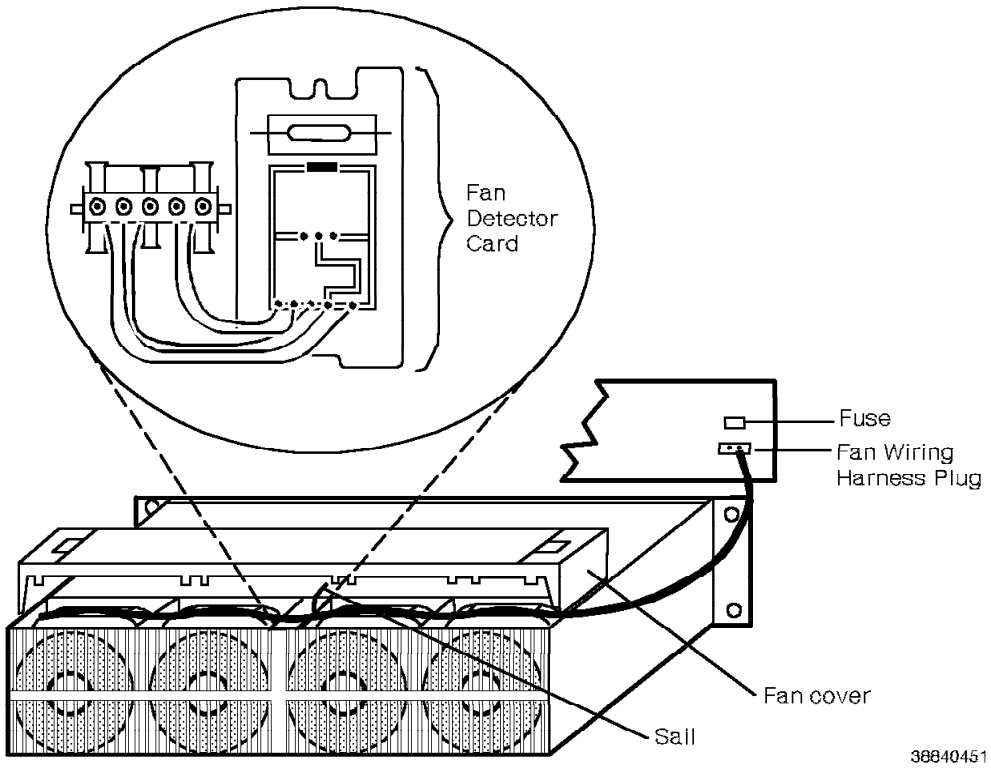


Figure 3-11. Model 40 or 50 Fan Assembly

The fan assembly is below the second shelf in each pod. It has no LEDs.

The fan assembly connections (Figure 3-11 on page 3-14) are as follows:

- The fan wiring harness connector attaches to the CCC motherboard or the TDM backplane.
- The fan wiring harness plugs are daisy-chained to the fans and fan detector card.
- The power plug attaches to the four fans.

3.3.2 Fan Detector Card

Refer to 4.18, “Fan Detector Card (Models 40 and 50)” on page 4-32.

3.4 Power System

The Model 40 or 50 power system consists of the following:

- EPO switch
- Power bus bar
- LCM (alternating current [ac] systems only)
  - Power entry assembly (PEA)
  - Rectifier assembly
- Capacitor assembly
- Memory retention battery
- BIM (dc systems only)
- +5P shelf power module
- +5 Vdc shelf power module
- +12 Vdc shelf power module
- ±15 Vdc shelf power module
- −48 Vdc talk (−48T) shelf power module
- Ring shelf power module

Note: The power bus bar is part of the power system, but is *not* an FRU.

Every cabinet has an EPO switch, an input power module, and shelf power modules.

At the base of every cabinet is a cabinet input power module that is the main power entry point to the cabinet. An ac system uses an LCM and a dc system uses a BIM.

The shelf power modules (Figure 3-12 on page 3-16) attach to the back of the CCC motherboard and TDM backplanes. Power from the cabinet LCM or BIM routes to the shelf power modules through the power bus bar.

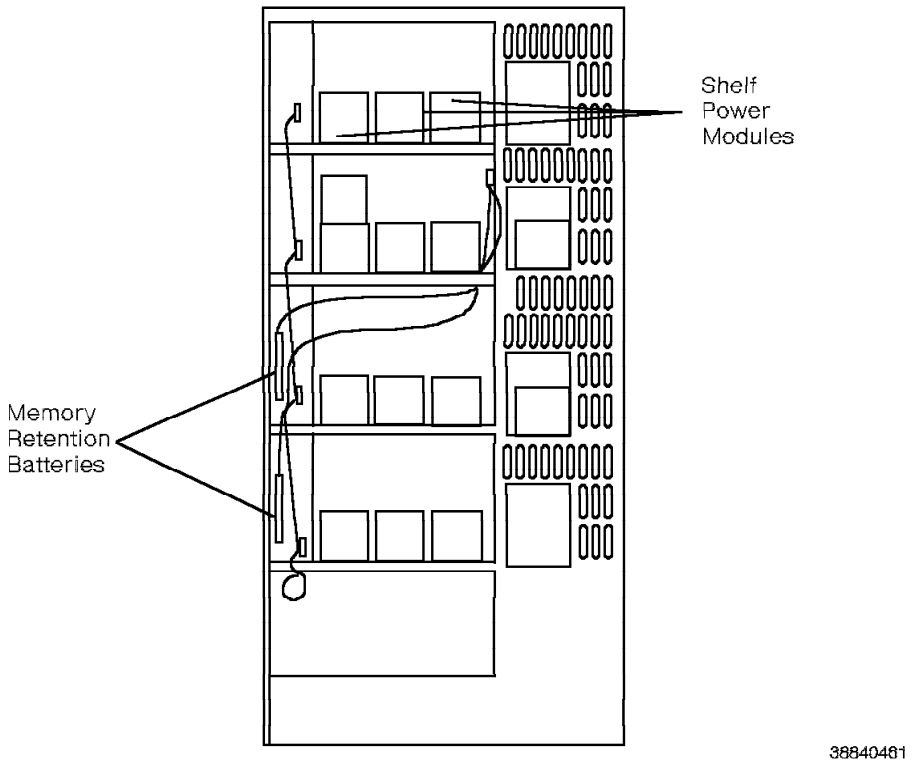


Figure 3-12. Shelf Power Modules for the Model 40 or 50 Power System

3.4.1 EPO Switch

An EPO switch is on the front of every cabinet in the system (Figure 3-13). Turning off any EPO switch removes power from *every* shelf in *every* cabinet in the system.

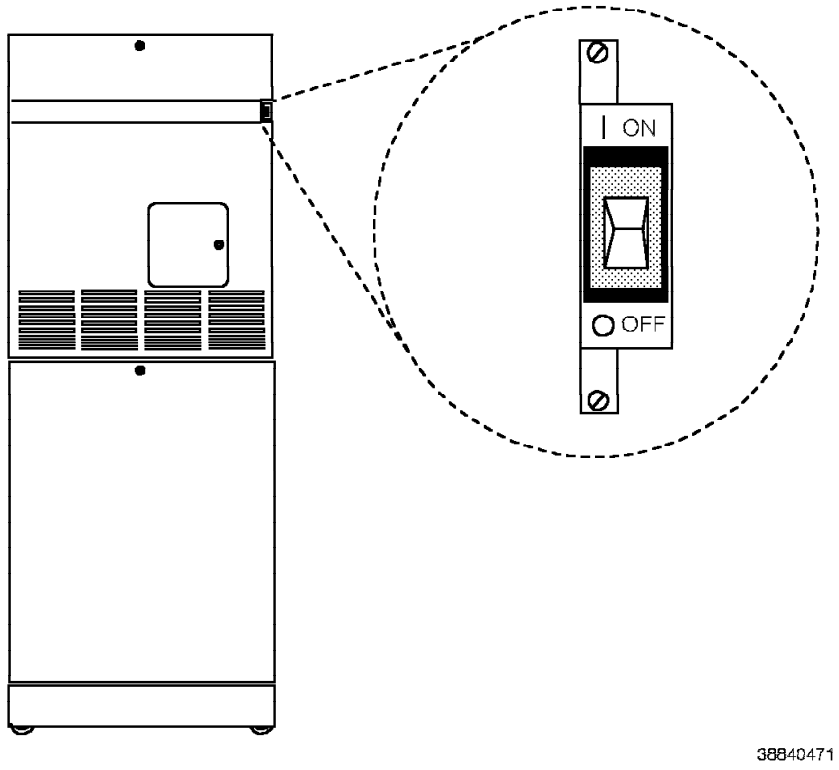


Figure 3-13. Model 40 or 50 EPO Switch

3.4.2 Power Bus Bar

The power bus bar (Figure 3-14) distributes power from the LCM or BIM to the shelf power modules.

The power bus bar runs vertically along the back left side of the cabinet. It connects to the LCM or BIM at the base of the cabinet. At each shelf, it connects to the TDM backplane or CCC motherboard by nine leads. The shelf power modules convert the −48 Vdc from the power bus bar to the needed voltages.

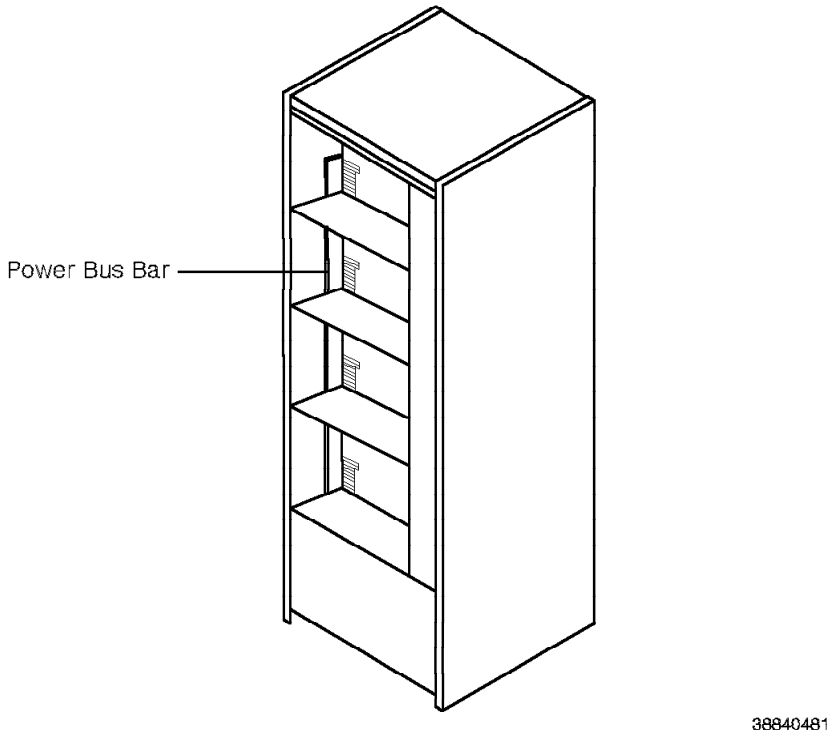


Figure 3-14. Model 40 or 50 Power Bus Bar

3.4.3 LCM

The LCM (Figure 3-15) is the main power entry point for ac systems. There is one LCM at the base of each ac-powered cabinet.

The LCM:

- Converts the 208 volts alternating current (Vac) or 240 Vac input power into −48 Vdc output. The optimum output range is from −42 Vdc to −52.8 Vdc.
- Supplies the shelf power modules in the cabinet with −48 Vdc over the power bus bar.
- Provides limited line power conditioning.

The LCM is strapped at the factory for 208 Vac. It can be restrapped at the site to support 240 Vac input.

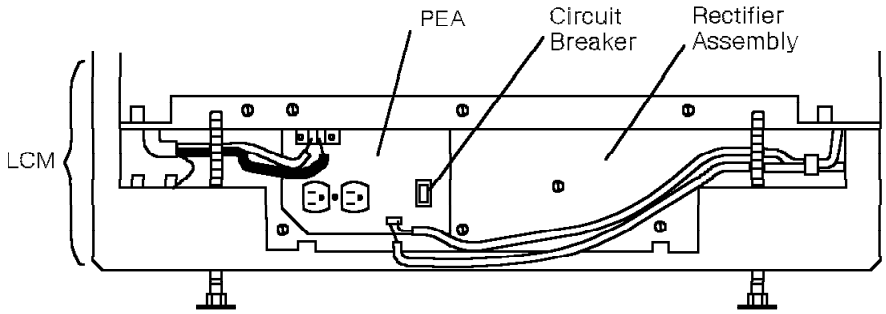


Figure 3-15. Model 40 or 50 LCM

The LCM consists of the following:

PEA Refer to 3.4.3.1, “PEA” on page 3-20.

Rectifier assembly
Refer to 3.4.3.2, “Rectifier Assembly” on page 3-21.

Magnetics
Two transformers in the back of the LCM.

The magnetics have the following plugs:

P1 Attaches to the P1 connector on the PEA.
P7 Attaches to the P8 connector on the rectifier assembly.

Note: Unlike the PEA and the rectifier assembly, the magnetics are *not* FRUs. If the magnetics fail, replace the LCM as a unit.

3.4.3.1 PEA

The PEA (Figure 3-16) is a subcomponent of the LCM. It is the main power entry point to the LCM.

The PEA is on the front left side of the LCM.

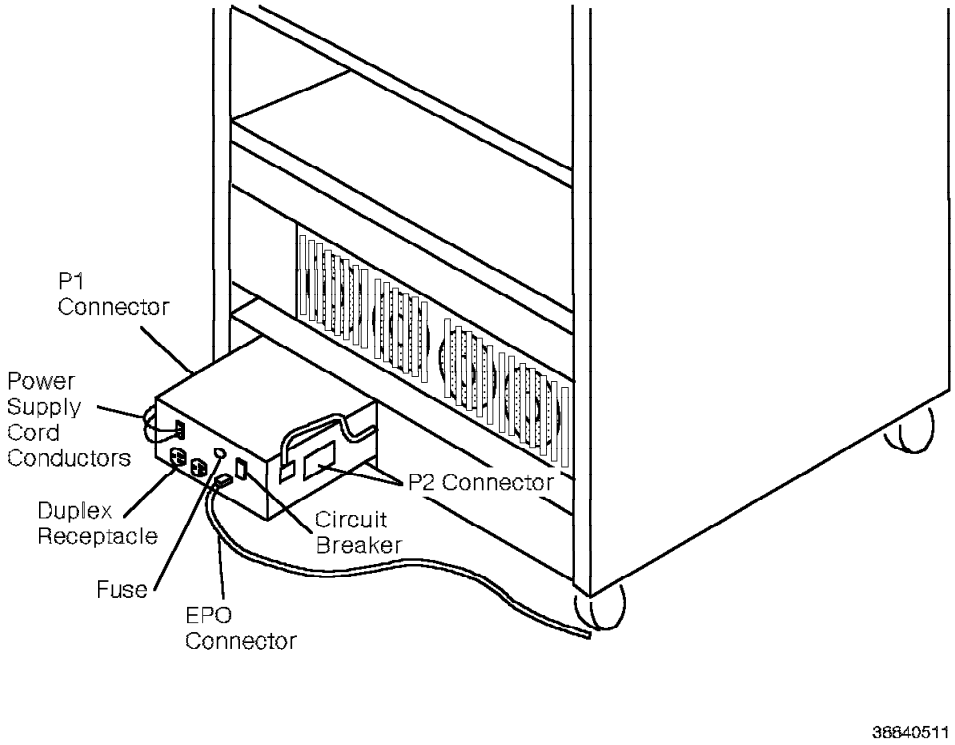


Figure 3-16. Model 40 or 50 PEA

The PEA consists of the following:

Power supply cord conductors
Provide input power to the LCM.

P1 connector
Terminates the P1 plug from the magnetics.

P2 connector
Terminates the P4 plug from the rectifier assembly.

EPO connector
Terminates the EPO cable from the cabinet's EPO switch.

120 Vac 60-Hertz (Hz) duplex receptacle
Used for service equipment.

20-amp (A) circuit breaker
Operating the circuit breaker removes output power from the PEA.

3.4.3.2 Rectifier Assembly

The rectifier assembly (Figure 3-17) is a subcomponent of the LCM. It is an ac-to-dc converter and provides over-voltage protection.

The rectifier assembly is on the front right side of the LCM. Three metal tabs, located on the right side, connect it to the power bus bar.

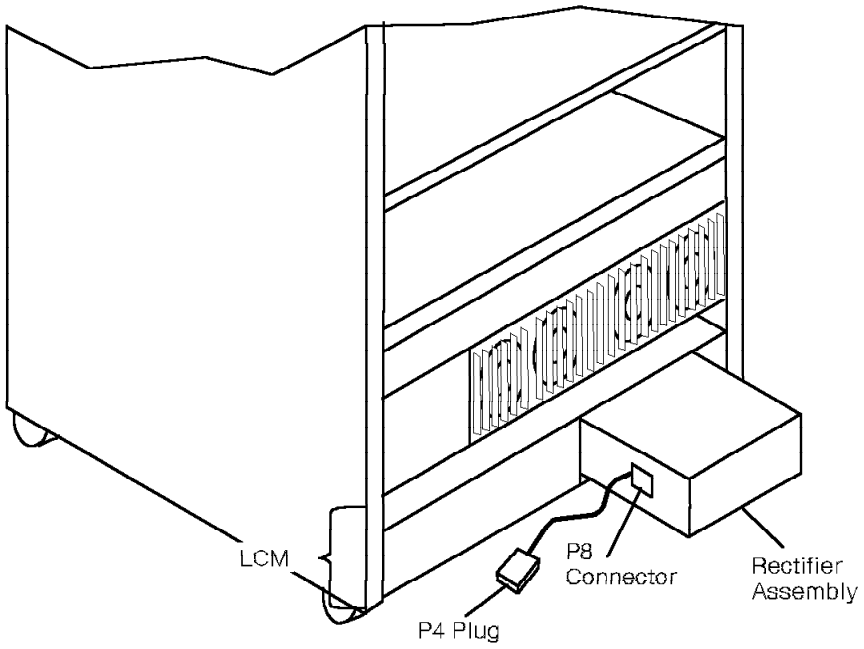


Figure 3-17. Model 40 or 50 Rectifier Assembly

The rectifier assembly has the following connectors:

P4 plug
Connects to the P2 connector of the PEA.

P8 connector
Terminates the P7 plug from the magnetics.

3.4.4 Capacitor Assembly

In ac system, the capacitor assembly (Figure 3-18) filters the rectifier assembly's output.

The capacitor assembly is at the back of the cabinet base, to the left of the LCM. Two tabs connect it to the power bus bar.

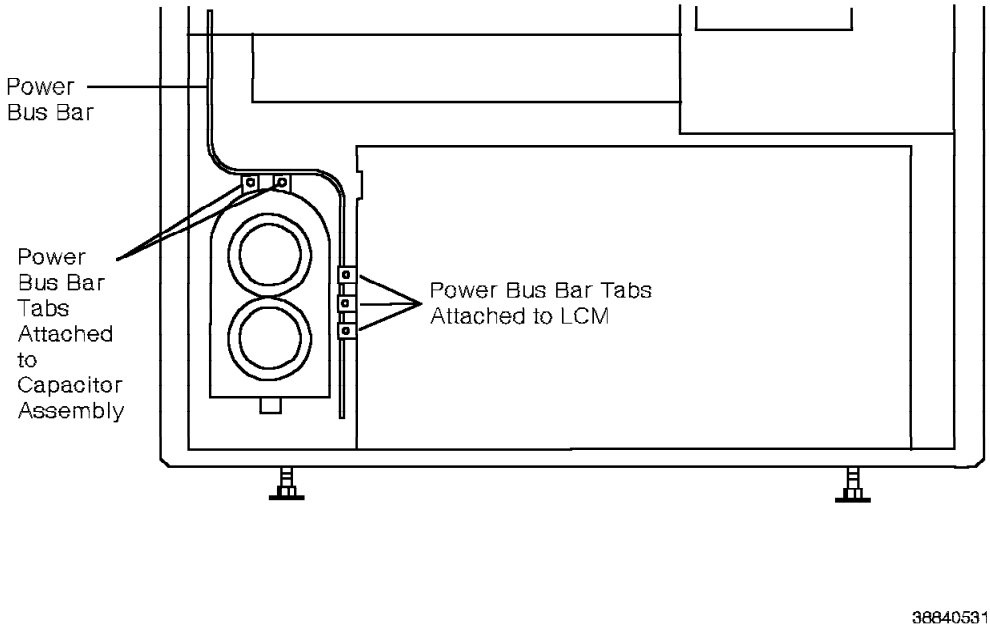


Figure 3-18. Model 40 or 50 Capacitor Assembly

3.4.5 Memory Retention Battery

The memory retention battery (Figure 3-19) is a sealed lead-acid type, 12 Vdc unit for ac systems only. During a power outage, the battery provides backup power to the +5P shelf power module, which permits the module to provide up to 15 minutes of power to memory. When the battery has no charge, it recharges in approximately 12 hours.

From the back of the cabinet, the memory retention battery is mounted to the left side of the cabinet in a battery carriage. For the Model 40, the unit is mounted at shelf 4. For the Model 50, a second unit is mounted at shelf 3.

A cable connects the memory retention battery to the +5P shelf power module. The cable plugs into the J1 and J2 connectors of the 9030A CCC motherboard.

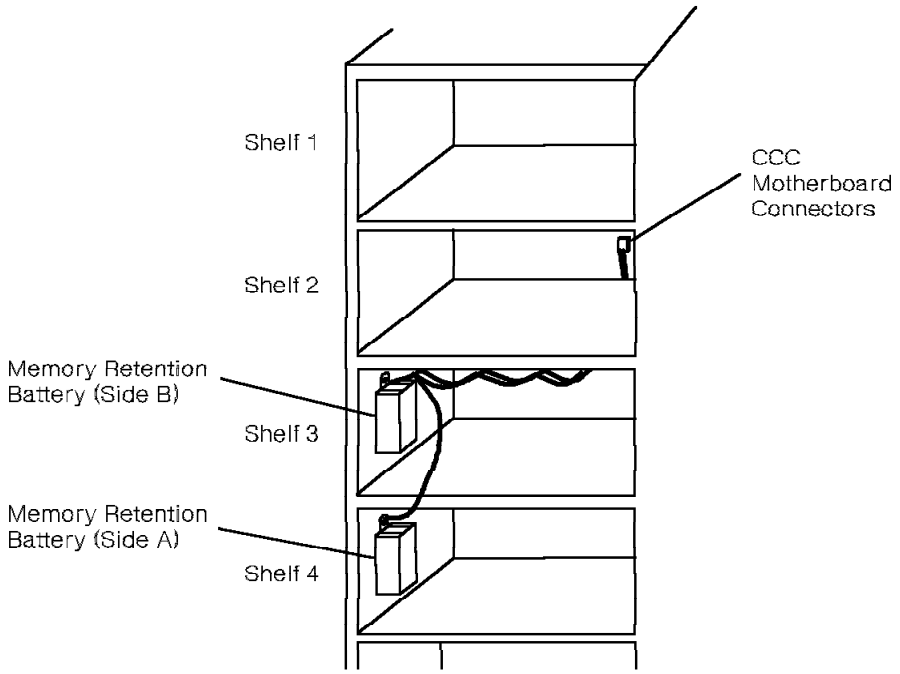


Figure 3-19. Model 40 or 50 Memory Retention Battery

3.4.6 BIM

The BIM is the main power entry point for dc systems (Figure 3-20). It filters and conditions the −48 Vdc from the battery source.

There is one BIM at the base of each dc-powered cabinet. Three metal tabs connect the BIM to the power bus bar.

The BIM does not provide a convenience outlet for service equipment.

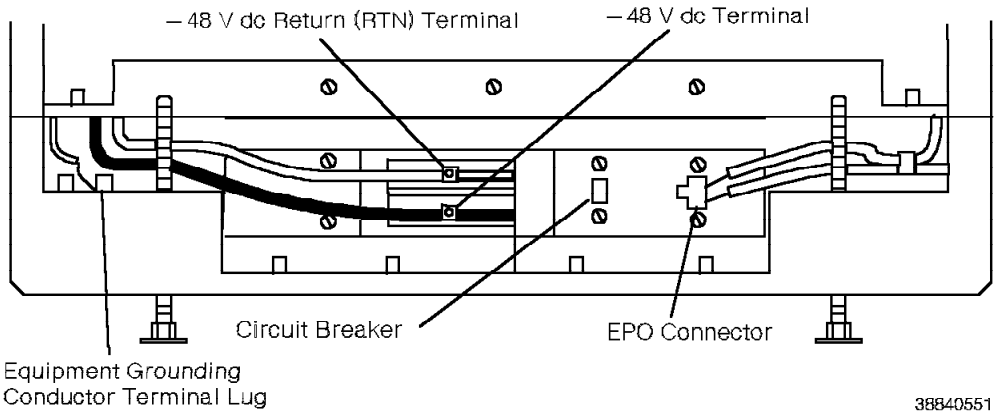


Figure 3-20. Model 40 or 50 BIM—Front View

The BIM consists of the following:

Equipment grounding conductor terminal lug
Provides for connection of the equipment grounding conductor.

−48 Vdc and −48 Vdc return terminals
Provides for connection of the dc branch circuit conductors.

The BIM terminals accommodate dc branch circuit conductors ranging in size from no. 6 to no. 2/0.

50A circuit breaker
Operating the circuit breaker removes output power from the BIM.

EPO connector
Terminates the EPO cable from the cabinet's EPO switch.

3.4.7 Shelf Power Modules

The 9751 CBX uses the following shelf power modules:

- +5P
- +5 Vdc (50A and 60A versions)
- +12 Vdc
- ±15 Vdc
- −48T
- Ring

The shelf power modules receive −48 Vdc input from two of the three upper bolts with which they connect to the motherboard or TDM backplane.

A typical shelf power layout for a CCC shelf (Figure 3-21) includes +12 Vdc, ±15 Vdc, +5 Vdc, and +5P modules.

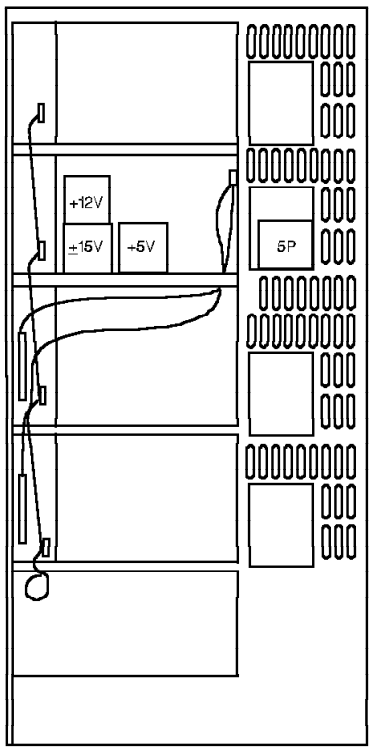


Figure 3-21. Typical CCC Shelf Power Module Layout for the Model 40 or 50

Each shelf power module has one green LED called the module is okay (MOK) LED. The ring shelf power module has two MOK LEDs—one for each of the two ring generators. Table 3-6 lists the shelf power module LED and the conditions it indicates.

Table 3-6. Shelf Power Module LED Indicator

Color	State	Indication
Green	On	The power module input and output are within acceptable limits.
	Off	The power module input and output are not within acceptable limits.

3.4.7.1 +5P Shelf Power Module

The +5P shelf power module (Figure 3-22) supplies +5 Vdc to memory. It also supplies charging voltage to the memory backup battery. Normally, the module operates on a −48 Vdc input, but during a power failure, it uses a +12 Vdc input from the battery.

The +5P shelf power module physically and electrically attaches to the CCC motherboard with six bolts that also serve as test points for the module.

The switch on the module controls output power.

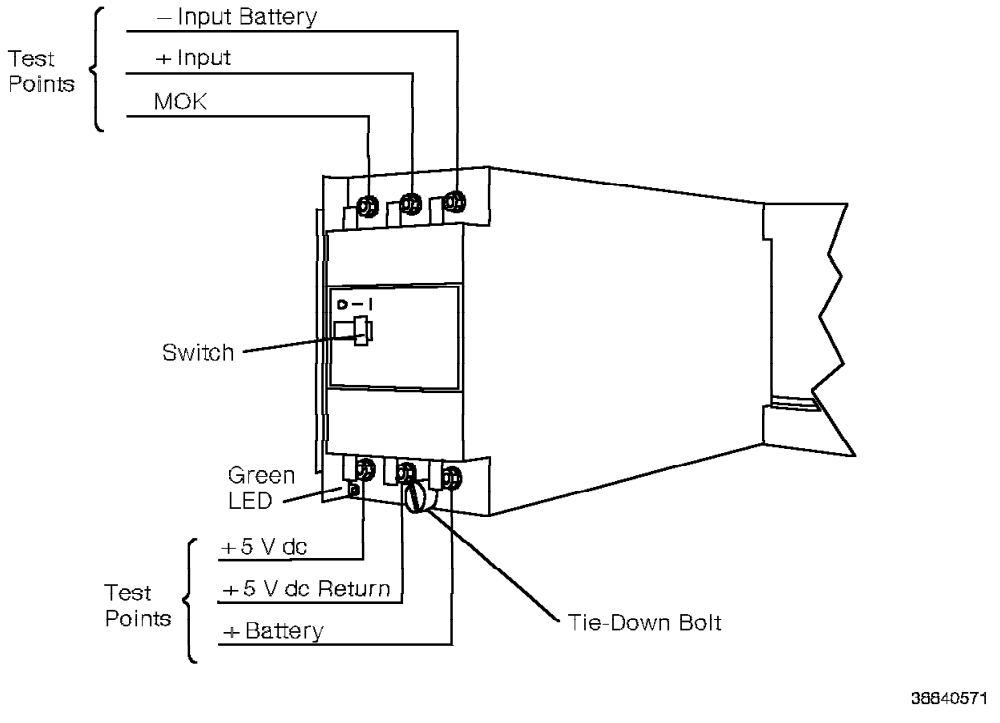


Figure 3-22. +5P Shelf Power Module for the Model 40 or 50

3.4.7.2 +5 V dc Shelf Power Module

The +5 Vdc (50A or 60A) shelf power module (Figure 3-23) supplies +5 Vdc to the TDM and CCC shelves.

The +5 Vdc (50A) shelf power module is required to provide power to the TDM shelves. The +5 Vdc (60A) shelf power module is required to provide power to the 9030A processor.

The +5 Vdc shelf power module physically and electrically attaches to the CCC motherboard or TDM backplane with six bolts that also serve as test points for the module.

The switch on the module controls output power.

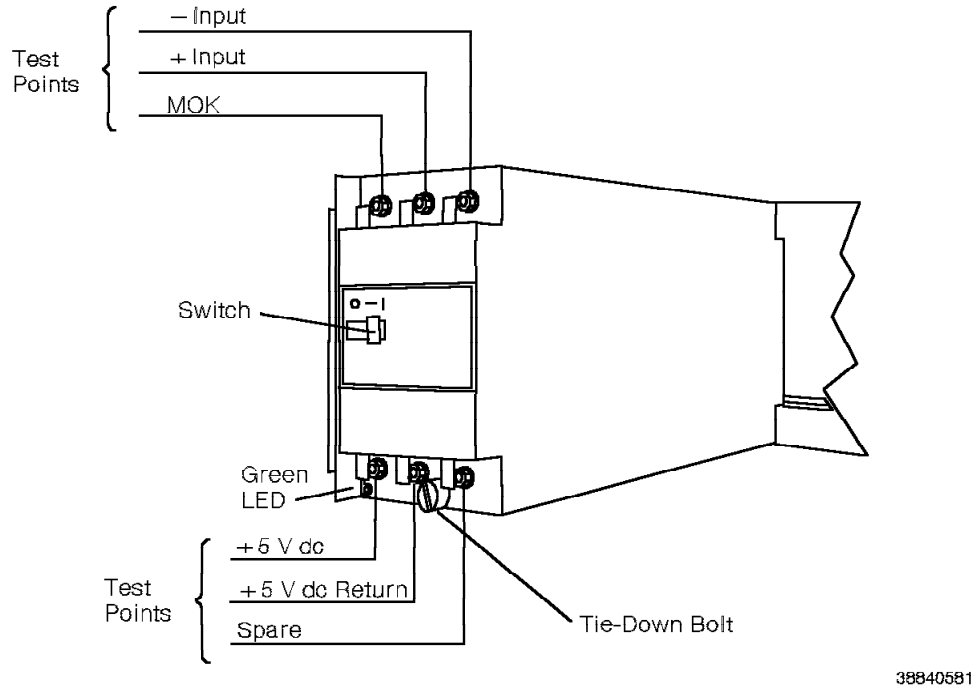


Figure 3-23. +5 V dc Shelf Power Module for the Model 40 or 50

3.4.7.3 +12 V dc Shelf Power Module

The +12 Vdc shelf power module (Figure 3-24) supplies +12 Vdc to the hard and diskette drive assemblies.

The +12 Vdc shelf power module physically and electrically attaches to the CCC motherboard with six bolts that also serve as test points for the module.

The switch on the module controls output power.

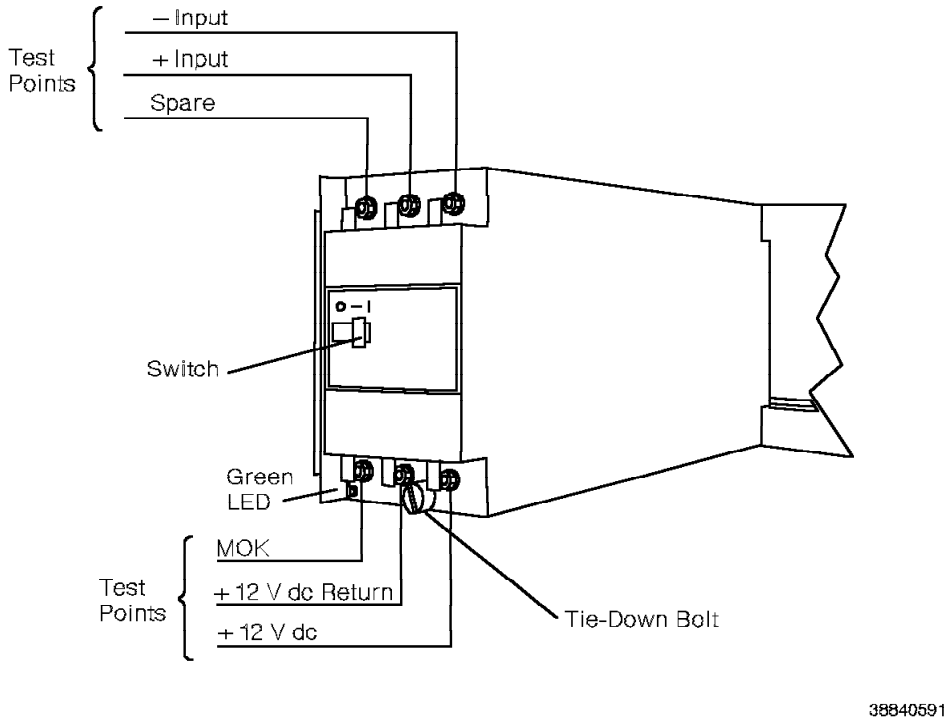


Figure 3-24. +12 V dc Shelf Power Module for the Model 40 or 50

3.4.7.4 ±15 V dc Shelf Power Module

The ±15 Vdc shelf power module (Figure 3-25) supplies ±15 Vdc to TDM and CCC shelves.

The ±15 Vdc shelf power module physically and electrically attaches to the CCC motherboard and TDM backplane with six bolts that also serve as test points for the module.

The switch on the module controls output power.

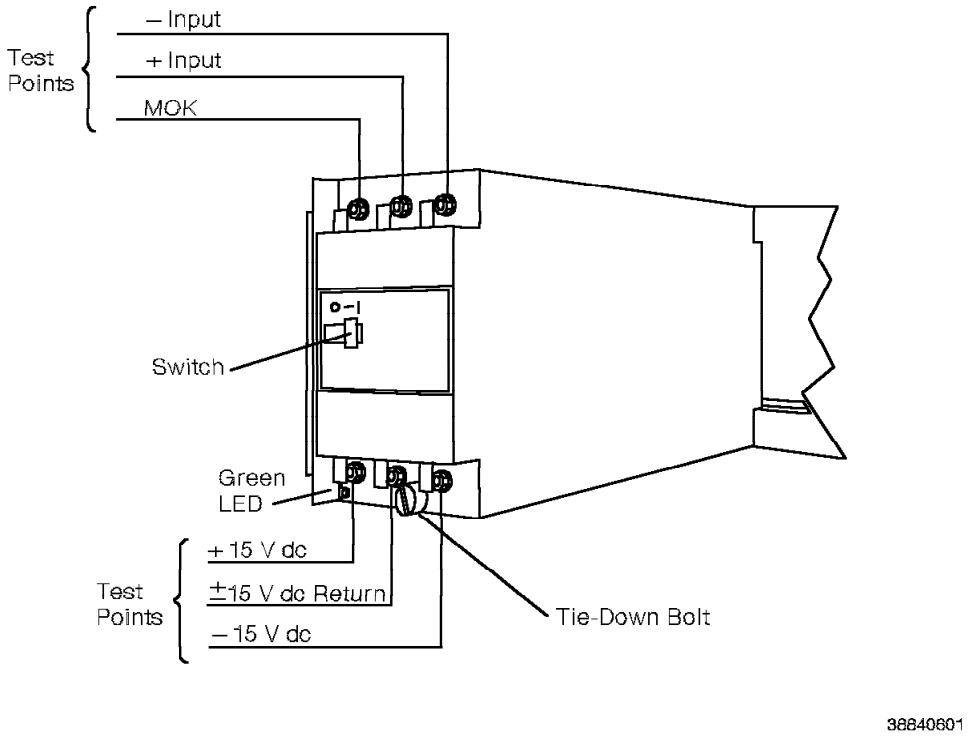


Figure 3-25. ±15 V dc Shelf Power Module for the Model 40 or 50

3.4.7.5 −48T Shelf Power Module

The −48T shelf power module (Figure 3-26) supplies −48 Vdc talk battery. Each TDM pod in the cabinet requires at least one −48T shelf power module.

The −48T shelf power module distributes the output through the power bus bar to all the shelves in the cabinet. The power bus bar distributes the −48 Vdc voltage throughout the cabinet. The −48 Vdc talk battery is fused at each shelf's LSM.

The −48T shelf power module physically and electrically attaches to the CCC motherboard and TDM backplane with six bolts that also serve as test points for the module.

The switch on the module controls output power.

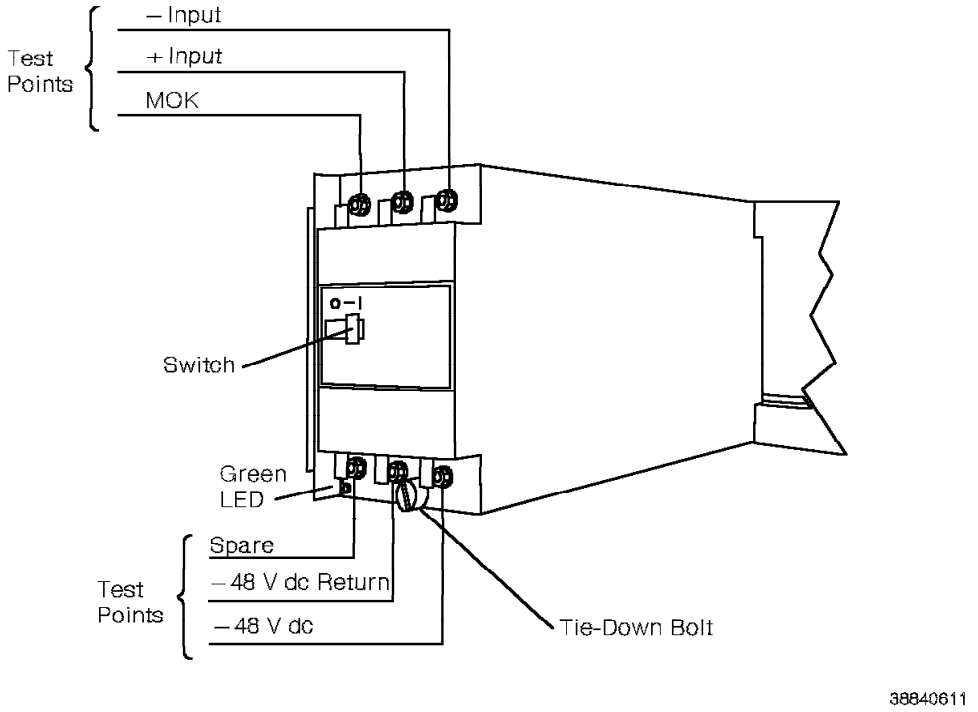


Figure 3-26. −48T Shelf Power Module for the Model 40 or 50

3.4.7.6 Ring Shelf Power Module

The ring shelf power module (Figure 3-27) supplies ring voltage throughout the cabinet. Each cabinet in the system requires one ring shelf power module.

The ring shelf power module distributes the voltage to all the shelves over the power bus bar. The power bus bar distributes the ring voltage throughout the cabinet. The ring voltage is fused at each shelf's LSM.

Each ring shelf power module contains two ring generators. When one fails, the other one begins to function.

The ring shelf power module physically and electrically attaches to the TDM backplane with six bolts that also serve as test points for the module.

The switch on the module controls output power.

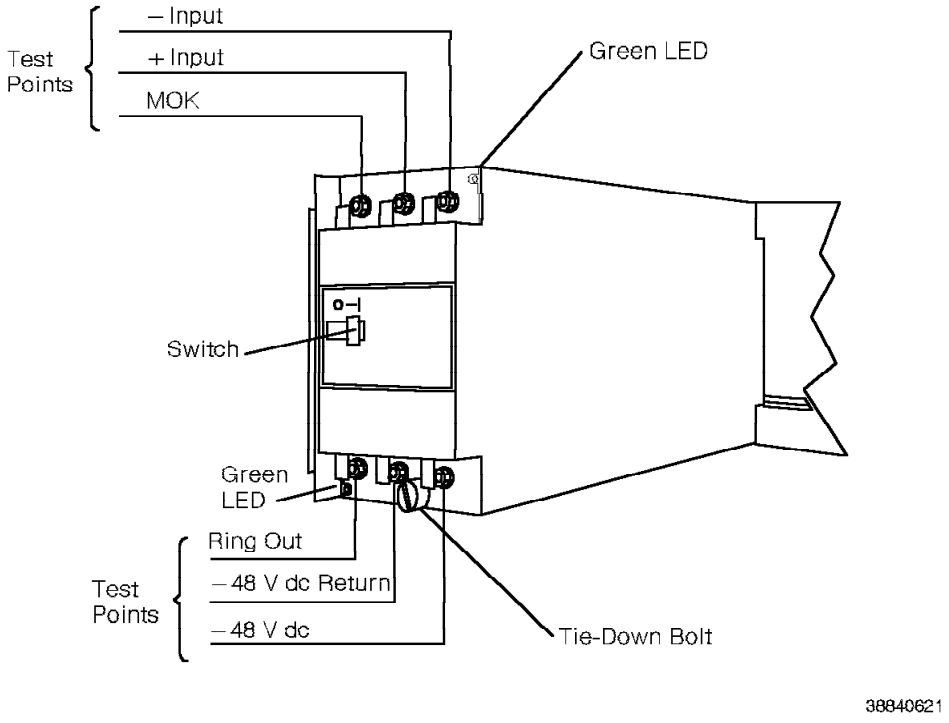


Figure 3-27. Ring Shelf Power Module for the Model 40 or 50

3.4.8 Cabinet Shelf Power Module Layouts

In the Model 40 or 50, each pod requires a set of power modules. The layout differs depending on whether the 9751 CBX is powered redundantly or nonredundantly. TDM pods can be redundantly powered regardless of whether it is a Model 40 or Model 50.

The CCC shelf power module configuration differs from a TDM shelf power module configuration. Table 3-7 lists the shelf power modules that each type of shelf requires.

In addition to the shelf power modules listed in Table 3-7:

- Each cabinet has one ring shelf power module that distributes ring voltage to both pods. The module is on:
  - Shelf 3 of cabinet 1
  - Shelf 7 of cabinet 2
  - Shelf 11 of cabinet 3
  - Shelf 15 of cabinet 4
  - Shelf 19 of cabinet 5
- Each pod requires one −48T shelf power supply to provide talk battery. The output is shared throughout the cabinet. However, a system with redundant power can have up to four −48T modules per cabinet.

  Adding an additional −48T shelf power supply to any pod provides redundancy to the entire cabinet.

Table 3-7. Shelf Power Modules Required for the Model 40 or 50

Shelf or Pod Type	Shelf Power Modules Required
CCC shelf in a system with nonredundant power	• One +5 Vdc (60A) • One ±15 Vdc • **Model 40:** One +5P **Model 50:** Two +5P • One +12 Vdc **Note:** The CCC shelf shares the ±15 Vdc and the +5 Vdc (60A) shelf power module with shelf 1.
Cabinet 1 upper pod in a system with redundant power	• One or two +5 Vdc (60A) • One or two ±15 Vdc • **Model 40:** One +5P **Model 50:** Two +5P • One +12 Vdc
TDM pod in a system with nonredundant power	• One +5 Vdc (50A) • One ±15 Vdc • One −48T
TDM pod in a system with redundant power	• Two +5 Vdc (50A) • Two ±15 Vdc • Two −48T

3.4.8.1 Cabinet 1 in a System with Nonredundant Power

Figure 3-28 shows the cabinet 1 shelf power module layout for a system with nonredundant power.

Model 50: Shelf 2 has two +5P shelf power modules.

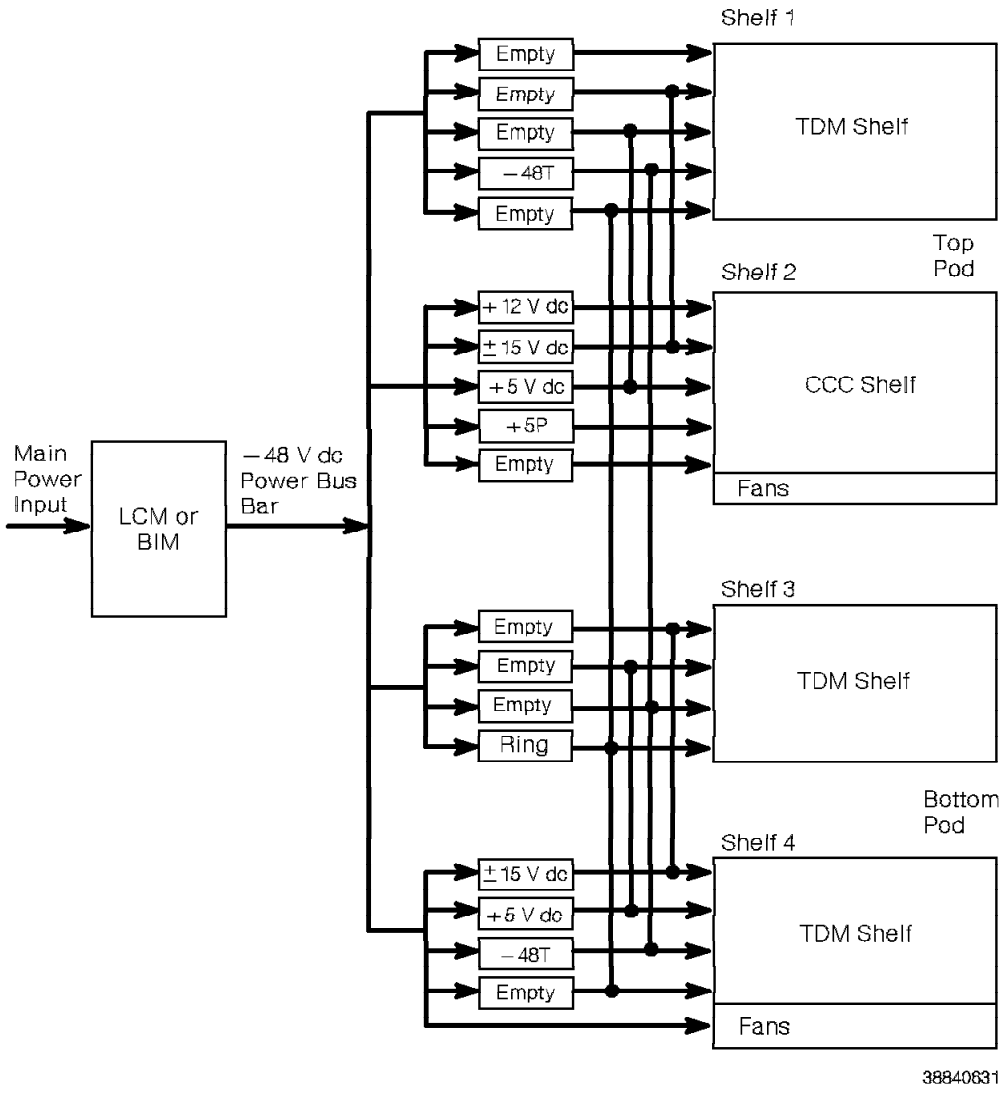


Figure 3-28. Cabinet 1 Shelf Power Module Layout in a System with Nonredundant Power

3.4.8.2 Cabinet 1 in a System with Redundant Power

Figure 3-29 shows the cabinet 1 shelf power module layout for a system with redundant power. In Figure 3-29:

- The ±15 Vdc power module on shelf 1 is redundant with the ±15 Vdc power module on shelf 2.
- The +5 Vdc power module on shelf 1 is redundant with the +5 Vdc power module on shelf 2.
- The ±15 Vdc power module on shelf 3 is redundant with the ±15 Vdc power module on shelf 4.
- The +5 Vdc power module on shelf 3 is redundant with the +5 Vdc power module on shelf 4.
- The −48T power module on shelf 3 is redundant with the −48T power module on shelves 1 and 4.

Model 50: Shelf 2 has two +5P shelf power modules.

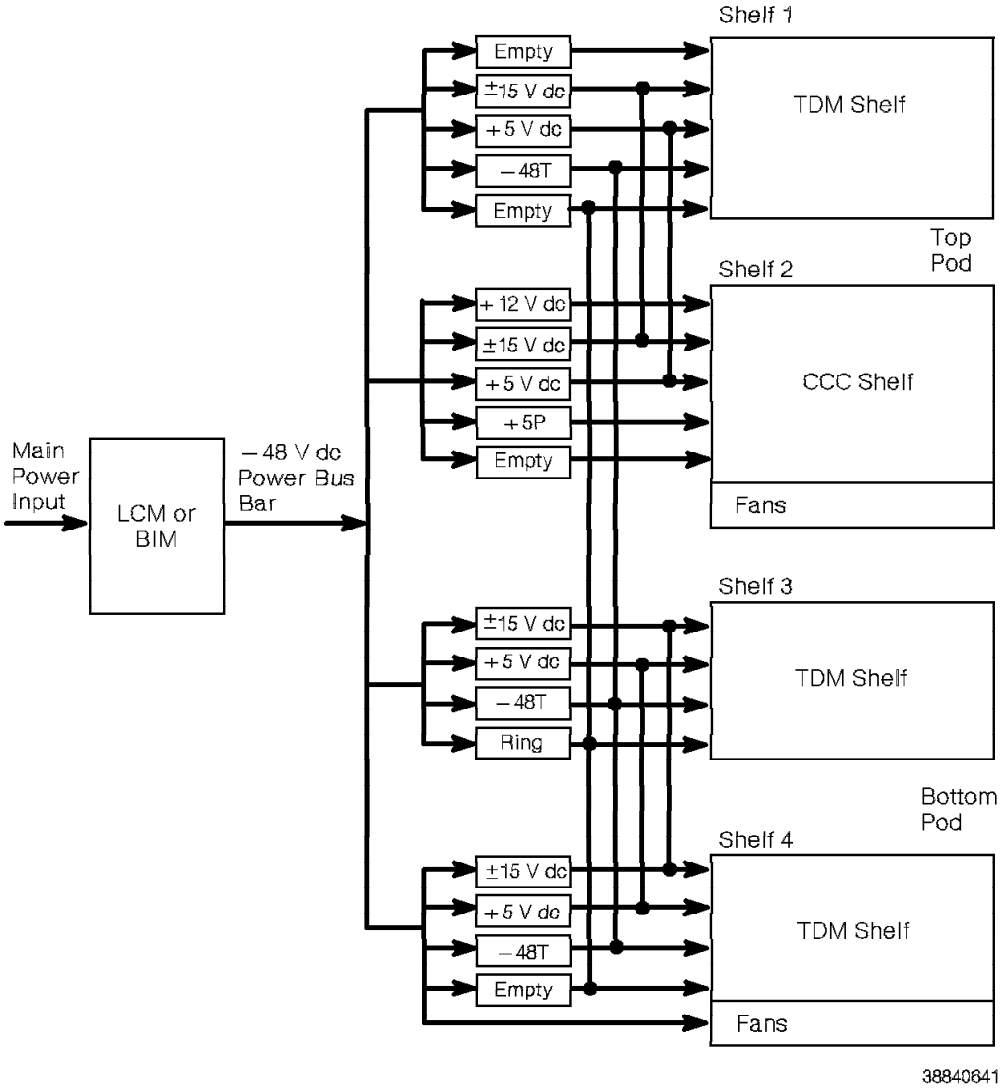


Figure 3-29. Cabinet 1 Shelf Power Module Layout in a System with Redundant Power

3.4.8.3 Cabinets 2 through 5 in a System with Nonredundant Power

Figure 3-30 shows the cabinets 2 through 5 shelf power module layout for a system with nonredundant power.

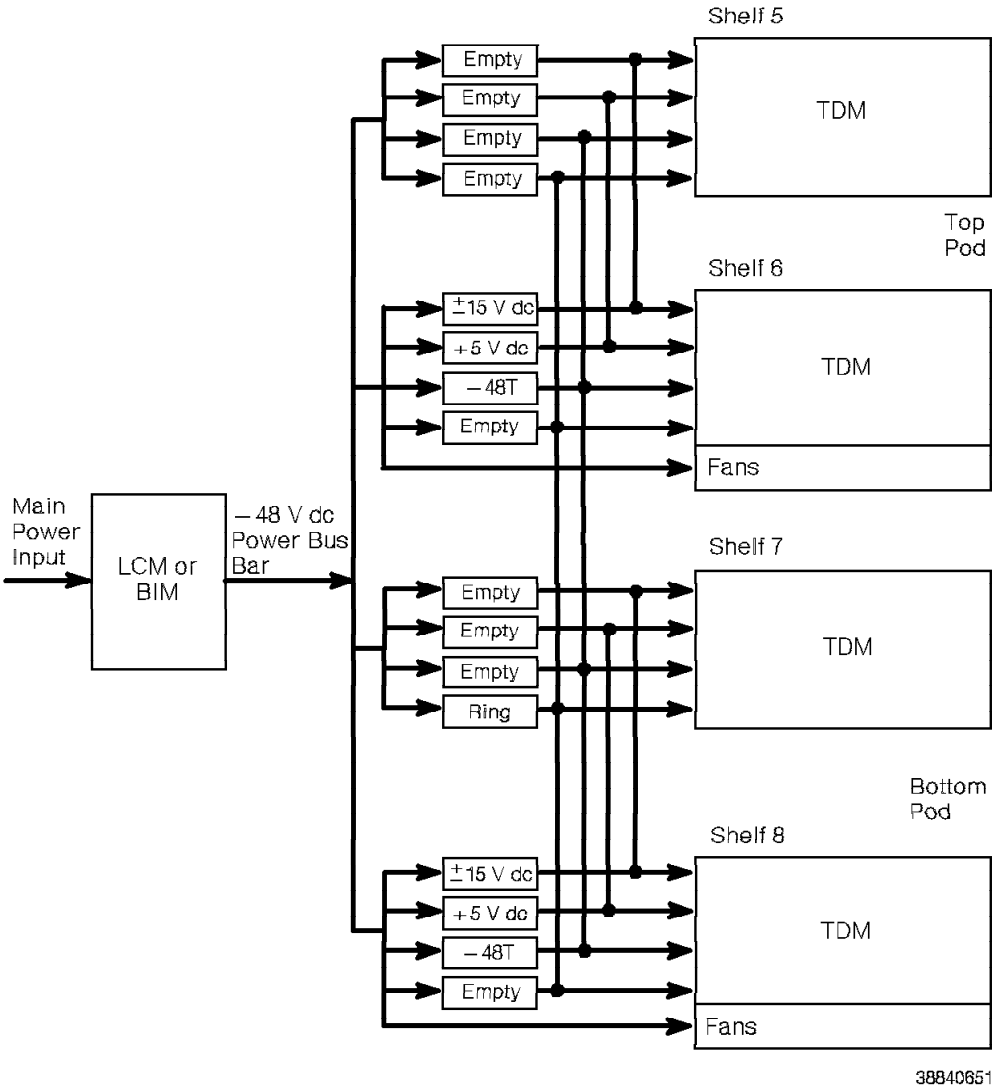


Figure 3-30. Cabinets 2 through 5 Shelf Power Module Layout in a System with Nonredundant Power

3.4.8.4 Cabinets 2 through 5 in a System with Redundant Power

Figure 3-31 shows the cabinets 2 through 5 shelf power module layout for a system with redundant power. In Figure 3-31:

- The ±15 Vdc power module on shelf 5 is redundant with the ±15 Vdc power module on shelf 6.
- The +5 Vdc power module on shelf 5 is redundant with the +5 Vdc power module on shelf 6.
- The −48T power module on shelf 5 is redundant with the −48T power module on shelves 6, 7, and 8.

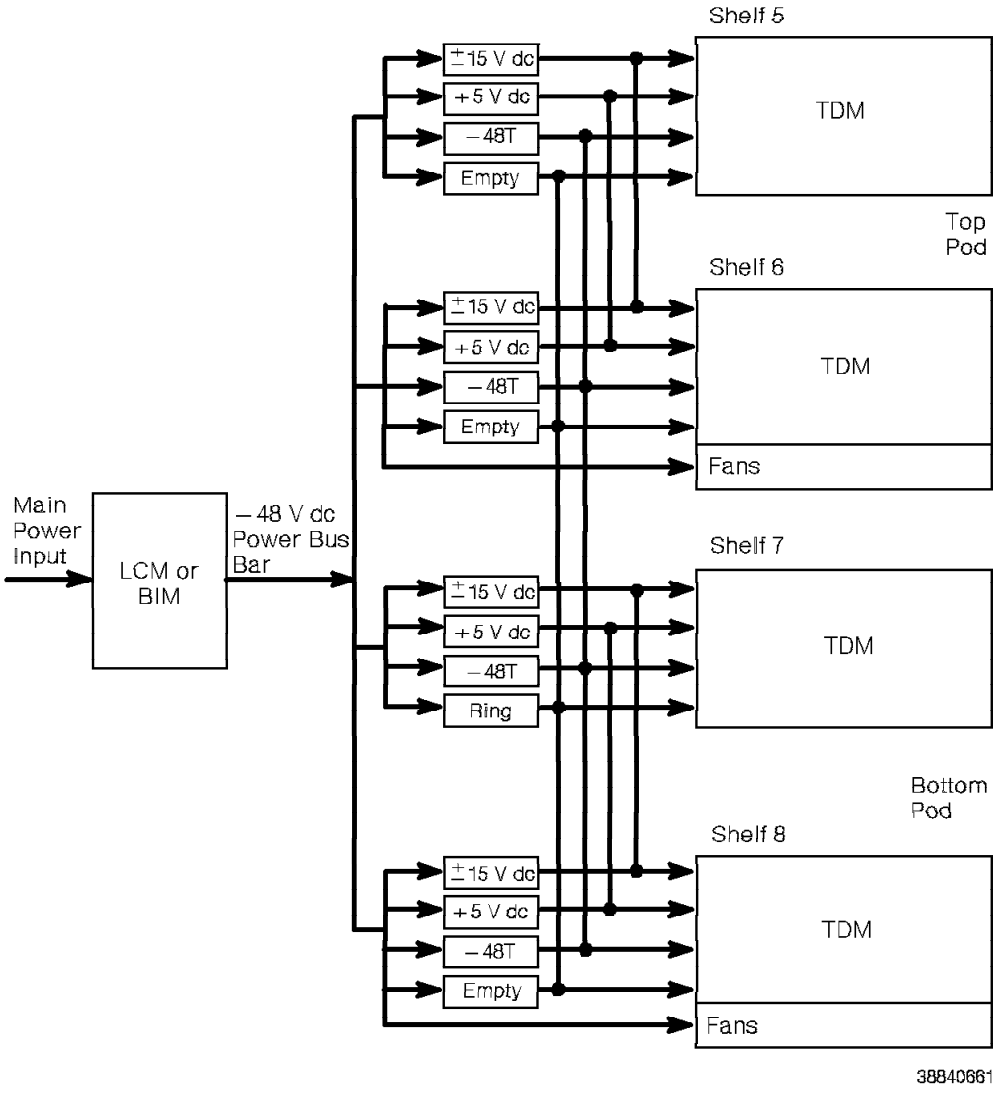


Figure 3-31. Cabinets 2 through 5 Shelf Power Module Layout in a System with Redundant Power

3.5 9030A CCC Group

The 9030A CCC group provides supervisory and control functions for the 9751 CBX.

In the Model 40 or 50, the 9030A CCC group consists of the following:

- 9030A CPU card
- 9030A memory expansion card
- 9030A I/O bus switch card
- 9030A CCC motherboard

The 9030A CPU card communicates with the TDM network control group through the 9030A CCC motherboard (Figure 3-32), and it communicates with the SMIOC and the PDC card through the 9030A I/O bus switch card.

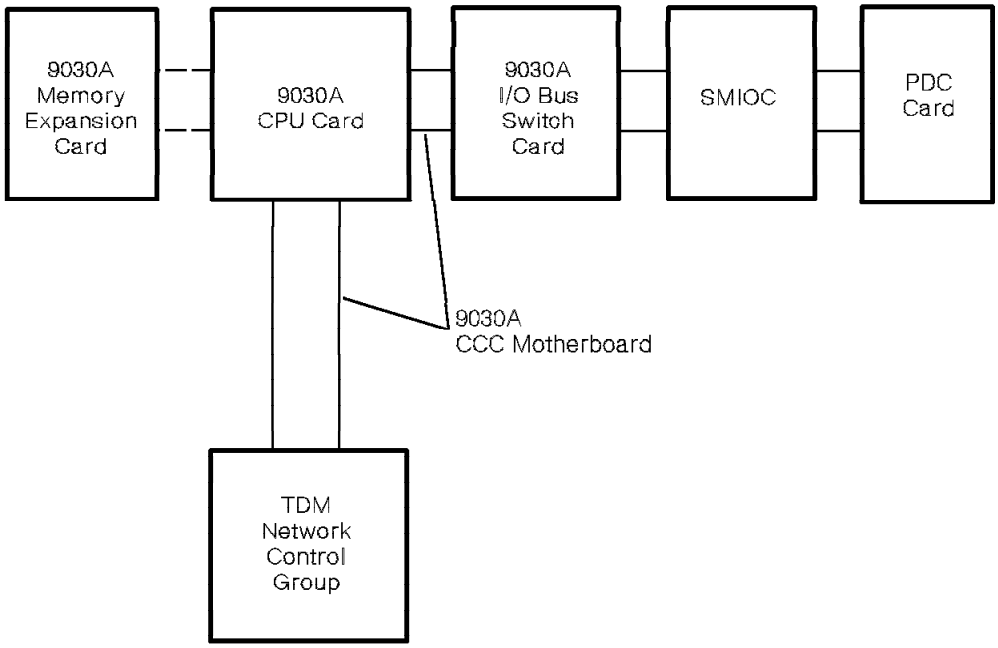


Figure 3-32. 9030A CCC Functional Diagram for the Model 40 or 50

3.5.1 9030A CPU Card

Refer to 4.48, “9030A CPU Card” on page 4-93.

3.5.2 9030A Memory Expansion Card

Refer to 4.50, “9030A Memory Expansion Card (Model 50)” on page 4-97.

3.5.3 9030A I/O Bus Switch Card

Refer to 4.49, “9030A I/O Bus Switch Card (Models 40 and 50)” on page 4-96.

3.5.4 9030A CCC Motherboard

The 9030A CCC motherboard interfaces the 9030A CPU card with the other cards on shelf 2.

Figure 3-33 shows the front view of the 9030A CCC motherboard for the Model 40.

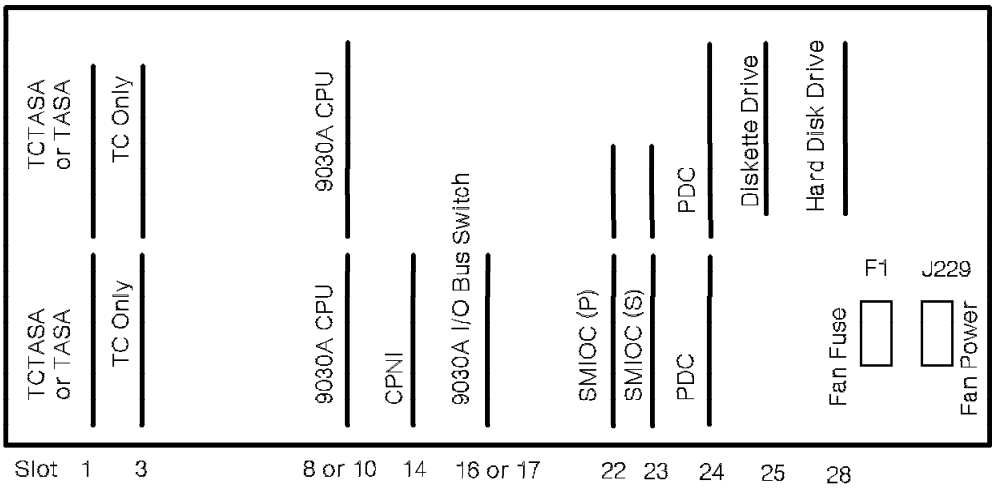


Figure 3-33. 9030A CCC Motherboard for the Model 40—Front View

Figure 3-34 shows the front view of the 9030A CCC motherboard for the Model 50.

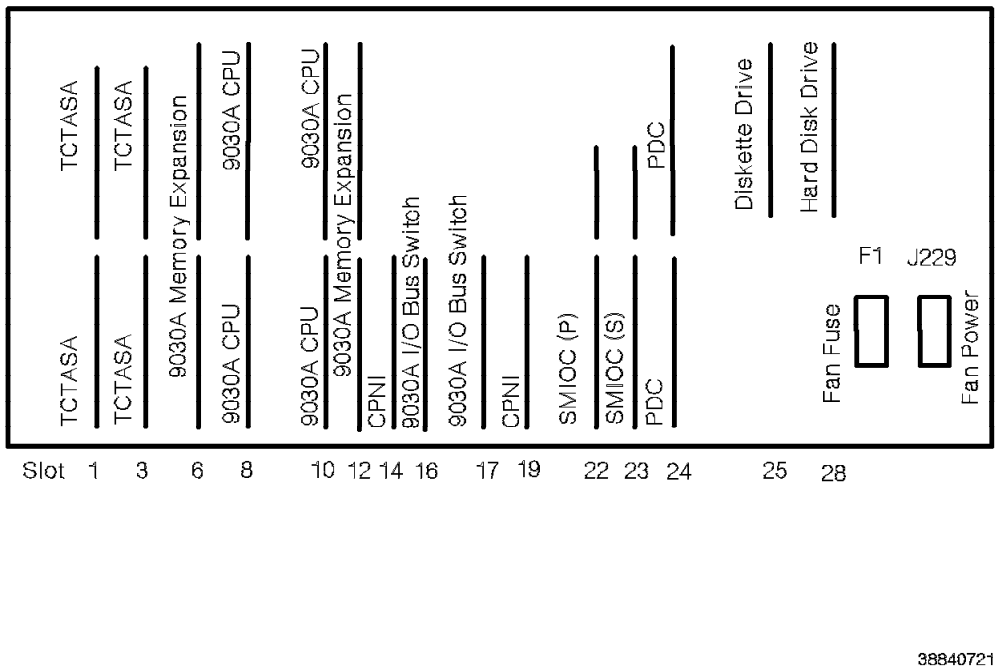


Figure 3-34. 9030A CCC Motherboard for the Model 50—Front View

Refer to the following for information about the 9030A CCC shelf's card slots and their purposes:

- 3.2.1.1, "9030A CCC Shelf for the Model 40" on page 3-6
- 3.2.1.2, "9030A CCC Shelf for the Model 50" on page 3-7

The following additional connectors appear on the back of the 9030A CCC motherboard:

F1 Fan fuse connector
J229 Fan wiring harness connector

Figure 3-35 shows the back view of the 9030A CCC motherboard for the Model 40 or 50.

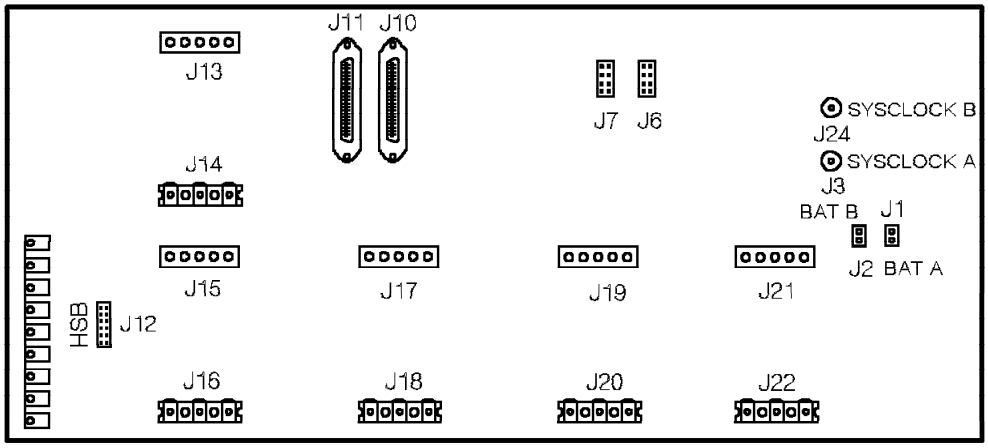


Figure 3-35. 9030A CCC Motherboard for the Model 40 or 50—Back View

Table 3-8 lists the connectors that appear on the back of the 9030A CCC motherboard.

Table 3-8. 9030A CCC Motherboard Connectors for the Model 40 or 50—Back View

Slot or Connector	**Purpose**
J1 and J2	Memory retention battery
J3 and J24	Twinaxial connectors for clock cables from the 24x23x23 universal motherboard on shelf 1
J6 and J7	Political timer battery
J10 and J11	Amphenol connectors for the primary and secondary SMIOCs
J12	HSB
J13 and J14	+12 Vdc shelf power module
J15 and J16	±15 Vdc shelf power module
J17 and J18	+5 Vdc shelf power module
J19 and J20	+5P shelf power module for CPU 2 (side B)
J21 and J22	+5P shelf power module for CPU 1 (side A)

3.5.5 Political Timer Battery

The political timer battery (Figure 3-36) supplies power for the circuitry in the 9030A CPU card that provides the current date and time.

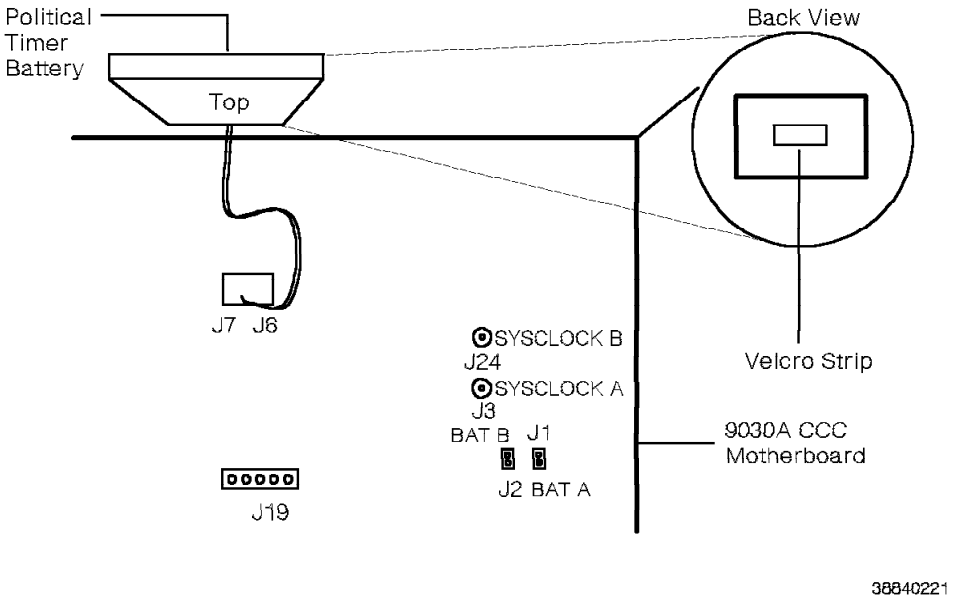


Figure 3-36. Model 40 or 50 Political Timer Battery

3.6 TDM Network Control Group

The TDM network (Figure 3-37 on page 3-42) provides a communication path between the 9030A CPU card and the TDM shelf cards.

The TDM network contains the following hardware:

- CSM card
- CSM motherboard
- Expander card
- Intershelf bus (ISB)
- TC card
- TASA card
- TCTASA card
- Universal motherboards
- TDM backplane

Note: A Model 40 system can contain either the TC card and the TASA card, or the combined TCTASA card. A Model 50 system always contains the TCTASA card.

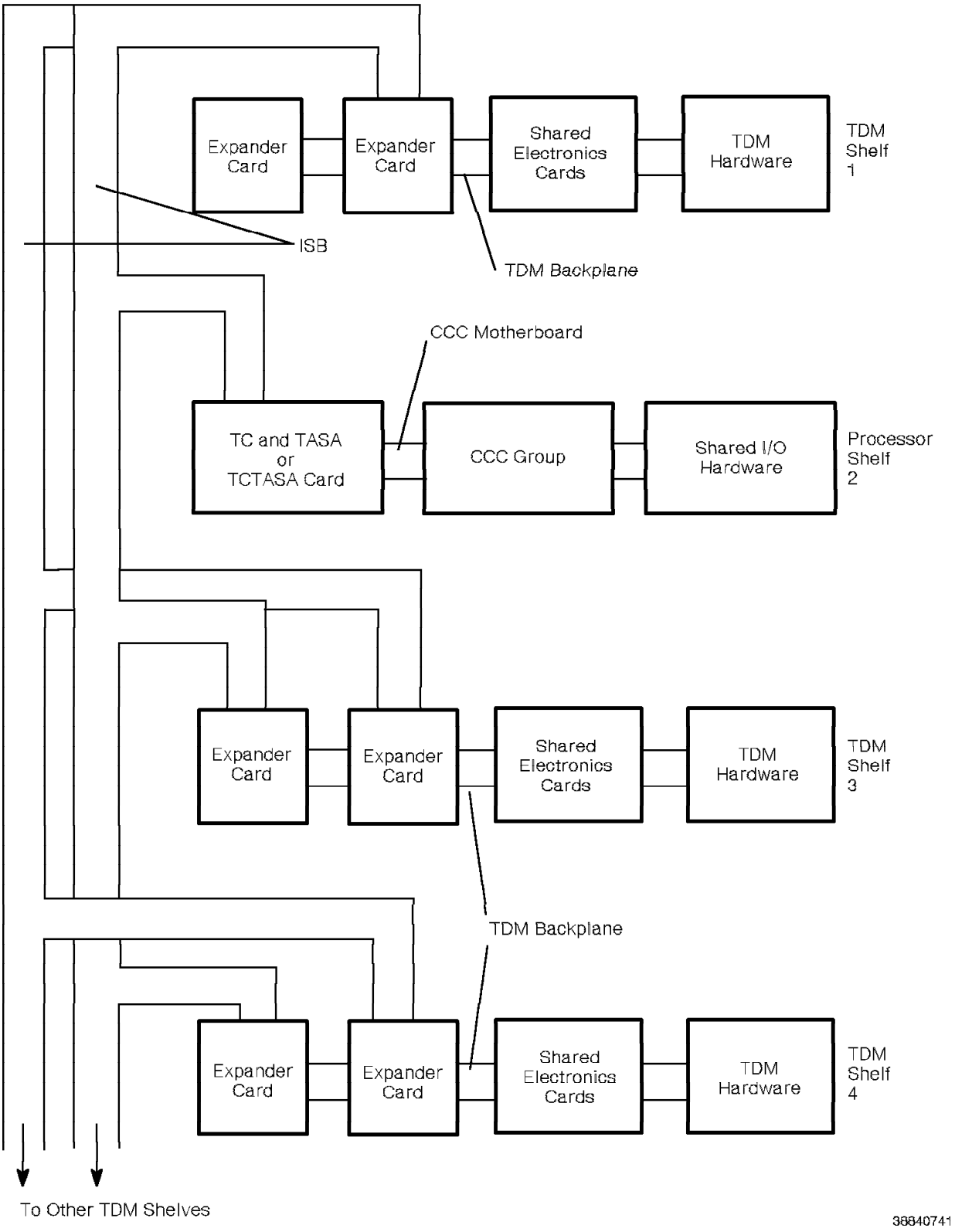


Figure 3-37. Model 40 or 50 TDM Network Functional Diagram

3.6.1 CSM Card

Refer to 4.12, “CSM Card” on page 4-21.

3.6.2 CSM Motherboard

The CSM motherboard (Figure 3-38) provides the interface for the CSM card and the Model 40 or 50. The front of the CSM motherboard has a 32-pin connector for the CSM card. The back of the CSM motherboard has the following:

- Eight twinaxial connectors for internal and external clocking
- A switch that you position to correspond with the shelf that the CSM motherboard is on
- A 10-pin flat cable connector for clock intercable connections between CSMs in a Model 50

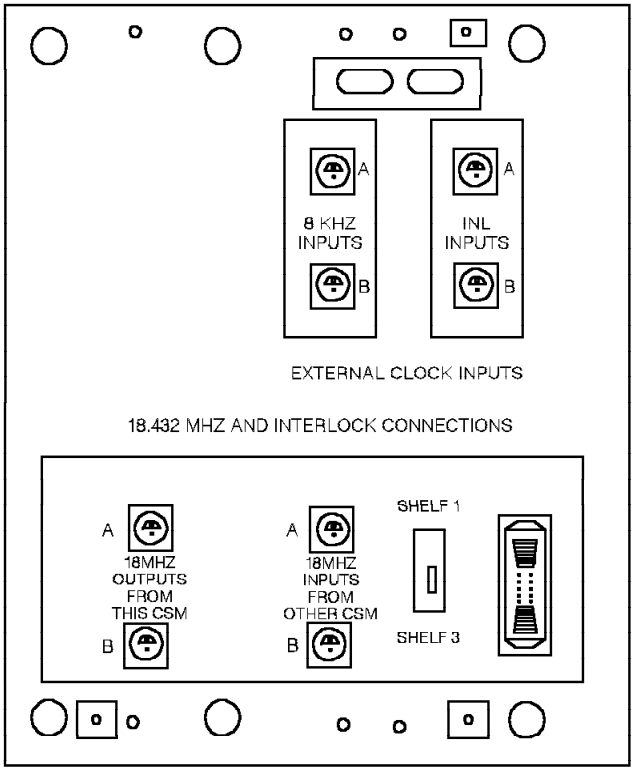


Figure 3-38. Model 40 or 50 CSM Motherboard

Install the CSM motherboard on a configurable TDM shelf where there are other motherboards such as the following:

- 6x3x1 message waiting motherboard
- 5x3x1 OPS motherboard
- 2x1x1 digital trunk motherboard

3.6.3 Expander Card

Refer to 4.16, “Expander Card (Models 40 and 50)” on page 4-29.

3.6.4 ISB

The intershelf communication is accomplished over the ISB. The ISB is a ribbon cable that connects from shelf to shelf and cabinet to cabinet.

Refer to Appendix B, “Models 40 and 50 Intershelf Bus Cabling” for ISB cable routing diagrams.

3.6.5 TC Card

Refer to 4.40, “TC Card (Model 40)” on page 4-81.

3.6.6 TASA Card

Refer to 4.39, “TASA Card (Model 40)” on page 4-80.

3.6.7 TCTASA Card

Refer to 4.42, “TCTASA Card (Models 40 and 50)” on page 4-83.

3.6.8 Universal Motherboards

Universal motherboards are on TDM shelves above the TDM backplane. The front of each has connectors for 23 cards.

The following are the types of universal motherboards in the Model 40 or 50:

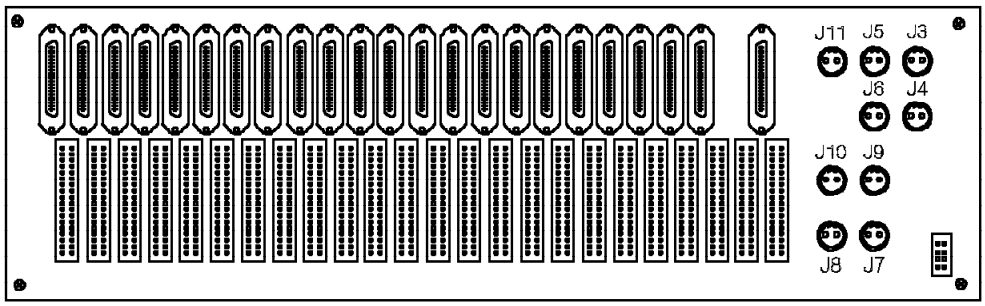
- 24x23x23 universal motherboard (with and without clock cable connectors)
- 24x23x23 short universal motherboard
- 6x5x5 universal motherboard

3.6.8.1 24x23x23 Universal Motherboard with Clock Cable Connectors

The front of 24x23x23 universal motherboard with clock cable connectors has a switch designated S1, which is between the two expander slots. If the motherboard is on shelf 1, set the S1 switch to the up (*On*) position. Otherwise, set the switch in the down (*Off*) position.

The back of the 24x23x23 universal motherboard with clock cable connectors (Figure 3-39 on page 3-45) has several connectors. The type of clock cabling determines which connectors you use. Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for more information.

The universal motherboard with clock cable connectors is on shelves 1 and 3 of cabinet 1.



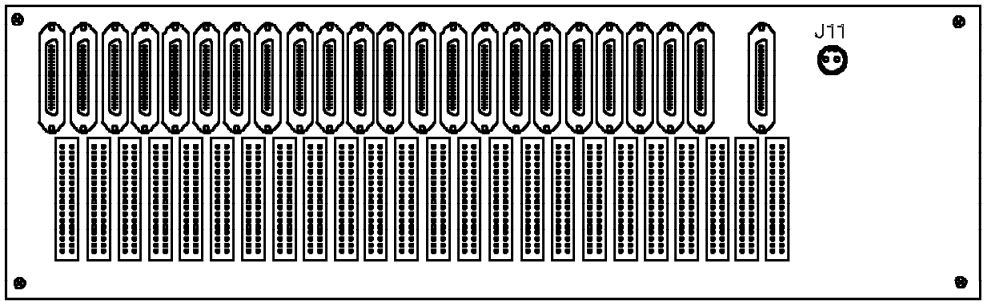
38842871

Figure 3-39. 24x23x23 Universal Motherboard with Clock Cable Connectors for the Model 40 or 50—Back View

3.6.8.2 24x23x23 Universal Motherboard without Clock Cable Connectors

Figure 3-40 shows the back of the 24x23x23 universal motherboard without clock cable connectors.

The universal motherboard without clock cable connectors is on any TDM shelf. It has a J11 connector, which you do not use.



38840761

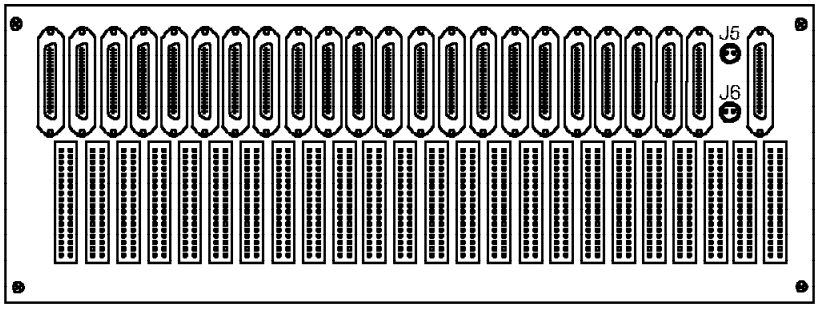
Figure 3-40. 24x23x23 Universal Motherboard without Clock Cable Connectors for the Model 40 or 50—Back View

3.6.8.3 24x23x23 Short Universal Motherboard

The 24x23x23 short universal motherboard is identical to the 24x23x23 universal motherboard without clock cable connectors, except that the back has no BNC twinaxial connectors.

Figure 3-41 on page 3-46 shows the back of the 24x23x23 short universal motherboard.

The short universal motherboard is on any TDM shelf.

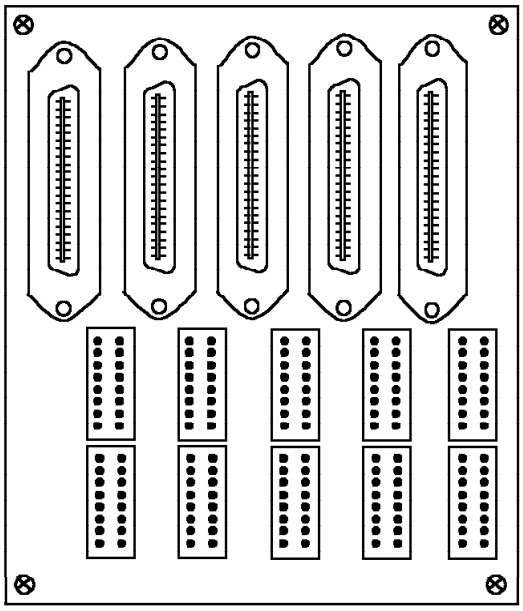


38842811

Figure 3-41. 24x23x23 Short Universal Motherboard for the Model 40 or 50—Back View

3.6.8.4 6x5x5 Universal Motherboard

The front of the 6x5x5 universal motherboard (Figure 3-42) has connectors for five cards.



38840771

Figure 3-42. 6x5x5 Universal Motherboard for the Model 40 or 50

The 6x5x5 universal motherboard is on any configurable TDM shelf. Use it on shelves where there are other motherboards, such as the following:

- 6x3x1 message waiting motherboard
- 5x3x1 OPS motherboard
- 2x1x4 digital trunk motherboard

3.7 Peripheral Device Hardware

The peripheral device hardware consists of the following:

- Diskette drive unit
- Hard disk drive unit
- PDC card

3.7.1 Diskette Drive Unit

The diskette drive unit loads the software from diskette to hard disk. It also copies software updates from hard disk to diskettes to back up the current site database.

The diskette drive unit (Figure 3-43) consists of a diskette drive, a drive electronics board, and a bracket.

Important Note: You *must* use 3.5-inch, 2-megabyte (MB), double-sided, high-density diskettes. Although the system can read and write to 1MB low-density diskettes, it *cannot* load or boot from them.

The 9751 CBX supports one diskette drive unit.

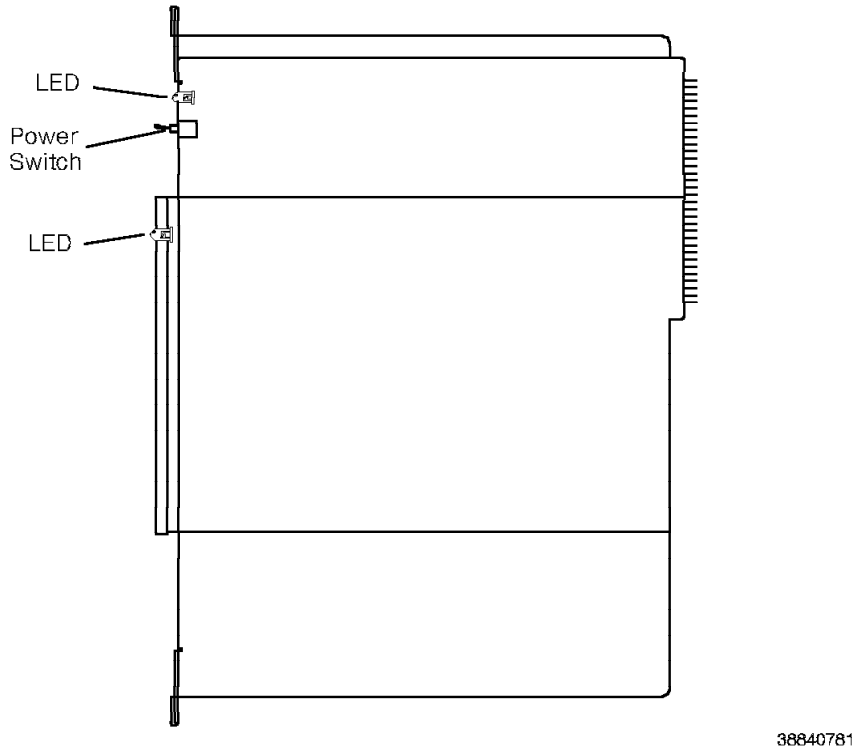


Figure 3-43. Model 40 or 50 Diskette Drive Unit

The diskette drive unit is in slot 25 on shelf 2 of the Model 40 or 50.

Table 3-9 lists the diskette drive unit LED indicators.

Table 3-9. Diskette Drive Unit LED Indicators

LED	Color	State	Indication
Diskette drive	Yellow or green	On	The diskette drive is being accessed.
		Off	The diskette drive is not being accessed.
Drive electronics board	Green	On	The diskette drive is supplied with +12 Vdc power.
		Off	The diskette drive is not supplied with +12 Vdc power.

The diskette drive unit has one switch on the drive electronics board that turns the +12 Vdc shelf power module to the diskette drive on and off.

Strap the jumper settings on the drive electronics board so the diskette drive unit correctly functions (Figure 3-44). Install one jumper plug each on the JMP1 and JMP5 pins.

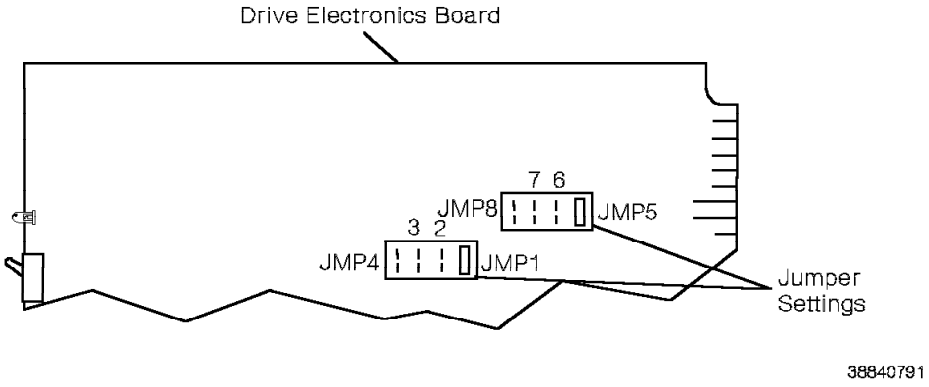


Figure 3-44. Diskette Drive Unit Jumper Setting

3.7.2 Hard Disk Drive Unit

The hard disk drive unit stores system software. The software includes the core image and configuration information.

The hard disk drive unit (Figure 3-45 on page 3-49) consists of the following:

- Hard disk drive
- Drive electronics board
- Bracket

The 9751 CBX supports one hard disk drive unit.

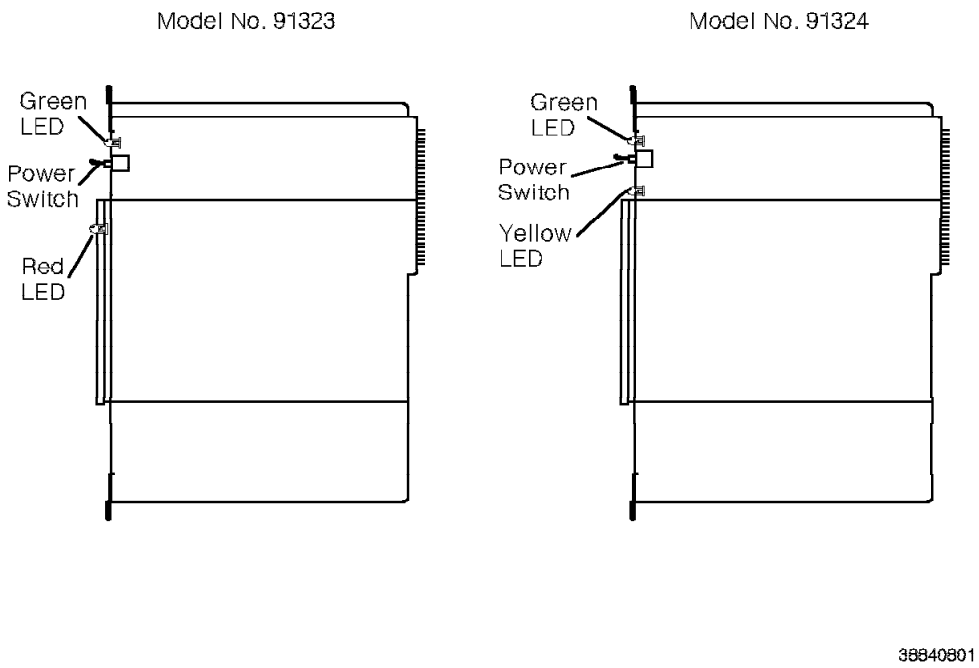


Figure 3-45. Model 40 or 50 Hard Disk Drive Unit

The hard disk drive is in slot 28 on shelf 2 of the Model 40 or 50.

Table 3-10 lists the model no. 91323 hard disk drive unit LEDs and the conditions they indicate.

Table 3-10. Model No. 91323 Hard Disk Drive Unit LED Indicators

LED	Color	State	Indication
Hard disk drive	Red	On	The hard disk drive is being accessed.
		Off	The hard disk drive is not being accessed.
Drive electronics board	Green	On	The +12 Vdc power is being supplied to the hard disk drive.
		Off	There is no +12 Vdc power being supplied to the hard disk drive.

Table 3-11 lists the model no. 91324 hard disk drive unit LEDs and the conditions they indicate.

Table 3-11. Model No. 91324 Hard Disk Drive Unit LED Indicators

LED	Color	State	Indication
Drive electronics board	Yellow	On	The hard disk drive is being accessed.
		Off	The hard disk drive is not being accessed.
Drive electronics board	Green	On	The +12 Vdc power is being supplied to the hard disk drive.
		Off	There is no +12 Vdc power being supplied to the hard disk drive.

It also has one switch on the drive electronics board that turns the +12 Vdc power supply to the disk drive on and off.

For the model no. 91323 hard disk drive unit, strap the jumper settings on the drive electronics board as follows (Figure 3-46):

- Install one jumper plug on the two JMP1 pins.
- Install the other jumper plug on the two JMP5 pins.

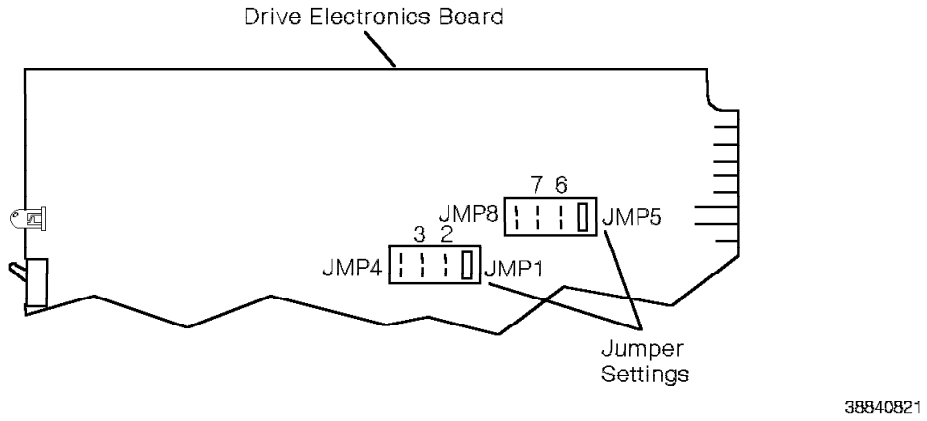


Figure 3-46. Model No. 91323 Hard Disk Drive Unit Jumper Setting

For the model no. 91324 hard disk drive unit, install one jumper plug on the two JMP1 pins (Figure 3-47 on page 3-51).

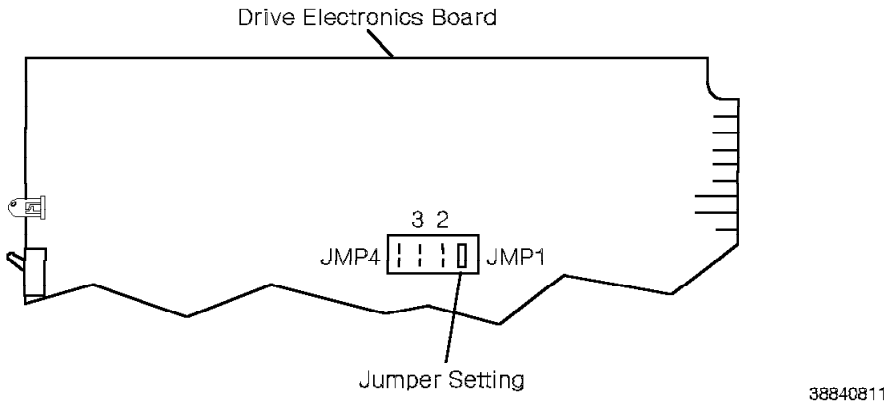


Figure 3-47. Model No. 91324 Hard Disk Drive Unit Jumper Setting

3.7.3 PDC Card

Refer to 4.29, “PDC Card” on page 4-60.

3.8 IPDN

The integrated services digital network (ISDN) primary digital network (IPDN) consists of the following:

- IPDN card
- IPDN breakout assembly
- IPDN cable

3.8.1 IPDN Card

Refer to 4.19, “IPDN Card” on page 4-33.

3.8.2 IPDN Breakout Assembly

Refer to 2.9.2, “IPDN Breakout Assembly” on page 2-24.

3.8.3 IPDN Cable

The Model 40 or 50 IPDN cable (Figure 3-48 on page 3-52) connects the IPDN card, T1DN card, and IPDN breakout assembly.

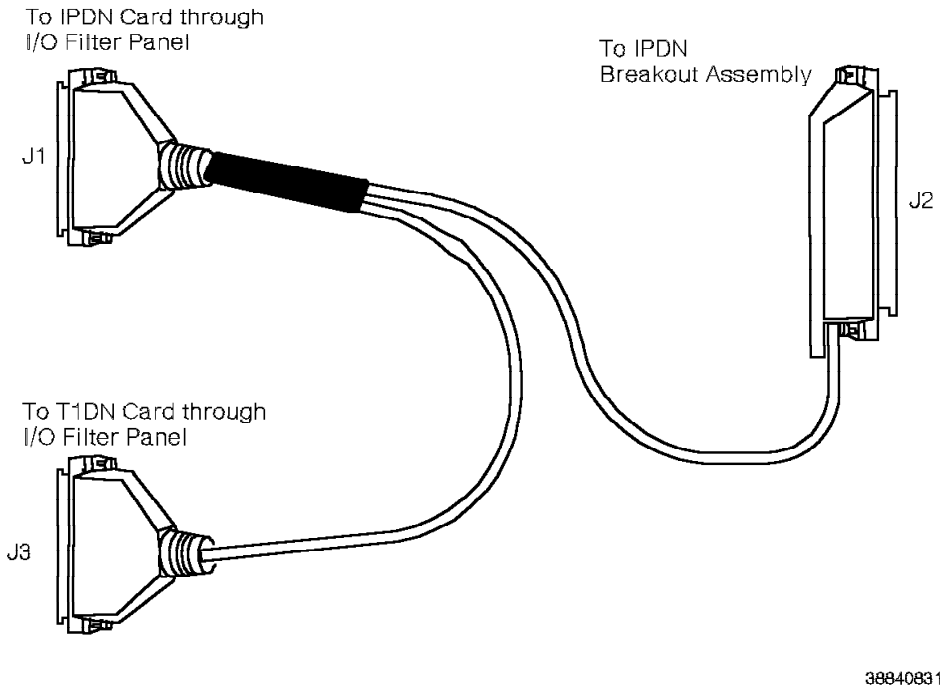


Figure 3-48. Model 40 or 50 IPDN Cable

Table 3-12 lists the Model 40 or 50 IPDN cable connectors and their purposes.

Table 3-12. Model 40 or 50 IPDN Cable Connectors

Connector	Purpose
J1	Attaches to the IPDN card through the I/O filter panel.
J2	Connects to the J4 connector on the IPDN breakout assembly.
J3	Attaches to the T1DN card through the I/O filter panel.

3.9 SMIOC and SMIOC Interconnect Box

Refer to 4.38, “SMIOC” on page 4-77 and 2.10.2, “SMIOC Interconnect Box” on page 2-27.

3.10 HSB Network

The HSB network is a monitoring system that detects fan, power supply, fuse failures, and over-temperature conditions in the Model 40 or 50. If a failure occurs, the SMIOC′s green DS8 LED turns off.

The HSB network consists of the following:

- LSM card
- HSB

3.10.1 LSM Card

Refer to 4.20, “LSM Card (Models 40 and 50)” on page 4-45.

3.10.2 HSB

The HSB (Figure 3-49) is a 20-wire ribbon cable that provides a path for transmitting power and cooling subsystem information from the LSM card to the SMIOC.

The HSB is in the back left side of the cabinet, next to the power bus bar. It extends from the top shelf to the bottom shelf in each cabinet, and attaches to a ribbon connector on the TDM backplane of each shelf.

In multicabinet systems, the HSB extends through a slot in the lower left side of the cabinet.

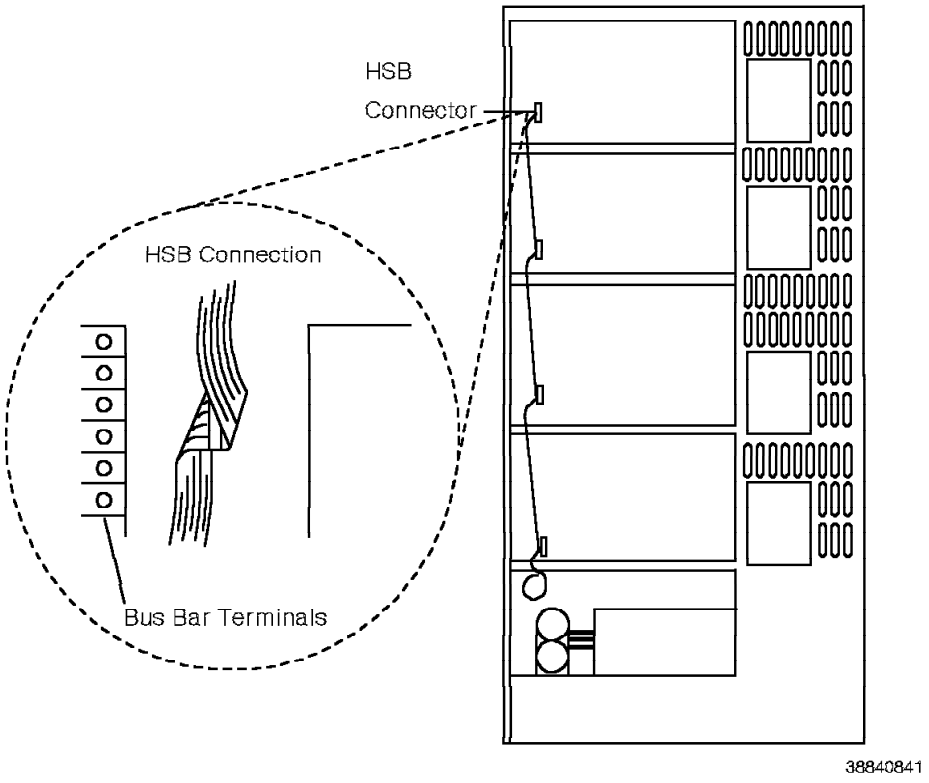


Figure 3-49. Model 40 or 50 HSB—Back View

The HSB has the following connectors:

- A 20-pin ribbon connector for each shelf motherboard connection
- A Y connector to other HSB cables in a multicabinet system

3.11 CPN

In the Models 40 and 50, the system uses CPN hardware when it has a CorNet-N link. Refer to 3.12, “CorNet-N” on page 3-55 for more information.

A *CPN* permits a *host* to transmit *packets* of call processing information to another processor.

The host can be:

- The processor
- An RPDN card

The network is the physical connection between hosts. Each host has two networks: network 1 and network 2. Neither network is the primary or preferred path. Each host determines if a problem is present and decides which network to use.

A packet is a message consisting of a set of data bytes that contains the following information:

- The message sender
- The message receiver
- The route the message should take to get to the destination
- The way to process the message
- The message text itself

Tokens control distribution of these packets of information. A token is a floating master message that coordinates which processor, or host, sends packet information over the CPN. A set of hosts that connect together and share a token is called a *ring*.

The processor that has the token is a *transmitter*. All other processors are *receivers*. The transmitting processor sends the packet information over both network 1 and network 2 at the same time. The receiving processor selects the data from one of the two networks.

The following are the CPN cards the Model 40 or 50 uses:

- Control packet network interface (CPNI) card
- CPNI paddleboard
- CPNJ card
- CPNJ motherboard

3.11.1 CPNI Card

Refer to 4.8, “CPNI Card (Models 40 and 50)” on page 4-17.

3.11.2 CPNI Paddleboard

Refer to 4.9, “CPNI Paddleboard (Models 40 and 50)” on page 4-18.

3.11.3 CPNJ Card

Refer to 4.10, “CPNJ Card (Models 40 and 50)” on page 4-19.

3.11.4 CPNJ Motherboard

Refer to 4.11, “CPNJ Motherboard (Models 40 and 50)” on page 4-20.

3.12 CorNet-N

CorNet-N hardware permits the Model 40 or 50 to use a CorNet-N link to connect to:

- Another 9751 CBX Release 9006m
- A 9751 CBX Release 9006.2 and above
- A 9200 CBX Release 3.2 and above

A *CorNet-N link* is an ISDN link between two *integrated services digital network private branch exchanges (ISPBXs)*. The CorNet-N link contains 23 B-channels and 1 D-channel.

A node that connects to a CorNet-N link can be one of the following types:

ISPBX An ISPBX uses a CorNet-N link to connect to another 9751 CBX or 9200 CBX. A *remote ISPBX* is accessed by the local 9751 CBX through a CorNet-N trunk.

Network node Another term for ISPBX.

Tandem node A tandem node provides a trunk-to-trunk connection for the routing of a call without transport of supplementary service information.

Transit node A transit node provides a CorNet-N trunk-to-trunk connection and can provide a network supplementary service—for example, call transfer.

The RPDN card is a protocol converter that converts ISDN meesaging to CPN protocol.

The RPDN card is treated as a host in the CPN and it uses the CPN to communicate with the host 9751 CBX CPU. It transmits the following messages:

- The call processing CorNet-N messages
- The system diagnostics messages
- The RPDN CLI command messages

A CorNet-N link requires the following:

- The following RPDN hardware:
  - RPDN card (1 to 16 per system)
  - RPDN motherboard (1 to 16 per system)

  Refer to 3.13, “RPDN” on page 3-56 for more information.
- Model no. 90635D T1DN card (1 to 64 per system)
- The following CPN cards:
  - CPNI card (one to two per node)
  - CPNI paddleboard (one to two per node)

- CPNJ card (number depends on the configuration)
- CPNJ motherboard (one for each CPNJ card)

Refer to 3.11, “CPN” on page 3-54 for more information.

Figure 3-50 shows the CorNet-N functional diagram.

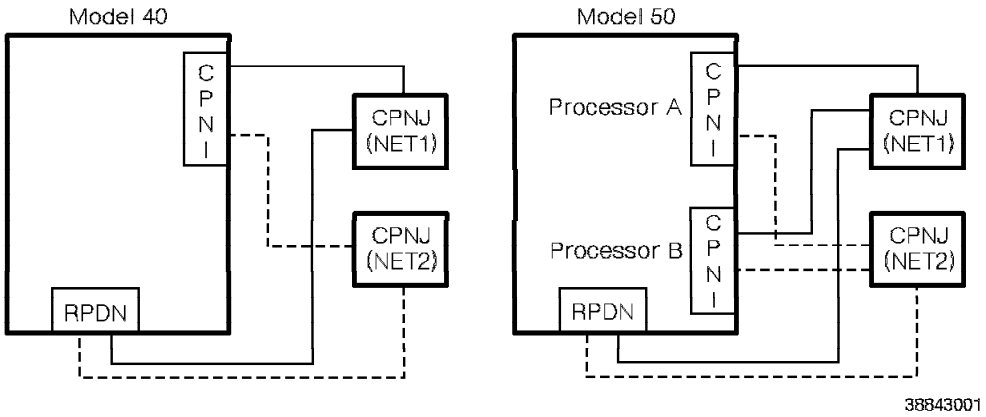


Figure 3-50. CorNet-N Functional Diagram

3.13 RPDN

In the Models 40 and 50, the system uses RPDN hardware when it has a CorNet-N link. Refer to 3.12, “CorNet-N” on page 3-55 for more information.

3.13.1 RPDN Card

Refer to 4.36, “RPDN Card (Models 40 and 50)” on page 4-73.

3.13.2 RPDN Motherboard

Refer to 4.37, “RPDN Motherboard (Models 40 and 50)” on page 4-76.

Chapter 4. 9751 CBX Cards

This chapter describes, in alphabetical order, the cards in the 9751 computerized branch exchange (CBX).

4.1 Types of 9751 CBX Cards

Table 4-1 lists the types of cards the 9751 CBX uses.

Table 4-1 (Page 1 of 3). Types of 9751 CBX Cards

Card Type	Description
Advanced diagnostics card (ADC)	Detects hardware and software errors, runs diagnostic tests, and monitors the system's hardware.
Control packet network (CPN) group (Models 40 and 50)	Permits a host to transmit packets of call processing information to another processor. The Model 40 or 50 uses CPN hardware as part of a CorNet-N link. The CPN group consists of the following cards: • Control packet network interface (CPNI) card • CPNI paddleboard • Control packet network junction (CPNJ) card • CPNJ motherboard
Data front end II (DFE II) card	Acts as a front-end processor for data calls and enhances data call setup.
Fan detector card	Used by the cooling system to detect failing fans.
Peripheral device controller (PDC) card	Interfaces the hard disk drive and the diskette drive with the processor and backplane.
ROLM private digital network (RPDN) group (Models 40 and 50)	Permits the Model 40 or 50 to use a CorNet-N link to connect to another 9751 CBX or 9200 CBX. The RPDN group consists of the following cards: • RPDN interface card • RPDN motherboard
ROLMbridge 5250 card group	Provides protocol conversion between IBM-supported American Standard Code for Information Interchange (ASCII) devices and an IBM System/36, System/38, or the System/36 personal computer (PC). **Note:** The 9751 CBX must use a terminal emulator with the ROLMbridge 5250 card group to access System/36, System/38, and System/36 PC software. The following are the ROLMbridge 5250 cards: • ROLMbridge 5250 7-channel card (link protocol converter [LPC] 1) • ROLMbridge 5250 enable/bypass card (LPC 2) • ROLMbridge 5250 motherboard
Shared electronics cards	Provide systemwide functions that the station and trunk interface cards share. Shared electronics cards are also known as critical electronics cards. The following are the shared electronics cards: • Conference bridge card • Dual-tone receiver card • Rotary register card • Rotary sender card • Tone sender card

Table 4-1 (Page 2 of 3). Types of 9751 CBX Cards

Card Type	Description
Station interface cards	Connect the 9751 CBX with external station devices. The following are the station interface cards: • Analog telephone interface (ATI) card • Attendant console controller (ACC) card • Codec card • Message waiting card • Message waiting 8-channel (MW8) card • Off-premises station (OPS) card • Off-premises station 8-channel (OPS8) card • ROLMlink interface (RLI) card **Warning:** Installations that require the use of exposed wiring (aerial cable or buried cable that is run with a power cable) must include protected wiring systems. Install protective devices at the main distribution frame (MDF) and at the distant end of the exposed wiring to satisfy the Underwriters' Laboratories (UL) and Canadian Standards Association (CSA) requirements. Refer to the *9750 Business Communications System and 9720 Redwood Business Communications System Secondary Protection Guide* for specific ROLM-approved protective devices.
System monitor input/output card (SMIOC)	Used with the SMIOC interconnect box. Connects peripheral equipment, bypass connections, and external alarms to the system.
Time-division multiplexing (TDM) network cards	Connect the processor with the TDM cards in the cabinet. The following are the TDM network cards: • Clock synchronization module (CSM) card • Expander card • Turnaround standalone (TASA) card • Time-division multiplexing controller (TC) card • Time-division multiplexing controller (TCL) card • Time-division multiplexing controller turnaround standalone (TCTASA) card • Time-division multiplexing expander (TXP) card

Table 4-1 (Page 3 of 3). Types of 9751 CBX Cards

Card Type	Description
Trunk interface cards	Connect the 9751 CBX with the various types of trunks available from the connecting telephone company. The following trunk interface cards transmit and receive analog signals to and from the telephone company: • Central office trunk 8-channel (COT8) card • Direct inward dialing 8-channel (DID8) card • Tie trunk interface (TTI) card The following trunk interface cards transmit and receive digital signals to and from the telephone company: • Integrated services digital network (ISDN) primary digital network (IPDN) card • T1 digital network (T1DN) card **Warning:** This interface is designated to be installed in a protected wiring system. The wiring system must include secondary protection devices. Refer to the *9750 Business Communications System and 9720 Redwood Business Communications System Secondary Protection Guide* for specific ROLM-approved protective devices.
9030 computer common control (CCC) cards	Provides supervisory and control functions for the Model 10. The following are the 9030 CCC cards: • Memory card • Memory controller card • 9030 central processing unit (CPU) card
9030A CCC cards	Provides supervisory and control functions for the system. The following are the 9030A CCC cards: • 9030A CPU card • 9030A I/O bus switch card • 9030A memory expansion card

Refer to 2.1, “Types of Model 10 Hardware” on page 2-2 and 3.1, “Types of Models 40 and 50 Hardware” on page 3-2 for more information about types of 9751 CBX hardware.

4.2 ACC Card

The ACC card is a 1-channel card that interfaces a 9755 Attendant Console (9755 ATC) with the 9751 CBX. It converts signals from digital to analog and from analog to digital during call processing.

The ACC card plugs into the TDM backplane. It receives commands, and sends and receives digitized voice signals from the processor over the TDM network (Figure 4-1).

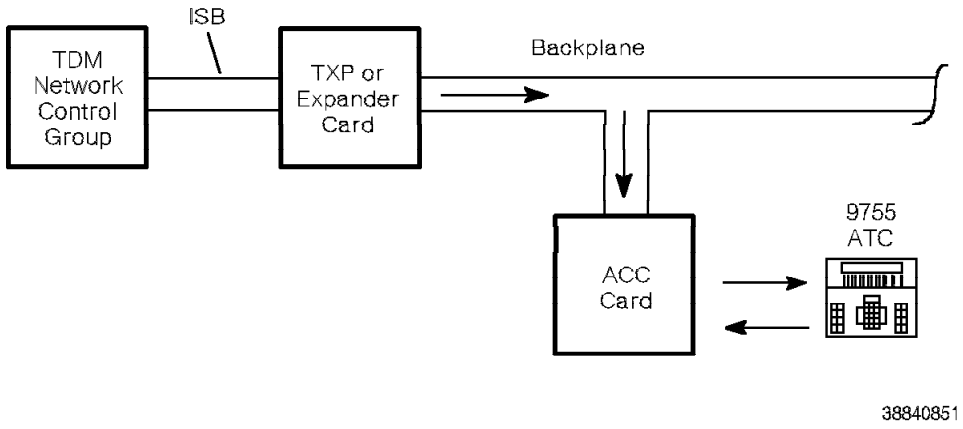


Figure 4-1. ACC Functional Diagram

The 9751 CBX supports up to eight 9755 ATCs. It also supports eight key telephone adapters (KTAs) for automatic call distribution (ACD) call waiting. A KTA, which is external to the system, connects the ACC card to a set of nine beehive lamps. Each 9755 ATC and each KTA requires a separate ACC card.

Figure 4-2 shows the ACC card.

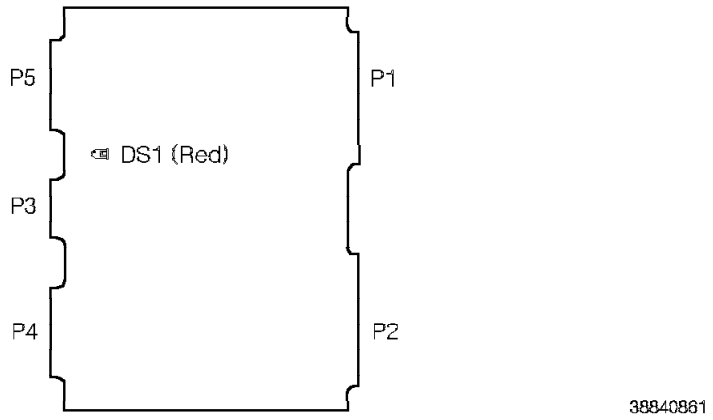


Figure 4-2. ACC Card

The ACC card is in any slot on any TDM shelf. Table 4-2 lists the ACC card light-emitting diode (LED) and the conditions it indicates.

Table 4-2. ACC Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the ACC card are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.3 ADC

The ADC tests trunks in the automatic facilities test system (AFACTS) and performs diagnostic tests on the following cards:

- ACC
- ATI
- COT8
- Conference bridge
- DID8
- Dual-tone receiver
- IPDN
- Message waiting
- MW8
- OPS
- OPS8
- Rotary register
- Rotary sender
- RLI
- T1DN
- TTI
- Tone sender

Figure 4-3 shows the ADC.

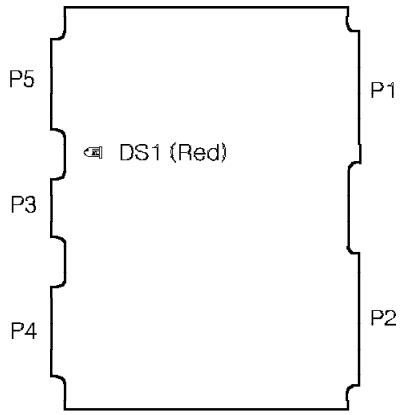


Figure 4-3. ADC

The ADC is in any slot on any TDM shelf. Table 4-3 lists the ADC LED and the conditions it indicates.

Table 4-3. ADC LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the ADC are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.4 ATI Card

The ATI card interfaces eight analog single-line extensions (eight channels) with the 9751 CBX (Figure 4-4). Use the card for stations on the premises or less than 3.5 kilometers (2.2 cable miles) from the 9751 CBX. It converts signals from digital to analog and from analog to digital during call processing.

The ATI card plugs into the backplane. It receives commands from the 9751 CBX operating system over the TDM network control group. It also supplies −24 volts direct current (V dc) talk battery.

One Amphenol cable connects the card to the MDF through the backplane. At the MDF the leads cross-connect to station cables that connect to analog telephones.

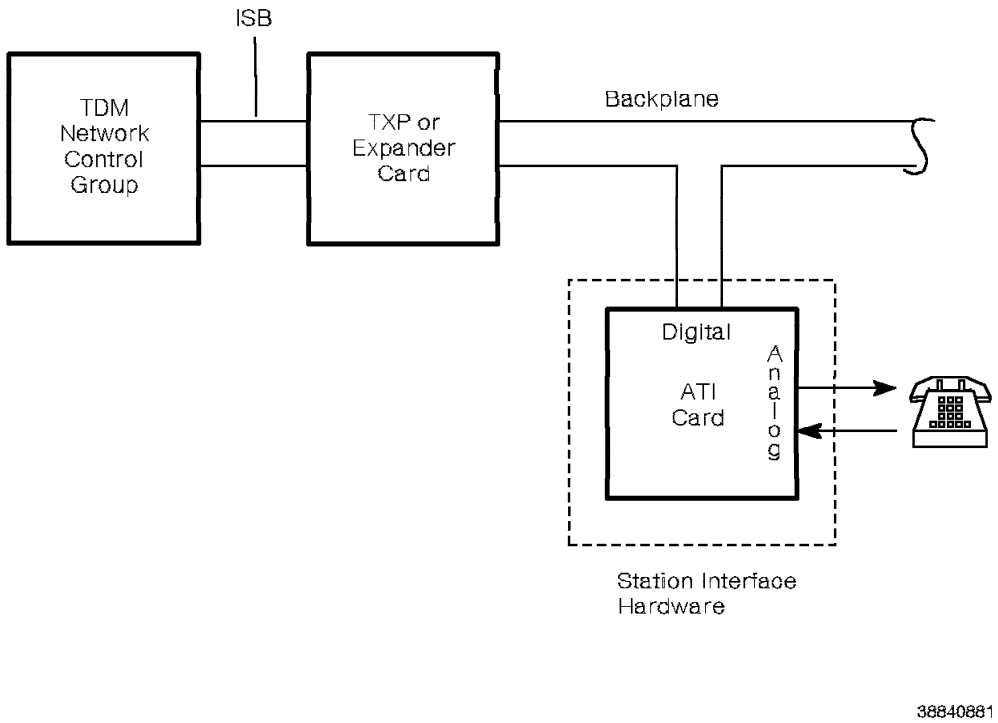


Figure 4-4. ATI Functional Diagram

Figure 4-5 shows the ATI card.

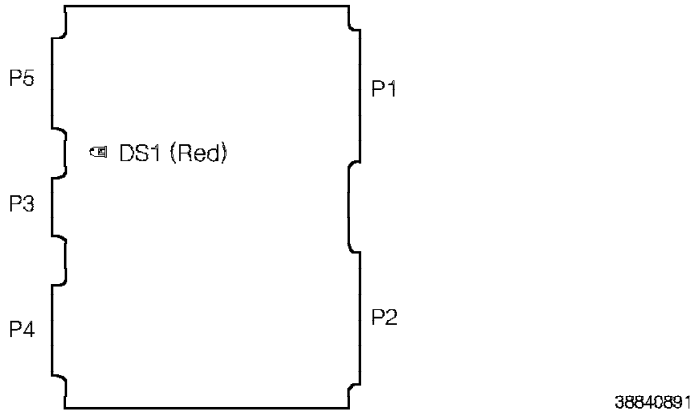


Figure 4-5. ATI Card

The ATI card is in any slot on any TDM shelf. Table 4-4 lists the ATI card LED and the conditions it indicates.

Table 4-4. ATI Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the ATI card are as follows:

P1 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.5 Codec Card (Models 40 and 50)

The codec card (Figure 4-6) converts voice signals that the telephone company transmits from analog to digital, and converts voice signals that the system transmits from digital to analog. It supports 16 channels.

The OPS and message waiting interface districts use the codec card. It is always the first card in the interface district.

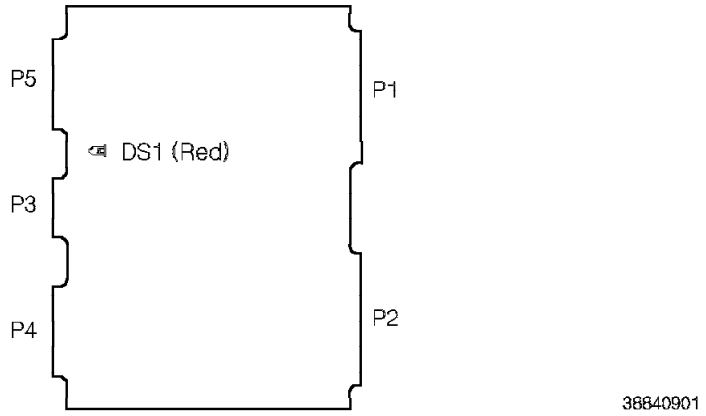


Figure 4-6. Codec Card for the Model 40 or 50

The codec card is in any slot on any TDM shelf. Table 4-5 lists the codec card LED and the conditions it indicates.

Table 4-5. Codec Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the codec card are as follows:

P1 Universal motherboard connector
P2 TDM backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.6 Conference Bridge Card

The conference bridge card permits users to establish conference calls that connect three to eight parties. In a system with a CorNet-N link, two of the eight parties can be remote extensions. It supports up to eight 8-party conference calls at a time.

The conference bridge card collects voice samples from all the participating parties′ station interface cards (Figure 4-7 on page 4-13). It then sends the total of all the voice samples, minus party A′s contribution, to party A′s interface card. Each party in the conference hears all other parties.

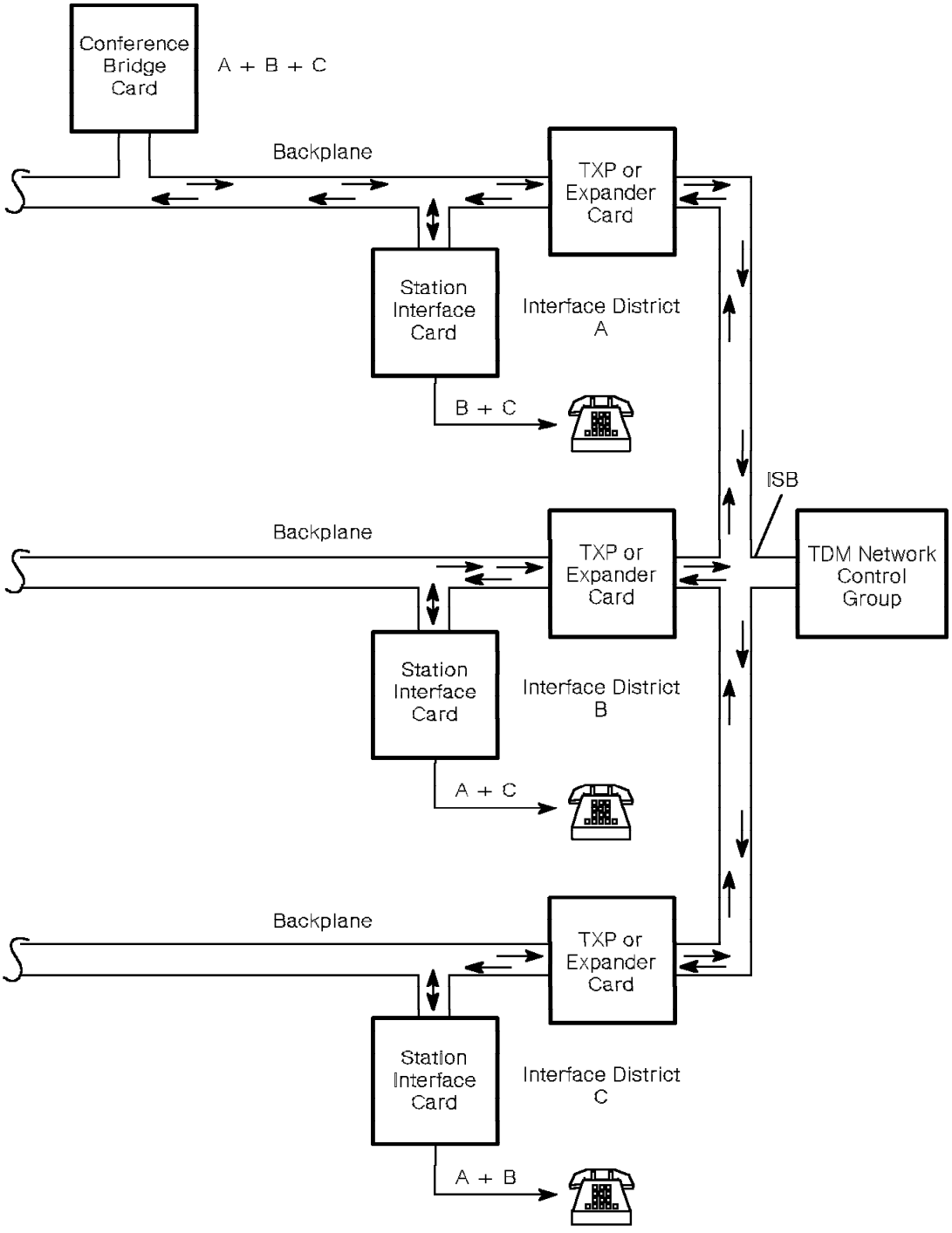


Figure 4-7. Conference Bridge Functional Diagram

Figure 4-8 shows the conference bridge card.

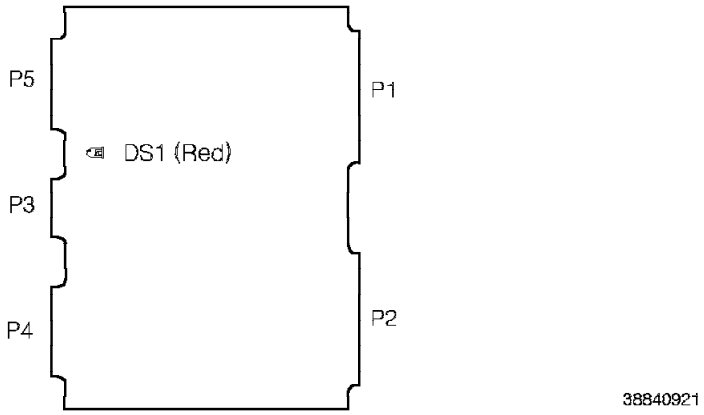


Figure 4-8. Conference Bridge Card

The conference bridge card is in any shared electronics slot or TDM slot. Table 4-6 lists the conference bridge card LED and the conditions it indicates.

Table 4-6. Conference Bridge Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the conference bridge card are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.7 COT8 Card

The COT8 card is an 8-channel state messaging card that interfaces 2-wire central office (CO) trunks and the 9751 CBX (Figure 4-9). It communicates with the public network and the 9751 CBX through the backplane.

The COT8 card converts voice signals that the telephone company transmits from analog to digital, and converts voice signals that the system transmits from digital to analog.

One Amphenol cable connects the card to the MDF through the backplane. At the MDF the leads cross-connect to incoming leads from the CO trunks.

Two conductors are allocated to each COT8 channel: tip (T) and ring (R). The T and R leads transmit and receive voice signals. They also signal incoming calls or outgoing calls.

For incoming calls, the CO grounds the tip lead to seize the COT8 channel.

For outgoing calls, the 9751 CBX:

1. Momentarily grounds the ring lead to seize the CO trunk.
2. Closes the loop between tip and ring leads.
3. Outpulses the dialed digits.

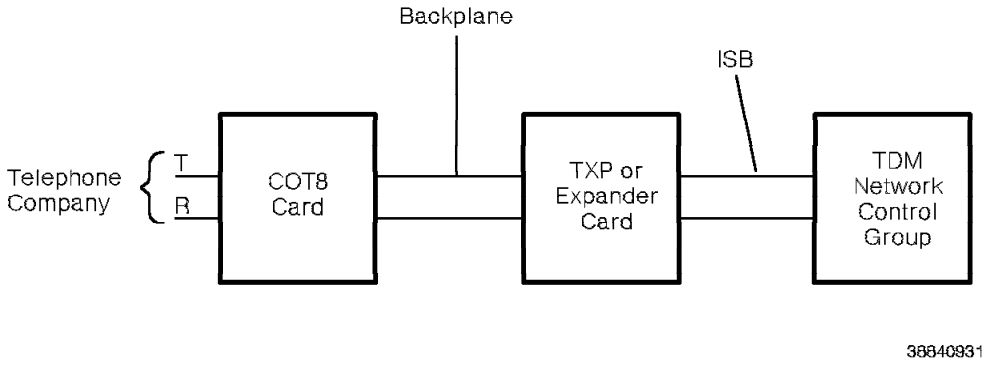


Figure 4-9. COT8 Functional Diagram

Figure 4-10 shows the COT8 card.

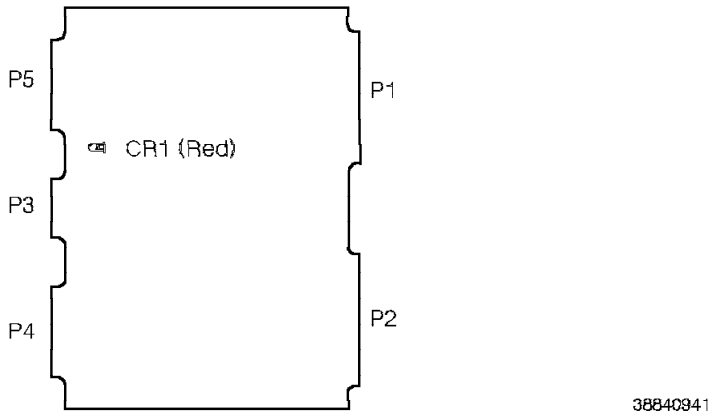


Figure 4-10. COT8 Card

The COT8 card is in any slot on any TDM shelf. Table 4-7 lists the COT8 card LED and the conditions it indicates.

Table 4-7. COT8 Card LED Indicator

LED	Color	State	Indication
CR1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the COT8 card are as follows:

P1 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.8 CPNI Card (Models 40 and 50)

Each CPNI card (Figure 4-11) is the interface between its associated processor and the CPN. Just as each processor contains two networks, the CPNI card has two network interfaces on the same card, so that each processor has access to both networks at all times.

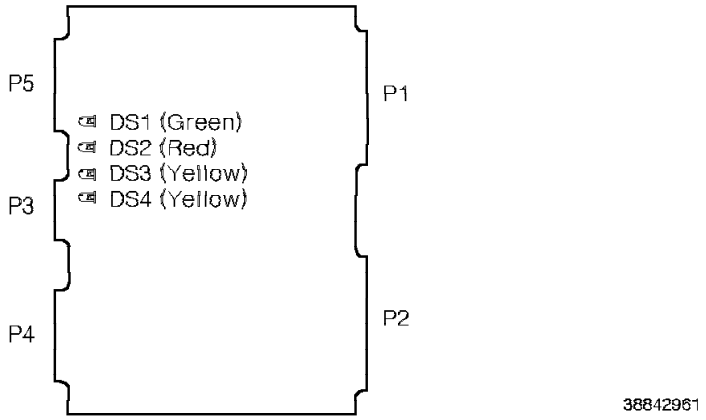


Figure 4-11. CPNI Card for the Model 40 or 50

The CPNI card is in:

- Slot 14 on shelf 2 of the Model 40
- Slots 14 and 19 on shelf 2 of the Model 50

The CPNI card in slot 14 connects to the processor in slot 8 of the 9030A CCC motherboard. The CPNI card in slot 19 connects to the processor in slot 10. Table 4-8 lists the CPNI card LEDs and the conditions they indicate.

Table 4-8. CPNI Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is active.
		Off	The card is inactive.
DS2	Red	On	The card is down.
		Off	The card is up.
DS3	Yellow	On	There is activity on network 1.
		Off	There is no activity on network 1.
DS4	Yellow	On	There is activity on network 2.
		Off	There is no activity on network 2.

The P connector designations for the CPNI card are as follows:

P1 CPNI paddleboard connector
P2 CCC motherboard connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.9 CPNI Paddleboard (Models 40 and 50)

The CPNI paddleboard (Figure 4-12) connects the CPNI card to the CPN. The paddleboard contains switch settings for the node number and the number of nodes in the system.

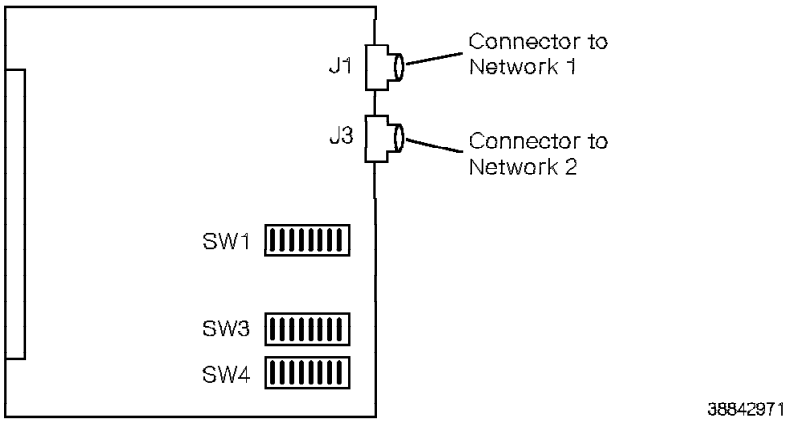


Figure 4-12. CPNI Paddleboard for the Model 40 or 50

A CPNI paddleboard is on the back of the CCC motherboard, directly behind each CPNI card.

The CPNI paddleboard has the following twinaxial connectors for the CPN cables:

J1 CPNJ motherboard connector (network 1)
J3 CPNJ motherboard connector (network 2)

Table 4-9 lists the CPNI paddleboard switch settings.

Table 4-9. CPNI Paddleboard Switch Settings

Switchpack	Setting
SW1	0 0 0 0 1 1 1 1
SW3	1 1 0 0 0 0 0 1
SW4	1 0 0 0 0 0 0 0

Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for more information to set the CPNI paddleboard switchpacks.

4.10 CPNJ Card (Models 40 and 50)

The CPNJ card (Figure 4-13) provides the control and drivers for the CPN.

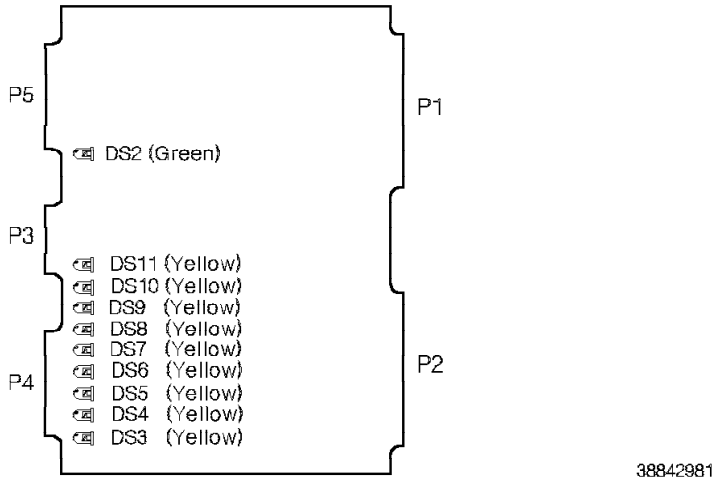


Figure 4-13. CPNJ Card for the Model 40 or 50

The CPNJ card is on any configurable TDM shelf. Table 4-10 lists the CPNJ card LEDs and the conditions they indicate.

Table 4-10. CPNJ Card LED Indicators

LED	Color	State	Indication
DS2	Green	On	The card is sensing clock and monitoring idle state.
		Off	The card is not sensing clock and monitoring idle state.
DS3 through DS11	Yellow	On	The card senses data activity at ports 1 through 9.
		Off	The card does not sense data activity.

The P connector designations for the CPNJ card are as follows:

P1 CPNJ motherboard connector
P2 TDM backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.11 CPNJ Motherboard (Models 40 and 50)

The CPNJ motherboard (Figure 4-14) provides the nine ports, or twinaxial connections, for the CPNJ card. Twinaxial cables connect all CPN hosts to the CPNJ motherboard.

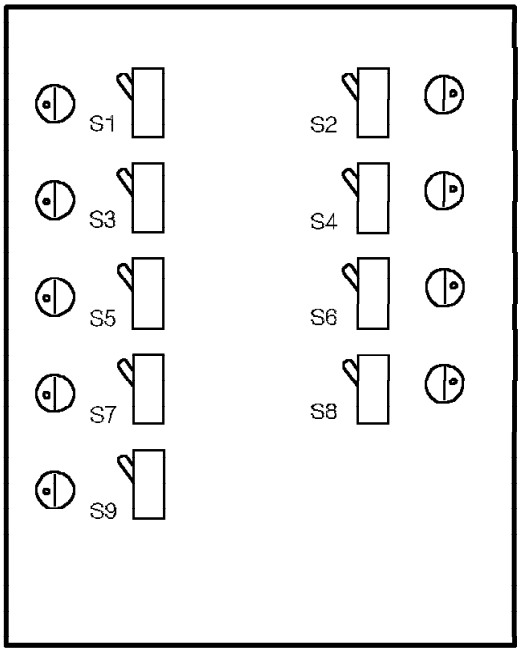


Figure 4-14. CPNJ Motherboard for the Model 40 or 50

The CPNJ motherboard is on the back of any TDM backplane, directly behind the CPNJ card.

The front of the CPNJ motherboard has one P1 connector, which is a socket for the CPNJ card network access.

The CPNJ motherboard contains attenuation switches (S1 through S9) for variations in network cable length. Ensure that each switch is in the *UP* position.

4.12 CSM Card

The CSM card (Figure 4-15) provides clock synchronization for the 9751 CBX.

The types of CSM cards are as follows:

Slave CSM

Used in a 9751 CBX that either receives clocking from an external T1 digital trunk, or has no T1DN cards.

Master CSM

Used when the 9751 CBX is the master clock source location in a large private digital network. However, the master CSM card can operate as a slave CSM if required.

In the Model 10, the clock output routes to the TCL card through the backplane.

In the Model 40 or 50, the clock output routes to the TASA or TCTASA card through the CCC backplane.

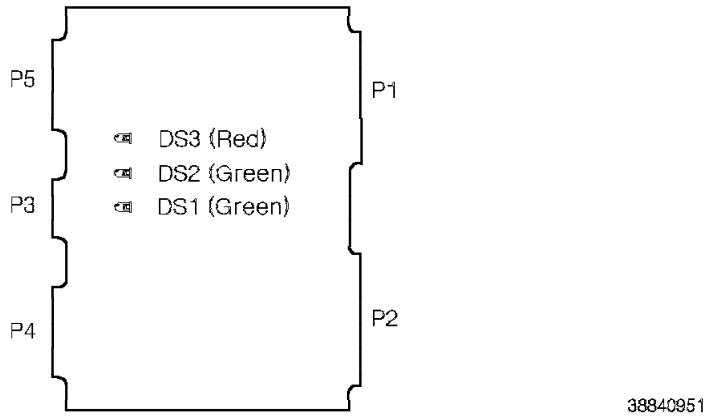


Figure 4-15. CSM Card

The CSM card is in:

- Slot 12 on shelf 1 of the Model 10
- Slot 6 on shelf 1 of the Model 40
- Slot 6, shelf 1 and slot 6, shelf 3 of the Model 50

Table 4-11 lists the CSM card LEDs and the conditions they indicate.

Table 4-11 (Page 1 of 2). CSM Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	A second CSM card is configured in the system and is active. **Note:** This LED lights only on the active CSM.
		Off	Only one CSM card is configured in the system.
DS2	Green	On	A CSM card is configured in the system and is active.
		Off	A CSM card is not configured in the system.

Table 4-11 (Page 2 of 2). CSM Card LED Indicators

LED	Color	State	Indication
DS3	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the CSM card are as follows:

P1 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.13 DFE II Card

The DFE II card acts as a front-end processor for data calls during interactive call setup (ICS). The 9751 CBX also requires the DFE II card to process T1DN subrate data.

The DFE II card has 16 channels. Channel 0 is dedicated to communication between the processor and the DFE II card. Channels 1 through 15 provide communication between the DFE II card and data devices.

The following events takes place during ICS (Figure 4-16):

1. Data terminating equipment (DTE), such as a terminal, sends a request for service message through the data communications module (DCM) to the 9751 CBX.
2. The 9751 CBX connects the data line to an available channel on the DFE II card.
3. The terminal sends a clear to send (CTS) message to the 9751 CBX.
4. The terminal makes a call request to the DFE II card.
5. The call is established at the RLI card and a connection is made.
6. The DFE II card drops out of the connection.

The DFE II card accelerates call setup; however, the 9751 CBX can perform ICS without it.

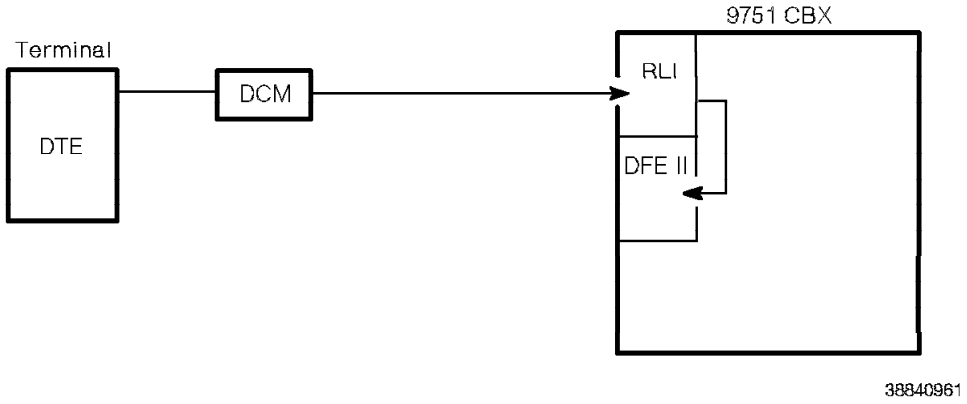


Figure 4-16. DFE II Functional Diagram

Figure 4-17 shows the DFE II card.

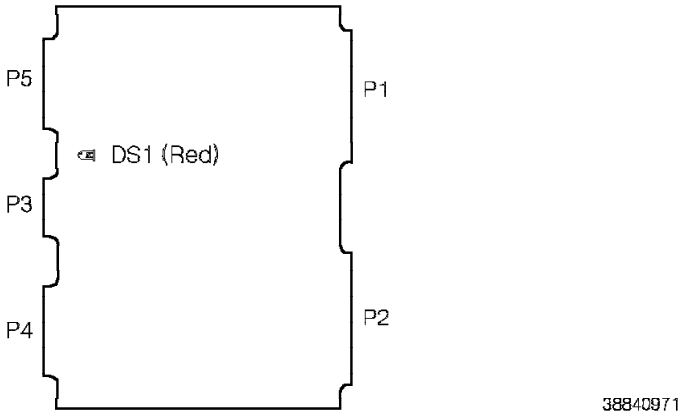


Figure 4-17. DFE II Card

The DFE II card is in any slot on any TDM shelf. Table 4-12 lists the DFE II card LED and the conditions it indicates.

Table 4-12. DFE II Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the DFE II card are as follows:

P1 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.14 DID8 Card

The DID8 card is an 8-channel card that supports direct inward dialing (DID) trunks from the telephone company to the 9751 CBX (Figure 4-18). The DID trunks permit callers to directly dial stations or groups of stations; the attendant need not route the call.

The DID8 card directly interfaces the 9751 CBX with the telephone network. It converts voice signals that the telephone company transmits from analog to digital, and converts voice signals that the system transmits from digital to analog. It contains four software-controlled balancing networks and a built-in rotary register.

The DID8 card connects to the MDF through one 25-pair cable on the backplane. At the MDF, the cable cross-connects to incoming leads from the DID trunks.

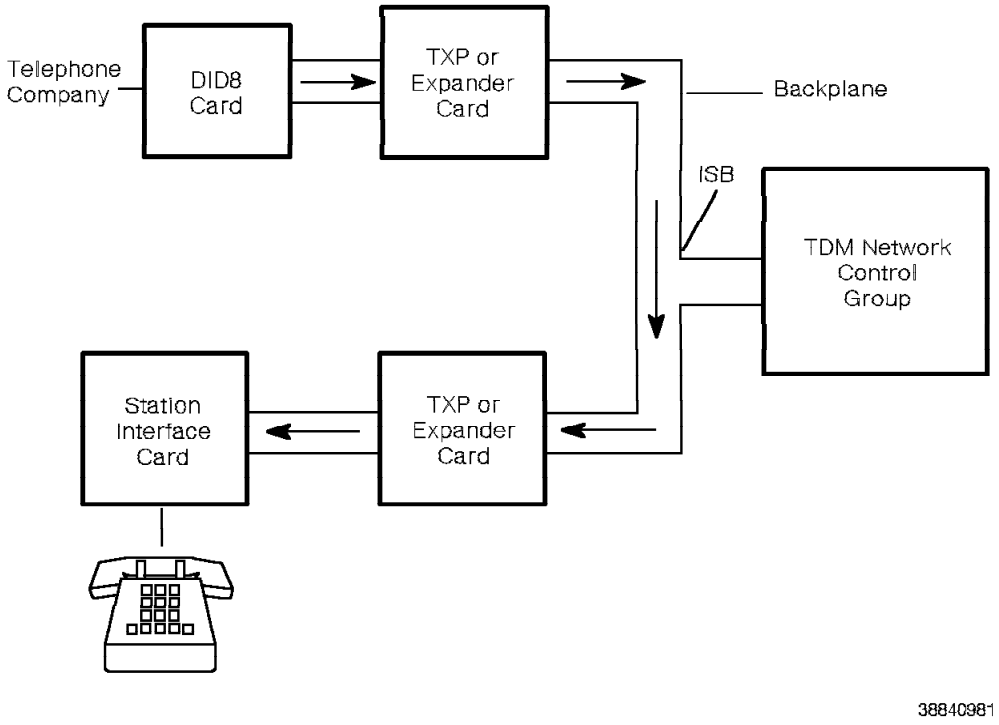


Figure 4-18. DID8 Functional Diagram

Figure 4-19 shows the DID8 card.

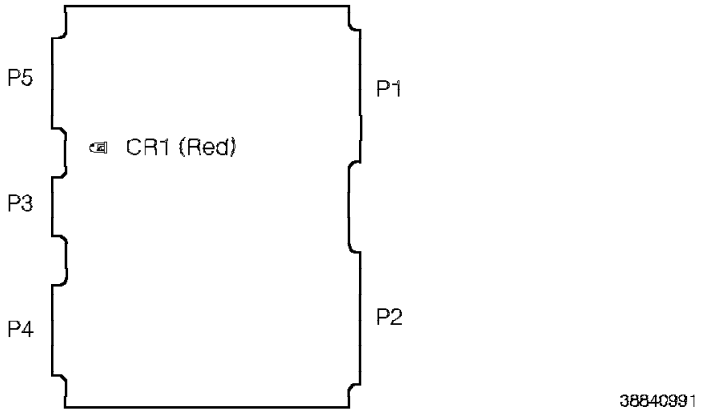


Figure 4-19. DID8 Card

The DID8 card is in any slot on any TDM shelf. Table 4-13 lists the DID8 card LED and the conditions it indicates.

Table 4-13. DID8 Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the DID8 card are as follows:

P1 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.15 Dual-Tone Receiver Card

The dual-tone receiver card is an 8-channel card that converts digitized dual-tone multifrequency (DTMF) tones into digitized words suitable for computer processing.

Note: ROLMphone telephones do not use the dual-tone receiver card.

When a user presses a number on a DTMF single-line telephone:

1. The telephone sends a dual tone to the ATI card.
2. The ATI card digitizes the signal and sends it to the dual-tone receiver card.
3. The dual-tone receiver card converts the dual tone into a digital word and transmits it to the processor (Figure 4-20).

The TDM network control group establishes the connection between the dual-tone receiver card and the ATI card.

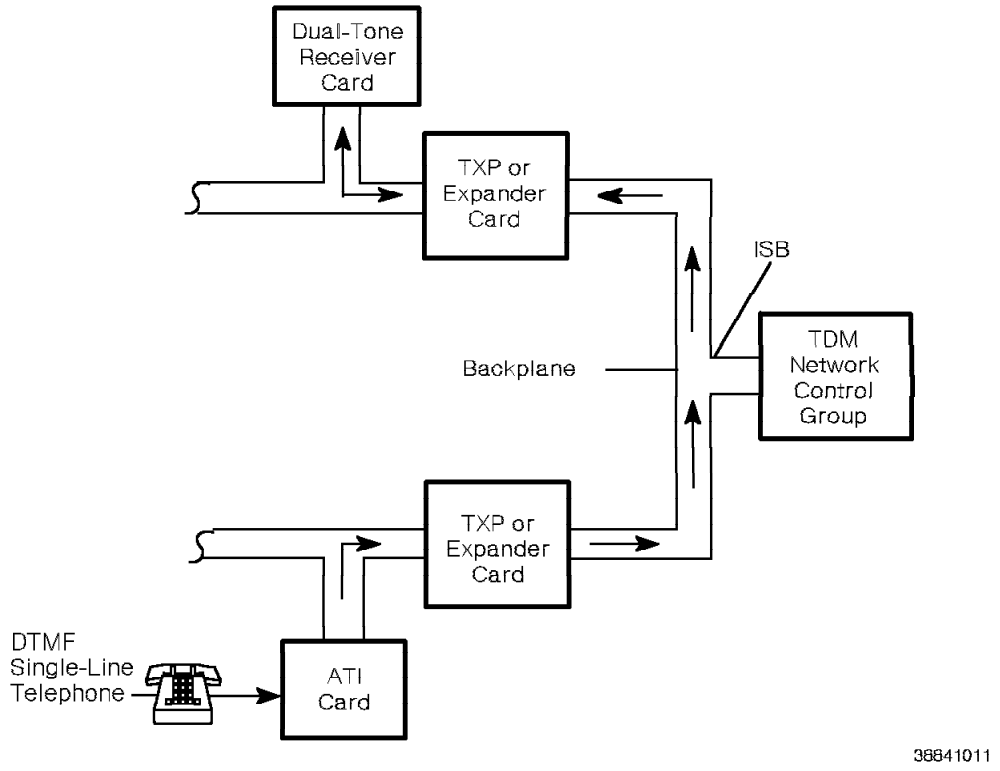


Figure 4-20. Dual-Tone Receiver Functional Diagram

Figure 4-21 shows the dual-tone receiver card.

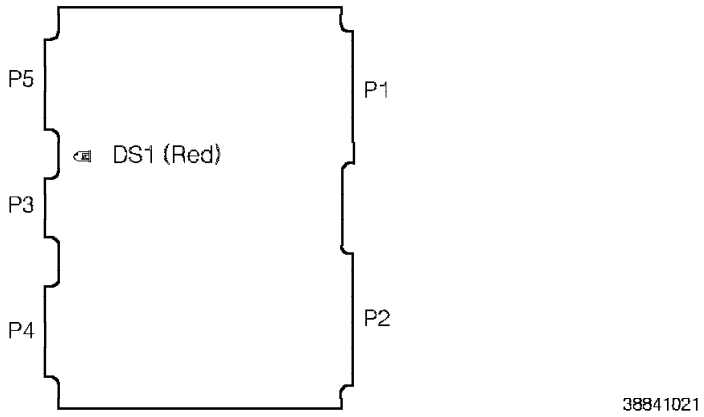


Figure 4-21. Dual-Tone Receiver Card

The dual-tone receiver card is in a shared electronics slot or any TDM slot. Table 4-14 lists the dual-tone receiver card LED and the conditions it indicates.

Table 4-14. Dual-Tone Receiver Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the dual-tone receiver card are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.16 Expander Card (Models 40 and 50)

The expander III (EXP III) or expander IIIE (EXP IIIE) card (Figure 4-22) provides an interface between the intershelf bus (ISB) and the TDM shelf cards.

Note: The EXP III and EXP IIIE cards are physically and functionally the same.

The EXP IIIE card has two modes: enhanced and compatible. The enhanced features of the EXP IIIE card, available with software Release 9005.1 and above, includes greater reliability and improved fault isolation.

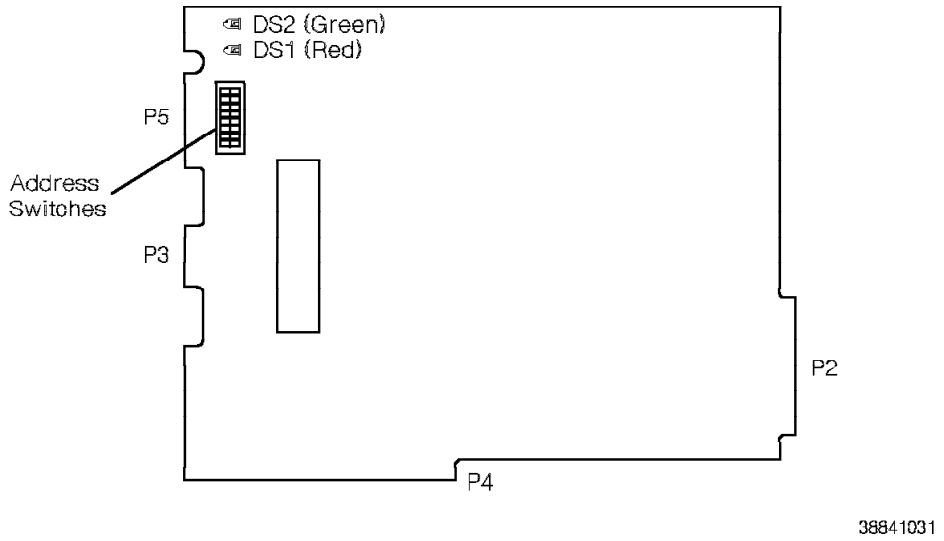


Figure 4-22. Expander Card for the Model 40 or 50

The expander cards are in the following locations on the TDM shelves:

- In the Model 40:
  - Slot 2 of every TDM shelf in cabinets 1, 3, and 5
  - Slot 4 of every TDM shelf in cabinets 2 and 4
- In the Model 50:
  - Slots 2 and 4 of every TDM shelf

Table 4-15 lists the expander card LEDs and the conditions they indicate.

Table 4-15. Expander Card LED Indicators

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.
DS2	Green	On	The card is active.
		Off	The card is inactive.

The P connector designations for the expander card are as follows:

P2 TDM motherboard connector
P3 Standard umbilical cord connector
P4 ISB zero insertion force (ZIF) connector interface
P5 Not used

Each expander card has a switchpack that identifies the shelf on which it resides. Table 4-16 lists the possible settings for the dual in-line package (DIP) switches.

Note: Switches 1, 2, and 7 are *never* used and must *always* be off.

Table 4-16. Expander Address DIP Switch Settings

Shelf	SW3	SW4	SW5	SW6
1	On	On	On	On
3	On	On	On	Off
4	On	On	Off	On
5	On	On	Off	Off
6	On	Off	On	On
7	On	Off	On	Off
8	On	Off	Off	On
9	On	Off	Off	Off
10	Off	On	On	On
11	Off	On	On	Off
12	Off	On	Off	On
13	Off	On	Off	Off
14	Off	Off	On	On
15	Off	Off	On	Off
16	Off	Off	Off	On
17	Off	Off	Off	Off

4.17 Fan Detector Card (Model 10)

The cooling system uses the fan detector card to detect failing fans.

In the Model 10, five fan wiring harnesses connect to the card. The fans receive power from the power supply via the card.

Figure 4-23 shows the fan detector card for the Model 10.

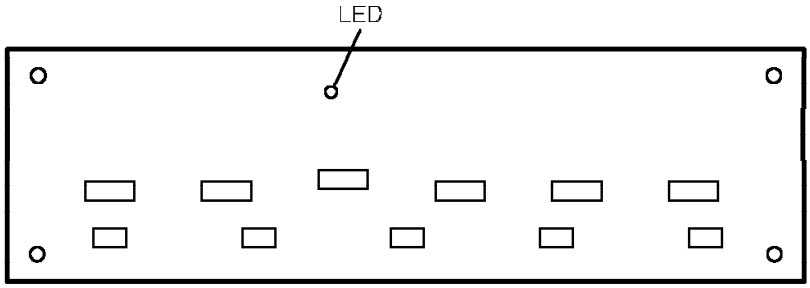


Figure 4-23. Fan Detector Card for the Model 10

Table 4-17 lists the Model 10 fan detector card LED and the conditions it indicates.

Table 4-17. Model 10 Fan Detector Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	All fans are turning at the correct predetermined speed.
		Off	All fans are not turning at the correct predetermined speed.

4.18 Fan Detector Card (Models 40 and 50)

The cooling system uses the fan detector card to detect failing fans.

In the Models 40 and 50, a fan wiring harness connects to the card. The fans receive power from the line conditioning module (LCM) or battery input module (BIM).

The Model 40 or 50 fan detector card has no LEDs.

Figure 4-24 shows the fan detector card for the Model 40 or 50.

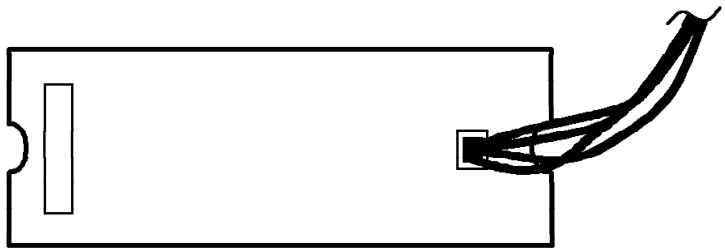


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Figure 4-24. Fan Detector Card for the Model 40 or 50

4.19 IPDN Card

The IPDN card permits a 9751 CBX to access the AT&T and MCI ISDN primary services.

Depending on the firmware release, the IPDN card can also support the following ISDNs:

- AT&T International MEGACOM
- AT&T switched 56 kilobits per second (Kbps) data services
- Sprint, with and without Federal Telecommunications System 2000 (FTS-2000) service
- Westinghouse
- Local exchange carrier 5ESS, software Releases 5E7 and 5E8, with and without FTS-2000 service
- Local exchange carrier DMS-100, software Release BCS-33
- Bell Canada DMS-100, software Release BCS-33

Contact your next level of support for more information.

The IPDN card connects to the ISDN primary rate interface. It serves as a protocol converter between the 9751 CBX T1 interface and the ISDN primary rate interface.

The IPDN card provides the following features to interface with the ISDN primary rate interface:

- 23 B channels at a rate of 64 Kbps. B channel support is on a call-by-call, channel-by-channel basis. Up to 16 B channels are available for data calls.
- Loopback capability to the ISDN primary rate interface

Depending on which application the 9751 CBX supports, the IPDN card also provides the following features:

- Automatic number identification (ANI)
- Dialed number identification service (DNIS)

Refer to Appendix C, “System Features” for more information.

The IPDN card provides the following features to interface with the 9751 CBX T1 interface:

- Voice calls and data calls
- A line rate of 1.544 megabits per second (Mbps)
- Yellow and blue alarm detection and transmission to the T1DN card
- T1 loopback capability
- T1 superframe (SF) or extended superframe (ESF) format
- Remote alarm indication (RAI), yellow alarm detection, and transmission to the ISDN primary rate interface

  When the IPDN card detects RAI from the network, it transmits normal frame with the correct cyclic redundancy check (CRC) to the network and sends a

blue alarm to the T1DN card. When there is a loss of signal (LOS) or loss of frame (LOF), the IPDN card sends and receives RAI from the network.

- Alarm indication signal (AIS), blue alarm detection, and transmission to the ISDN primary rate interface

  When the IPDN card detects AIS from the network, it transmits RAI to the network and sends a blue alarm to the T1DN card. When the T1DN card detects a yellow alarm, the IPDN card sends the AIS to the network.
- External alarm (hard-wired) of the T1DN card that indicates the IPDN card did not pass self-test
- DTMF signaling
- Wink start

The IPDN card connects to the backplane to receive shelf power. However, it does *not* directly connect to the TDM bus. Instead, it connects to the T1DN card through the T1 link (Figure 4-25).

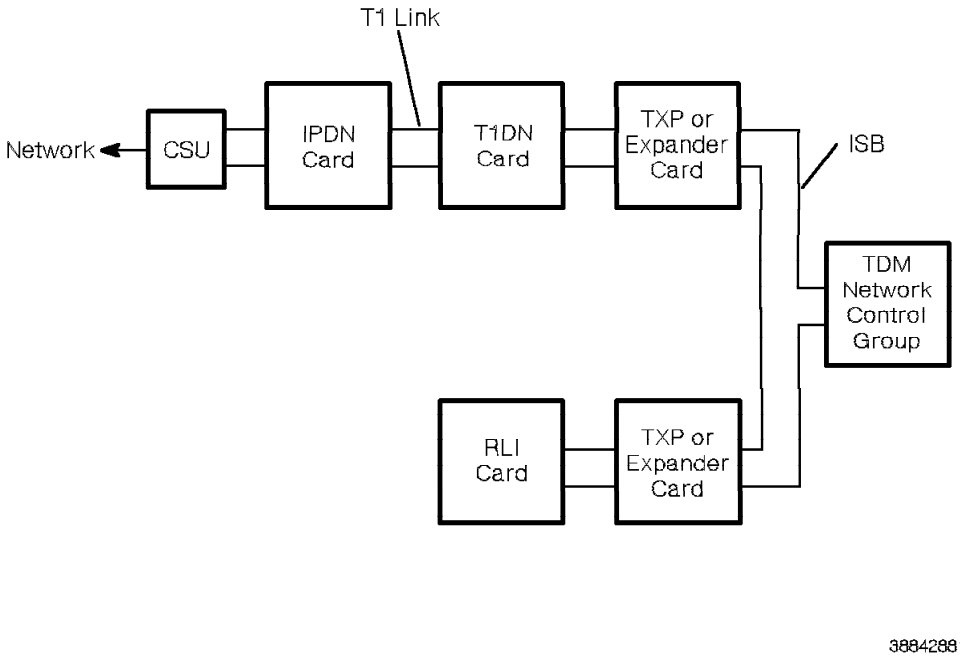

Figure 4-25. IPDN Functional Diagram

Figure 4-26 on page 4-35 and Figure 4-27 on page 4-36 shows the connection between the 9751 CBX and the ISDN primary rate interface through the standard T1DN cable that connects to J3 on the IPDN breakout assembly.

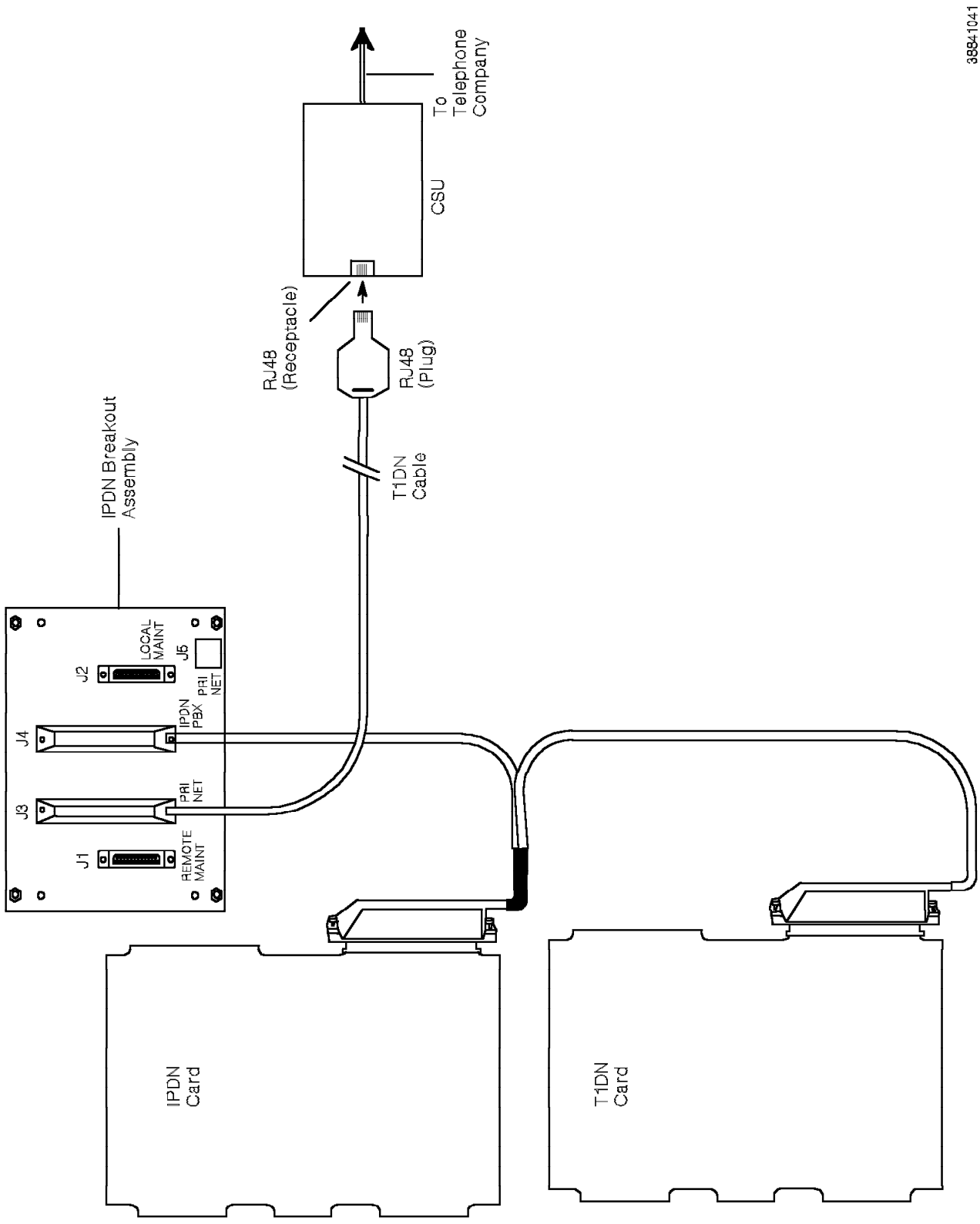

Figure 4-26. 9751 CBX to Telephone Company Connection for the Model 10

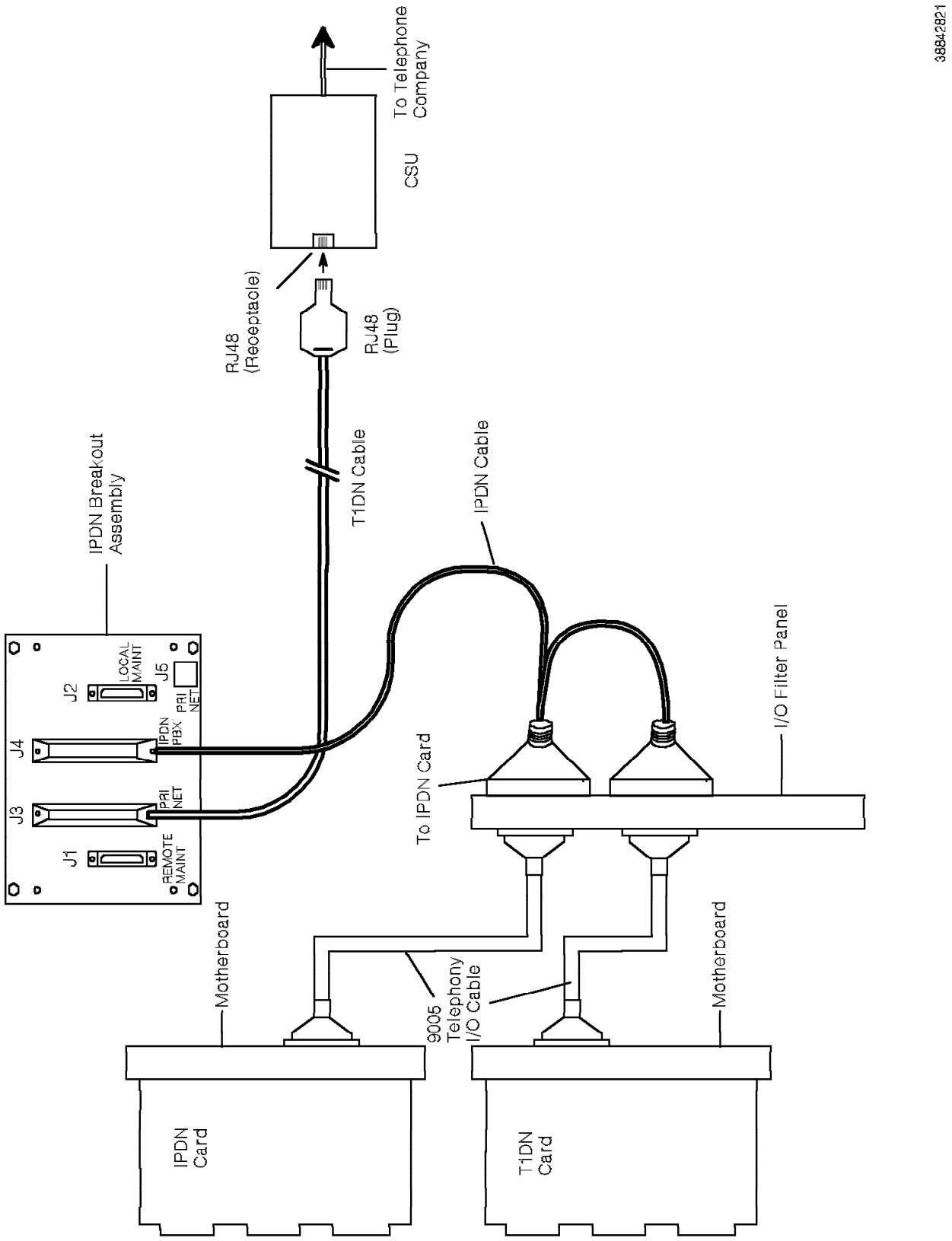

Figure 4-27. 9751 CBX to Telephone Company Connection for the Model 40 or 50

Figure 4-28 shows the IPDN card.

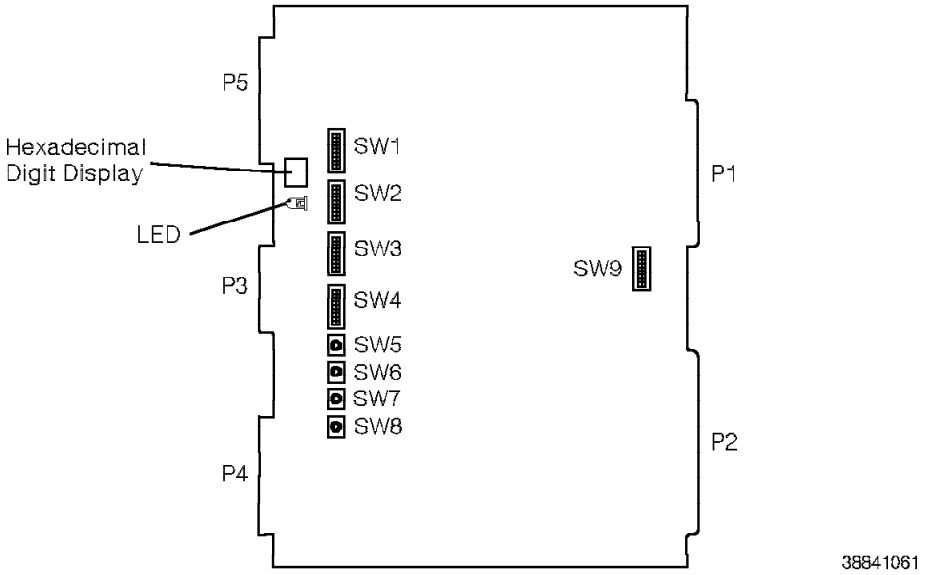

Figure 4-28. IPDN Card

The IPDN card must be on the same shelf as the T1DN card. Table 4-18 lists the IPDN card LED and the conditions it indicates.

Table 4-18. IPDN Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the IPDN card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.19.1 IPDN Card Digital Display

Table 4-19 lists the IPDN card digital display indications. The display slowly flashes three-digit alphanumerics serially, for example, E...A...0.

Table 4-19. IPDN Card Digital Display Indications

State	Indication
Blinking 0	Layers 1, 2, and 3 are established. The IPDN card is ready to process calls. 0 also displays when there are no calls active on the IPDN card.
Blinking digit from 1 to 9	Normal operation. Blinking digit shows how many calls are now active on the IPDN card. Even though there can be 23 active channels, the display indicates up to nine channels only.
Blinking DC0	The IPDN card is in T1 loopback operation.
Blinking DA0	The IPDN card is in ISDN loopback operation.
EA0	There is no communication between IPDN and the network. Layer 1 is not established.
EA1	IPDN receives a blue alarm condition from the network. Layer 1 is not established.
EA2	IPDN receives a yellow alarm condition from the network. Layer 1 is not established.
EA3	Layer 1 is established and IPDN is attempting to establish layer 2.
EA5	Cyclic redundancy check (CRC) errors exist in the ISDN line.
EC0	Loss of carrier from the T1DN card. A red alarm condition exists in the 9751 CBX, originating from the T1DN card.
EC1	The T1DN card did not pass self-test. A blue alarm AIS condition is received from the T1DN card.
EC2	Loss of carrier from IPDN. A yellow alarm condition is received from the T1DN card.

Note: Refer to 4.19.2.3, “Switchpack SW2, Bits 2, 3, and 4 and Corresponding Digit Display Indications” on page 4-40 for information on diagnostic (D) digit display indications and associated error (E00 - E61) conditions.

4.19.2 IPDN Card Switchpacks

This section provides the settings and indications for the IPDN card switchpacks.

CUSTOMER IMPACT

After you change switch settings, apply the umbilical cord to reset the IPDN card. This disrupts any calls active on the IPDN card.

To avoid disrupting calls, ensure that `0` appears on the card's digital display before proceeding. This indicates that there are no active calls.

4.19.2.1 Switchpack SW1, Bits 1 through 8

Table 4-20 lists the SW1 switch settings and indications.

Note: *Off* is the default setting for these bits.

Table 4-20. IPDN Card SW1 Switch Settings

Switch	Bit	Setting	Indication
SW1	1	On	Does not clear the error log when restarted (recommended setting).
		Off	Clears the error log when restarted.
	2	On	Not used.
		Off	Set this bit to *Off*.
	3	On	Reserved.
		Off	Set this bit to *Off*.
	4	On	Sets the ISDN interface to SF/ZCS/data inversion format.
		Off	Sets the ISDN interface to ESF/B8ZS frame format (preferred for new installations).
	5	On	Reserved.
		Off	Set this bit to *Off*.
	6	On	Reserved.
		Off	Set this bit to *Off*.
	7	On	Reserved.
		Off	Set this bit to *Off*.
	8	On	Reserved.
		Off	Set this bit to *Off*.

4.19.2.2 Switchpack SW2, Bits 1 and 5 through 8

Table 4-21 lists the SW2 bits 1 and 5 through 8 switch settings and indications.

Note: *Off* is the default setting for these bits.

Table 4-21. IPDN Card SW2 Switch Settings

Switch	Bit	Setting	Indication
SW2	1	On	Sets the card in diagnostic (DIAG) mode. **Important Note:** Do *not* put the card in DIAG mode unless you are receiving errors.
		Off	Sets the card to normal operation.
	2	Refer to Table 4-22 on page 4-41.	Diagnostics bit 1.
	3	Refer to Table 4-22 on page 4-41.	Diagnostics bit 2.
	4	Refer to Table 4-22 on page 4-41.	Diagnostics bit 3.
	5	On	Sets the card to ISDN network loopback (DA0).
		Off	Sets the card to normal operation.
	6	On	Sets the card to T1 loopback test (DC0).
		Off	Sets the card to normal operation.
	7	On	Reserved.
		Off	Set this bit to *Off*.
	8	On	Suppresses ANI digits and delivers DNIS digits (if present).
		Off	Delivers ANI and DNIS digits (if present).

4.19.2.3 Switchpack SW2, Bits 2, 3, and 4 and Corresponding Digit Display Indications

Table 4-22 on page 4-41 lists the SW2 diagnostic bit (2, 3, and 4) settings. These settings determine which of the diagnostics tests to run when the SW2 bit 1 switch is set to *On* for DIAG mode. This table also lists the corresponding digital display indications that result when you run each test.

Important Note: All of the tests listed in Table 4-22 on page 4-41 run automatically each time the IPDN card is powered on. For this reason, do *not* put the card in DIAG mode unless you are receiving errors that justify running the tests.

Table 4-22. IPDN Card SW2 Switch Settings and Corresponding Digital Display Indications

SW2-			Test	Digit Display	
4	3	2		Normal Operation	Error Condition
Off	Off	Off	Memory test	D00	E00 (read-only memory [ROM]) E01 (random access memory [RAM])
Off	Off	On	Memory switch test	D10	E10
Off	On	Off	DTMF test	D20	E2xxx **Note: xxx** is the total number of detected sender to receiver (S/R) errors
Off	On	On	LAPD controller test	D30	E30
On	Off	Off	ISDN frame test	D40	E40 (internal) E41 (external)
On	Off	On	T1DN frame test	D50	E50 (internal) E51 (external)
On	On	Off	EIA/TIA-232-E test	D60	E60 (Port A) E61 (Port B)
On	On	On	All of the above tests	D70	E70

The following list describes each of the tests:

Memory test — Performs a checksum test on ROM and a read-write test to RAM.

LAPD controller test — Performs a wrap test of the link access procedure D-channel (LAPD) controller.

Memory switch test — Tests the memory switch path.

ESF test — Performs a wrap test of ISDN layer 1.

T1 frame test — Performs a wrap test of T1 layer 1.

DTMF test — Performs a wrap test between the DTMF sender and receiver.

EIA/TIA-232-E test — Performs an internal wrap test of the port on the IPDN card.

The last test runs all of the tests listed in Table 4-22.

4.19.2.4 Switchpack SW3, Bits 1 through 4

The SW3 bits 1 through 4 select the number of T1 channels reserved for data calls. When you select channels for data calls, assign the highest numbers. Table 4-23 on page 4-42 lists the SW3 bits 1 through 4 switch settings.

Note: Even though there can be up to 23 active channels, configure all 24 channels listed in Table 4-23 on page 4-42. In the TRUNK screen, configure

channel 24 as a data channel with the UP field set to DOWN. Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* for more information.

Table 4-23. IPDN Card SW3 Bits 1 - 4 Switch Settings

SW3-				T1 Channel Numbers (V=Voice D=Data)																						
4	3	2	1	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Off	Off	Off	Off	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D
Off	Off	Off	On	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D
Off	Off	On	Off	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D
Off	Off	On	On	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D
Off	On	Off	Off	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D
Off	On	Off	On	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D
Off	On	On	Off	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D
Off	On	On	On	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D
On	Off	Off	Off	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D
On	Off	Off	On	V	V	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D
On	Off	On	Off	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D	D	D
On	Off	On	On	V	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D	D	D
On	On	Off	Off	V	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D	D	D	D
On	On	Off	On	V	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D	D	D	D	D
On	On	On	Off	V	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
On	On	On	On	V	V	V	V	V	V	V	V	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

4.19.2.5 Switchpack SW3, Bit 5

Table 4-24 lists the SW3 bit 5 settings.

Table 4-24. IPDN Card SW3 Bit 5 Switch Settings

Setting	Indication
On	Selects ANI digits from the calling party subaddress field.
Off	Selects ANI digits from the calling party number field (normal setting).

4.19.2.6 Switchpack SW3, Bit 6

Table 4-25 lists the SW3 bit 6 settings.

Table 4-25. IPDN Card SW3 Bit 6 Switch Settings

Setting	Indication
On	Selects DNIS digits from the called party subaddress field.
Off	Selects DNIS digits from the called party number field (normal setting).

4.19.2.7 Switchpack SW3, Bit 7

SW3 bit 7 sets the call type for data calls and Format 2 voice calls. Table 4-26 on page 4-43 lists the SW3 bit 7 settings.

Table 4-26. IPDN Card SW3 Bit 7 Switch Settings

Setting	Indication
On	Uses the software defined network (SDN) capability for voice calls and software defined data network (SDDN) capability for data calls.
Off	Uses the public network for voice and data calls.

Contact your next level of support for more detailed information.

4.19.2.8 Switchpack SW3, Bit 8

SW3 bit 8 selects the carrier. Refer to Table 4-27.

4.19.2.9 Switchpack SW4, Bits 1, 2, 7, and 8

These bits are reserved. Set them to *Off*.

4.19.2.10 Switchpack SW3 Bit 8 and SW4 Bits 3 through 6

Table 4-27 lists the switch settings for SW3 bit 8 and SW4 bits 3 through 6. The 9751 CBX supports ISDN connections to any or all of the carriers, but requires that an individual IPDN card be dedicated to each carrier.

Depending on the firmware release, the IPDN card supports the carriers listed. Contact your next level of support for more information.

Table 4-27. IPDN Card SW3 Bit 8 and SW4 Bits 3 through 6 Switch Settings

SW3-8	SW4-3	SW4-4	SW4-5	SW4-6	Network ID
Off	Off	Off	Off	Off	AT&T
On	Off	Off	Off	Off	MCI
Off	On	On	Off	Off	Westinghouse
On	On	On	Off	Off	Sprint
Off	Off	Off	Off	On	Local exchange carrier 5ESS
Off	On	Off	Off	On	Local exchange carrier DMS-100
Off	On	Off	Off	On	Bell Canada DMS-100

Important Note: The IPDN card ships with the J4 center pin connected to pin B. If you use local exchange carrier DMS-100 or Bell Canada DMS-100, move the card's J4 center pin to pin A.

4.19.2.11 Switchpack SW5 through SW8, Bits 0 through 9

These rotary switches permit the configuration of a four-digit extension for a test call from the ISDN network. Set SW5 through SW8 sequentially to create the extension number. Otherwise, set these to 0.

4.19.2.12 Switchpack SW9, Bits 1 through 8

The maximum cable length between the IPDN card and the IPDN breakout assembly is 14 meters (approximately 45 feet). The maximum distance between the IPDN breakout assembly and the channel service unit (CSU) is 185 meters (approximately 610 feet). The maximum combined distance between the IPDN card and the CSU is 200 meters (approximately 655 feet).

Use the DIP switch configuration information in Table 4-28 to set the IPDN card for this combined distance.

Table 4-28. IPDN Card SW9 Bits 1 through 8 Switch Settings

Switch	IPDN-to-CSU Distance											
	10 ft 3m	**50 ft 15.2m**	**90 ft 27.4m**	**130 ft 39.6m**	**160 ft 48.8m**	**220 ft 67m**	**300 ft 91.4m**	**360 ft 109.7m**	**430 ft 131.1m**	**500 ft 152.4m**	**570 ft 173.7m**	**650 ft 198.1m**
SW9-1	On	Off	Off	On	Off	Off	On	Off	Off	On	Off	Off
SW9-2	Off	On	Off	Off	On	Off	Off	On	Off	Off	On	Off
SW9-3	Off	Off	On	Off	Off	On	Off	Off	On	Off	Off	On
SW9-4	Off	Off	Off	On	On	On	Off	Off	Off	On	On	On
SW9-5	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On
SW9-6	Off	Off	Off	On	On	On	Off	Off	Off	On	On	On
SW9-7	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On
SW9-8	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

4.20 LSM Card (Models 40 and 50)

The LSM card (Figure 4-29) detects and reports to the SMIOC the following conditions for each TDM shelf:

- Open −48 Vdc circuit breaker
- Tripped ring fuse
- Fan and shelf power module failures
- Shelf identification
- Over-temperature conditions

The LSM card has a connector for the umbilical cord; however, it is *not* the standard connector that is on other 9751 CBX cards.

Attach the umbilical cord to the LSM card when you remove and replace most cards. By doing so, the LSM card protects the 9751 CBX by:

- Providing power to the card that you are removing or replacing, which prevents system interrupts
- Using its fuse protector to detects short circuits in the replacement card, which prevents you from replacing one defective card with another defective card
- Using its temperature sensor to detect temperatures above 140°F (60°C), which causes the main circuit breaker to trip on the affected cabinet

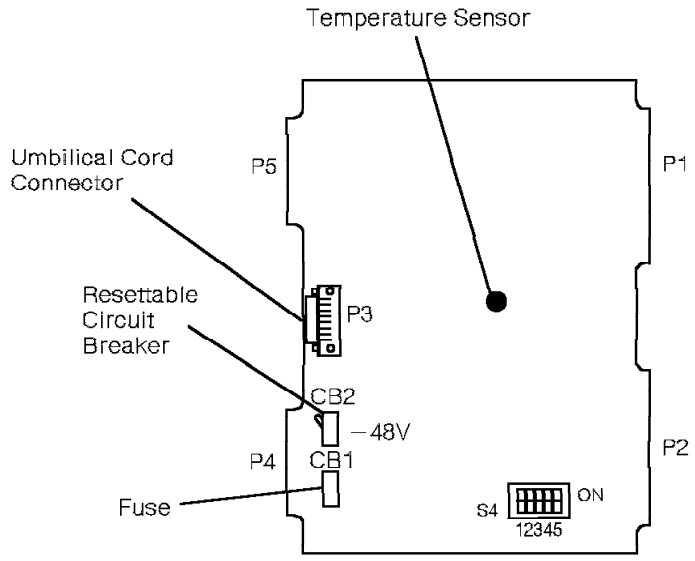

Figure 4-29. LSM Card for the Model 40 or 50

The LSM card is in slot 30 on all TDM shelves. It has no LEDs.

The P connector designations for the LSM card are as follows:

P1 Not used
P2 TDM motherboard connector
P3 Umbilical cord connector
P4 Not used
P5 Not used

The following also appears on the LSM card:

Grasshopper fuse (CB1)
Used for the ring power. It is fused at ¼ amp.

Circuit breaker (CB2)
Used for the −48 Vdc talk battery.

Switchpack S4
A 5-position switchpack that identifies the shelf on which the card resides.

Table 4-29 lists the switch settings for switchpack S4.

Table 4-29. LSM Card Switchpack S4 Settings

Shelf	SW1	SW2	SW3	SW4	SW5
1	Off	Off	Off	Off	On
3	Off	Off	Off	On	On
4	Off	Off	On	Off	Off
5	Off	Off	On	Off	On
6	Off	Off	On	On	Off
7	Off	Off	On	On	On
8	Off	On	Off	Off	Off
9	Off	On	Off	Off	On
10	Off	On	Off	On	Off
11	Off	On	Off	On	On
12	Off	On	On	Off	Off
13	Off	On	On	Off	On
14	Off	On	On	On	Off
15	Off	On	On	On	On
16	On	Off	Off	Off	Off
17	On	Off	Off	Off	On
18	On	Off	Off	On	Off
19	On	Off	Off	On	On
20	On	Off	On	Off	Off

4.21 Memory Card (Model 10)

The memory card (Figure 4-30) provides 12 megabytes (MB) of memory storage for the system software and databases.

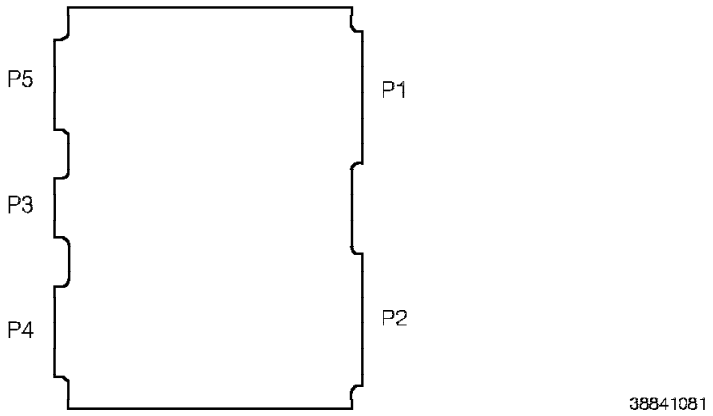

Figure 4-30. Memory Card for the Model 10

The memory card is in slot 22 on shelf 1 of the Model 10. It has no LEDs.

The P connector designations for the memory card are as follows:

P1 Universal backplane connector
P2 Universal backplane connector
P3 Not used
P4 Not used
P5 Not used

4.22 Memory Controller Card (Model 10)

The memory controller card (Figure 4-31) acts as an interface between the memory card and the 9030 CPU card. It corrects single-bit and double-bit memory errors, provides memory address protection, and refreshes memory.

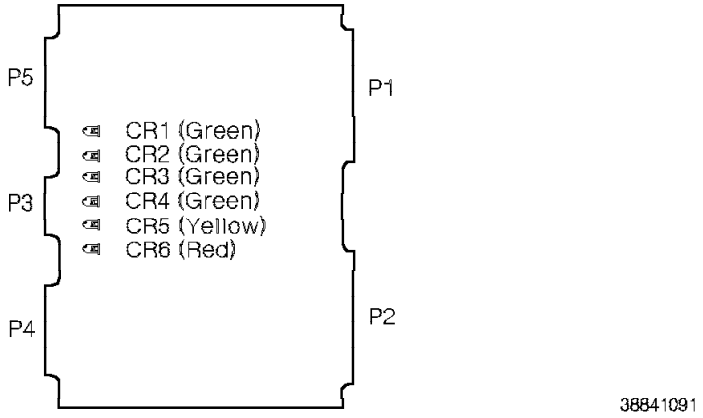

Figure 4-31. Memory Controller Card for the Model 10

The memory controller card is in slot 21 on shelf 1 of the Model 10. Table 4-30 lists the memory controller card LEDs and the conditions they indicate.

Table 4-30. Memory Controller Card LED Indicators

CR1 (Green)	CR2 (Green)	CR3 (Green)	CR4 (Green)	CR5 (Yellow)	CR6 (Red)	Indication
Off	Off	Off	Off	Off	Off	The card is operating normally.
On	On	On	On	Off	Off	Diagnostics are running on the card.
On	Off	Off	Off	On	On	There is a 9030 CPU card failure.
On	On	Off	Off	On	On	There is a memory controller card failure.
Off	Off	On	Off	On	On	There is a memory card failure.
On	Off	Off	On	On	On	There is a hard disk drive failure.
Off	Off	Off	On	On	On	There is a PDC card or 9030 CPU card failure.
On	On	On	Off	On	On	There is a PDC card, 9030 CPU card, or memory controller card failure.
On	Off	Off	On	Off	Off	The core image volume is loading. **Note:** The indicated LEDs light alternately.

The P connector designations for the memory controller card are as follows:

P1 Universal backplane connector
P2 Universal backplane connector
P3 Not used
P4 Front edge connector to P4 of the 9030 CPU card
P5 Front edge connector to P5 of the 9030 CPU card

4.23 Message Waiting Card (Models 40 and 50)

The message waiting card (Figure 4-32) is part of the message waiting interface district. It plugs into the message waiting interface motherboard.

Refer to 4.24, “Message Waiting Interface District (Models 40 and 50)” on page 4-51 for more information.

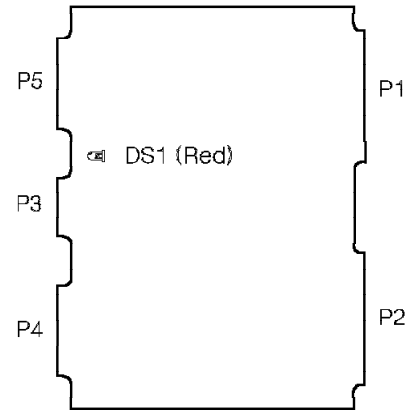

Figure 4-32. Message Waiting Card for the Model 40 or 50

The message waiting card has one LED. Table 4-31 lists the message waiting card LED and the conditions it indicates.

Table 4-31. Message Waiting Card LED Indicators

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the message waiting card are as follows:

P1 Interface motherboard connector
P2 TDM backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.24 Message Waiting Interface District (Models 40 and 50)

The message waiting interface district interfaces 16 analog single-line telephones with message waiting lamps in the Model 40 or 50 (Figure 4-33). It also supplies −48 Vdc talk battery.

The message waiting cards contain lamp driver circuitry that interprets commands from the processor and turns on the station message waiting lamp. The message waiting telephone lamp flashes, indicating a message alert, or lights steadily, indicating a do-not-disturb or forward state.

The message waiting interface district includes a codec card to convert voice signals from digital to analog and from analog to digital during call processing. It receives commands over the TDM network. It also sends and receives digitized voice signals over the TDM network.

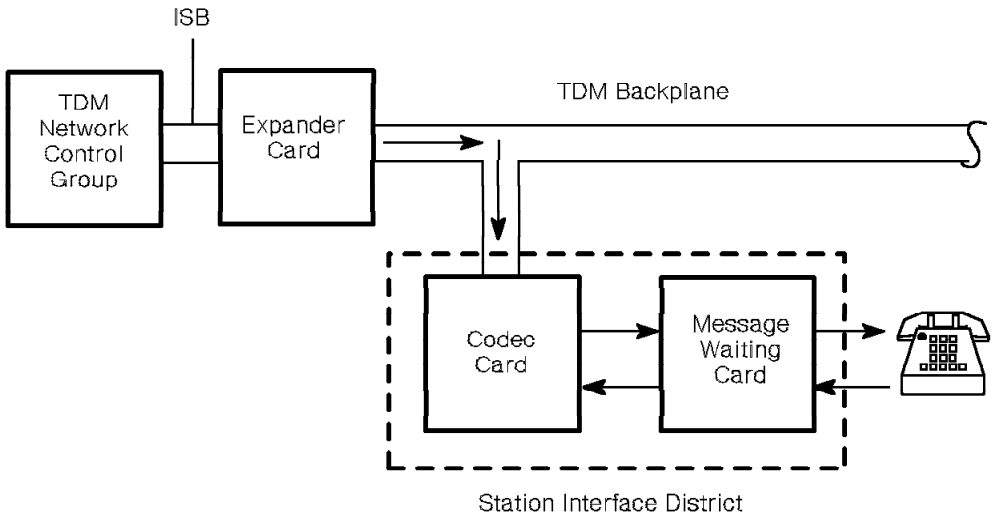

Figure 4-33. Message Waiting Interface District Functional Diagram for the Model 40 or 50

The message waiting interface district consists of the following:

- One 16-channel codec
- Two 8-channel message waiting cards
- One 6x3x1 interface motherboard
- One Amphenol cable

The message waiting interface district (Figure 4-34) is on any configurable TDM shelf. The motherboard spans six slots.

One Amphenol cable connects the message waiting motherboard to the MDF through the TDM backplane. At the MDF the leads cross-connect to station cables that connect to analog telephones.

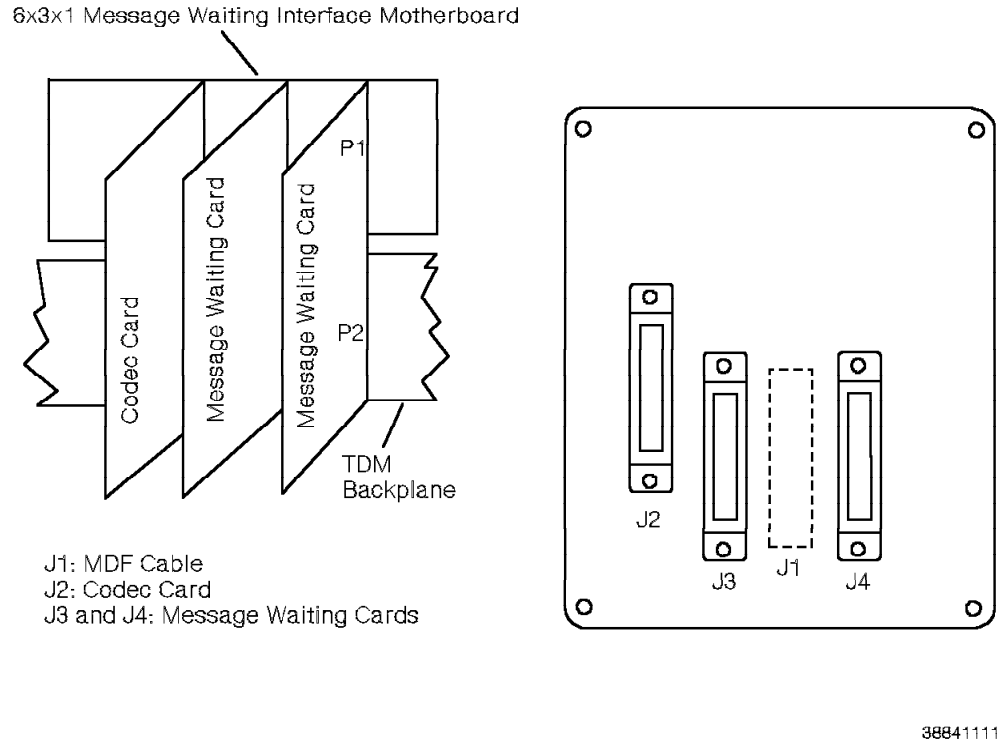

Figure 4-34. Message Waiting Interface District for the Model 40 or 50

4.25 MW8 Card

The MW8 card is a state messaging card that interfaces single-line stations equipped with message waiting lamps with the 9751 CBX. For the Model 10, it provides message waiting capability. For the Model 40 or 50, the MW8 card enhances the message waiting capability the message waiting interface district provides. It also performs the function of the codec and rotary register cards.

The MW8 card also provides wink-off disconnect supervision for such devices as voice response units (VRUs) and answering machines.

The MW8 card contains lamp driver circuitry that interprets commands from the processor and turns on the station message waiting lamp (Figure 4-35). The message waiting telephone lamp flashes, indicating a message alert, or lights steadily, indicating a do-not-disturb or forward state.

One Amphenol cable connects the card to the MDF through the backplane. At the MDF the leads cross-connect to station cables that connect to analog telephones.

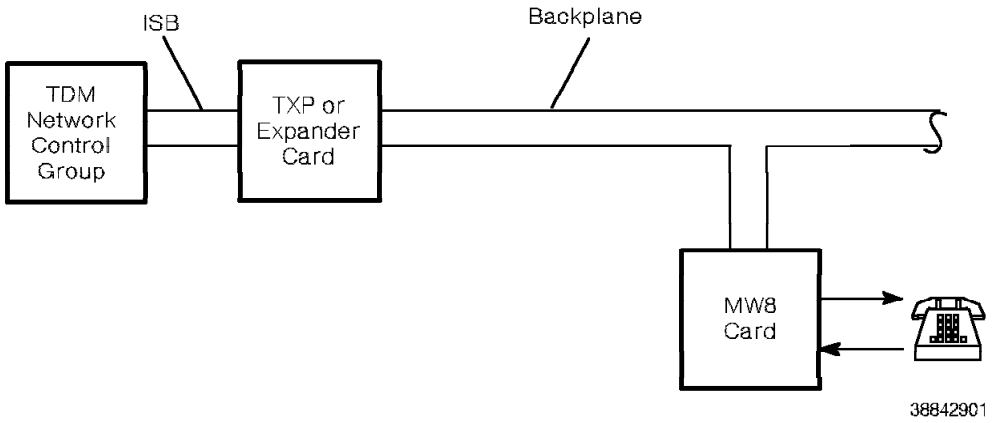

Figure 4-35. MW8 Functional Diagram

Figure 4-36 shows the MW8 card.

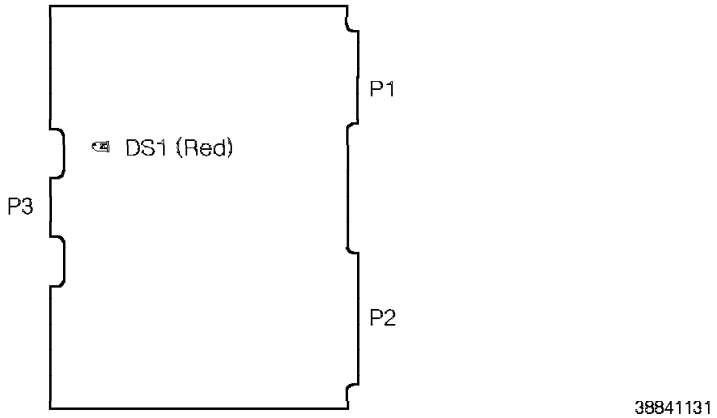

Figure 4-36. MW8 Card

The MW8 card is in any TDM slot on any shelf. Table 4-32 lists the MW8 card LED and the conditions it indicates.

Table 4-32. MW8 Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the MW8 card are as follows:

P1 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P2 **Model 10:** Universal backplane connector

Models 40 and 50: Universal backplane, TDM backplane, or universal motherboard connector

P3 Standard umbilical cord connector

4.26 OPS Card (Models 40 and 50)

The OPS card (Figure 4-37) is part of the OPS interface district. It plugs into the OPS interface motherboard.

Refer to 4.27, “OPS Interface District (Models 40 and 50)” on page 4-56 for more information.

Important Note: Do *not* use OPS cards and OPS8 cards in the same system.

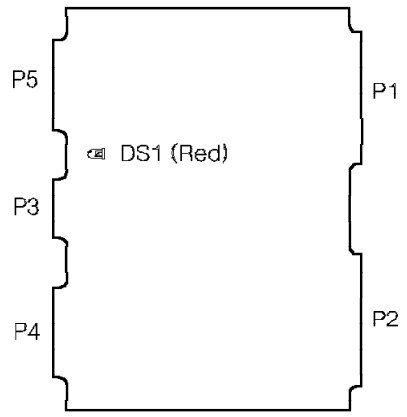

Figure 4-37. OPS Card for the Model 40 or 50

Table 4-33 lists the OPS card LED and the conditions it indicates.

Table 4-33. OPS Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the OPS card are as follows:

P1 Interface motherboard connector
P2 TDM backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.27 OPS Interface District (Models 40 and 50)

The OPS interface district interfaces stations that are not on the premises with the Model 40 or 50. Each OPS card compensates for signal loss in the line from an off-premise extension.

The OPS interface district cards (Figure 4-38) function as a district through a separate 5x3x1 OPS interface motherboard mounted above the TDM backplane.

The OPS interface district requires the codec card, which converts voice signals from analog to digital and from digital to analog during call processing.

The OPS district receives commands, and sends and receives digitized voice signals over the TDM network.

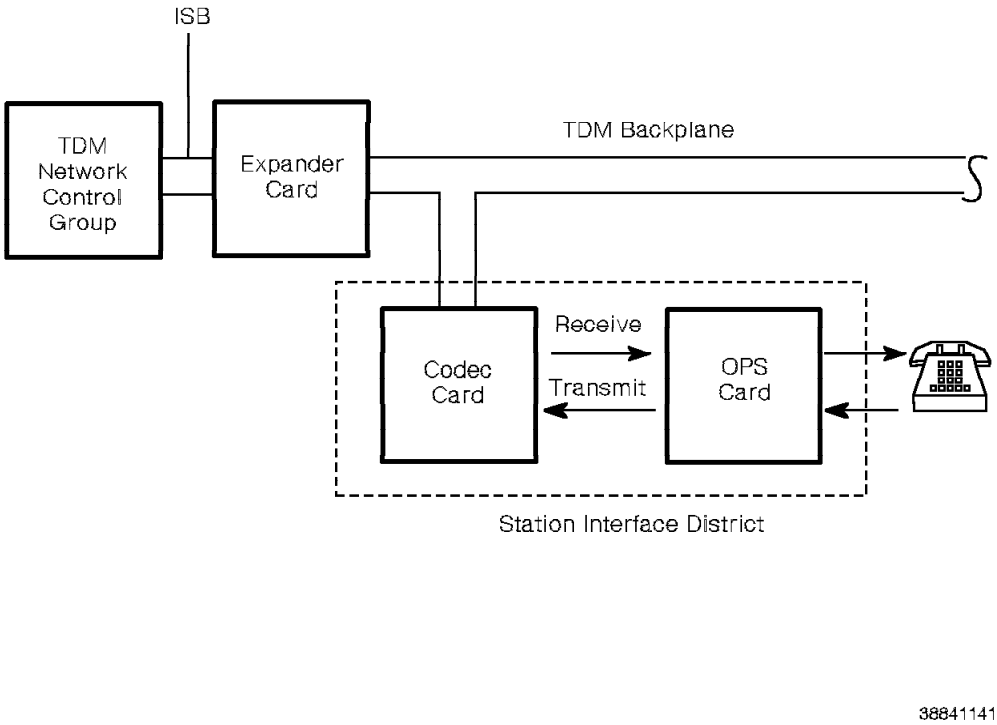

Figure 4-38. OPS Interface District Functional Diagram for the Model 40 or 50

The OPS interface district (Figure 4-39) consists of the following:

- One 16-channel codec
- Two 8-channel OPS cards
- One 5x3x1 interface motherboard
- One Amphenol cable

The OPS interface district is on any configurable TDM shelf. The motherboard spans five slots.

One Amphenol cable connects the motherboard to the MDF through the TDM backplane. At the MDF the leads cross-connect to the leads of the off-premise line from the CO.

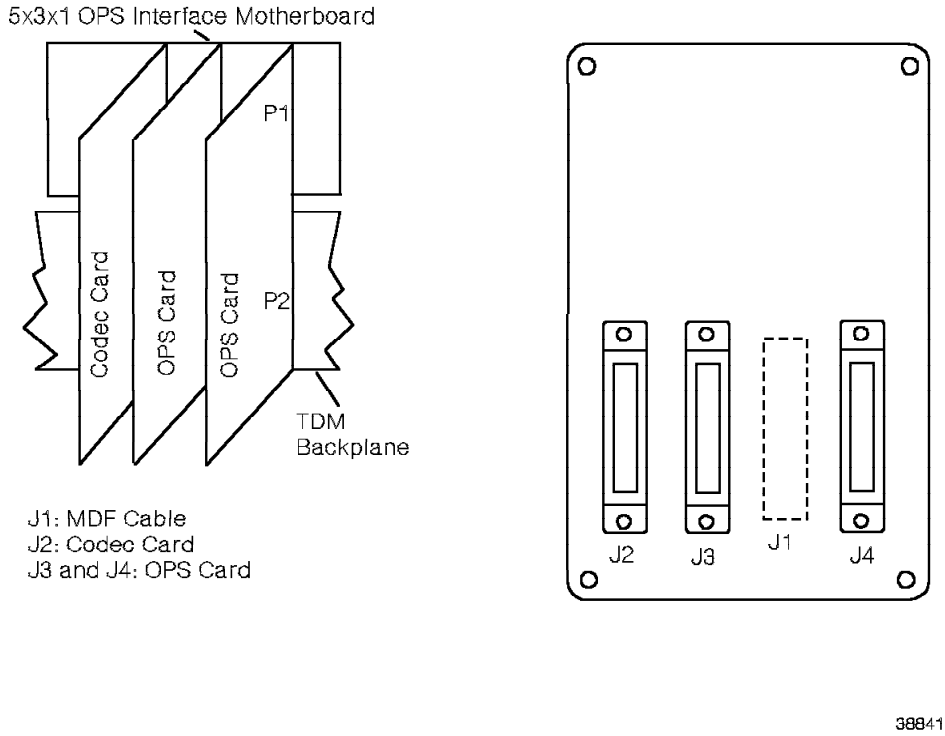

Figure 4-39. OPS Interface District for the Model 40 or 50

4.28 OPS8 Card

The OPS8 card is an 8-channel state messaging card that interfaces stations that are not on the premises with the 9751 CBX. It has four software-controlled balancing networks and a built-in rotary register.

The OPS8 card compensates for signal loss in the line from an off-premises extension to the 9751 CBX. The OPS8 card provides a configurable wink-off feature to support voice-transmitting units, such as VRUs, and some nonintelligent devices such as modems.

The OPS8 card receives commands from the processor, and sends and receives digitized voice signals through the TDM network control group (Figure 4-40).

One Amphenol cable connects the card to the MDF through the backplane. At the MDF the leads cross-connect to the leads of the off-premise line from the CO.

Important Note: Do *not* use OPS cards and OPS8 cards in the same system.

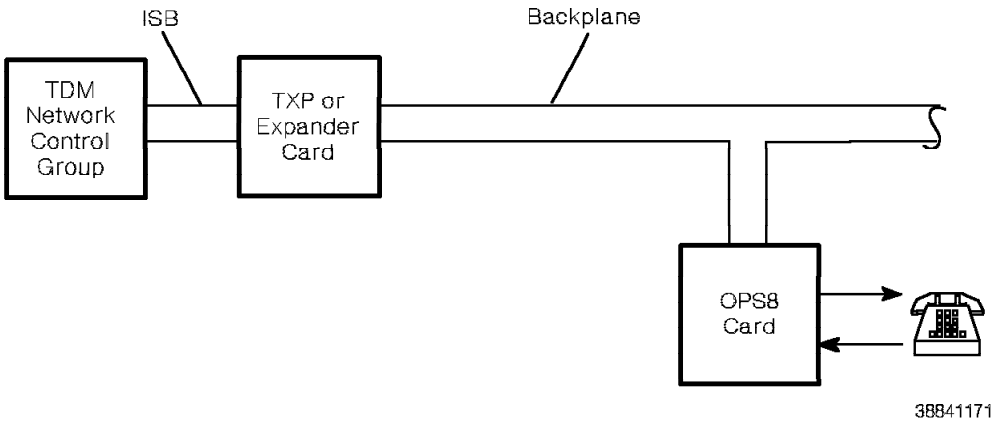

Figure 4-40. OPS8 Functional Diagram

Figure 4-41 shows the OPS8 card.

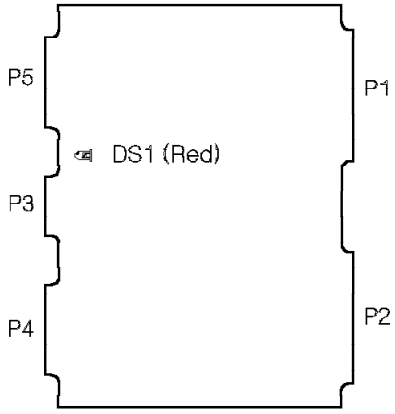

Figure 4-41. OPS8 Card

The OPS8 card is in any TDM slot on any shelf. Table 4-34 lists the OPS8 card LED and the conditions it indicates.

Table 4-34. OPS8 Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the OPS8 card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: Universal motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.29 PDC Card

The PDC card (Figure 4-42) controls the processor's interface with the hard disk drive and the diskette drive. It supports one hard disk drive and one diskette drive.

The PDC card communicates with the disk drive assemblies through the backplane.

In the Model 10, the type of dual drive assembly determines the type of PDC card the 9751 CBX requires:

Model no. 91215A dual drive assembly
Use the model no. 90594, Version B or above, peripheral device controller, new (PDCN), card.

Model no. 91216 dual drive assembly
Use the model no. 90595 peripheral device controller, enhanced (PDCE), card.

In the Models 40 and 50, the type of hard disk drive determines the type of PDC card the 9751 CBX requires:

Model no. 91323 hard disk drive
Use the PDCN card.

Model no. 91324 hard disk drive
Use the PDCE card.

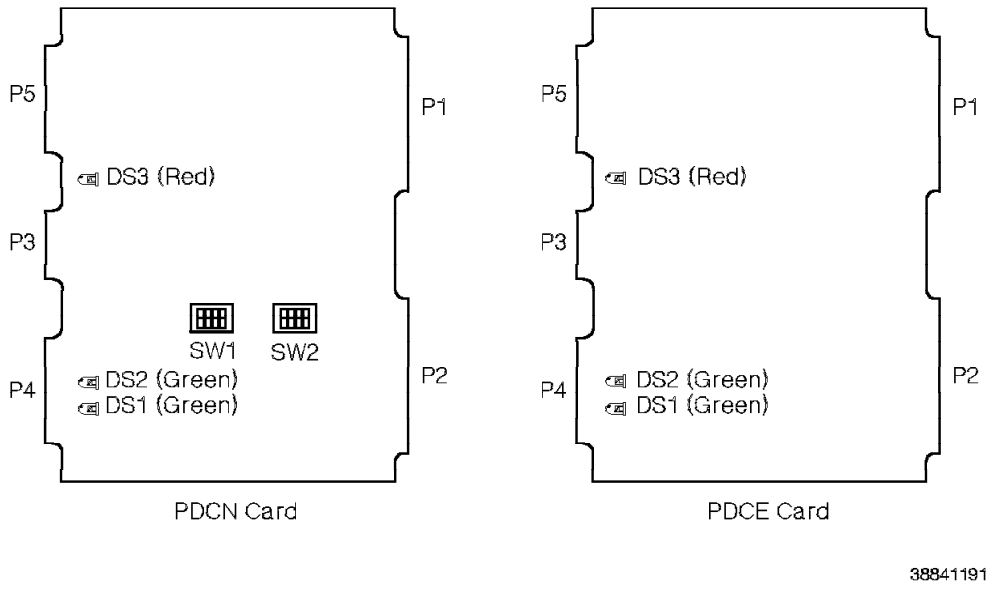

Figure 4-42. PDC Card

The PDC card is in:

- Slot 23 on shelf 1 of the Model 10
- Slot 24 on shelf 2 of the Model 40 or 50

Table 4-35 lists the PDC card LEDs and the conditions they indicate.

Table 4-35. PDC Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is accessing the hard disk drive.
		Off	The card is not accessing the hard disk drive.
DS2	Green	On	The card is accessing the diskette drive.
		Off	The card is not accessing the diskette drive.
DS3	Red	On	The card is down.
		Off	The card is up.

The switchpacks are as follows:

PDCN card The PDCN card has the following switchpacks:

SW1 All DIP switches are preset to *Off*.

SW2 All DIP switches are preset to *Off* except for DIP switch 8, which is set to *On*.

PDCE card The PDCE card has no switchpacks.

The P connector designations for the PDC card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.30 RLI Card

The RLI card interfaces the following devices with the 9751 CBX:

- Voice-only devices
- Data-only devices
- Voice and data devices

The RLI card supports up to 16 devices. The devices can be all of one type (for example, all voice-only) or a combination of different types (for example, eight voice-only and eight data-only). The supported devices include the following:

- Asynchronous data communications modules (ADCMs)
- Asynchronous rack-mount data communication modules (ARMDCMs)
- Cedar load module (CDLM)
- Cypress load module (CLM)
- Desktop products
- Rack-mount data communication modules (RMDCMs)
- ROLMphone telephones (with or without data)

The RLI card performs the following functions (Figure 4-43):

- Receives control commands the 9751 CBX operating system sends through the TDM network
- Transmits and receives data to and from the 9751 CBX operating system through the TDM network
- Transmits and receives digitized voice signals over the TDM network

The RLI card supports both voice and data applications. The voice or data device performs the digital-to-analog and analog-to-digital conversion.

One Amphenol cable connects the card to the MDF. At the MDF, the leads cross-connect to incoming leads from the voice or data devices.

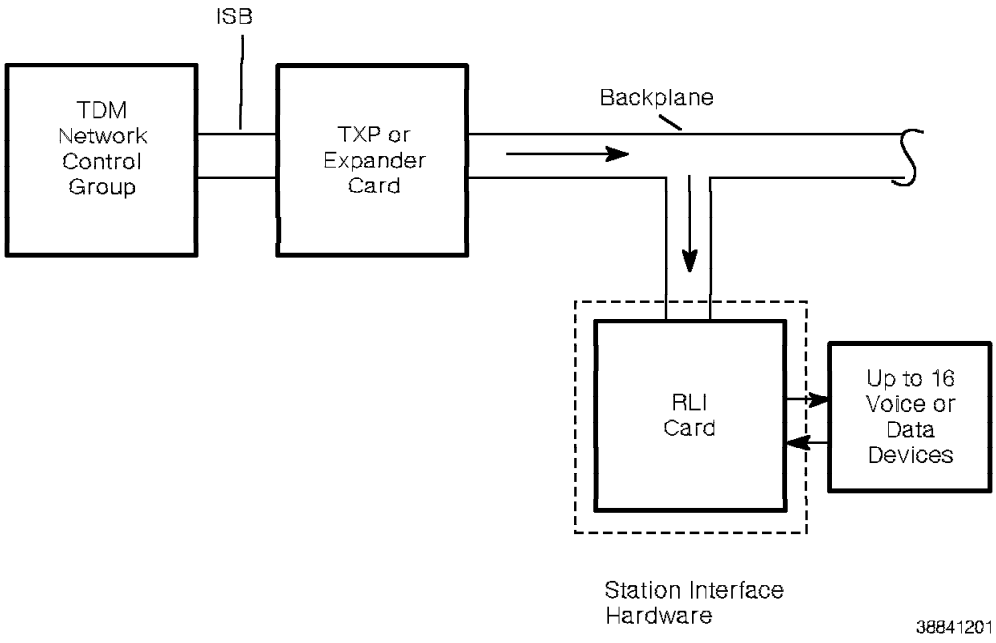

Figure 4-43. RLI Functional Diagram

Figure 4-44 shows the RLI card.

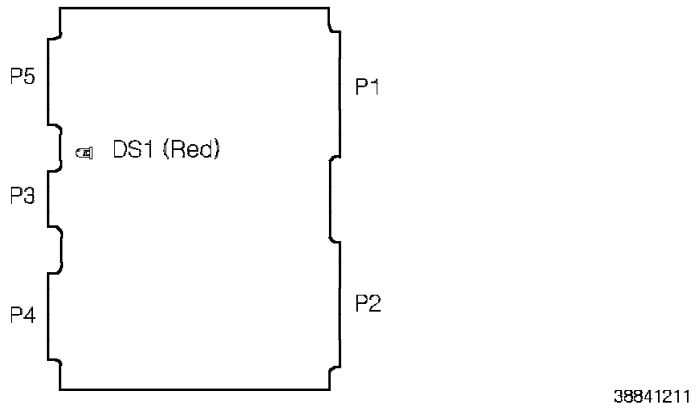

Figure 4-44. RLI Card

The RLI card is in any TDM slot on any shelf. Table 4-36 lists the RLI card LED and the conditions it indicates.

Table 4-36. RLI Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the RLI card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: Universal motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.31 ROLMbridge 5250 Enable/Bypass Card (Models 40 and 50)

The ROLMbridge 5250 enable/bypass card (Figure 4-45) is an unpopulated card (a card with no components). It routes the Model 40 or 50 enable line signal to the ROLMbridge 5250 7-channel card.

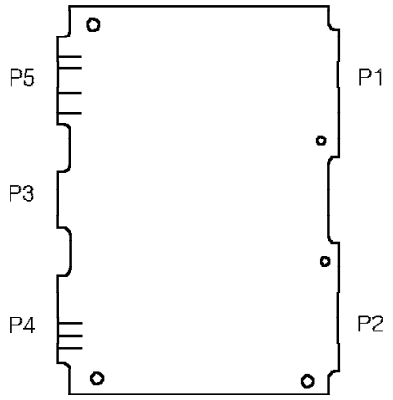

Figure 4-45. ROLMbridge 5250 Enable/Bypass Card for the Model 40 or 50

4.32 ROLMbridge 5250 Motherboard (Models 40 and 50)

The ROLMbridge 5250 motherboard provides the interface between the twinaxial connectors to the host connection and the two ROLMbridge 5250 7-channel cards in the Model 40 or 50 (Figure 4-46).

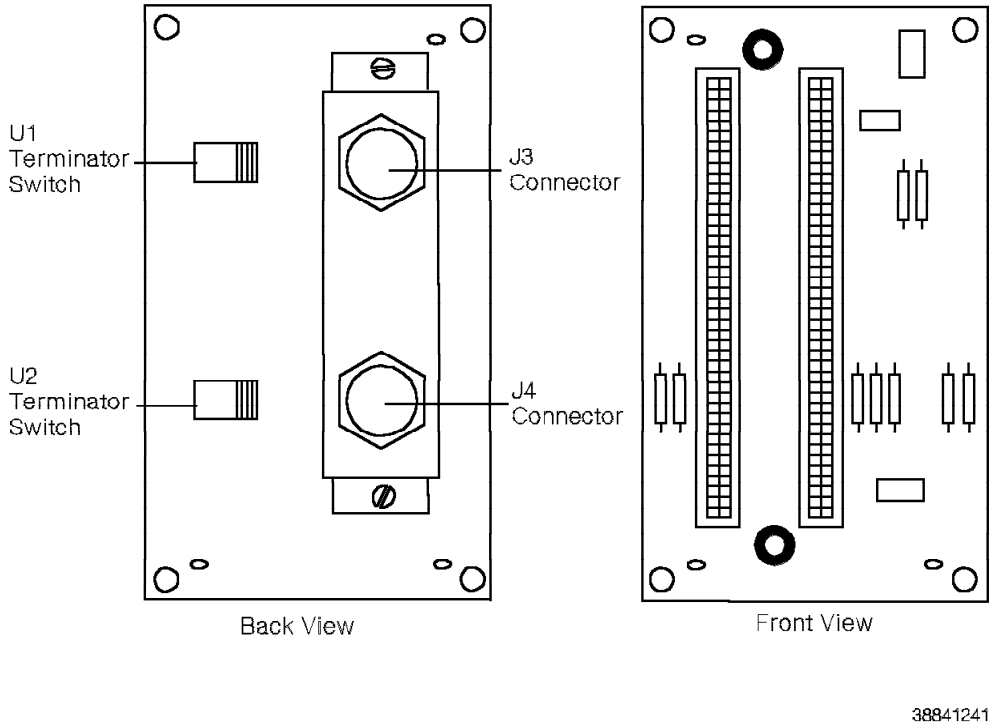

Figure 4-46. ROLMbridge 5250 Motherboard for the Model 40 or 50

The ROLMbridge 5250 motherboard is on any TDM shelf.

Two edge connector sockets appear on the front of the ROLMbridge 5250 motherboard.

Two twinaxial cable connectors on the back of the ROLMbridge 5250 motherboard provide a cable connection through the input/output (I/O) filter panel to the host connection. Each of these connectors is associated with a terminator switch that shows whether the ROLMbridge 5250 7-channel card is the last device on the twinaxial cable. These switches must always be set to *terminate*.

Table 4-37 on page 4-66 lists the connectors that appear on the back of the ROLMbridge 5250 motherboard.

Table 4-37. ROLMbridge 5250 Motherboard Connectors

Edge Connector	Purpose	Twinaxial Connector	Twinaxial Connector Label	Terminator Switch
J1	LPC1 (a ROLMbridge 5250 7-channel card)	J3	TWINAX1	U1
J2	LPC2 (either a ROLMbridge 5250 enable/bypass card or another ROLMbridge 5250 7-channel card)	J4	TWINAX2	U2

4.33 ROLMbridge 5250 7-Channel Card (Models 40 and 50)

The ROLMbridge 5250 7-channel card (Figure 4-47) provides protocol conversion that permits asynchronous devices to connect to a host connection through the Model 40 or 50.

The ROLMbridge 5250 7-channel card supports up to seven data line connections. Use two ROLMbridge 5250 7-channel cards to support 14 channels.

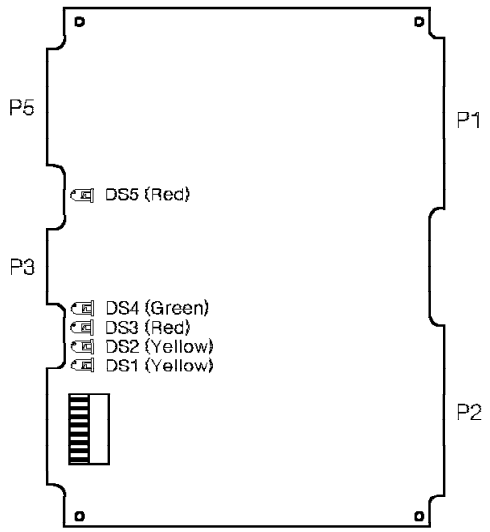

Figure 4-47. ROLMbridge 5250 7-Channel Card for the Model 40 or 50

Table 4-38 lists the ROLMbridge 5250 7-channel card LEDs and the conditions they indicate.

Table 4-38 (Page 1 of 2). ROLMbridge 5250 7-Channel Card LED Indicators

LED	Color	State	Indication
DS1	Yellow	On	The channel is hung up.
		Off	There is no communication with the host.
		Flicker	The card is receiving correctly transmitted twinaxial commands. **Note:** This LED can be difficult to read. If it flickers slowly, it can be so dim that it appears to be off; if it flickers rapidly, it can appear to be on.
DS2	Yellow	On	A connection is made with a host computer.
		Off	A connection is not made with a host computer.
DS3	Red	On	The card did not pass self-test.
		Off	The card passed self-test.
DS4	Green	Off	The card passed self-test.
		Blinking	The card did not pass self-test.

Table 4-38 (Page 2 of 2). ROLMbridge 5250 7-Channel Card LED Indicators

LED	Color	State	Indication
DS5	Red	On	The card is down.
		On	The card is up.

The P connector designations for the ROLMbridge 5250 7-channel card are as follows:

P1 ROLMbridge motherboard connector
P2 TDM backplane connector
P3 Standard umbilical cord connector
P5 Not used

The ROLMbridge 5250 7-channel card has the following DIP switches:

DIP switches 1 through 7

The *CLOSED/ON* position enables the host channel. The *OPEN/OFF* position disables the host channel.

You normally set these DIP switches to *CLOSED/ON*. If other devices are on the same cable, set the DIP switches to *OPEN/OFF* for the channel those devices use.

DIP switch 8

Not used.

4.34 Rotary Register Card

The rotary register card converts dial pulses from rotary telephones or tie trunk interfaces into digital words suitable for computer processing (Figure 4-48).

The rotary register card has 16 registers. Each card can service 16 lines at the same time.

When a user dials a number on a rotary telephone:

1. The ATI card converts off-hook pulses into digital pulses.
2. The digital pulses are sent to the rotary register.
3. The rotary register translates the digital pulses into a digital word that the processor can interpret.

The TDM network control group establishes the connection between the rotary register card and the ATI card.

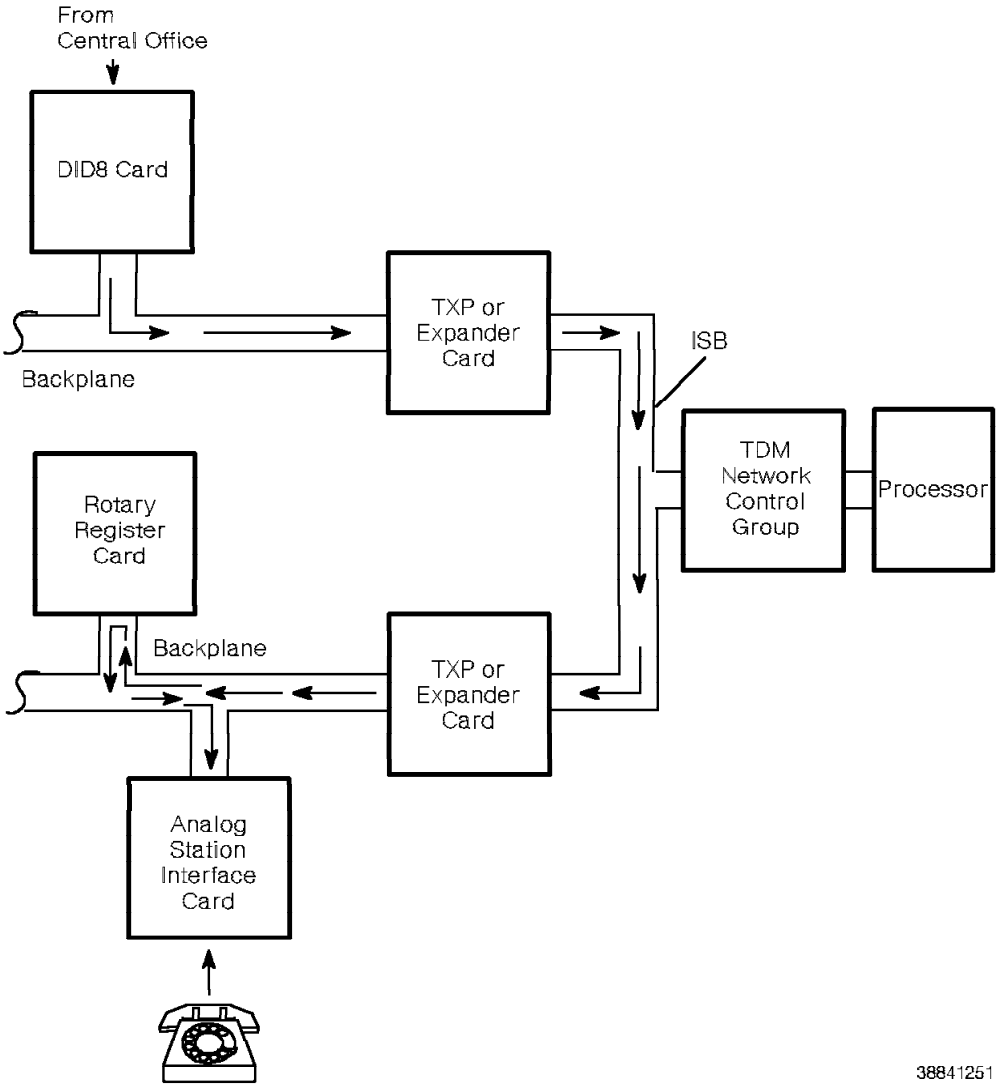

Figure 4-48. Rotary Register Functional Diagram

Figure 4-49 shows the rotary register card.

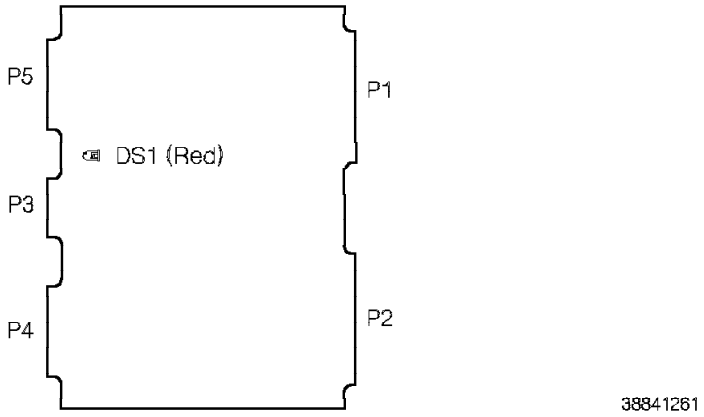

Figure 4-49. Rotary Register Card

The rotary register card is in a shared electronics slot or any TDM slot. Table 4-39 lists the rotary register card LED and the conditions it indicates.

Table 4-39. Rotary Register Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the rotary register card are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.35 Rotary Sender Card

The rotary sender card supports applications, particularly trunking, that require off-hook outpulsing.

The rotary sender card receives digital words from the computer, converts the words into digital pulses, and sends the digital pulses to the trunk card (Figure 4-50). The trunk card translates digital pulses into dial pulses for the trunk.

The rotary sender has 16 registers. Each card can service 16 trunks at the same time.

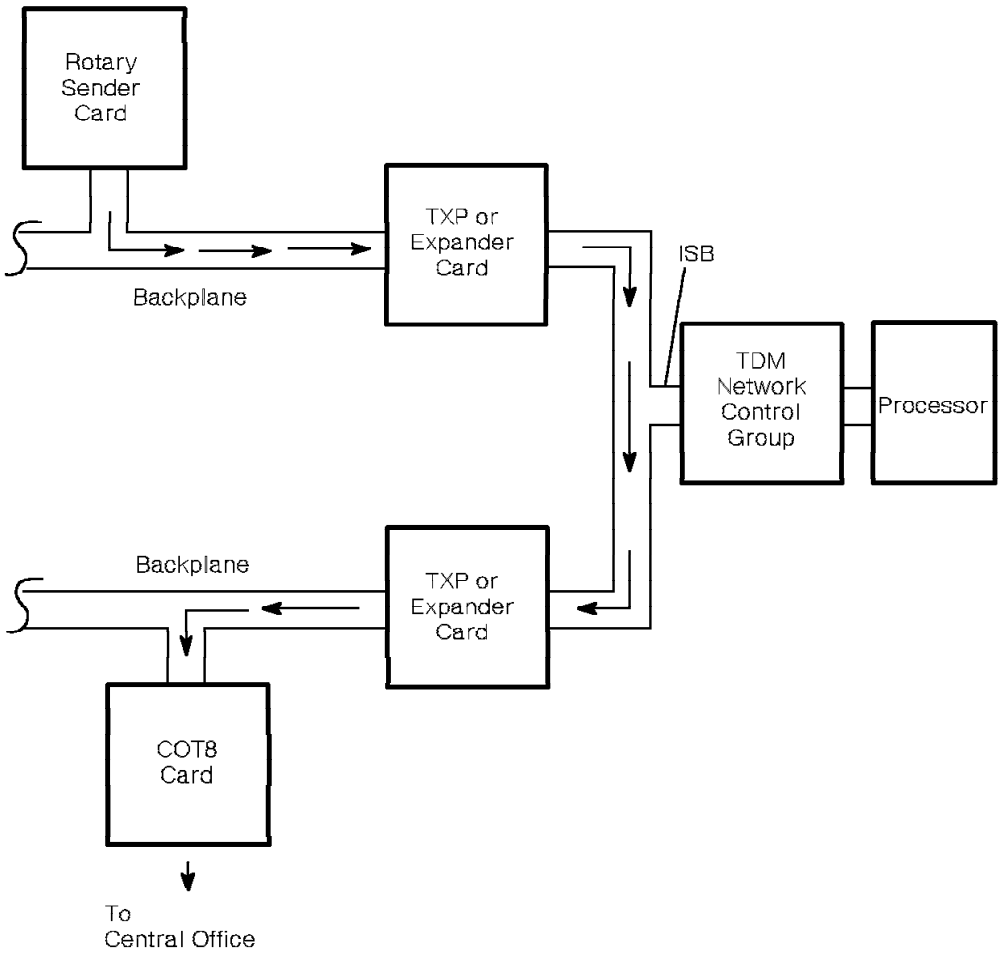

Figure 4-50. Rotary Sender Functional Diagram

Figure 4-51 shows the rotary sender card.

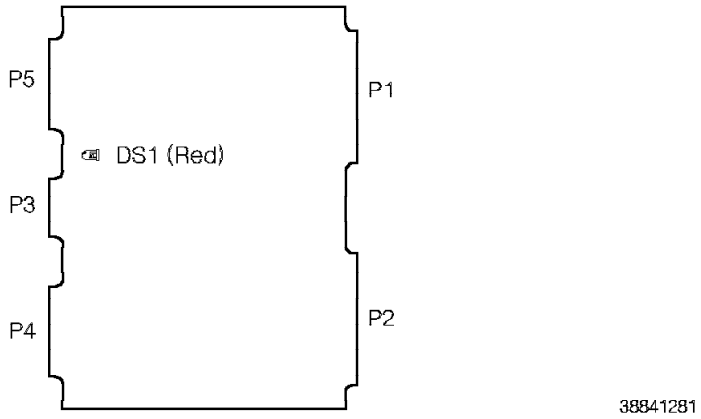

Figure 4-51. Rotary Sender Card

The rotary sender card is in a shared electronics slot or any TDM slot. Table 4-40 lists the rotary sender card LED and the conditions it indicates.

Table 4-40. Rotary Sender Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the rotary sender card are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.36 RPDN Card (Models 40 and 50)

The RPDN card permits a 9751 CBX to use a CorNet-N link to connect to another 9751 CBX or to a 9200 CBX.

The RPDN card interfaces with one to four D-channels on one end and with the CPN at the other end (Figure 4-52). Therefore, each RPDN card can support up to four CorNet-N links.

Just as each processor contains two networks, the RPDN card has two network interfaces on the same card, so that each processor has access to both networks at all times. The card can also communicate with the 9751 CBX through the TDM bus.

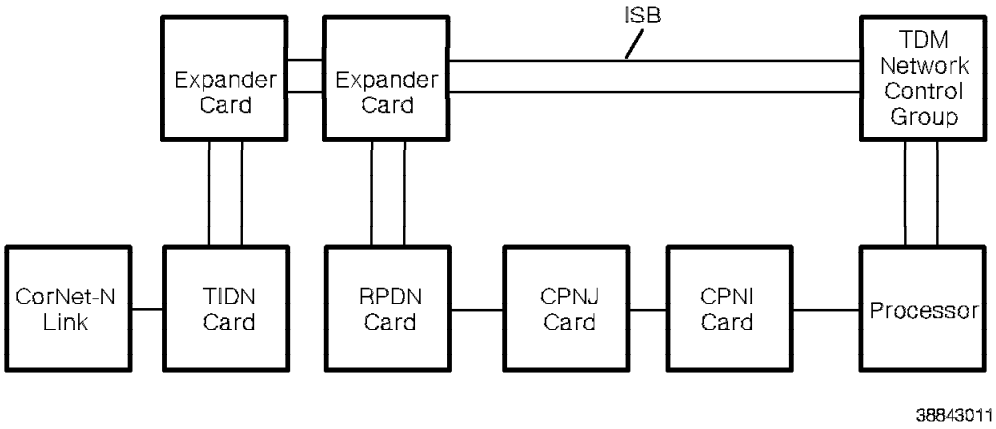

Figure 4-52. RPDN Functional Diagram

Figure 4-53 shows the RPDN card.

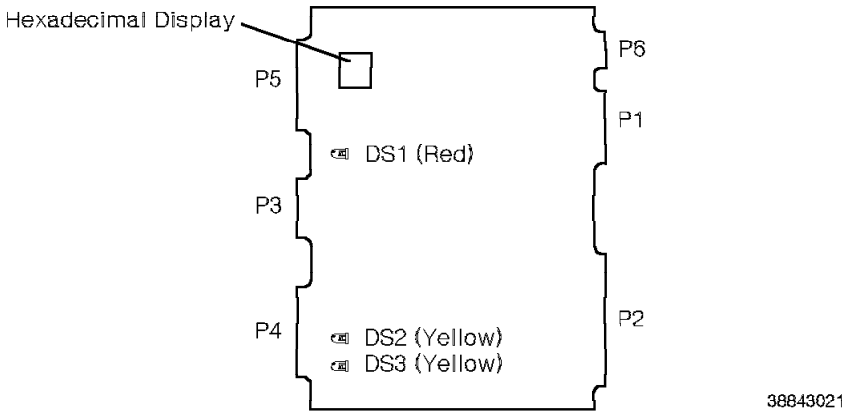

Figure 4-53. RPDN Card for the Model 40 or 50

The RPDN card is in any configurable TDM shelf. Table 4-41 lists the RPDN card LEDs and the conditions they indicate.

Table 4-41. RPDN Card LED Indicators

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.
DS2	Yellow	On	There is activity on network 1.
		Off	There is no activity on network 1.
DS3	Yellow	On	There is activity on network 2.
		Off	There is no activity on network 2.

The P connector designations for the RPDN card are as follows:

P1 Not used
P2 TDM backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used
P6 RPDN motherboard connector

The RPDN card's hexadecimal display indications vary depending on whether the display is toggling.

If the display is *not* toggling, one of the conditions listed in Table 4-42 displays.

Table 4-42. RPDN Card Hexadecimal Display Indications When Display is Not Toggling

Hexadecimal Display	Indication
0 through 8	The card is in firmware boot state. 0 through 7 indicate testing. 8 indicates download.
9	The card is in loadware initialization state.
E	The loadware failed.
F	The firmware failed.

If the display is toggling, it does so in the sequence listed in Table 4-43 on page 4-75. The display updates once per second.

Table 4-43. RPDN Card Hexadecimal Display Indications When Display is Toggling

Hexadecimal Display	Indication
A	The state of D-channel 0 follows.
0 through 9	The state of D-channel 0. Refer to Table 4-44.
B	The state of D-channel 1 follows.
0 through 9	The state of D-channel 1. Refer to Table 4-44.
C	The state of D-channel 2 follows.
0 through 9	The state of D-channel 2. Refer to Table 4-44.
D	The state of D-channel 3 follows.
0 through 9	The state of D-channel 3. Refer to Table 4-44.

Table 4-44 lists the possible D-channel states.

Table 4-44. RPDN Card Hexadecimal Display Indications for D-Channel States

Hexadecimal Display	Indication
9	There is no CPN communcation with the local host.
8	• CPN host communcation is established. • The D-channel is not configured.
7	• The D-channel is configured. • The card does not detect framing on the link (layer 1).
6	• The card detects valid framing on the link (layer 1). • Layer 2 cannot communicate with its peer.
5	Layer 2 is communicating with its peer.
4	Call control is processing a restart packet sequence with its peer.
1 through 3	Reserved.
0	Call control: • Completed the restart packet sequence with its peer. • Successfully activated. • Can process call setup requests.

4.37 RPDN Motherboard (Models 40 and 50)

The RPDN motherboard (Figure 4-54) is a 2x1x1 motherboard that provides the connection for one RPDN card.

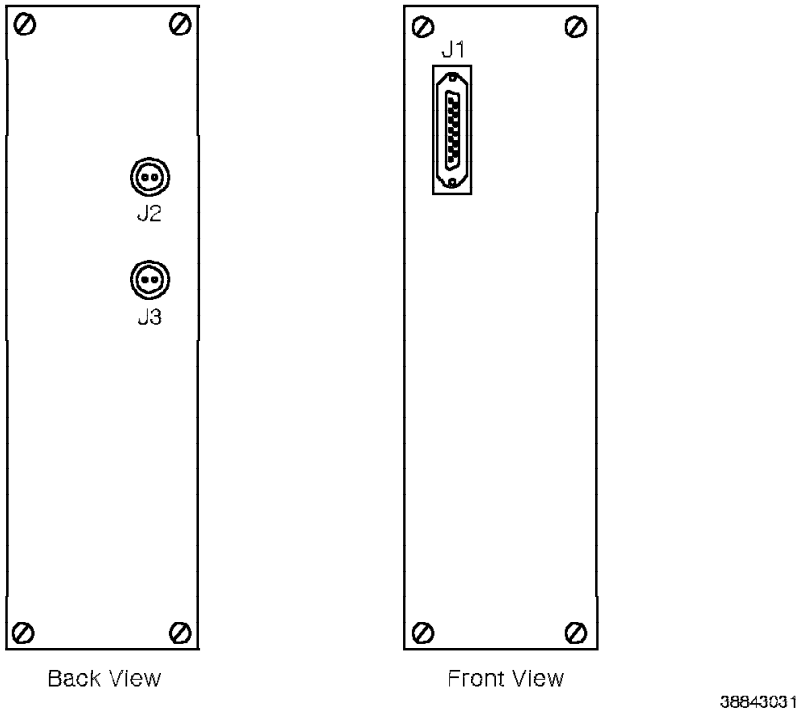

Figure 4-54. RPDN Motherboard for the Model 40 or 50

The RPDN motherboard is on any configurable TDM shelf, directly behind the RPDN card.

The front of the RPDN motherboard has a connector for the RPDN card's P6 connector. The back has two twinaxial connectors for CPN cables.

4.38 SMIOC

The SMIOC (Figure 4-55) consists of the following:

Peripheral equipment ports
The SMIOC has eight configurable ports that support peripheral equipment such as modems, printers, terminals, and application processors.

Note: The 9751 CBX monitor connects to port 1 or port 2. The 9751 CBX monitor II only connects to port 2 as a DCE port.

Alarms The SMIOC transmits error information to the active processor, logs the errors in the hardware error table, and activates visual and auditory alarms on the 9755 ATC.

System thermometer
The SMIOC transmits temperature information to the system software and is the source of temperature alarm. The temperature displays on the command line interpreter (CLI) system banner.

The system supports up to two SMIOCs and SMIOC interconnect boxes. A second SMIOC provides eight additional peripheral equipment ports, but does *not* provide the system thermometer or system alarm function.

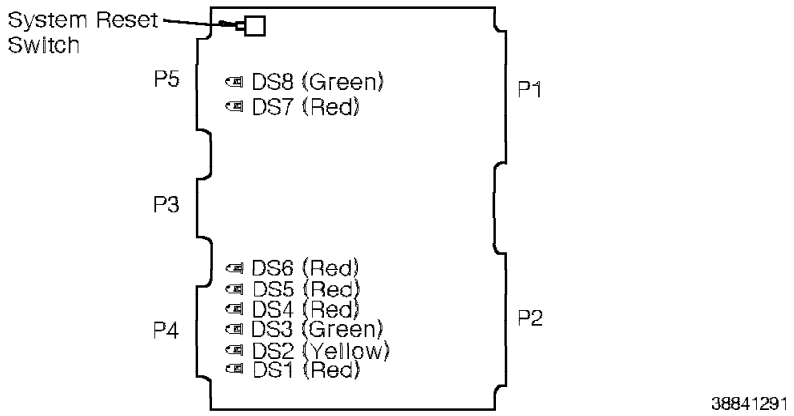

Figure 4-55. SMIOC

The primary SMIOC is in:

- Slot 18 on shelf 1 of the Model 10
- Slot 22 on shelf 2 of the Model 40 or 50

The secondary SMIOC, if there is one, is in:

- Slot 19 on shelf 1 of the Model 10
- Slot 23 on shelf 2 of the Model 40 or 50

Table 4-45 on page 4-78 lists the SMIOC LEDs and the conditions they indicate.

Note: If there is a secondary SMIOC in the system, ignore LEDs DS4 through DS7.

Table 4-45. SMIOC LED Indicators

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.
DS2	Yellow	On	The card is running a self-test.
		Off	The card is not running a self-test.
DS3	Green	On	The card is active, indicating normal condition.
		Off	The card is inactive.
DS4	Red	On	**In a system with a 9751 CBX monitor or 9751 CBX monitor II:** An error condition reached the threshold and was successfully transferred to the remote service processor. **In a system without a 9751 CBX monitor or 9751 CBX monitor II:** A warning alarm is present.
		Off	There is no error condition.
DS5	Red	On	**In a system with a 9751 CBX monitor or 9751 CBX monitor II:** A telco problem with a dedicated trunk line is present. **In a system without a 9751 CBX monitor or 9751 CBX monitor II:** A minor alarm is present.
		Off	There is no error condition.
DS6	Red	On	**In a system with a 9751 CBX monitor or 9751 CBX monitor II:** Data was not successfully transferred to the remote service processor. **In a system without a 9751 CBX monitor or 9751 CBX monitor II:** A major alarm is present.
		Off	There is no error condition.
DS7	Red	On	The 9751 CBX is in bypass mode.
		Off	The 9751 CBX is not in bypass mode.
DS8	Green	On	The card passed self-test, and there is not a fan or shelf power module failure.
		Off	The card did not pass self-test, a fan failed, or a shelf power module failed.

The SMIOC has a system reset switch that resets the processor and the TDM bus.

The P connector designations for the SMIOC are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.39 TASA Card (Model 40)

The TASA card connects the ISB source and destination buses in the Model 40 (Figure 4-56).

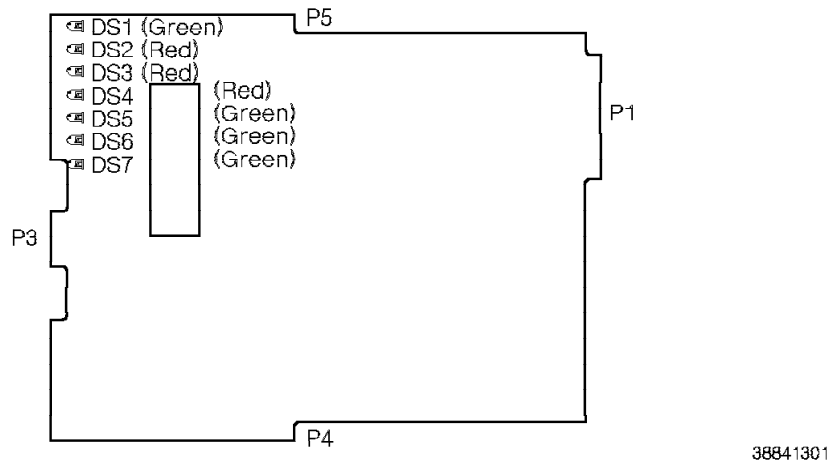

Figure 4-56. TASA Card for the Model 40

The TASA card is in slot 1 of shelf 2 of the Model 40. Table 4-46 lists the TASA card LEDs and the conditions they indicate.

Table 4-46. TASA Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is operational.
		Off	The card is not operational.
DS2	Red	On	The card is not configured.
		Off	The card is configured.
DS3	Red	Blinking	There is a parity error on the source bus.
		Off	There are no parity errors on the source bus.
DS4	Red	On	The clock is not present.
		Off	The clock is present.
DS5	Green	On	The source cable integrity is correct.
		Off	The source cable is not correctly configured.
DS6	Green	On	The destination cable integrity is correct.
		Off	The destination cable is not correctly configured.
DS7	Green	On	The round-trip ISB clock is present.
		Off	There is a loss of clock on the bus.

The P connector designations for the TASA card are as follows:

P1 CCC motherboard connector
P3 Standard umbilical cord connector
P4 ISB ZIF connector interface
P5 ISB ZIF connector interface

4.40 TC Card (Model 40)

The TC card (Figure 4-57) controls the Model 40 TDM network if the TCTASA card is not present.

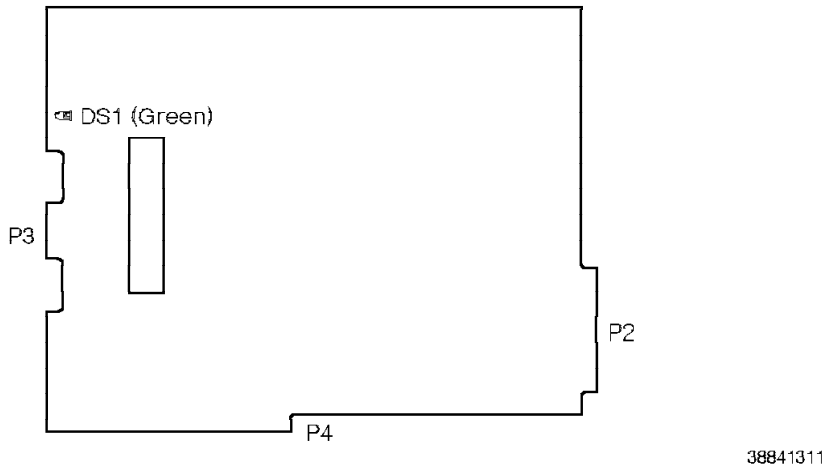

Figure 4-57. TC Card for the Model 40

The TC card is in slot 3 on shelf 2 of the Model 40. Table 4-47 lists the TC card LED and the conditions it indicates.

Table 4-47. TC Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is operational.
		Off	The card is not operational.
		Dim or flickering	The card is operating normally.

The P connector designations for the TC card are as follows:

P2 CCC motherboard connector
P3 Standard umbilical cord connector
P4 ISB ZIF connector interface

4.41 TCL Card (Model 10)

The TCL card (Figure 4-58) controls the Model 10 TDM network. It is the interface between the ISB and the TDM cards.

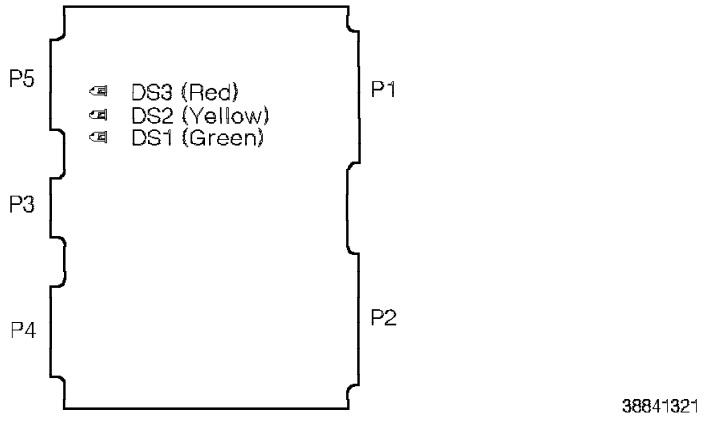

Figure 4-58. TCL Card for the Model 10

The TCL card is in slot 17 on shelf 1 of the Model 10. Table 4-48 lists the TCL card LEDs and the conditions they indicate.

Table 4-48. TCL Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is operational.
		Off	The card is not operational.
DS2	Yellow	On	The system is loading software.
		Off	The system is not loading software.
DS3	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the TCL card are as follows:

P1 Universal backplane connector
P2 Universal backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.42 TCTASA Card (Models 40 and 50)

The TCTASA card combines the functions of the TC card and the TASA card (Figure 4-59). The TCTASA provides an interface between the computer I/O and the ISB. It also provides enhanced diagnostic capabilities.

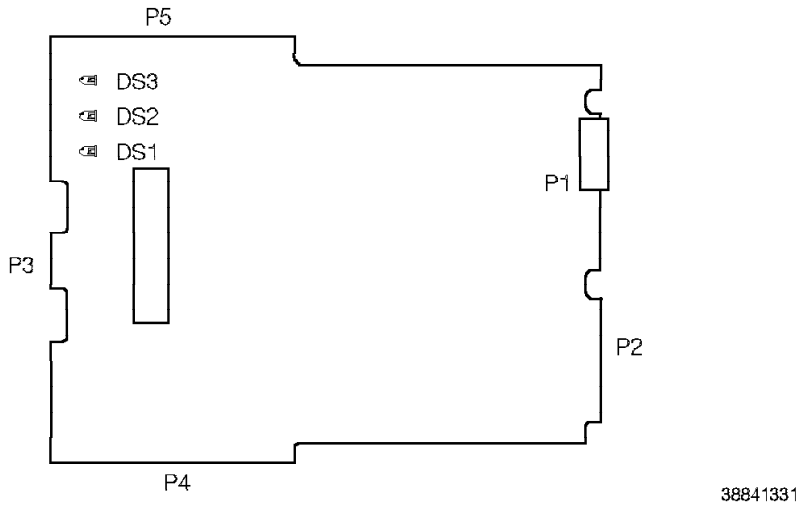

Figure 4-59. TCTASA Card for the Model 40 or 50

The TCTASA card is in:

- Slot 1 on shelf 2 of the Model 40
- Slots 1 and 3 on shelf 2 of the Model 50

Table 4-49 lists the TCTASA card LEDs and the conditions they indicate.

Table 4-49. TCTASA Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is operational.
		Off	The card is not operational.
DS2	Yellow	On	The system is loading software.
		Off	The system is not loading software.
DS3	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the TCTASA card are as follows:

P1 CCC motherboard connector
P2 CCC motherboard connector
P3 Standard umbilical cord connector
P4 ISB ZIF connector interface
P5 ISB ZIF connector interface

4.43 Tone Sender Card

The tone sender card supplies a digital representation of test tones, dial tone, ringback, busy tone, error tone, pulse tone, howler, and DTMF digits during call processing.

The tone sender card sends digitally encoded tones to the ATI card (Figure 4-60). The TDM network control group establishes the connection between the tone sender card and the ATI card.

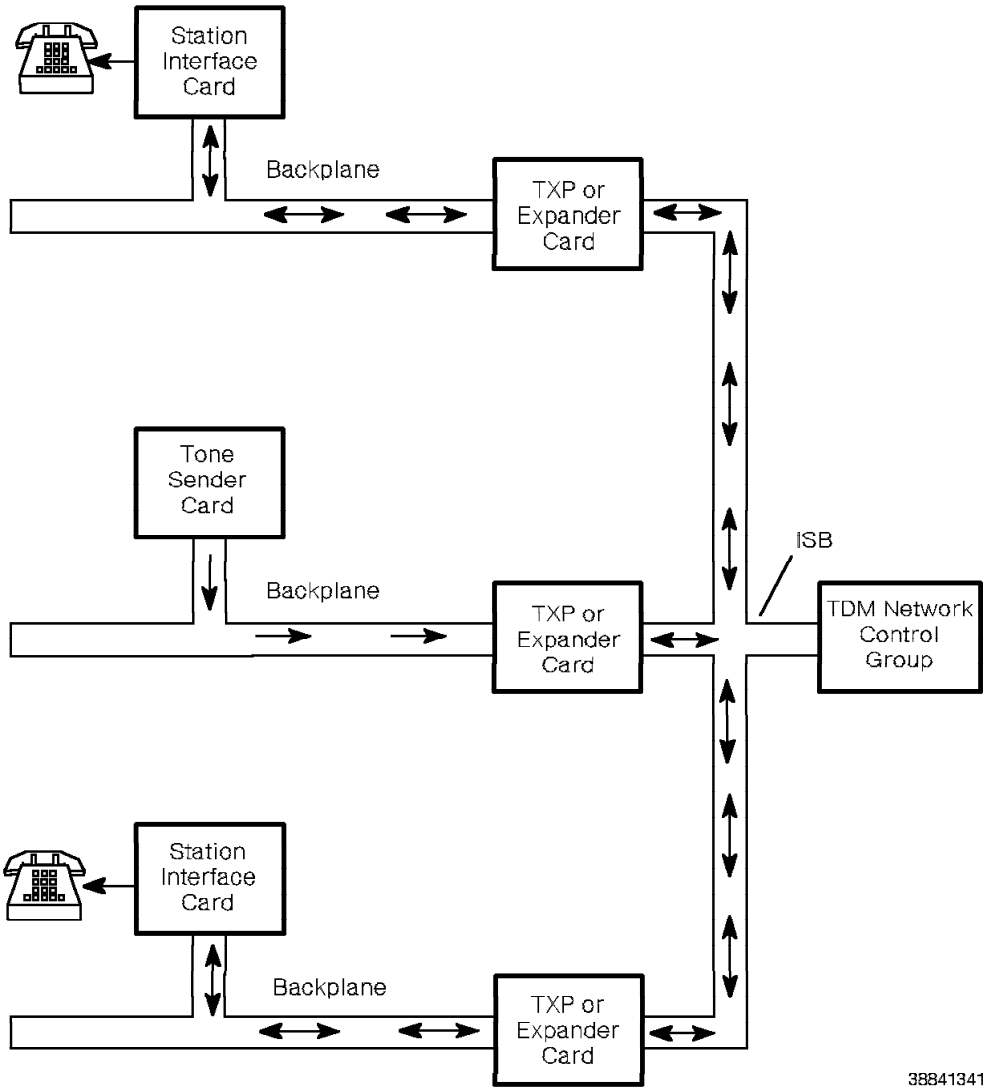

Figure 4-60. Tone Sender Functional Diagram

Figure 4-61 shows the tone sender card.

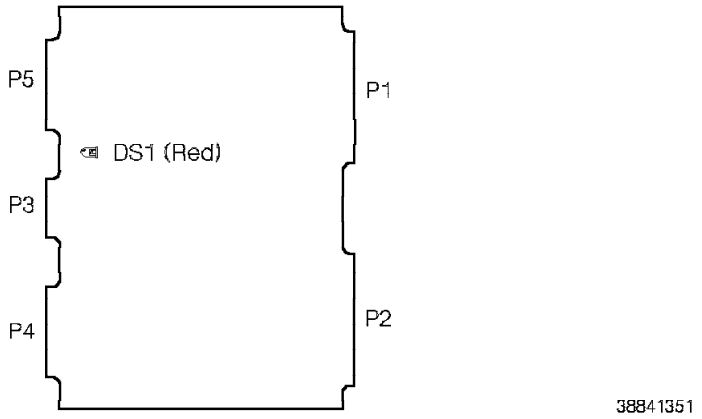

Figure 4-61. Tone Sender Card

The tone sender card is in a shared electronics slot or any TDM slot. Table 4-50 lists the tone sender card LED and the conditions it indicates.

Table 4-50. Tone Sender Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the tone sender card are as follows:

P1 Not used

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.44 TTI Card

The TTI card interfaces the 9751 CBX 4-wire tie trunks with the Type I E & M signaling that connects to any private branch exchange (PBX) with tie trunk (4-wire) capability or to other 9751 CBXs.

One Amphenol cable connects the card to the MDF. At the MDF, the leads cross-connect to incoming leads from the TTI trunks.

The TTI card has the following pairs allocated to each channel:

T and R Receive signals.
E and M Provide signals.
T1 and R1 Transmit signals.

The TTI card converts analog signals received from and transmitted to distant end PBXs into digital words (Figure 4-62). Each TTI channel performs digital-to-analog and analog-to-digital conversions during call processing.

The TTI card's signaling circuitry sends and receives signals from distant end 9751 CBXs or PBXs as follows:

- For outgoing calls, the M-lead sends a signal (change in voltage) to the distant end 9751 CBX.

  The distant end 9751 CBX senses this signal, seizes the trunk, and sends a proceed-to-send signal or answer supervision. This information returns to the calling 9751 CBX over the E-lead.

- For incoming calls, the E-lead detector senses the seizure-request signal from the distant end 9751 CBX or PBX.

  The M-lead returns a signal to the far end 9751 CBX that indicates the trunk is seized and ready to receive incoming digits.

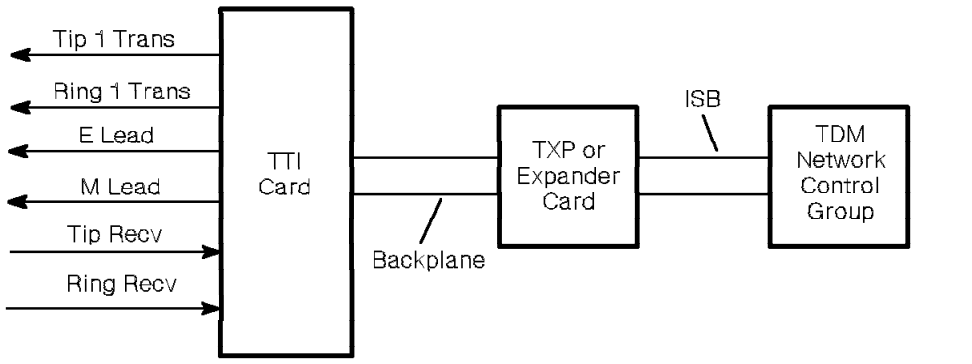

Figure 4-62. TTI Functional Diagram

Figure 4-63 shows the TTI card.

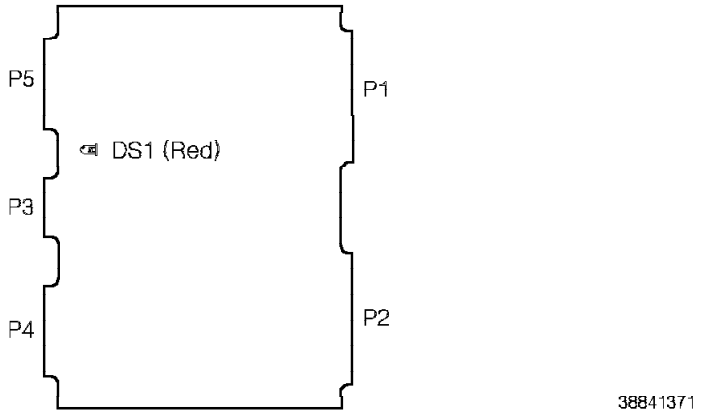

Figure 4-63. TTI Card

The TTI card is in any TDM slot on any shelf. Table 4-51 lists the TTI card LED and the conditions it indicates.

Table 4-51. TTI Card LED Indicator

LED	Color	State	Indication
DS1	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the TTI card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: Universal motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.45 TXP Card (Model 10)

The TXP card (Figure 4-64) provides an interface between the Model 10 ISB and the TDM cards on shelves 2 and 3.

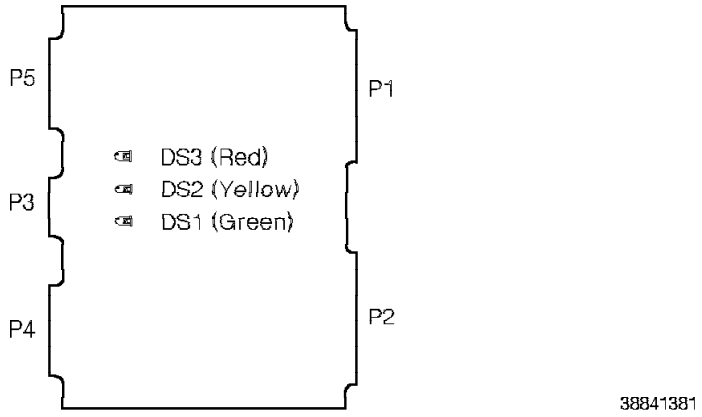

Figure 4-64. TXP Card for the Model 10

The TXP card is in slot 25 on shelves 2 and 3 of the Model 10. Table 4-52 lists the TXP card LEDs and the conditions they indicate.

Table 4-52. TXP Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is active.
		Off	The card is inactive.
DS2	Yellow	On	The system is loading software from the TCL card.
		Off	The system is not loading software.
DS3	Red	On	The card is down.
		Off	The card is up.

The P connector designations for the TXP card are as follows:

P1 Universal backplane connector
P2 Universal backplane connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.46 T1DN Card

The T1DN card transmits voice and data information over a digital facility at the rate of 1.544 Mbps. Because the T1DN card multiplexes information from up to 24 channels into a single digital bit stream, up to 24 analog voice or data trunk facilities can operate over a single pair of wires (Figure 4-65).

A T1 link is sometimes referred to as a digital signal 1 (DS1) facility because DS1 is the speed (1.544 Mbps) of the signal the T1 facility carries.

A *DS1 facility* is a dedicated 4-wire communications link that connects digital endpoints. DS1 facilities use a variety of transmission media, including microwave, fiber-optic cable, satellite, or a T1 conditioned metallic span line.

Digital endpoints are devices that terminate the DS1 facility, such as 9751 CBX systems, multiplexers, or external devices such as channel banks.

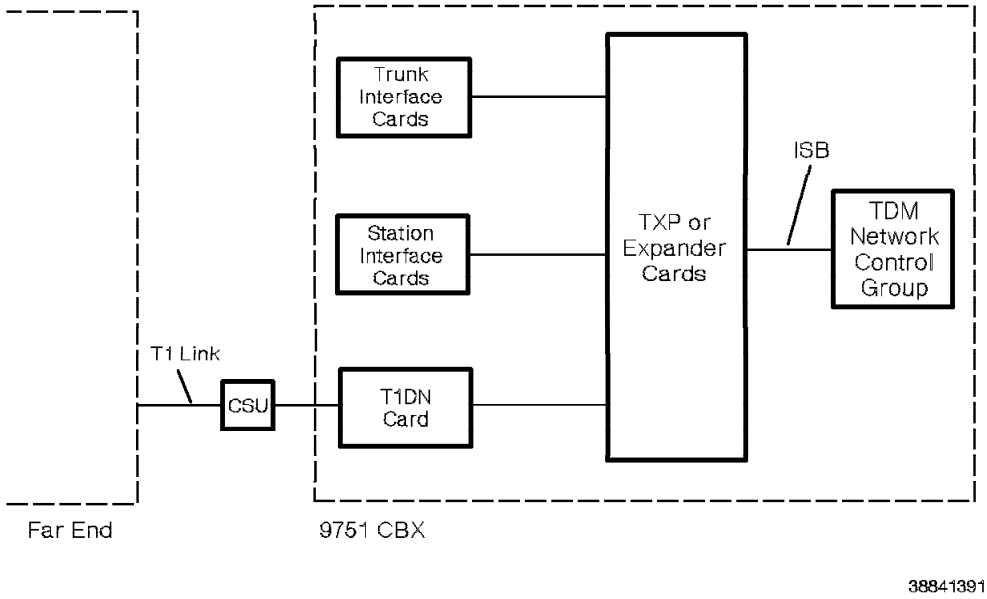

Figure 4-65. T1DN Functional Diagram

The T1DN card accepts an alarm dry-contact closure from an external T1 device, such as a CSU. It connects directly to the external T1 device through a 4-pair wire on the Model 10 backplane or the Model 40 or 50 I/O filter panel as follows:

- One pair receives digital signals
- One pair transmits digital signals
- One pair is as an alarm lead
- One pair is not used

The T1DN card supports the following T1 line coding formats:

- SF/ZCS
- ESF/B8ZS

It operates in a D4 SF mode and is compatible with the D4 ESF mode.

Figure 4-66 shows the T1DN card.

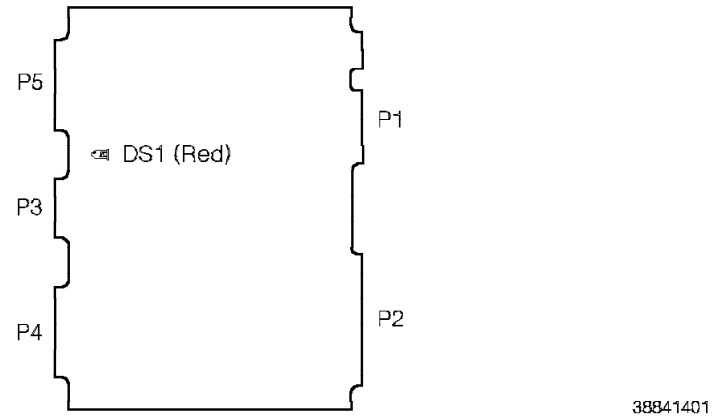

Figure 4-66. T1DN Card

The T1DN card is on any shelf in any slot; however, the following conditions apply:

Model 10: The T1DN card must be in slot 13 on shelf 1 when the Model 10 requires external clocking from a T1 digital network. The T1 span designated as the primary clock source terminates on the T1DN card in slot 13.

The T1DN card must be in slot 14 on shelf 1 if there is a secondary clock path from the T1 digital network. The T1 span designated as the secondary clock source terminates on the T1DN card in slot 14.

Models 40 and 50: If the 9751 CBX uses two T1DN cards as external clock sources, install the first one in slot 7 on shelf 1 and the second one in slot 7 on shelf 3. Install additional T1DN cards in any slot on any TDM shelf.

Use a 2x1x4 digital trunk motherboard (Figure 4-67 on page 4-91) when there are no slots available on a 24-slot TDM motherboard in which to install a T1DN card. Install the digital trunk motherboard in any configurable TDM shelf.

Note: Use only the twinaxial connector B to route a cable from the digital trunk motherboard to the 24x23x23 universal motherboard on shelf 1.

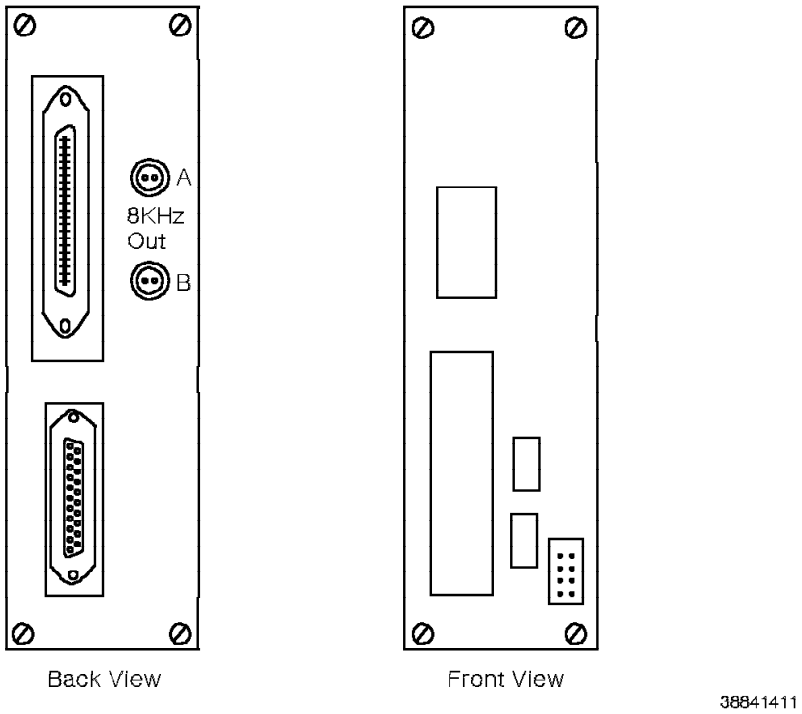

Figure 4-67. 2x1x4 Digital Trunk Motherboard for the Model 40 or 50

Table 4-53 lists the T1DN card LED and the conditions it indicates.

Table 4-53. T1DN Card LED Indicators

LED	Color	State	Indication
DS1	Red	On	The card is down or did not pass power-on diagnostics.
		Blinking momentarily	The card is undergoing power-on diagnostics.
		Off	The card is up and passed power-on diagnostics.

The P connector designations for the T1DN card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: Universal motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: TDM backplane connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.47 9030 CPU Card (Model 10)

The 9030 CPU card (Figure 4-68) performs the data manipulation and control functions of the CCC group.

It has a program load button that manually loads the system software. It also controls the external input/output (I/O) devices such as the diskette drive and the hard disk drive.

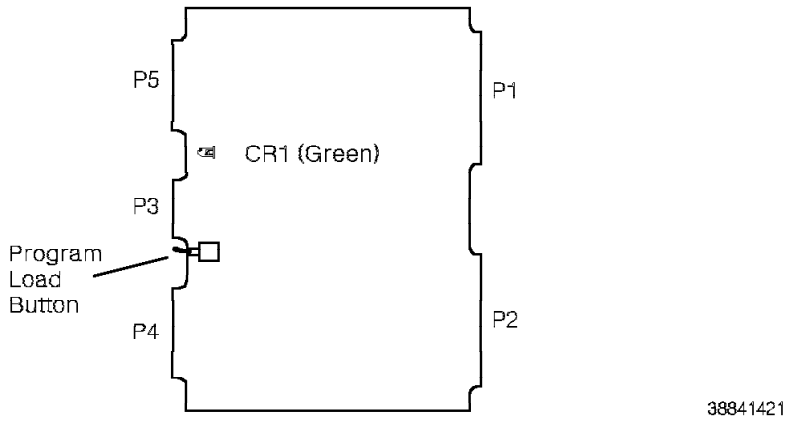

Figure 4-68. 9030 CPU Card for the Model 10

The 9030 CPU card is in slot 20 in shelf 1 of the Model 10. Table 4-54 lists the 9030 CPU card LED and the conditions it indicates.

Table 4-54. 9030 CPU Card LED Indicator

LED	Color	State	Indication
CR1	Green	Blinking	The card is up.
		Off	The card is down.

The P connector designations for the 9030 CPU card are as follows:

P1 Universal backplane connector
P2 Universal backplane connector
P3 Not used
P4 Front edge connector to P4 of the memory controller card
P5 Front edge connector to P5 of the memory controller card

4.48 9030A CPU Card

The 9030A CPU card (Figure 4-69) controls the functions of the 9030A CCC group and the I/O devices that are attached to the system. It contains 12MB of memory and stores the system software and databases.

It has a program load button to load system software. It also has two hexadecimal digital displays.

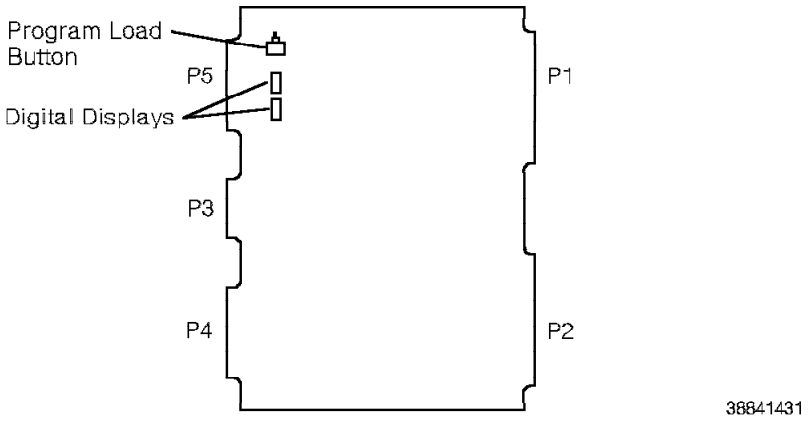

Figure 4-69. 9030A CPU Card

The 9030A CPU card is in:

- Slot 21 on shelf 1 of the Model 10
- Slot 10 on shelf 2 of the Model 40
- Slots 8 and 10 on shelf 2 of the Model 50

It has no LEDs.

Table 4-55 lists the 9030A CPU card hexadecimal display indications.

Note: If any of the displays stays on for more than 10 seconds, it indicates a failure.

Table 4-55 (Page 1 of 2). 9030A CPU Card Hexadecimal Display Indicators

State	Indication
Off	The card is not receiving power.
A 0	The card is being initialized.
A E	The memory is being initialized.
A 1	The card is reading the PDC card configuration.
A 2	The card is searching for a diskette for the boot loader.
A 3	The diskette boot has begun.
A 4	The card is searching the hard disk for the boot loader.
A 5	The boot loader is loading from the hard disk.
Alternating B 0 and B 1	The software boot loader is running.
A 6	The card is transferring the control from the firmware to the loaded software.
Alternating A C and C A	The card is active.

Table 4-55 (Page 2 of 2). 9030A CPU Card Hexadecimal Display Indicators

State	Indication
E C	After a power failure, error checking has begun.
E E	The 9030A memory expansion card failed.
A F	The card is initializing the 9030A memory expansion card.
B B	A 9030A memory expansion card is discovered and will be tested.
B C	Error checking on the 9030A memory expansion card is in progress.
B D	An error occurred while testing the 9030A memory expansion card.
B E	The memory on the 9030A memory expansion card failed.
B F	After a power failure, the card is verifying the 9030A memory expansion card.
F 0	Software is running through a power failure restart initialization.
F 1	After automatic program load (APL), software is running through initialization.
F 2	A restart is occurring.
F 3	Low level initialization is complete.
F 4	High level initialization is occurring. After it completes, the system is fully operational.
E D	Software error is encountered during a power failure restart.
A 7	A standby load is about to begin.
A 8	The card is waiting for the active side to send data to the standby side.
Alternating A 9 and A A	The standby side is loading software from the active side.
A B	The card is transferring control from the standby load firmware to the software.
A D	A 9030A memory expansion card needs to be installed.
F A	A standby load failed.
Alternating 5 B and B 5	The standby processor is running normally.
B E	The 9030A memory expansion card failed.

The P connector designations for the 9030A CPU card are as follows:

P1 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P2 **Model 10:** Universal backplane connector
Models 40 and 50: CCC motherboard connector

P3 Standard umbilical cord connector

P4 Not used

P5 Not used

4.49 9030A I/O Bus Switch Card (Models 40 and 50)

The 9030A I/O bus switch card (Figure 4-70) interfaces the I/O cards such as the SMIOC and the PDC card with the 9030A CPU card.

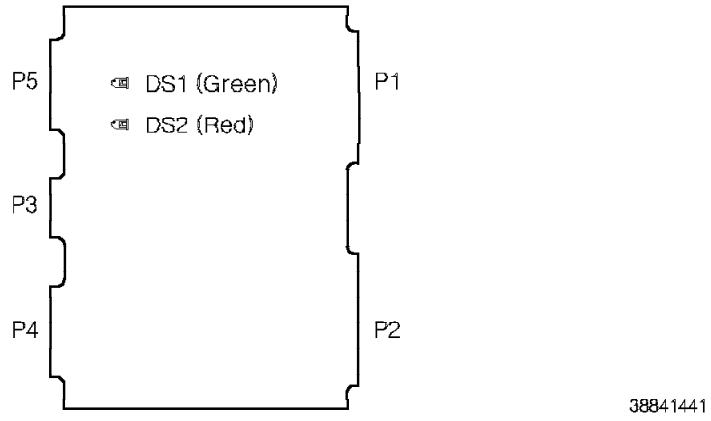

Figure 4-70. 9030A I/O Bus Switch Card for the Model 40 or 50

The 9030A I/O bus switch card is in:

- Slot 17 on shelf 2 of the Model 40
- Slots 16 and 17 on shelf 2 of the Model 50

Table 4-56 lists the 9030A I/O bus switch card LEDs and the conditions they indicate.

Table 4-56. I/O Bus Switch Card LED Indicators

LED	Color	State	Indication
DS1	Green	On	The card is active.
		Off	The card is on standby.
DS2	Red	On	The card is on standby.
		Off	The card is active.

The P connector designations for the 9030A I/O bus switch card are as follows:

P1 CCC motherboard connector
P2 CCC motherboard connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

4.50 9030A Memory Expansion Card (Model 50)

In the Model 50, the 9030A memory expansion card (Figure 4-71) increases the 9030A CPU card's memory from 12MB to 24MB.

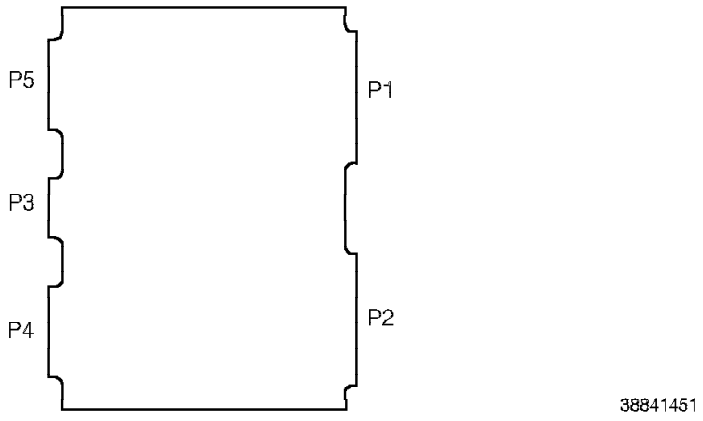

Figure 4-71. 9030A Memory Expansion Card for the Model 50

The 9030A memory expansion cards are in slots 6 and 12 on shelf 2 of the Model 50. The system requires a 9030A CPU card on each processor side (standby and active) for the 9030A memory expansion card to function correctly.

The P connector designations for the 9030A memory expansion card are as follows:

P1 CCC motherboard connector
P2 CCC motherboard connector
P3 Standard umbilical cord connector
P4 Not used
P5 Not used

Chapter 5. Peripheral Equipment

This chapter describes, in alphabetical order, the station devices, desktop products, printers, terminals, and modems that connect to the 9751 computerized branch exchange (CBX).

5.1 Data Communications Equipment

Data communications equipment includes the following:

- Asynchronous data communications module (ADCM)
- Rack-mount data communications equipment
- ROLMphone 244PC
- ROLMphone with data communications module (DCM)
- ROLMphone with data communications option (DCO)

5.1.1 ADCM

The ADCM (Figure 5-1) is a stand-alone data communications module that connects asynchronous workstations through the ROLMlink interface (RLI) card to remote computing resources. The ADCM receives power from the associated RLI card.

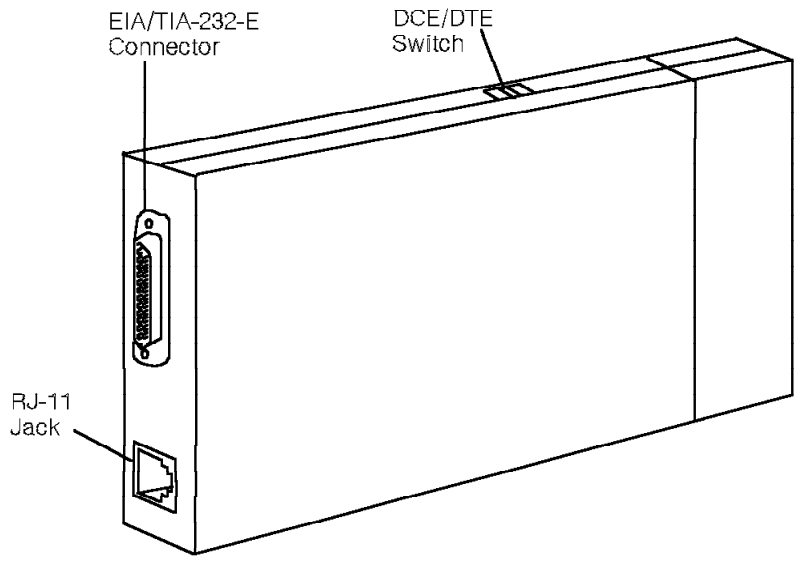

Figure 5-1. ADCM

Asynchronous work stations include terminals, personal computers (PCs), protocol converters, modems, and host computers.

A telephone line connects the ADCM to the 9751 CBX. An EIA/TIA-232-E cable connects the ADCM to asynchronous work stations.

The ADCM resides in a single-channel cassette or grouped in 8- or 16-channel enclosures (Figure 5-2 on page 5-3).

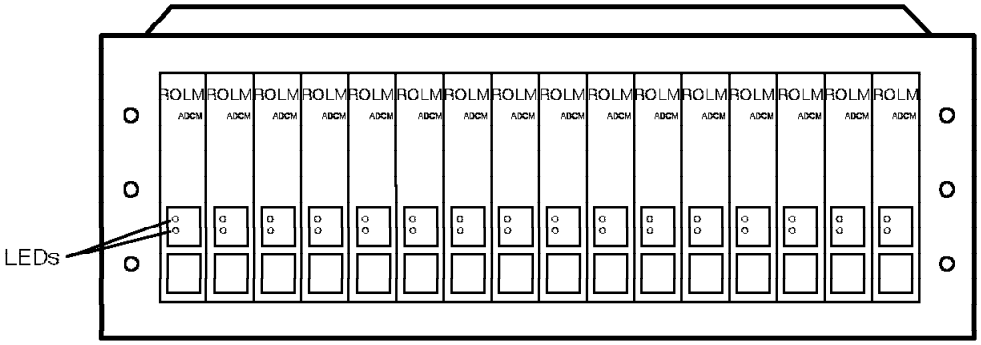

Figure 5-2. ADCM 16-Channel Enclosure

The ADCM supports only asynchronous data communications. Use the ADCM data devices that have communication speeds from 110 bits per second (bps) to 76800 bps.

Each ADCM cassette has a two-position switch to select its operation as either data circuit-terminating equipment (DCE) or data terminating equipment (DTE). Table 5-1 lists the ADCM light-emitting diodes (LEDs) and the conditions they indicate.

Table 5-1. ADCM LED Indicators

LED	Color	State	Indication
Power	Green	On	The ADCM is receiving power from the ROLMlink.
		Off	The ADCM is not receiving power from the ROLMlink.
Fault	Yellow	On	The ADCM passed self-test, but has no data terminal ready (DTR) signal or data set ready (DSR) signal from the data device.
		Flashing slowly	The ADCM did not pass internal test.
		Flashing quickly	There is a user loopback.
		Off	The ADCM passed self-test, and received a DTR signal or DSR signal from the data device.

5.1.2 Rack-Mount Data Communications Equipment

Rack-mount data communications equipment (Figure 5-3 on page 5-5) includes the following:

- Asynchronous rack-mount data communications module (ARMDCM)
- Rack-mount card cage
- Rack-mount data communications module (RMDCM)
- Rack-mount modem plug adapter

The rack-mount card cage is a metal cage you install in a 48-centimeter (19-inch) cabinet. The cabinet can also contain the following:

Air baffle

A plenum that provides fresh air to the rack-mount card cage. The system requires it only when other equipment is above or below the rack-mount card cage.

Fan assembly

Forces fresh air up through the rack-mount card cages to cool the system. The system requires it when the cabinet contains four or more rack-mount card cages. It is mounted just below the bottom rack-mount card cage.

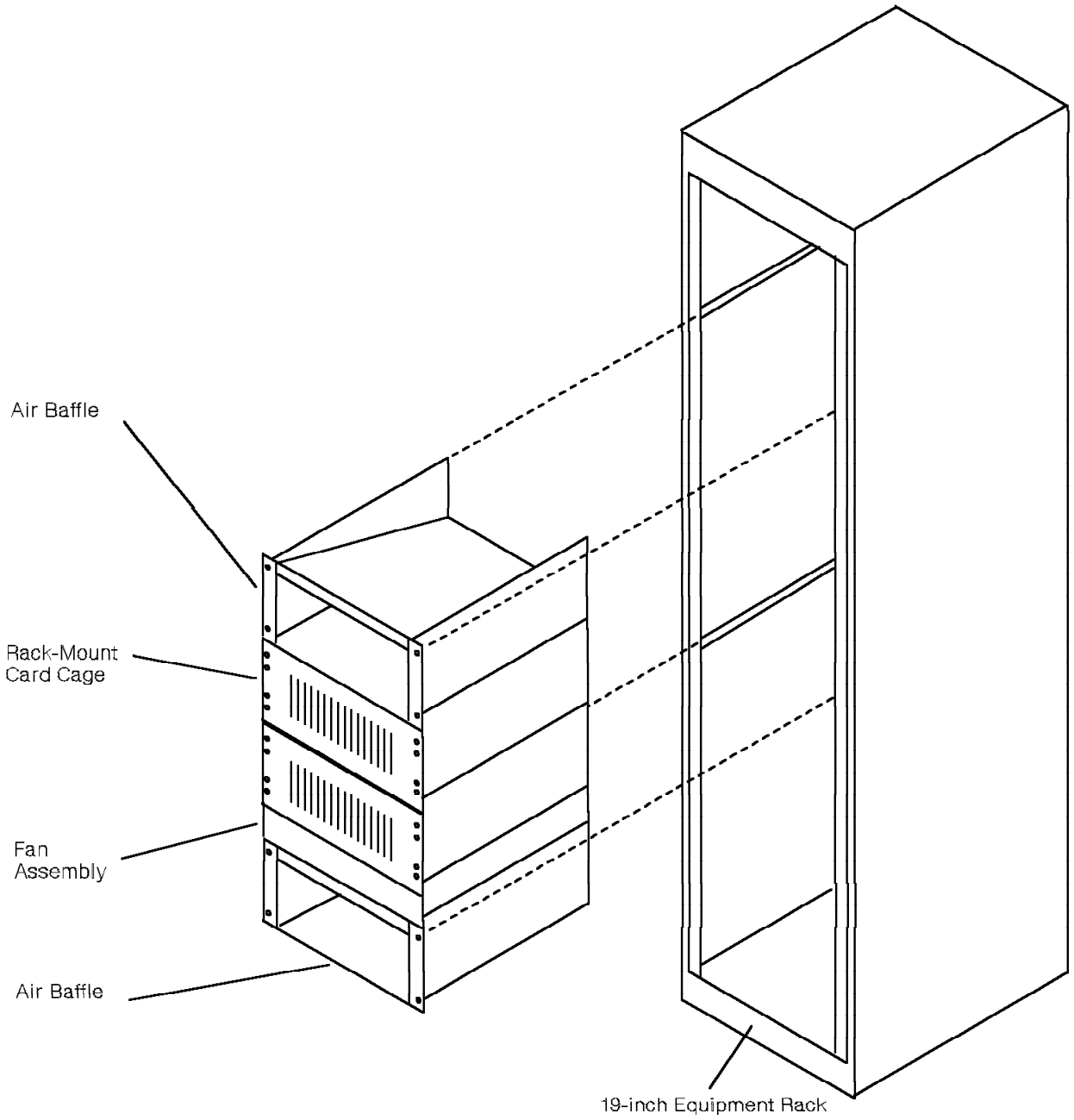

Figure 5-3. Rack-Mount Data Communications Equipment

5.1.2.1 ARMDCM

The ARMDCM (Figure 5-4) is installed in the rack-mount card cage. It provides two independent DCM channels per card: channel A and channel B. The ARMDCM is an asynchronous interface between computers or intelligent modems and the 9751 CBX.

The ARMDCM has 13 LEDs, 4 jumper plugs, and 2 toggle switches. The LEDs indicate the operational status of the card. The 4 jumper plugs, 2 for channel A and 2 for channel B, indicate whether DTE or DCE equipment connects to each of the channels. One toggle switch designates which channel the LEDs monitor, and the other designates the card's operation mode (normal or test).

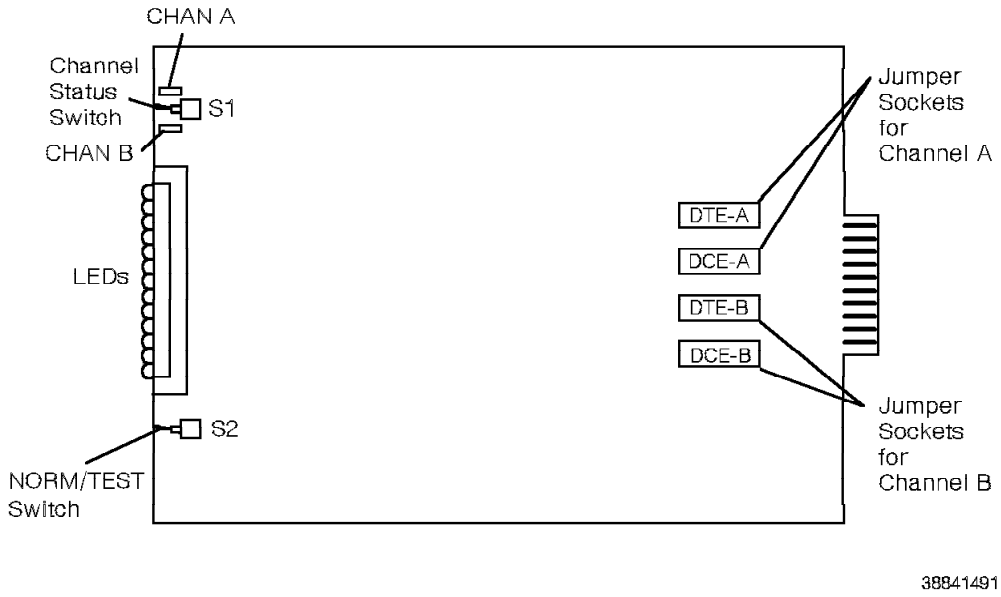

Figure 5-4. ARMDCM

Figure 5-5 on page 5-7 shows the ARMDCM LEDs.

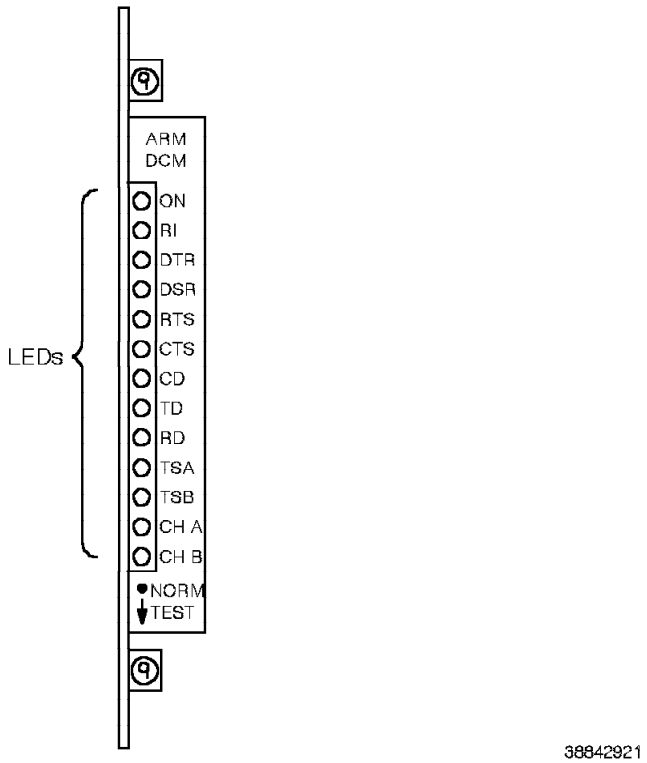

Figure 5-5. ARMDCM LEDs

Table 5-2 lists the ARMDCM LED indicators when the system uses it as a DCE.

Table 5-2 (Page 1 of 2). ARMDCM LEDIndicators for DCEs

LED	Color	State	Indication
ON	Red	On	The card is receiving power.
		Off	The card is not receiving power.
R1	Red	On	The card is sending the ring signal to the computer.
		Off	The card is not sending the ring signal to the computer.
DTR	Red	On	The card is receiving the DTR signal from the computer.
		Off	The card is not receiving the DTR signal from the computer.
DSR	Red	On	The card received the DTR signal and is sending the DSR signal to the computer.
		Off	The card did not receive the DTR signal and is not sending the DSR signal to the computer.
RTS	Red	On	The card is receiving the request to send signal from the computer.
		Off	The card is not receiving the request to send signal from the computer.

Table 5-2 (Page 2 of 2). ARMDCM LEDIndicators for DCEs

LED	Color	State	Indication
CTS	Red	On	The card is sending the clear to send (CTS) signal to the computer.
		Off	The card is not sending the CTS signal to the computer.
CD	Red	On	The card is sending the carrier detect (CD) signal to the computer.
		Off	The card is not sending the CD signal to the computer.
TD	Red	On	The card is receiving transmit data from the computer.
		Off	The card is not receiving transmit data from the computer.
RD	Red	On	The card is sending receive data to the computer.
		Off	The card is not sending receive data to the computer.
TSA	Red	On	Channel A is in loopback test mode.
		Off	Channel A is not in loopback test mode.
TSB	Red	On	Channel B is in loopback test mode.
		Off	Channel B is not in loopback test mode.
CH A	Red	On	Channel A is being monitored.
		Off	Channel A is not being monitored.
CH B	Red	On	Channel B is being monitored.
		Off	Channel B is not being monitored.

Table 5-3 lists the ARMDCM LED indicators when the system uses it as a DTE.

Table 5-3 (Page 1 of 2). ARMDCM LEDIndicators for DTEs

LED	Color	State	Indication
ON	Red	On	The card is receiving power.
		Off	The card is not receiving power.
R1	Red	On	The card is receiving the ring signal from the modem.
		Off	The card is not receiving the ring signal from the modem.
DTR	Red	On	The card is sending the DTR signal to the modem.
		Off	The card is not sending the DTR signal to the modem.
DSR	Red	On	The card received DTR and is sending the DSR signal from the modem.
		Off	The card is not receiving the DSR signal from the modem.

Table 5-3 (Page 2 of 2). ARMDCM LEDIndicators for DTEs

LED	Color	State	Indication
RTS	Red	On	The card is sending the request to send signal to the modem.
		Off	The card is not sending the request to send signal to the modem.
CTS	Red	On	The card is receiving the CTS signal from the modem.
		Off	The card is not receiving the CTS signal from the modem.
CD	Red	On	**Synchronous applications:** The modem received the modem carrier. In duplex mode, the LED remains on for the duration of the call. **Asynchronous applications:** The CD signal is received from the modem.
		Off	The modem did not receive the modem carrier or it did not receive the CD signal.
TD	Red	On	The card is sending transmit data to the modem.
		Off	The card is not sending transmit data to the modem.
RD	Red	On	The card is receiving data from the modem.
		Off	The card is not receiving data from the modem.
TSA	Red	On	Channel A is in loopback test mode.
		Off	Channel A is not in loopback test mode.
TSB	Red	On	Channel B is in loopback test mode.
		Off	Channel B is not in loopback test mode.
CH A	Red	On	Channel A is being monitored.
		Off	Channel A is not being monitored.
CH B	Red	On	Channel B is being monitored.
		Off	Channel B is not being monitored.

5.1.2.2 Rack-Mount Card Cage

The rack-mount card cage houses up to 16 RMDCMs or ARMDCMs. It is installed in a 48-centimeter (19-inch) cabinet and can be up to 1524 meters (4500 feet) from the 9751 CBX.

The rack-mount card cage contains a power supply and a backplane.

The rack-mount card cage has one LED that lights when the power supply is plugged in.

5.1.2.3 RMDCM

The RMDCM (Figure 5-6) is installed in the rack-mount card cage. It provides one DCM channel per card. The RMDCM is an interface between computers or modems and the 9751 CBX.

The RMDCM has 13 LEDs, 3 jumper plugs, and 1 toggle switch. The LEDs indicate the operational status of the card. Two of the jumper plugs, X1 and X2, select the type of interface connection (EIA/TIA-232-E or V.35) that the equipment connected to the card requires. The third jumper plug, X3, is factory-set to *OUT*. The toggle switch designates a normal or test operation mode for the card.

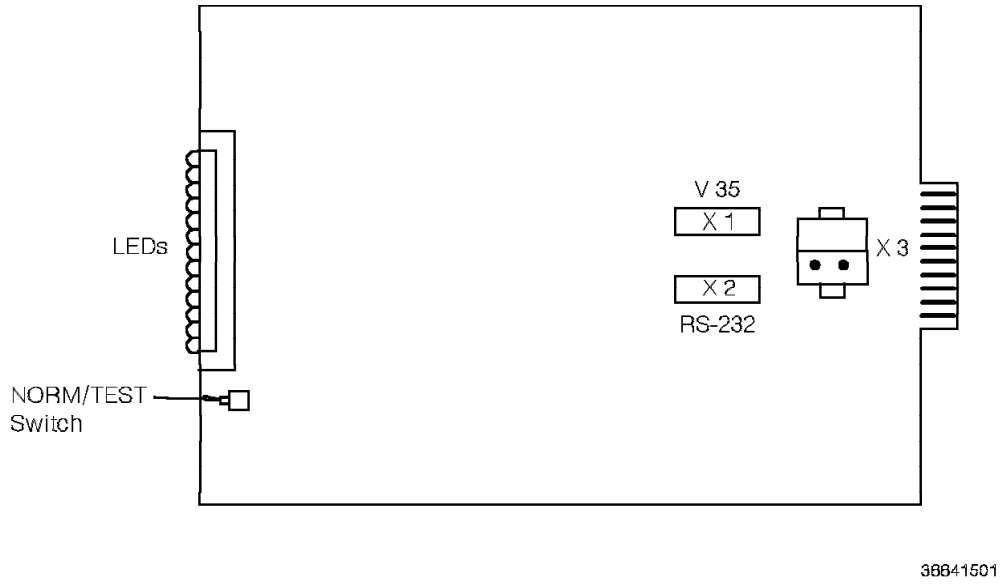

Figure 5-6. RMDCM

Figure 5-7 on page 5-11 shows the RMDCM LEDs.

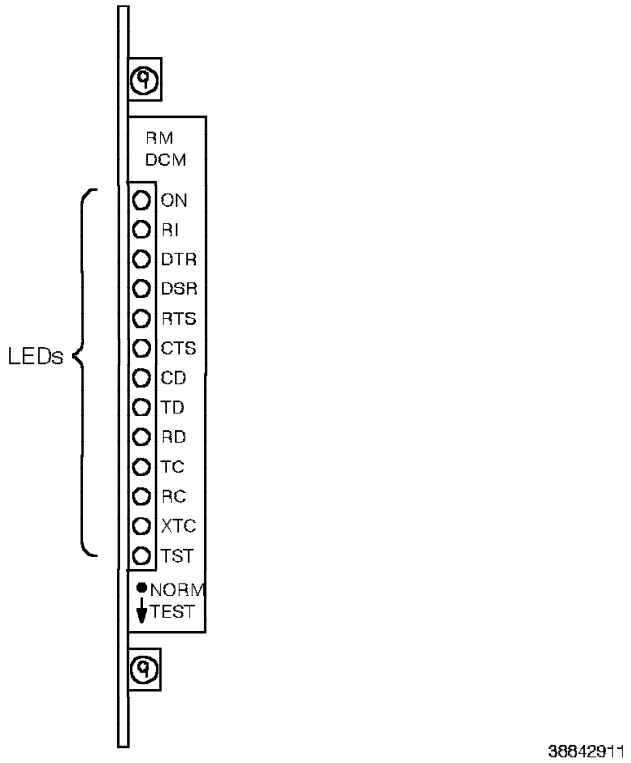

Figure 5-7. RMDCM LEDs

Table 5-4 lists the RMDCM LED indicators when the system uses it as a DCE.

Table 5-4 (Page 1 of 2). RMDCM LEDIndicators for DCEs

LED	Color	State	Indication
ON	Red	On	The card is receiving power.
		Off	The card is not receiving power.
R1	Red	On	The card is sending the ring signal to the computer.
		Off	The card is not sending the ring signal to the computer.
DTR	Red	On	The card is receiving the DTR signal from the computer.
		Off	The card is not receiving the DTR signal from the computer.
DSR	Red	On	The card received the DTR signal and is sending the DSR signal to the computer.
		Off	The card has not received the DTR signal and is not sending the DSR signal to the computer.
RTS	Red	On	The card is receiving the request to send signal from the computer.
		Off	The card is not receiving the request to send signal from the computer.

Table 5-4 (Page 2 of 2). RMDCM LEDIndicators for DCEs

LED	Color	State	Indication
CTS	Red	On	The card is sending the CTS signal to the computer.
		Off	The card is not sending the CTS signal to the computer.
CD	Red	On	The card is sending the CD signal to the computer.
		Off	The card is not sending the CD signal to the computer.
TD	Red	On	The card is receiving transmit data from the computer.
		Off	The card is not receiving transmit data from the computer.
RD	Red	On	The card is sending receive data to the computer.
		Off	The card is not sending receive data to the computer.
TC	Red	On	The card is sending the transmit clock to the computer.
		Off	The card is not sending the transmit clock to the computer.
RC	Red	On	The card is sending the receive clock to the computer.
		Off	The card is not sending the receive clock to the computer.
XTC	Red	On	The card is receiving the external transmit clock from the computer.
		Off	The card is not receiving the external transmit clock from the computer.
TST	Red	On	The card is in reset mode.
		Slow flash	The SW1 switch is set to *TEST*.
		Off	The card is operating normally.

Table 5-5 lists the RMDCM LED indicators when the system uses it as a DTE.

Table 5-5 (Page 1 of 2). RMDCM LEDIndicators for DTEs

LED	Color	State	Indication
ON	Red	On	The card is receiving power.
		Off	The card is not receiving power.
R1	Red	On	The card is receiving the ring signal from the modem.
		Off	The card is not receiving the ring signal from the modem.

Table 5-5 (Page 2 of 2). RMDCM LEDIndicators for DTEs

LED	Color	State	Indication
DTR	Red	On	The card is sending the DTR signal to the modem.
		Off	The card is not sending the DTR signal to the modem.
DSR	Red	On	The card is receiving the DSR signal from the modem.
		Off	The card is not receiving the DSR signal from the modem.
RTS	Red	On	The card is sending the request to send signal to the modem.
		Off	The card is not sending the request to send signal to the modem.
CTS	Red	On	The card is receiving the CTS signal from the modem.
		Off	The card is not receiving the CTS signal from the modem.
CD	Red	On	**Synchronous applications:** The modem received the modem carrier. In duplex mode, the LED remains on for the duration of the call. **Asynchronous applications:** The CD signal is received from the modem.
		Off	The modem did not receive the modem carrier or the modem did not receive the CD signal.
TD	Red	On	The card is sending transmit data to the modem.
		Off	The card is not sending transmit data to the modem.
RD	Red	On	The card is receiving data from the modem.
		Off	The card is not receiving data from the modem.
TC	Red	On	The card is receiving the transmit clock from the modem.
		Off	The card is not receiving the transmit clock from the modem.
RC	Red	On	The card is receiving the receive clock from the modem.
		Off	The card is not receiving the receive clock from the modem.
XTC	Red	On	The card is sending the external transmit clock to the modem.
		Off	The card is not sending the external transmit clock to the modem.
TST	Red	On	The card is in reset mode.
		Slow flash	The SW1 switch is set to *TEST*.
		Off	The card is operating normally.

5.1.2.4 Rack-Mount Modem Plug Adapter

Install the optional rack-mount modem plug adapter (Figure 5-8) on the back of the rack-mount card cage. The rack-mount modem plug adapter provides an interface to nonintelligent modems that use a modular telephone cord for tip and ring leads and mode indication/mode indication common (MI/MIC) leads.

Note: Do not use the rack-mount modem plug adapter with ARMDCMs.

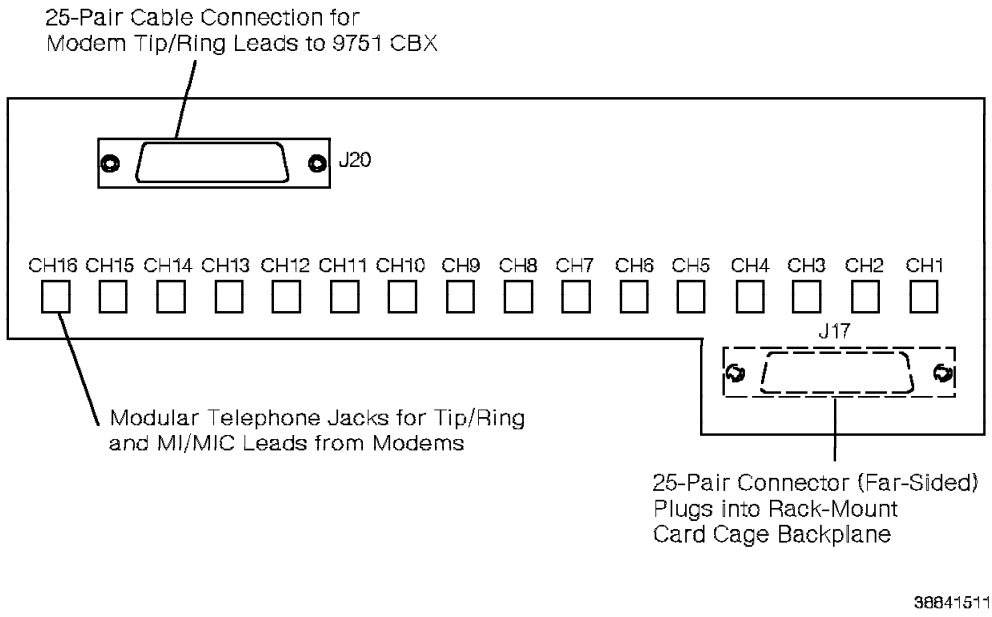

Figure 5-8. Rack-Mount Modem Plug Adapter

5.1.3 ROLMphone 244PC

The ROLMphone 244PC works with any IBM PC or with any other IBM PC-compatible personal computer.

The ROLMphone 244PC (Figure 5-9) has 4 line keys, 24 feature buttons, 2 of which are volume control buttons, and a two-way speakerphone.

Single twisted-pair wiring connects the ROLMphone 244PC to the 9751 CBX.

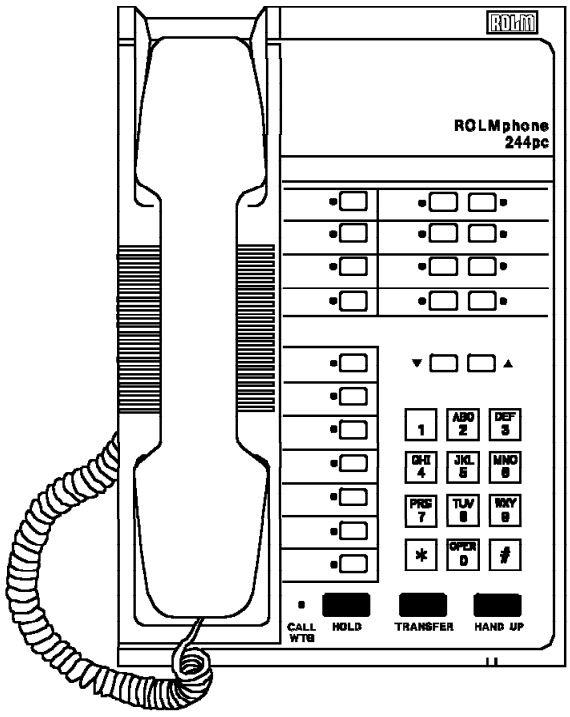

Figure 5-9. ROLMphone 244PC—Front View

For data communications, the ROLMphone 244PC attaches to any PC with an EIA/TIA-232-E cable (Figure 5-10).

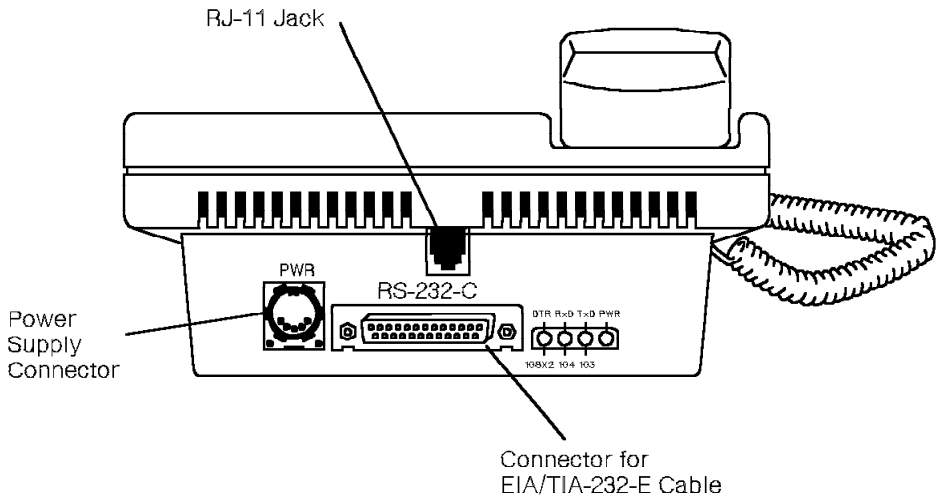

Figure 5-10. ROLMphone 244PC—Back View

The ROLMphone 244PC connects to a wall-mounted power supply and supports data communications features. It has four LEDs that indicate the telephone's data operational states.

Refer to the *ROLMphone 244PC User's Manual* for more information.

5.1.4 ROLMphone with DCO

The ROLMphone with DCO is a ROLMphone 612 (Figure 5-11) or ROLMphone 624 (Figure 5-12 on page 5-18) with a DCO module at the bottom of the set.

The ROLMphone with DCO has the following configuration options:

- Use *ROLMlink mode* for the telephone station features equivalent to the ROLMphone 240 and 400. This option is preferable in an automatic call distribution (ACD) environment.

  However, the telephony applications processing interface (API) is not supported in ROLMlink mode.

- Use *Cypress mode* for the same telephony API as in the ROLMphone 244PC.

  However, the telephone station features are subject to the same limitations as a ROLMphone 244PC.

For data communications, the ROLMphone with DCO attaches to any PC with an EIA/TIA-232-E cable (Figure 5-13 on page 5-18).

Refer to the following for more information:

- 5.8.8, “ROLMphone 600 Series” on page 5-33
- *9751 CBX, Release 9005/9006m, ROLMphone 600 Series with DCO User’s Manual*

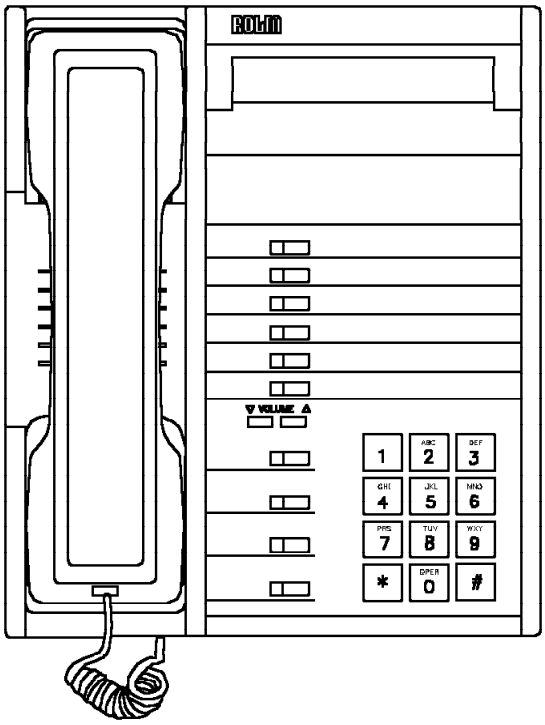

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Figure 5-11. ROLMphone 612SL With DCO—Front View

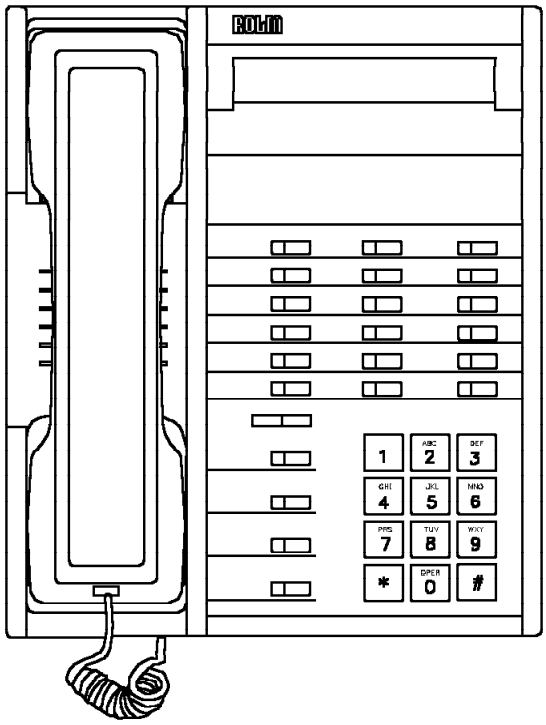

Figure 5-12. ROLMphone 624SL With DCO—Front View

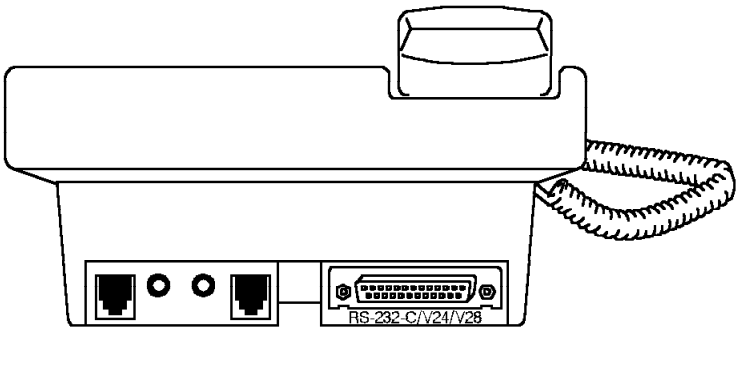

Figure 5-13. ROLMphone 612 or 624 With DCO—Back View

5.1.5 ROLMphone with DCM

ROLMphone telephones that can support a DCM include the following models (Figure 5-14):

- ROLMphone 120
- ROLMphone 240
- ROLMphone 240E
- ROLMphone 400

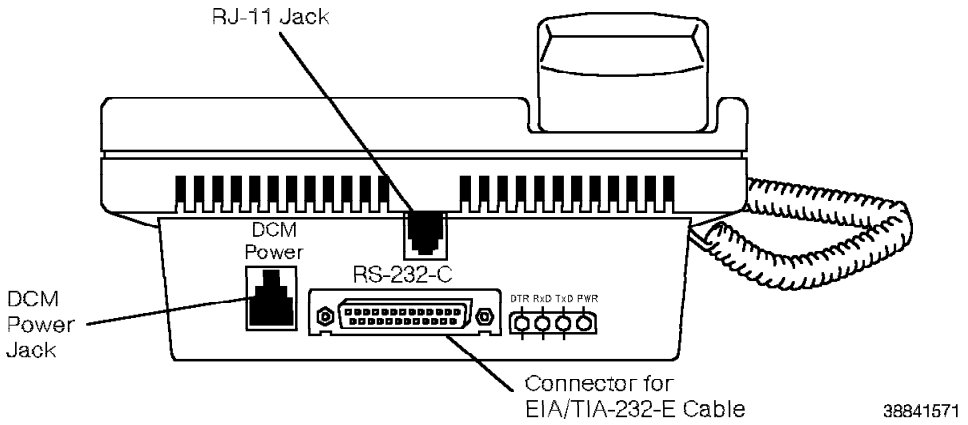

Figure 5-14. ROLMphone with DCM—Back View

The DCM permits simultaneous transmission of voice and data signals over single twisted-pair telephone wire. The DCM is a printed circuit board mounted inside the ROLMphone base.

Data devices such as PCs and terminals connect to the ROLMphone through an EIA/TIA-232-E connector at the base of the ROLMphone.

The RLI card interfaces the ROLMphone to the 9751 CBX.

5.2 Desktop Products

The following are desktop products the 9751 CBX can connect to:

- Cedar personal communications computer
- Cypress personal communications terminal
- Juniper II personal communications complement

The Cedar computer requires a Cedar load module (CDLM) and the Cypress terminal requires a Cypress load module (CLM).

The RLI card supports the desktop products.

5.2.1 Cedar Personal Communications Computer

The Cedar computer combines an IBM PC-compatible computer and terminal with a digital telephone. Use the computer and telephone for simultaneous voice and data calls.

The Cedar computer (Figure 5-15) has the following:

- 22.8-centimeter (9-inch) display
- Two diskette drives
- Retractable and detachable keyboard
- Dashboard that consists of a 12-button telephone keypad, up to 11 repdial keys, up to 4 lines, 10 soft function keys, and 3 telephone function keys
- Digital telephone with a two-way speakerphone
- File transfer capabilities
- Data communications software

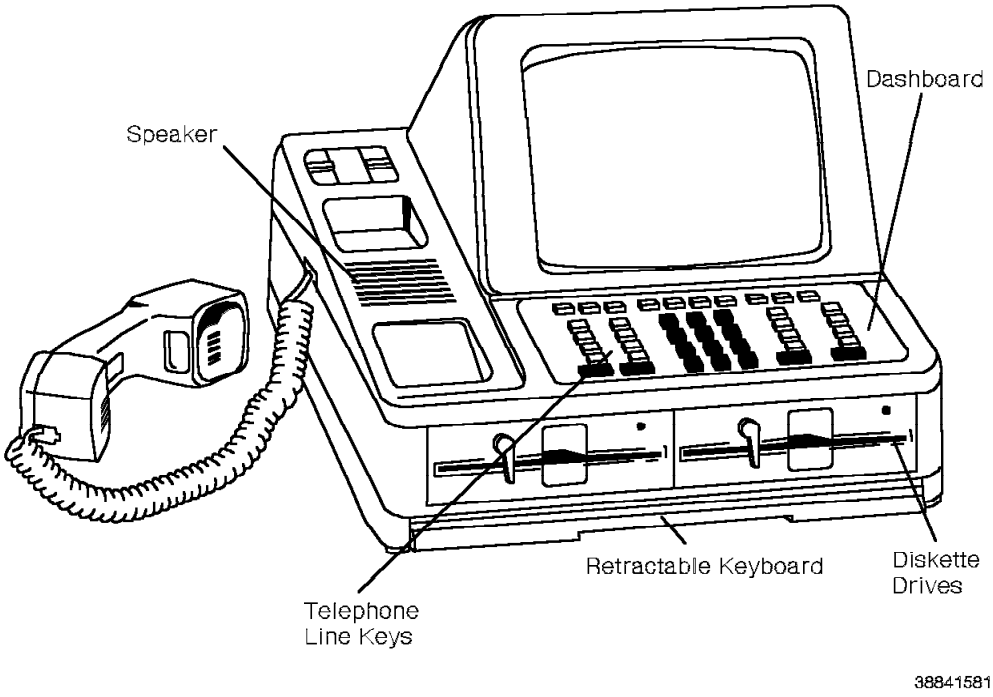

Figure 5-15. Cedar Personal Communications Computer

The CDLM (Figure 5-16) contains software for the Cedar unit. It connects to the 9751 CBX and serves up to 50 Cedar computers.

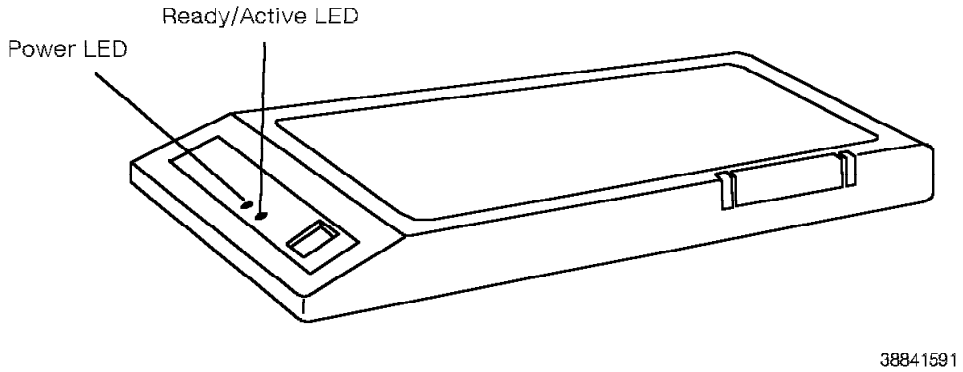

Figure 5-16. Cedar Load Module

Table 5-6 lists the CDLM LEDs and the conditions they indicate.

Table 5-6. CDLM LED Indicators

LED	State	Indication
Power	On	The CDLM is receiving power.
	Off	The CDLM is not receiving power.
Ready/ Active	Flickers then lights steadily	The CDLM passed self-test and is correctly connected to the switch.
	Flickers	The CDLM did not pass self-test or is incorrectly connected to the 9751 CBX.
	Blinking	The CDLM is downloading software.

The CDLM stores and loads the Cedar program code to the Cedar personal computers. Software updates are installed in the CDLM without disturbing the users or physically modifying the Cedar computer.

5.2.2 Cypress Personal Communications Terminal

The Cypress terminal is a work station that functions as a terminal and a digital telephone. Use the terminal and telephone for simultaneous voice and data calls.

The Cypress terminal has the following:

- 22.8-centimeter (9-inch) display
- Retractable keyboard
- Dashboard that consists of a 12-button telephone keypad, up to 11 repdial keys, up to 4 line keys, 10 soft function keys, and 3 telephone function keys (Figure 5-17)
- Digital telephone with a two-way speakerphone.
- Data communications software that provides automatic logon to host computers or databases
- Dynamic operation, which permits one soft key to hold several features
- Personal telephone list
- Reminder file
- Call-me display
- Calculator
- Security lock

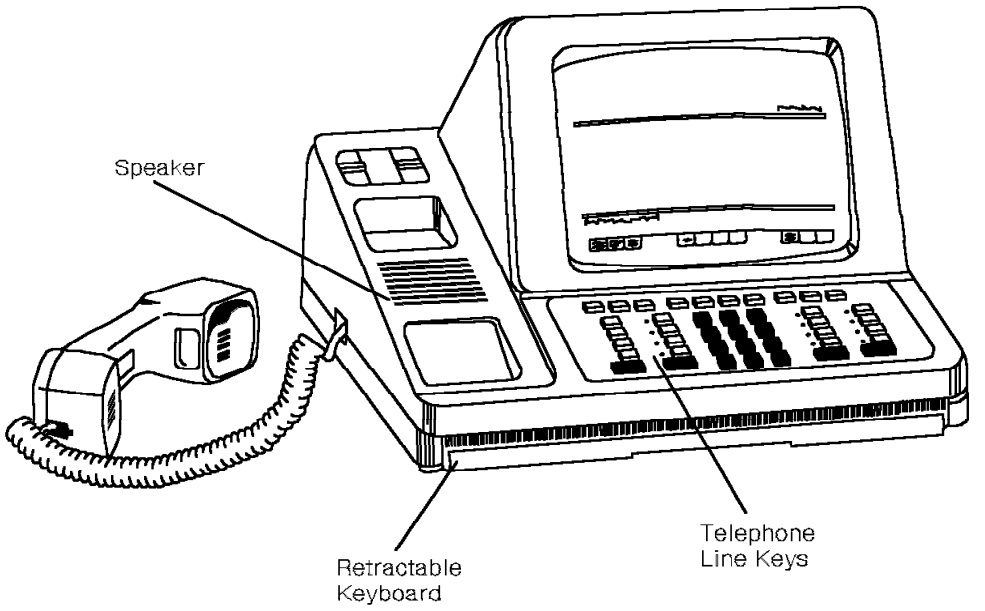

Figure 5-17. Cypress Personal Communications Terminal

The CLM (Figure 5-18) contains software for the Cypress terminal. It connects to the 9751 CBX and serves up to 50 Cypress terminals.

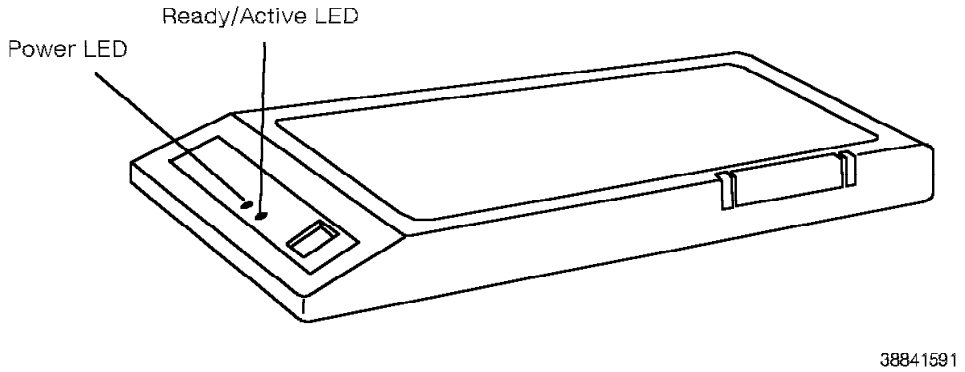

Figure 5-18. Cypress Load Module

Table 5-7 lists the CLM LEDs and the conditions they indicate.

Table 5-7. CLM LED Indicators

LED	State	Indication
Power	On	The CLM is receiving power.
	Off	The CLM is not receiving power.
Ready/ Active	Flickers then lights steadily	The CLM passed self-test and is correctly connected to the 9751 CBX.
	Flickers	The CLM did not pass self-test or is incorrectly connected to the 9751 CBX.
	Blinking	The CLM is downloading software.

The CLM stores and loads the Cypress program code to the Cypress terminals. Software updates are installed in the CLM without disturbing the users or physically modifying the Cypress terminal.

5.2.3 Juniper II Personal Communications Complement

The Juniper II complement adds IBM telephony communications capabilities to existing IBM PC or IBM PC XT desktop computers (Figure 5-19). The Juniper II complement consists of the following:

- An adapter card
- A system diskette that contains personal communications software
- A digital telephone with a 2-way speakerphone

Use the computer and telephone for simultaneous voice and data calls.

The IBM PC or IBM PC XT can use Cypress terminal features if the adapter card is installed in the PC and a cable is run from the card to the Juniper II telephone.

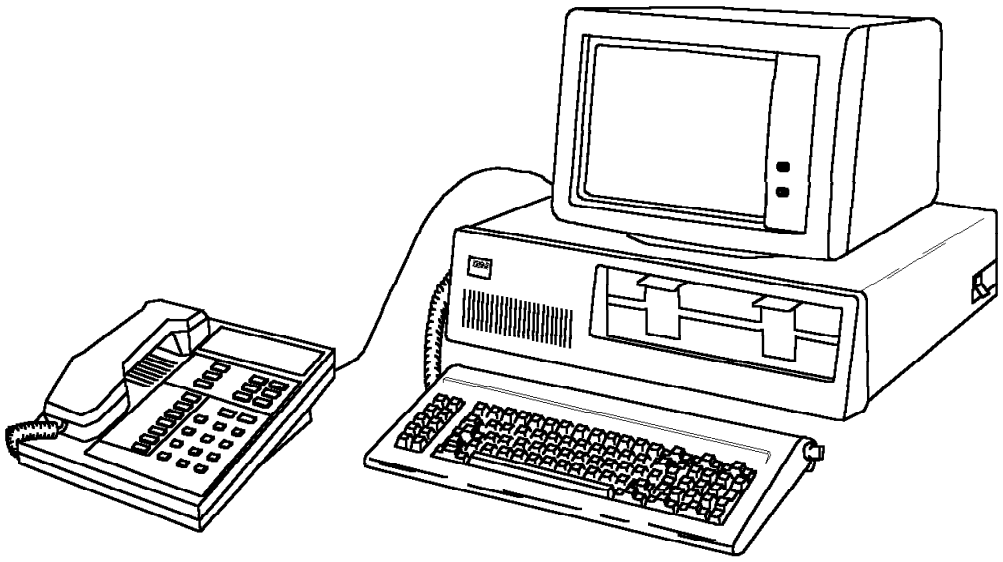

Figure 5-19. Juniper II Personal Communications Complement

5.3 Maintenance Terminal

The maintenance terminal is a two-way communications device that provides access to the 9751 CBX. It uses 3.5-inch diskettes, is battery operated, and is portable. It usually has a built-in modem and a liquid crystal display (LCD).

Use the maintenance terminal to:

- Call in diagnostic routines
- List error tables
- List traffic table information
- Control card status during maintenance

Use soft-copy maintenance analysis procedures (MAPs) loaded on diskettes to troubleshoot errors on the 9751 CBX. Soft-copy MAPs are only supported on the following maintenance terminals:

- IBM PC Convertible laptop computer
- Zenith Supersport 2 laptop computer

5.4 Modem

The 9751 CBX supports both intelligent and nonintelligent modems. It also supports both synchronous and asynchronous modems.

Modems can connect to the following data communications modules:

- ADCM
- ARMDCM
- RMDCM

5.5 Music-on-Hold Interface Box

The music-on-hold interface box is mounted near the MDF. It connects a customer-supplied music source to the 9751 CBX. The music-on-hold interface box limits the volume from the music source.

5.6 Printer

Use a serial printer to generate hard copies of reports, listings, and call detail recording (CDR) reports. Use an EIA/TIA-232-E cable to connect the printer to the system monitor input/output (SMIOC) interconnect box.

5.7 ROLMdial S100

The ROLMdial S100 device (Figure 5-20) interfaces video equipment with the 9751 CBX. It is available for 9751 CBX systems with software Release 9005.2.79 and above.

You can configure the ROLMdial S100 as a 1- or 2-port device. Each device requires:

- One or two ROLMphone 120 records that are configured for data
- One or two T1 or integrated services digital network (ISDN) channels

The video call uses only the data channels and does not use the voice channels.

The ROLMdial S100 device connects to the 9751 CBX through ROLMlink. It connects to the video equipment through RS-366 and V.35 cables.

Refer to the *ROLMdial S100 Installation and Troubleshooting Guide* for more information.

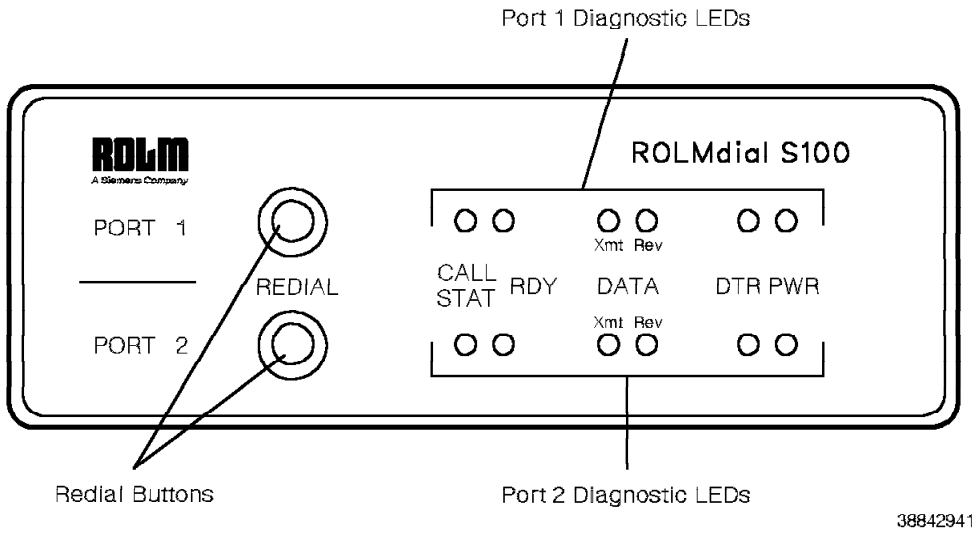

Figure 5-20. ROLMdial S100—Front View

5.8 ROLMphone Telephones

ROLMphone telephones have multiple line and feature buttons, and translate analog signals to digital signals. ROLMphone telephones also have optional features such as:

- Headset jacks for ACD and message centers
- Handsets with hearing aid compatibility
- DCM
- DCO
- LCD display
- 2-way speaker
- Headset/recorder option (HRO), which is a modular headset/recording interface for the ROLMphone 600 series telephone
- Keyboard expansion option (KEO), which supplies 20 additional function keys and LEDs for the ROLMphone 600 series telephone

The RLI card is the interface between the ROLMphone telephones and the 9751 CBX.

Refer to the following for more information:

ROLMphone 120, 240, and 400 telephones
Refer to the *ROLMphone User Guide*.

ROLMphone 312 and 600 series telephones
Refer to the *9751 CBX, Release 9005/9006m, ROLMphone 300/600 Series User Guide*.

ROLMphone with DCM
Refer to the *9751 CBX, Release 9005/9006m, Data Communications User Guide*.

ROLMphone with DCO
Refer to the *9751 CBX, Release 9005/9006m, ROLMphone 600 Series with DCO User's Manual*.

5.8.1 ROLMphone 120

The ROLMphone 120 (Figure 5-21) is a 1-line telephone. It has 12 feature buttons, 2 of which are volume control buttons, and a 1-way receive speakerphone. LEDs indicate when the line and features are in use.

Refer to the *ROLMphone User Guide* for more information.

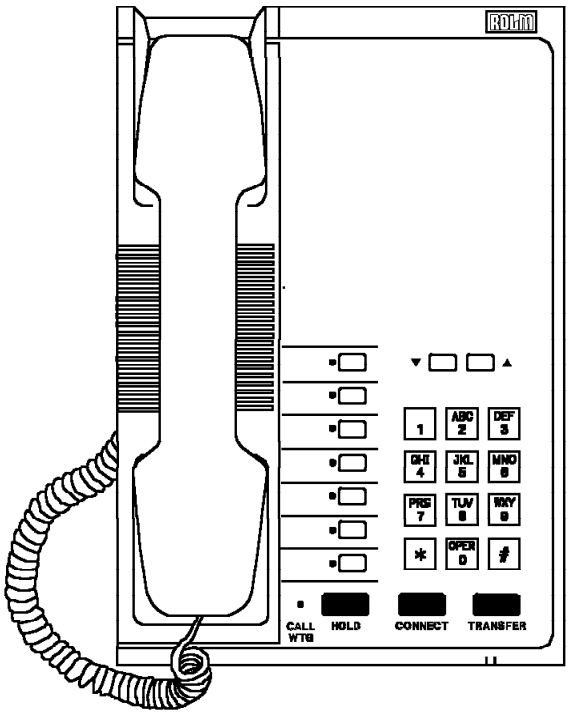

Figure 5-21. ROLMphone 120

5.8.2 ROLMphone 240

The ROLMphone 240 (Figure 5-22) can have up to 11 lines. It has 24 feature buttons, 2 of which are volume control buttons, and a 2-way speakerphone. The LEDs indicate when the lines and features are in use.

Refer to the *ROLMphone User Guide* for more information.

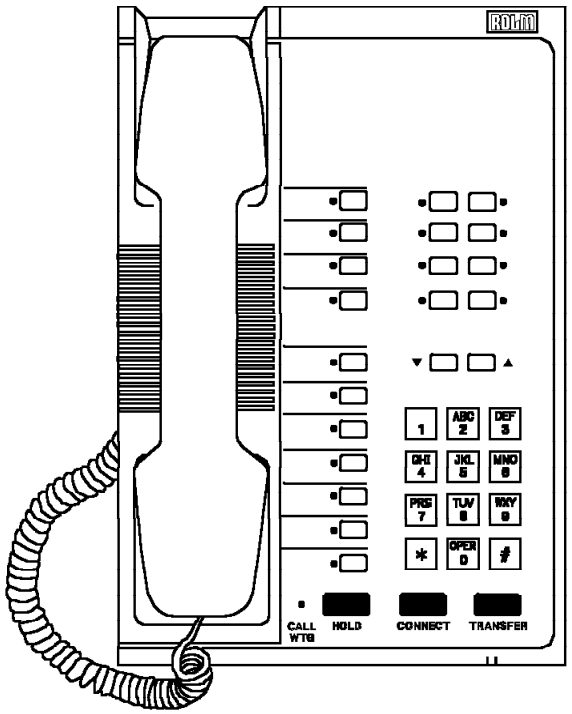

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Figure 5-22. ROLMphone 240

5.8.3 ROLMphone 240 Basic

The ROLMphone 240 Basic is the same as the ROLMphone 240, except that it does not have the DCM and headset options, and it has a 1-way speakerphone.

5.8.4 ROLMphone 240E

The ROLMphone 240E (Figure 5-23) has 24 feature buttons, 11 of which can be lines; a 2-way speakerphone; and a 2-line, 24-character alphanumeric display.

You can use the ROLMphone 240E as an ACD agent telephone. It is available with a headset or DCM.

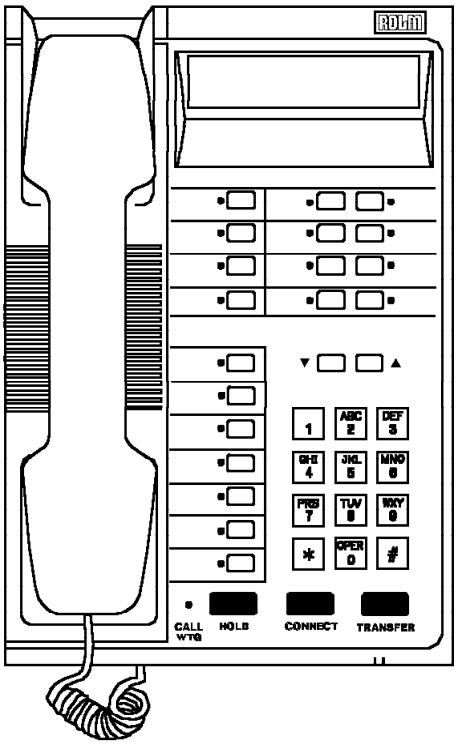

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Figure 5-23. ROLMphone 240E

5.8.5 ROLMphone 312

The ROLMphone 312 (Figure 5-24) is a single-line telephone that provides basic telephone features equivalent to the ROLMphone 120. It has one line button, 12 feature buttons (including volume up and volume down), and a 1-way receive speakerphone. The LEDs indicate when the lines and features are in use.

Refer to the *9751 CBX, Release 9005/9006m, ROLMphone 300/600 Series User Guide* for more information.

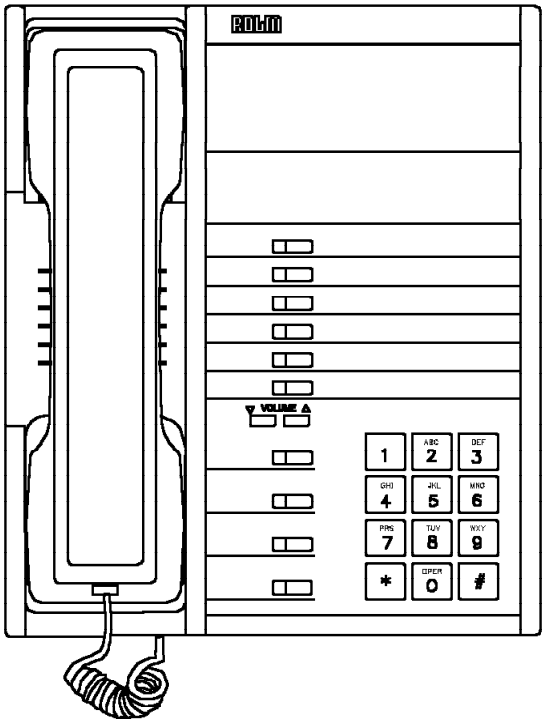


Figure 5-24. ROLMphone 312

5.8.6 ROLMphone 312L

The ROLMphone 312L is identical to the ROLMphone 312, except that it provides an LCD display that is 24 characters long and two rows high.

5.8.7 ROLMphone 400

The ROLMphone 400 (Figure 5-25) can have up to 29 lines. It has 40 feature buttons, 2 of which are volume control buttons; a 2-way speakerphone; and a 60-character alphanumeric display. The LEDs indicate when the lines and features are in use.

Refer to the *ROLMphone User Guide* for more information.

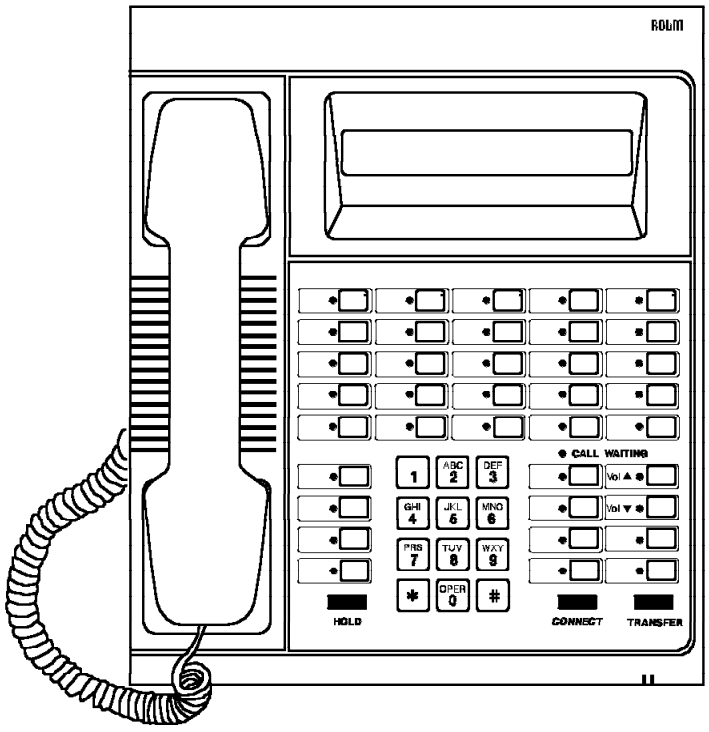


Figure 5-25. ROLMphone 400

5.8.8 ROLMphone 600 Series

The ROLMphone 600 series telephones, depending on how they are configured, can provide:

- The station features of the ROLMphone 120, 240, and 400
- The data communications features of the ROLMphone 244PC

These models are combinations of the following factory-configured permanent options:

- LCD display that is 2 rows high and 24 characters long
- Integral speakerphone
- 12 function keys for the ROLMphone 612 models
- 24 function keys for the ROLMphone 624 models

The following are field-installable options:

- HRO
- KEO
- DCO

Refer to the *9751 CBX, Release 9005/9006m, ROLMphone 300/600 Series User Guide* for more information.

5.8.8.1 ROLMphone 612

The ROLMphone 612 (Figure 5-26) is a multiline telephone that supports up to 10 lines (excluding the KEO). It provides 12 function keys (including volume up and volume down) and 10 LEDs.

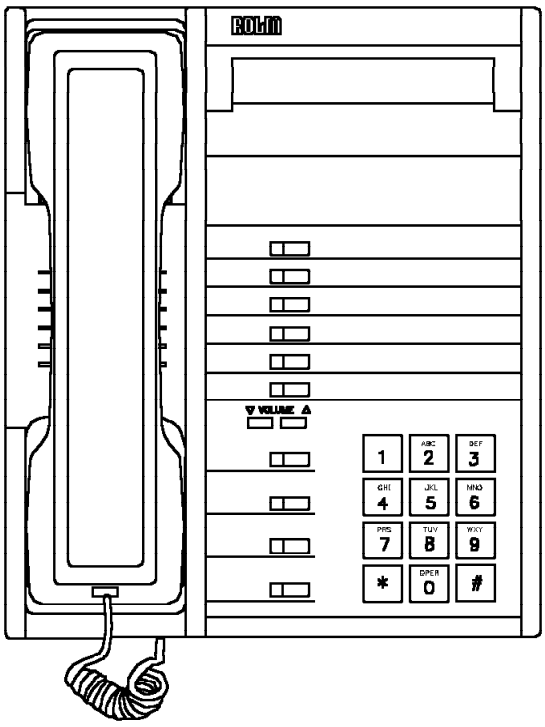


Figure 5-26. ROLMphone 612SL

5.8.8.2 ROLMphone 624

The ROLMphone 624 (Figure 5-27) is a multiline telephone that supports up to 11 lines (excluding the KEO). It provides 24 function keys (including volume up and volume down) and 22 LEDs.

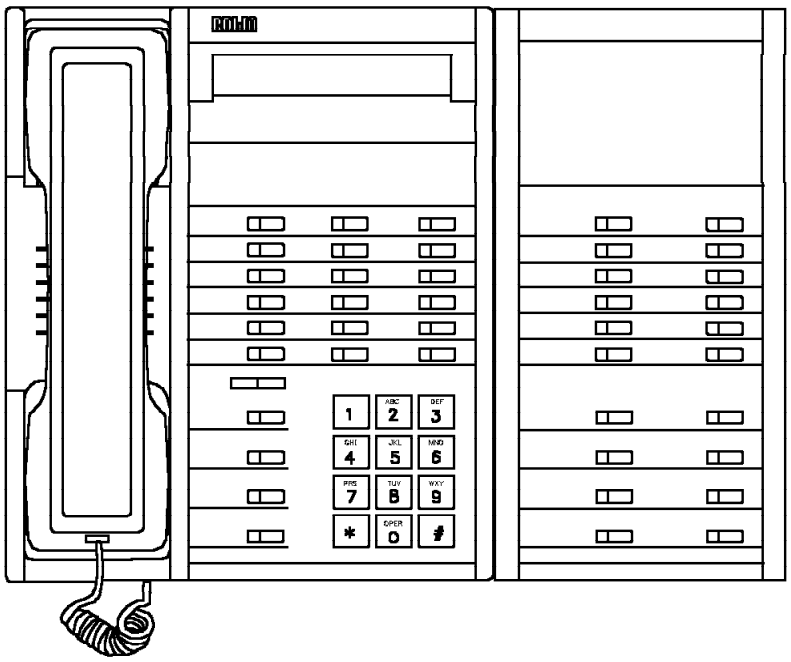


Figure 5-27. ROLMphone 624SL With KEO

5.9 Single-Line Telephones

You can use the following types of single-line telephones with the 9751 CBX:

- Basic single-line telephone
- Flashphone telephone

The ATI card interfaces the 9751 CBX with single-line telephones.

5.9.1 Basic Single-Line Telephone

A basic single-line telephone sends rotary or dual-tone multifrequency (DTMF) signals representing digits to the processor. It provides access to one line and has one extension number.

5.9.2 Flashphone Telephone

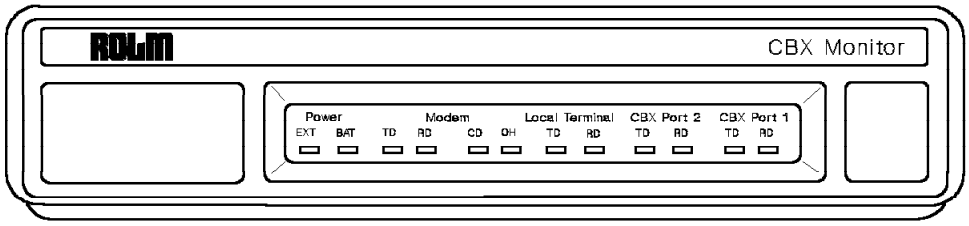
The Flashphone sends digits to the processor in DTMF signals. It has a FLASH button and a message waiting lamp.

If the 9751 CBX has a message waiting or message waiting 8-channel (MW8) card, the system supports the Flashphone telephone's message waiting lamp.

The location and function of the FLASH button makes access to the system features faster and easier than with the basic single-line telephone.

5.10 9751 CBX Monitor

The 9751 CBX monitor is an intelligent modem that collects and reports data (Figure 5-28). The system supports one 9751 CBX monitor per node.



38841701

Figure 5-28. 9751 CBX Monitor—Front View

Table 5-8 lists the 9751 CBX monitor LED indicators.

Note: In Table 5-8, *monitor* refers to the 9751 CBX monitor.

Table 5-8 (Page 1 of 2). 9751 CBXMonitor LED Indicators

Function	LED	State	Indication
Power	EXT	Off	The monitor is off and not battery-powered.
	BAT	Off	
	EXT	Off	The external power is off, and the monitor is battery-powered.
	BAT	On	
	EXT	On	The external power is on, and there is a battery problem.
	BAT	Off	
	EXT	On	The monitor is on, and the battery is charging.
	BAT	On	

Table 5-8 (Page 2 of 2). 9751 CBXMonitor LED Indicators

Function	LED	State	Indication
Modem	TD	Flashing	The data is being sent over the telephone line.
		Off	No data is being sent over the telephone line.
	RD	Flashing	The data is being received on the telephone line.
		Off	The data is not being received on the telephone line.
	CD	On	The carrier signal from another modem was received.
		Off	The carrier signal from another modem was not received.
	OH (Off-hook)	On	The monitor is attempting to seize a telephone line.
		Off	The monitor is not attempting to seize a telephone line.
Local Terminal	TD	Flashing	The monitor is sending the data to the maintenance terminal.
		Off	The maintenance terminal is not receiving data.
	RD	Flashing	The maintenance terminal is sending data to the monitor.
		Off	The monitor is not receiving data.
CBX Port 1	TD	Flashing	The monitor is sending data to the 9751 CBX.
		Off	The 9751 CBX is not receiving data.
	RD	Flashing	The 9751 CBX is sending data to the monitor.
		Off	The monitor is not receiving data.
CBX Port 2	TD	Flashing	The monitor is sending data to the 9751 CBX.
		Off	The 9751 CBX is not receiving data.
	RD	Flashing	The 9751 CBX is sending data to the monitor.
		Off	The monitor is not receiving data.

5.11 9751 CBX Monitor II

The 9751 CBX monitor II is an enhancement to the external 9751 CBX monitor. The 9751 CBX monitor II consists of software and hardware. It is available for 9751 CBX systems with software Release 9005.1.73 and above.

The 9751 CBX monitor II software resides in the 9751 CBX and is responsible for processing service-related data from the 9751 CBX. The 9751 CBX monitor II hardware includes the external 9751 CBX monitor II modem (Figure 5-29). It reports the service-related data to a remote service processor.

The 9751 CBX monitor II kit contains the following:

- 9751 CBX monitor II modem
- Battery
- Battery base
- AC power cord with ac adapter
- EIA/TIA-232-E cable
- Wall-mount bracket
- Telephone line cord

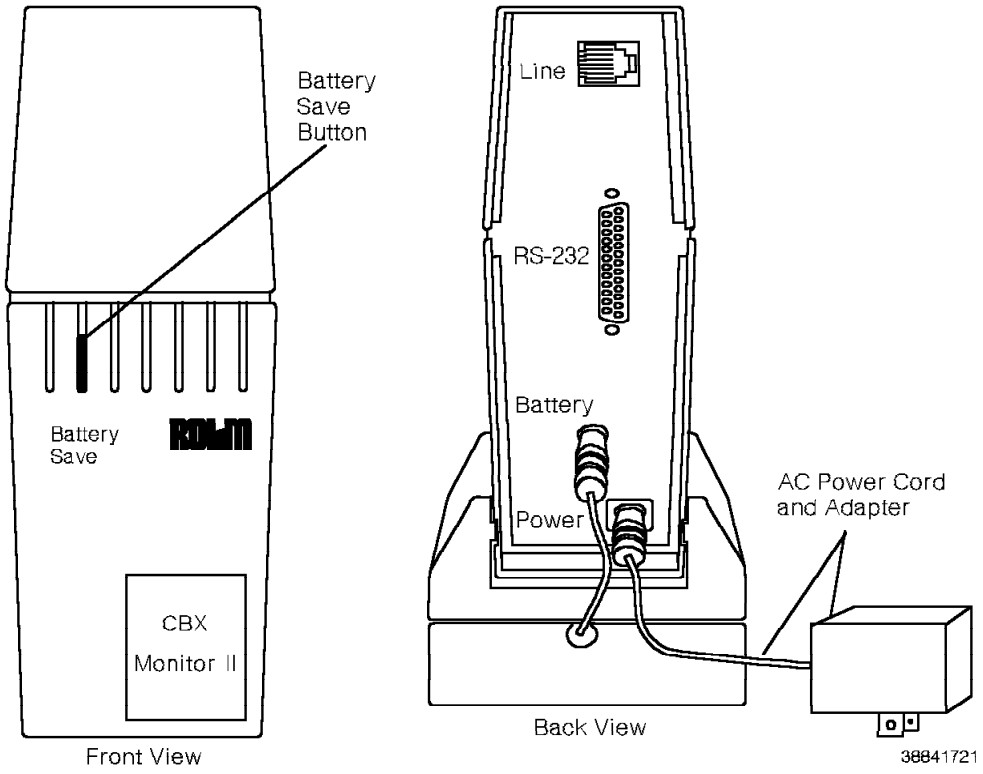


Figure 5-29. 9751 CBX Monitor II Modem

Mount the 9751 CBX monitor II modem on a wall near the SMIOC interconnect box. An EIA/TIA-232-E cable from port 2 of the SMIOC interconnect box connects the modem to the 9751 CBX. A telephone line cord is routed from the back of the modem to an RJ-11 jack in the telephone equipment room. The RJ-11 jack connects to a dedicated loop-start trunk over which service-related data is sent to the service center. In case of ac power loss, a backup battery is included to power the modem for a limited time.

Figure 5-30 on page 5-39 shows the icons that appear on the front of the 9751 CBX monitor II modem.

Refer to 7.6, “Error Reporting with the 9751 CBX Monitor and 9751 CBX Monitor II” on page 7-9 for information about LEDs on the 9755 Attendant Console (9755 ATC) and the SMIOC that provide service indications on the status of the 9751 CBX monitor II.

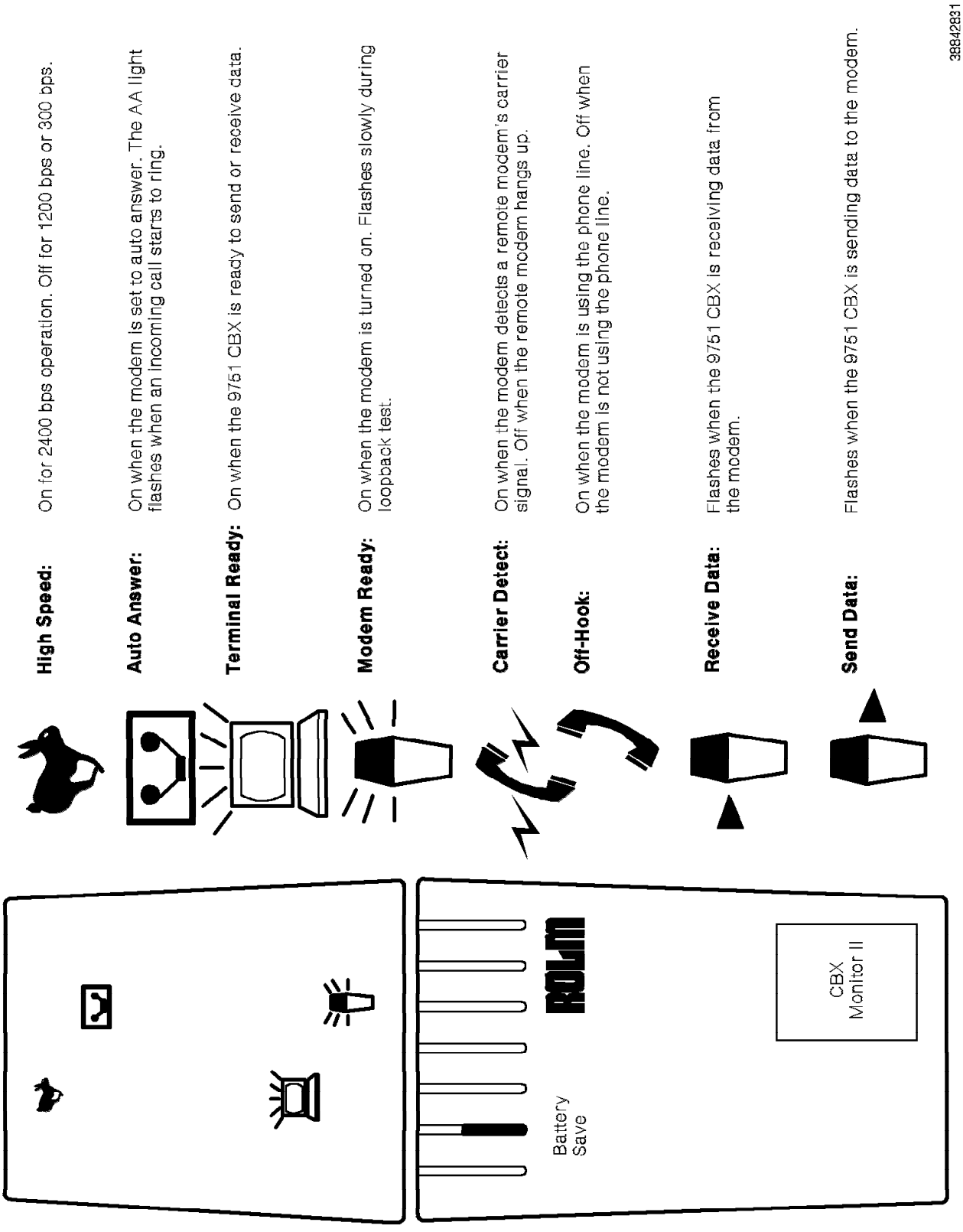


Figure 5-30. 9751 CBX Monitor II Modem Icons

5.12 9755 ATC

An attendant uses the 9755 ATC (Figure 5-31) compact desktop device to process internal and external telephone calls.

A link connects the console to the ACC card in the 9751 CBX.

A compact step-down transformer supplies power to the console. The step-down transformer has two connections: a 3-pronged plug to the building power supply and a 3-wire cable attached to the connector block.

The 9755 ATC has four switches and three connectors. The switches are for power, testing, day or night mode, and an alerting tone. The connectors are for headset and handset, the EIA/TIA-232-E cable to the optional IBM PC, and the connector block.

The connector block is mounted near the step-down transformer. It is the interface for the step-down transformer, the 9755 ATC, and the ACC card.

The face of the 9755 ATC has a display panel for call process status, a display for system status, and keys and buttons for call processing, dialing, and control.

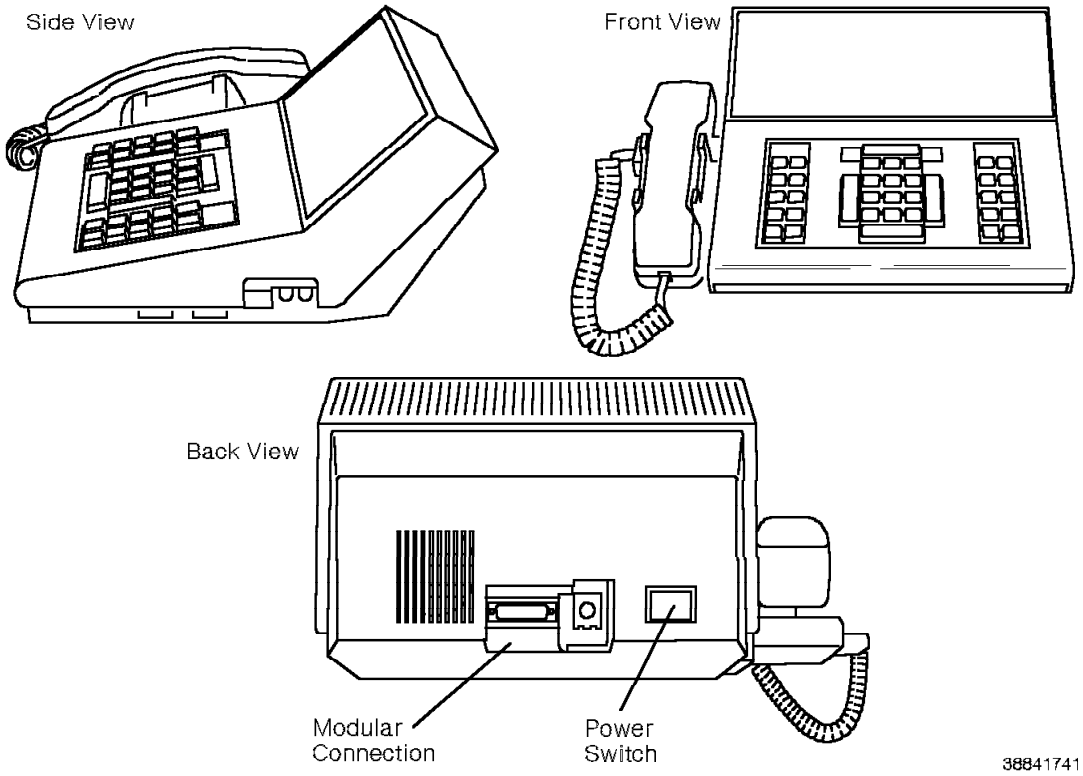


Figure 5-31. 9755 ATC

Chapter 6. Managing System Software

This chapter describes the procedures to manage the system software.

6.1 Initiating System Software (Initial Program Load)

New systems do not require preparation for loading. The 9751 computerized branch exchange (CBX) software is installed with the site-specific information and with the core image (CI) volume name initialized.

Initiate the 9751 CBX system software as follows:

1. Power on the 9751 CBX.
2. Turn on the shelf power modules on all the shelves. The following message appears on the maintenance terminal:

   ```
   *** HDIPL ***

   LOAD DISKTOOL (Y/N)?
   ```

   N is the default.
3. Type N or press Enter.

   The system automatically loads the software. The following message appears on the maintenance terminal screen:

   ```
   LOADING:  CI_9005.x.xx
   Initiating System
   ```

   where **x.xx** is the software release and bind number.
4. Set the time and day when the system banner appears.
5. Type the user name and password.
6. Type the following to verify that the software load is complete:

   ```
   LIST STATUS SYSTEM
   ```

   When software loading is complete, the following message appears:

   ```
   SYSTEM_STATUS = NORMAL
   ```

6.2 Using the IPLOAD Command

The IPLOAD command writes the CI volume name to the hard disk. If the system tries to reload, it reads the IPLOAD name from hard disk and boots the specified CI volume.

CUSTOMER IMPACT

Failure to use the IPLOAD command each time you load the system from diskettes or replace or rename the CI volume can result in the loss of telephony for an extended period of time.

6.3 Loading Initial Software from Diskettes (Manual Program Load)

Load the initial software from diskettes to memory as follows:

1. Ensure that you have the most current copy of the software volumes such as the CNFG, CI, DFE, DISKTOOL, PATCH_VOL, and SYSTEM_INFO volumes.
2. Power on the 9751 CBX.
3. Place the first diskette of the CI volume in the diskette drive.

4. Press the program load button on the 9030 CPU card or the 9030A CPU card.

   The following message appears on the maintenance terminal:

   ```
   *** FLOPPY IPL (REV x) ***

   MULTI-DISK LOAD

   LOADING CORE_IMAGE_VOL
   ```

   where **x** is the revision number.

5. When one diskette is completely loaded, take it out of the drive and insert the next one.

   After the CI diskettes are loaded, the system banner appears.

6. Set the time and date.

7. Type your user name and password. The system prompts you to insert the CNFG volume.

8. Insert the CNFG volume diskette into the drive.

9. Use the procedure in 6.15, "Copying a Volume from Diskettes to Hard Disk" on page 6-8 to copy the CI and CNFG volumes to hard disk.

10. Type the `IPLOAD <core_image_vol name>` command to ensure the system loads the correct CI volume.

11. If the message `SOFTWARE NOT INSTALLED` appears, place the SYSTEM_INFO volume diskette in the drive, and type the following:

    ```
    INSTALL SOFTWARE
    ```

    When the system prompts you, type the name of the CI volume, that you installed on hard disk.

    The following message indicates that the site-specific information is loaded:

    ```
    VOLUME CI_xxxx SUCCESSFULLY INSTALLED
    ```

12. Type the following command:

    ```
    APPLY PATCH DISK ALL
    ```

13. Type the following command to load the CI and CNFG information from the hard disk:

    ```
    FINIT BOOT
    ```

14. Copy any other diskette volumes to the hard disk using the procedure in 6.15, "Copying a Volume from Diskettes to Hard Disk" on page 6-8.

15. Type the following command to verify that the software load is complete:

    ```
    LIST STATUS SYSTEM
    ```

    When software loading is complete, the following message appears:

    ```
    SYSTEM_STATUS = NORMAL
    ```

6.4 Loading Memory from Hard Disk (Models 10 and 40)

There are two ways to load memory from the hard disk, depending on if you can access CLI:

- **If you can access CLI:** Enter CLI mode and type the following command to load the CI and CNFG databases from the hard disk to memory:

  ```
  FINIT BOOT
  ```

- **If you cannot access CLI:** Press the program load button on either the 9030 CPU card or the 9030A CPU card to load the CI and CNFG databases from the hard disk to memory.

6.5 Loading Memory (Model 50)

There are two procedures for loading memory in a Model 50, depending on the changes made to the software:

- Software configuration changes require loading the standby memory from the active memory, as described in 6.5.1, “Loading Standby Memory from Active Memory.”
- Software changes made to the hard disk, such as patching and CDR, require the loading procedure described in 6.5.2, “Loading Standby Memory from Hard Disk” to ensure that both processors are updated.

6.5.1 Loading Standby Memory from Active Memory

Type the following command to copy the contents of the active processor’s memory into the memory of the standby processor:

```
LOAD STBY MEM
```

The following message appears:

```
STANDBY LOAD STARTED-SLOAD INITIATED FROM NODE 1
```

When the standby memory is loaded, the following message appears:

```
STANDBY LOAD SUCCEEDED NODE 1
```

6.5.2 Loading Standby Memory from Hard Disk

Download the databases from hard disk to memory as follows:

1. Type the following to initiate the load:

   ```
   LOAD STBY 9005.x.xx
   ```

   where **x.xx** is the software release and bind number.

   The following message appears:

   ```
   STANDBY LOAD STARTED - SLOAD INITIATED FROM NODE 1.
   STANDBY LOAD SUCCEEDED NODE 1.
   WARNING: DO NOT SWITCHOVER UNTIL STANDBY
   SIDE¢S SYSTEM_STATUS IS NORMAL
   ```

2. Type the following command to list the system status of the standby processor:

   ```
   LIST STATUS SYSTEM S
   ```

3. Type the LIST STATUS SYSTEM S command as many times as necessary until the following message appears:

   SYSTEM_STATUS = NORMAL

4. Type the following to start the watchdog timer on the standby side:

   START WDT S

5. Type the following to list the system status again:

   LIST STATUS SYSTEM S

   When the WDT = ENABLED message appears, the system is ready for a switchover.

   Warning: This type of switchover causes the loss of all calls in the setup mode. Use it only during periods of low traffic.

6. Type the following command:

   SWITCHOVER UNCONDITIONAL MAJOR

   The system switches over and the system banner appears.

7. Verify that telephony operation has been restored and the system is stable.

8. Type the following command to list the system status on the standby processor:

   LIST STATUS SYSTEM S

   If the INDEPENDENT SOFTWARE = YES message appears, type the following command to load memory on the standby processor from the active processor's memory:

   LOAD STBY MEM

9. When the message STANDBY LOAD SUCCEEDED appears, list the system status again (LIST STATUS SYSTEM S) to verify that the following message appears:

   INDEPENDENT SOFTWARE = NO

6.6 Using CLI Commands for Volume Information

Use the CLI commands listed in Table 6-1 to get information about the volumes.

Table 6-1 (Page 1 of 2). CLICommands That Provide Volume Information

CLI Command	Information Provided
LIST FL 1	Lists all the volumes on the diskette, the size in logical units (LDUs) of each volume, and the quantity of diskettes required to copy each volume.
LIST HD	Lists all the volumes on the hard disk, the size in LDUs of each volume, and the quantity of diskettes required to copy each volume.
LIST VOL <lv_name>	Lists information about the *specified* mounted volume, such as its date of creation, size, and aliases given to it.
LIST VOL ALL	Lists information, such as the date of creation and size, about *all* the volumes that are currently mounted on the hard disk and diskettes.
PDIO C PDIO S PDIO VOL_NAME	Clears, reads, sets the physical disk input/output (I/O) (hard disk and diskette drive) and reads a volume name.

Table 6-1 (Page 2 of 2). CLICommands That Provide Volume Information

CLI Command	Information Provided
VERIFY VOL <lv_name>	Verifies the readability of a specified mounted volume.

6.7 Formatting a Diskette

Formatting diskettes prepares them for the system's use. Format a diskette as follows:

1. Insert the diskette to be formatted.

   Important Note: You *must* use 3.5-inch, 2-megabyte (MB), double-sided, high-density diskettes. Although the system can read and write to 1MB low-density diskettes, it *cannot* load or boot from them.

2. Type the following CLI command:

   FORMAT FL

   The system prompts you to insert the diskette to be formatted into the diskette drive.

3. Type C to continue formatting or A to terminate formatting. The default is C.

6.8 Defining a Volume

Defining a volume sets aside space for it on diskettes or on the hard disk. Use this command when you:

- Make a backup copy of an existing volume. Define a new, empty volume with a unique name and copy the desired volume into it.
- Reload all the system software from diskettes to a new hard disk. Define the software volumes on hard disk before you copy to them.

Type the following CLI command to define a volume:

DEFINE VOL <media> <vol name> <LDU size> <lv type>

6.9 Mounting a Volume on Diskettes

Mounting a volume makes it accessible to the system. Type the following CLI command to mount a volume on diskettes:

MOUNT FLOPPY_VOL <vol name> <alias_lv_name>

where <**alias_lv_name**> is optional.

When you type the MOUNT FLOPPY_VOL command, the system searches the diskette drive for the requested volume. The system displays the following prompt three times:

PLACE FLOPPY #1 of xxx IN DRIVE #1

where **xxx** is the name of the volume.

The following message appears:

TYPE ¢C¢ TO CONTINUE OR ¢A¢ TO ABORT (DEFAULT = ¢C¢):

If it does not find the specified volume after three attempts, one of the following messages appears:

```
MOUNT VOL xxx
***ERROR: FLOPPY DISK ERROR: DRIVE NOT READY FOR I/O OR NO DISK IN DRIVE***
```

where **xxx** is the name of the volume.

If the system finds the first diskette, but does not find subsequent ones, it attempts three times to mount the specified diskette. The following message appears:

```
***** ERROR: NOT SEQUENCE ONE OF VOLUME *****

TYPE ¢C¢ TO CONTINUE OR ¢A¢ TO ABORT (DEFAULT = ¢C¢):

MOUNT FLOPPY ERROR:  Volume not found
```

After a restart or a full initialization (FINIT), the system automatically tries to mount the CNFG volume. It does not return an error message, but searches first the hard disk and then the diskette drive continuously until it finds that volume.

6.10 Mounting a Volume on Hard Disk

Type the following CLI command to mount a volume on the hard disk:

```
MOUNT HD_VOL <lv_name> <alias_lv_name>
```

where <**alias_lv_name**> is optional.

6.11 Mounting a Volume with an Alias

An alias is the shortened name of a volume, such as CI for core image volume. Its primary use is for ease of input on the maintenance terminal.

Type the following CLI command to mount a volume with an alias:

```
MOUNT VOL <lv_name> <alias_lv_name>
```

where <**alias_lv_name**> is optional.

Note: Mount the core image, the configuration and the patch volumes with their correct aliases (CI, CNFG, and PV). To make changes to the CI and CNFG volumes, type the full volume name. If the system cannot find the correct aliases, you cannot make any volume changes.

Refer to 6.14, “Demounting a Volume” on page 6-8 to delete an alias.

6.12 Mounting a Volume for Copying

Type the following CLI command to mount a volume on diskettes so you can copy it to another volume:

```
MOUNT COPY_ONLY_VOL <lv_name> <alias_lv_name>
```

where <**alias_lv_name**> is optional.

This command speeds up the mounting procedure.

6.13 Verifying a Volume

Verify a volume to ensure that all sectors allocated for that volume are readable. You must mount a volume before you can verify it.

Type the following CLI command to verify the volume each time you define it on the hard disk:

```
VERIFY VOL <lv_name>
```

6.14 Demounting a Volume

Type the following command to demount a volume from the hard disk or diskette drive:

```
DEMOUNT VOL <vol_name>
```

Remove the diskettes from the drive when you finish demounting because the system needs to indicate end-of-file.

This command eliminates all aliases previously given. It is the only way to delete an alias.

6.15 Copying a Volume from Diskettes to Hard Disk

Copy a volume from diskettes to the hard disk as follows:

1. Insert the diskette you are copying *from* into the diskette drive. Type the following to determine the name of the diskette:

   ```
   LIST FL 1
   ```

2. Type the following to mount the volume on the diskettes that you are copying from:

   ```
   MOUNT FLOPPY_VOL <source_vol_name> <alias name>
   ```

   Type the following to mount the CNFG volume or to mount a volume from a write-protected diskette:

   ```
   MOUNT COPY_ONLY_VOL <source_vol_name> <alias name>
   ```

3. Define an area on the hard disk for the volume. Type the following CLI command to give the volume a unique name and indicate its size in LDUs:

   ```
   DEFINE VOL HD <target_vol_name> <size> <lv_type>
   ```

4. Type the following to mount the volume you defined in step 3 on page 6-8:

   MOUNT HD_VOL <target_vol_name> <alias name>

5. Type the following to verify that the space allocated to the volume is readable:

   VERIFY VOL <target_vol_name>

6. **Warning:** Do not reverse the source and target names when you type the COPY VOL command. It ruins the original diskette and you lose data.

   Type the following command to copy the volume from diskette to hard disk:

   COPY VOL <source_vol_name> <target_vol_name>

   or

   COPY VOL <source alias name> <target alias_name>

   When the procedure is complete, the following message appears:

   ***** COPY VOL <vol_name> COMPLETE *****

6.16 Copying a Large Volume from Hard Disk to Diskettes

Warning: To get a usable backup of the CNFG or any hard disk volume, the system must be stable, with no restarts occurring. Troubleshoot an unstable system before performing backups.

Create a backup on diskettes of the CNFG or any hard disk volume with a size greater than 4 LDUs as follows:

1. Type the following to clear the status buffer:

   CLEAR STATUS FS ALL

2. If you are copying volumes other than CNFG, mount the volume first. Type the following:

   MOUNT VOL <lv_name> <alias_lv_name>

3. Type the following to determine the size of the volume on hard disk in LDUs:

   LIST VOL <lv_name>

   One diskette holds up to 4 LDUs. Verify that the volume fits on two diskettes. If the size is 4 or fewer LDUs, use the procedure in 6.17, “Copying a Small Volume from Hard Disk to Diskettes” on page 6-11.

4. Format the necessary number of blank diskettes.

   Important Note: You *must* use 3.5-inch, 2MB, double-sided, high-density diskettes. Although the system can read and write to 1MB low-density diskettes, it *cannot* load or boot from them.

   You need 1 diskette for every 4 LDUs. Ensure that the write-protect windows on the diskettes are covered. Type the following to format the diskettes:

   FORMAT FL

5. Manually label the blank diskettes that will contain the backup volume.

6. Define the diskette volume according to the VOL type (CI, CNFG, or FS).

   Type the following to define the CNFG volume:

   DEFINE VOL FL <lv_name> <lv_size> <CN>

   Type the following command to define the CI or DISKTOOL volume:

   DEFINE VOL FL <lv_name> <lv_size> <CI>

   Type the following command to define other volumes:

   DEFINE VOL FL <lv_name> <lv_size> <FS>

7. Type the following to mount the new volume on the diskette defined in step 6:

   MOUNT FLOPPY_VOL <lv_name> <alias_lv_name>

8. Load the diskettes as the system prompts you.

   Warning: Do not reverse the source and target names when you type the COPY VOL command.

9. Type the following to copy the source volume on hard disk to the diskettes:

   COPY VOL <source_vol_name> <target_vol_name>

   Follow the system prompts.

   Type the following to track the progress of the copy function:

   STATUS COPY_VOL ALL

   When the copy function is complete, the following message appears:

   ```
   COPY <source_vol_name> <target_vol_name>
   ***** COMPLETE *****
   ```

10. After you copy the CNFG or SYSTEM_INFO volume, type the following:

    DEMOUNT VOL <source_vol_name>

11. Type the following to rename the floppy volume to its correct logical name:

    RENAME VOL <target_vol_name> <new_vol_name>

12. Type the following to demount the volume on diskettes before removing the diskettes from the disk drives:

    DEMOUNT VOL <target_vol_name>

13. Type the following to remount the CNFG volume:

    MOUNT VOL CNFG_9005.x.xx CNFG

    where **x.xx** is the software release and bind number.

6.17 Copying a Small Volume from Hard Disk to Diskettes

Warning: To get a usable backup of the CNFG or any FS-type volume, the system must be stable, with no restarts occurring. Troubleshoot an unstable system before performing backups.

Create a backup of the CNFG or any FS-type volume with a size of 4 or fewer LDUs as follows:

Note: Use this procedure to back up the CNFG volume after you make any CNFG moves, adds, or changes.

1. Type the following to clear the status buffer:

   ```
   CLEAR STATUS FS ALL
   ```

2. If you are copying volumes other than CNFG, type the following to mount it:

   ```
   MOUNT VOL <lv_name> <alias_lv_name>
   ```

3. Type the following to determine the size of the volume in LDUs:

   ```
   LIST VOL <lv_name>
   ```

   One diskette holds up to 4 LDUs. Verify that the volume will fit on one diskette. If the volume is larger than 4 LDUs, use the procedure in 6.16, “Copying a Large Volume from Hard Disk to Diskettes” on page 6-9.

4. Manually label the blank diskettes with the volume names that will contain the backup volume.

   Important Note: You *must* use 3.5-inch, 2MB, double-sided, high-density diskettes. Although the system can read and write to 1MB low-density diskettes, it *cannot* load or boot from them. Ensure that the write-protect windows on the diskettes are covered.

5. Type the following to copy the source volume to the diskettes:

   ```
   COPY BACKUP <vol_name>
   ```

   This command formats the diskettes, defines and mounts the volume on diskettes, copies the contents of the volume on hard disk to diskettes, and demounts the volume on diskettes.

   The system automatically creates a new hard disk backup volume called COPY_BACKUP.TEMP. This volume is identical to the primary volume and is copied to the diskettes. Use the COPY_BACKUP.TEMP volume if the primary volume on hard disk is lost for any reason. Note that this volume is automatically overwritten every time the `COPY BACKUP` command is used.

6. Type the following to track the progress of the copy function:

   ```
   STATUS COPY_BACKUP ALL
   ```

   When the COPY BACKUP procedure is complete, the following message appears:

   ```
   COPY_BACKUP <vol_name>
   ***** COMPLETE *****
   ```

7. Verify the completion of the COPY BACKUP as follows:
   a. Verify that the following message appears:

      ***** COMPLETE *****

   b. Type the following to check for an OS F1 error in the software error table:

      LIST ERRORS SOFTWARE

      If this error occurs, the COPY BACKUP procedure did not complete successfully.

6.18 Copying a CNFG Volume

Copy the CNFG volume as follows:

1. Type the following command to determine the size of the CNFG volume:

   LIST VOL CNFG

2. Type the following command to define an area on the hard disk for the new CNFG volume:

   DEFINE VOL HD <CNFG_new> <lv_size> CN

   where <**CNFG_new**> is the new volume name.

   Note: The lv_size should be the size of the old CNFG volume plus 1 LDU.

3. Type the following to mount the volume you defined in step 2:

   MOUNT VOL CNFG_<new>

   where <**new**> is the new volume name.

4. Type the following to copy the CNFG volume to the new volume:

   COPY VOL CNFG CNFG_<new>

   where <**new**> is the new volume name.

   When the copy is complete, the following message appears:

   ***** COPY VOL CNFG_NEW COMPLETE *****

5. Contact your next level of support if the procedure is *not* successful.

6.19 Backing Up a Volume on Hard Disk

Back up a volume on hard disk as follows:

1. If the source volume has not been mounted, type the following to mount it:

   MOUNT VOL <source_vol_name>

2. Type the following to determine the size of the volume in LDUs to be backed up:

   LIST VOL <lv_name>

3. Define an area on the hard disk for the volume. Type the following to give the new volume a unique name and indicate its size in LDUs:

   DEFINE VOL HD <target_vol_name> <size> <FS, CN, or CI>

4. Type the following to mount the volume you defined in step 3:

   MOUNT HD_VOL <target_vol_name>

5. Type the following to verify that the space allocated to the volume is readable:

   VERIFY VOL <target_vol_name>

6. **Warning:** Do not reverse the source and target names when you type the COPY VOL command.

   Type the following to copy the source volume on the hard disk to the target volume:

   COPY VOL <source_vol_name> <target_vol_name>

   When the procedure is complete, the following message appears:

   ***** COPY VOL <vol_name> COMPLETE *****

6.20 Automatic Configuration Volume Backup (ACVB)

ACVB applies only to single-node systems. ACVB is a program that is automatically invoked to create a backup configuration volume on a formatted diskette. You can start the ACVB program immediately or at designated intervals.

One diskette accommodates a CNFG volume of up to 4 LDUs without using the compression utility. The system determines whether compression must be performed on the CNFG volume.

Systems with more than 8 LDUs cannot use ACVB—you must back up the CNFG volume manually. Refer to 6.22, “Building a CNFG Volume” on page 6-17 and 6.24, “Uncompressing a CNFG Volume” on page 6-20.

6.20.1 Using ACVB

Use ACVB as follows:

1. Ensure that there is a diskette in the diskette drive. It must be a formatted blank diskette or have one of the following names:

   - CNFG_FL_VOL.BU
   - CNFG_FL_VOL.BU.COMPRESS

   Leave the diskette in the drive and the CNFG volume is automatically backed up.

2. Ensure that the most recent CNFG volume is on the hard disk and is mounted under the alias CNFG.

3. Type the following CNFG command to list the ACVB attributes:

   LIST AUTO_CNFG_BACKUP

4. Type the following to modify the screen:

   MODIFY AUTO_CNFG_BACKUP

Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* to configure the AUTO_CNFG_BACKUP screen.

6.20.2 ACVB Process

Five minutes before ACVB begins, the system displays a message which indicates that ACVB will begin in 5 minutes.

ACVB does not begin until all users exit CNFG. If a user is in CNFG, the system displays a message which indicates that ACVB will begin in 5 minutes. ACVB waits 5 minutes for the user to exit CNFG. If the user does *not* exit CNFG, the system displays a message which indicates that ACVB cannot run while CNFG is in use and requests the user to exit CNFG.

If after five more minutes, the user has not exited CNFG, ACVB terminates and attempts to run in 24 hours at the time specified in the TIME OF DAY (HR:MN) field of the CNFG AUTO_CNFG_BACKUP screen.

If a user attempts to enter CNFG while ACVB is running, the system displays a message which indicates that the user cannot enter CNFG until ACVB completes.

When ACVB starts, the system displays a message which indicates that ACVB is in progress and CNFG activity is suspended.

If any part of the ACVB program fails, the program terminates and attempts to run in 24 hours at the time specified in the TIME OF DAY (HR:MN) field of the CNFG AUTO_CNFG_BACKUP screen.

When ACVB has completed the BUILD process, the system displays a message which indicates that ACVB has released CNFG resources and users may resume CNFG activity.

When ACVB successfully performs a backup to diskette, the system displays a message indicating that ACVB is complete.

If ACVB cannot successfully perform a backup to diskette, the system displays a message indicating that ACVB was terminated. When ACVB terminates, it attempts to run in 24 hours at the time specified in the TIME OF DAY (HR:MN) field of the CNFG AUTO_CNFG_BACKUP screen.

6.20.3 ACVB Error Messages

While ACVB runs, the system may display an error message indicating that:

- The CNFG software cannot start the ACVB program
- ACVB cannot verify that the diskette in the drive is to be used to back up the CNFG volume because it is not formatted or contains a file with an invalid extension name
- ACVB cannot find the CNFG volume
- ACVB cannot define a hard disk BUILD volume due to lack of space

6.20.4 Reloading the Backup CNFG Volume

Use one of the following procedures to manually define a workable CNFG volume.

6.20.4.1 Reloading the AUTO_CNFG_BACKUP Diskette (Up to 4 LDUs)

In a system with up to 4 LDUs, reload the backup CNFG volume as follows:

1. Type the following:

```
MOUNT FL CNFG_FL_VOL.BU
LIST VOL CNFG_FL_VOL.BU
DEFINE VOL HD CNFG_INDEX <size> CN
MOUNT VOL CNFG_INDEX
BUILD CNFG CNFG CNFG_FL_VOL.BU CNFG_INDEX
RENAME VOL CNFG_9005.x.xx CNFG_OLD
DEMOUNT VOL CNFG_OLD
RENAME VOL CNFG_INDEX CNFG_9005.x.xx
MOUNT VOL CNFG_9005.x.xx CNFG
```

   where <**size**> is the size of the CNFG_FL_VOL.BU plus 1, and **x.xx** is the software release and bind number.

   Recommendation: If multiple backups exist on the system, use the volume name CNFG_<today's date> instead of CNFG_OLD. By doing so, you can easily determine which backup to restore if it becomes necessary.

2. Perform the download procedure as follows:

   Models 10 and 40: Type the following:

```
FINIT NOBOOT
```

   Model 50: Type the following:

```
LOAD STBY 9005.x.xx
```

   where **x.xx** is the software release and bind number.

6.20.4.2 Reloading the AUTO_CNFG_BACKUP Diskette (5 to 8 LDUs)

In a system with 5 to 8 LDUs, reload the backup CNFG volume as follows:

1. Type the following:

```
MOUNT FL CNFG_FL_VOL.BU.COMPRESS
LIST VOL CNFG_FL_VOL.BU.COMPRESS
DEFINE VOL HD CNFG_UNC <size> CN
```

   where <**size**> is the size of the CNFG_FL_VOL.BU.COMPRESS plus 1

2. Type the following:

```
MOUNT VOL CNFG_UNC
UNCOMPRESS VOL CNFG_FL_VOL.BU.COMPRESS CNFG_UNC
LIST VOL CNFG_UNC
DEFINE VOL HD CNFG_INDEX <size> CN
```

   where <**size**> is the size of the CNFG_UNC plus 1.

3. Type the following:

```
MOUNT VOL CNFG_INDEX
BUILD CNFG CNFG CNFG_UNC CNFG_INDEX
RENAME VOL CNFG_9005.x.xx CNFG_OLD
DEMOUNT VOL CNFG_OLD
RENAME VOL CNFG_INDEX CNFG_9005.x.xx
MOUNT VOL CNFG_9005.x.xx CNFG
DEMOUNT VOL CNFG_UNC
DELETE VOL CNFG_UNC
```

   where **x.xx** is the software release and bind number.

Recommendation: If multiple backups exist on the system, use the volume name CNFG_<today's date> instead of CNFG_OLD. By doing so, you can easily determine which backup to restore if it becomes necessary.

4. Perform the download procedure as follows:

   Models 10 and 40: Type the following:

   FINIT NOBOOT

   Model 50: Type the following:

   LOAD STBY 9005.x.xx

   where **x.xx** is the software release and bind number.

6.21 Renaming a Volume

Although a volume's alias lasts only as long as the volume is mounted, the name provided by the RENAME command is retained when the volume is demounted.

Use this command carefully because the system requires that certain volumes have specific names as listed in Table 6-2.

Table 6-2. Volume Names

Volume	Required Name	Alias
CNFG	CNFG_9005.**x.xx** (where **x.xx** is the software release and bind number)	CNFG
CI	CI_9005.**x.xx** (where **x.xx** is the software release and bind number)	CI
Traffic statistics	STF	
Audit trail data	TRAIL	
CDR	CDR	
DFE	DX_DFE	
DIAG	DIAG	

Rename a specified volume as follows:

1. Type the following to mount the volume that you are renaming:

   MOUNT VOL <lv_name> <alias_lv_name>

   where <**alias_lv_name**> is optional.

2. Type the following:

   RENAME VOL <old_lv_name> <new_lv_name>

6.22 Building a CNFG Volume

Warning: To obtain a usable backup of the CNFG volume, the system must be stable, with no restarts occurring. Troubleshoot an unstable system before performing backups.

Build a CNFG volume and produce a backup CNFG volume on the hard disk as follows:

Note: The volume names CNFG_BU, CNFG_NEW, CNFG_9005**x.x.xx**_OLD, and CNFG_9005.**x.xx** are specified in the procedure to clarify the steps (where **x.xx** is the software release and bind number). You can substitute other volume names. However, the volume must have the name CNFG_9005.**x.xx**, where **x.xx** is the software release and bind number.

Recommendation: If multiple backups exist on the system, use the volume name CNFG_<today's date> instead of CNFG_OLD. By doing so, you can easily determine which backup to restore if it becomes necessary.

1. Type the following:

   ```
   DIAG
   LIST DISABLE
   ```

   Note any disabled tests.

2. Type the following to temporarily disable the system self-tests:

   ```
   DISABLE TEST ALL
   DIAG OFF
   ```

3. Type the following to clear the status buffer:

   ```
   CLEAR STATUS FS ALL
   ```

4. Type the following to determine the size of the CNFG volume in LDUs:

   ```
   LIST VOL CNFG
   ```

5. Define the temporary backup volume on the hard disk. Type the following using the size determined in step 4:

   ```
   DEFINE VOL HD CNFG_BU <size> CN
   ```

6. Type the following to mount the backup volume:

   ```
   MOUNT HD_VOL CNFG_BU
   ```

7. Type the following to copy the CNFG volume to the newly created volume:

   ```
   COPY VOL CNFG CNFG_BU
   ```

   This process takes approximately 2 minutes per LDU.

   The system displays a message when the copy is complete.

8. Define a volume on the hard disk to contain the CNFG volume. Type the following and include the size determined in step 4:

   ```
   DEFINE VOL HD CNFG_NEW <size> CN
   ```

9. Type the following to mount the volume you just defined:

   ```
   MOUNT HD_VOL CNFG_NEW
   ```

10. Type the following to verify the temporary backup volume on the hard disk (step 5):

    ```
    VERIFY VOL CNFG_NEW
    ```

11. Type the following to begin the build of the new CNFG volume:

    ```
    BUILD CNFG_VOL CNFG CNFG_BU CNFG_NEW
    ```

    The build takes approximately 4 minutes per LDU.

    The system displays a message when the process successfully completes.

    Note: If you do not receive the message, verify that you correctly followed steps 2 on page 6-17 through 10 on page 6-17, then repeat the process. If the build fails again, contact your next level of support and do *not* continue with this procedure.

12. Type the following to verify that the CNFG volume was successfully built:

    ```
    STATUS BUILD ALL
    ```

    The last entry listed verifies the completion of the backup. The text of the message is listed in step 11. Do not proceed if you do not receive this completion message.

13. Type the following command to restore the index files:

    ```
    RESTORE VOL CNFG_NEW
    ```

14. Type the following to perform the file system debugger commands on the CNFG_NEW volume:

    ```
    FSD X CNFG_NEW
    FSD M
    ```

    If the free count is greater than 300 blocks, continue with step 15.

    If the free count is less than 300 blocks, expand the volume as follows:

    a. Type the following to demount the CNFG_NEW volume:

       ```
       DEMOUNT VOL CNFG_NEW
       ```

    b. Type the following to expand the CNFG_NEW volume:

       ```
       EXPAND VOL CNFG_NEW 1
       ```

    c. Type the following to mount the CNFG_NEW volume:

       ```
       MOUNT VOL CNFG_NEW
       ```

15. Type the following to delete the previous CNFG backup on the hard disk, if one exists:

    ```
    DELETE VOL CNFG_9005.x.xx_OLD
    ```

    where **x.xx** is the software release and bind number.

16. Type the following to rename the active CNFG volume and demount it:

    ```
    RENAME VOL CNFG CNFG_9005.x.xx_OLD
    DEMOUNT VOL CNFG
    ```

    where **x.xx** is the software release and bind number.

17. Type the following to rename the new CNFG volume and mount it with the alias CNFG:

    ```
    RENAME VOL CNFG_NEW CNFG_9005.x.xx
    MOUNT VOL CNFG_9005.x.xx CNFG
    ```

    where **x.xx** is the software release and bind number.

18. Perform the download procedure as follows:

    Models 10 and 40: Type the following:

    ```
    FINIT NOBOOT
    ```

    Model 50: Type the following:

    ```
    LOAD STBY 9005.x.xx
    ```

    where **x.xx** is the software release and bind number.

19. Type the following to demount and delete the temporary volume used for the build:

    ```
    DELETE VOL CNFG_BU
    ```

    where **x.xx** is the software release and bind number.

20. Type the following commands to enable the system self-tests:

    ```
    DIAG
    ENABLE TEST ALL
    ```

21. Type the following to disable any tests noted in step 1 on page 6-17:

    ```
    DISABLE TEST <test name>
    DIAG OFF
    ```

The CNFG build procedure is complete. Copy the volume to preserve the CNFG volume.

6.23 Compressing a CNFG Volume

You can compress a backup CNFG volume between 5 and 8 LDUs to permit storage on a single diskette.

The COMPRESS command works on any non-bootable volume. The MOUNT VOL command indicates whether a volume is compressed or partially compressed.

Type the following CLI command to compress the CNFG volume:

```
COMPRESS VOL <SRC_VOL> <DEST_VOL>
```

where <**SRC_VOL**> is the volume to compress, and <**DEST_VOL**> is the volume to save into.

Note: The system cannot use a compressed volume until you use the procedure in 6.24, “Uncompressing a CNFG Volume” on page 6-20.

6.24 Uncompressing a CNFG Volume

If the CNFG volume is compressed, uncompress it before using it. Type the following CLI command to uncompress the CNFG volume:

```
UNCOMPRESS VOL <SRC_VOL> <DEST_VOL>
```

where <**SRC_VOL**> is the volume to uncompress, and <**DEST_VOL**> is the volume to save into.

6.25 Expanding a CNFG Volume on Hard Disk

Note: You cannot expand a volume defined for diskettes.

Expand a CNFG volume on the hard disk as follows:

1. Determine if the CNFG volume needs to be expanded. Type the following to display the number of free blocks remaining in the CNFG volume:

   ```
   FSD X CNFG
   FSD M
   ```

   If the number of free blocks displayed is less than 200, continue with step 2. If the number is greater than 200, there is no need to expand the CNFG volume.

2. Type the following to demount the CNFG volume:

   ```
   DEMOUNT VOL CNFG
   ```

3. Type the following to expand the volume:

   ```
   EXPAND VOL CNFG_9005.x.xx <1>
   ```

   where **x.xx** is the software release and bind number.

   The system displays a message when the volume is successfully expanded.

4. Type the following and remount the CNFG volume:

   ```
   MOUNT VOL CNFG_9005.x.xx CNFG
   ```

   where **x.xx** is the software release and bind number.

6.26 Deleting a Volume

Warning: Use the `DELETE VOL` command carefully because the system requires that certain volumes stay on the hard disk.

Delete a volume from the hard disk as follows:

1. Demount the volume.
2. Type the following:

   ```
   DELETE VOL <lv_name>
   ```

6.27 Upgrading to a New Software Release

The procedures needed to load a new software release are not provided in this manual. They are provided with the new software release.

6.28 Applying Patches to the Software

The patch facility is a set of programs and CLI commands that patches the software code. It permits engineers to alter the software with patches at the customer site.

A number of software fixes are grouped together and sent out to a customer site in a patch volume on a diskette. An accompanying letter explains the purpose of, and instructions to load the patch.

Warning: Only experienced personnel should apply patches. Using the APPLY PATCH command during normal operating hours can result in the loss of telephony or can impair system performance. Back up the working core image before you begin the patching procedure.

Apply a patch as follows:

1. Type the following to mount the volume on the diskette:

   ```
   MOUNT COPY_ONLY_VOL PATCH_VOL
   ```

2. Insert the patch volume diskette into the diskette drive.
3. Type the following and note the size of the LDUs:

   ```
   LIST VOL PATCH_VOL
   ```

4. Type the following in DIAG mode to define an area on the hard disk for the volume:

   ```
   DEFINE VOL HD MPV<x>_<yy> <lv_size> FS
   ```

   where **x** is the patch volume number, **yy** is the bind number, and <**lv_size** > is the number of LDUs shown in step 3. For example, MPV3_78 is the third patch volume of bind 78.

5. Type the following to mount the volume:

   ```
   MOUNT VOL MPV<x>_<yy> PV
   ```

   where **x** is the patch volume number, and **yy** is the bind number.

6. Type the following to copy the volume onto the diskette:

   ```
   COPY VOL PATCH_VOL PV
   ```

   When the copy function is complete, the following message appears:

   ```
   COPY PATCH_VOL PV
   ***** COMPLETE *****
   ```

7. Type the following to demount the volume:

   ```
   DEMOUNT VOL PATCH_VOL
   ```

8. Type the following to apply the patches:

   ```
   APPLY PATCH CI_9005.x.xx ALL
   ```

   where **x.xx** is the software release and bind number of the patch.

9. Type the following to verify that the patches are successfully applied:

   STATUS PATCH CI_9005.x.xx ALL

   where **x.xx** is the software release and bind number of the patch.

10. Contact your next level of support if the procedure is not successful.
11. Perform the correct download procedure.

6.29 Automatic Standby Updates (Model 50)

The automatic standby update (ASU) system feature:

- Loads the core image and database for all nodes onto the standby processor
- Copies memory from the active side to the standby side

After you exit the CNFG mode after making updates, the ASU program runs automatically. If you did not make updates during the CNFG session, ASU does not run.

While the ASU runs, the following message appears on the current system console and on all CNFG users' terminals:

```
AUTO STANDBY UPDATES IN PROGRESS -
***CNFG ACTIVITY WILL BE SUSPENDED - PLEASE WAIT ***
STANDBY LOAD STARTED-SLOAD INITIATED FROM NODE <number>.
STANDBY LOAD STARTED NODE <number>.
```

When the ASU is complete, the following message appears:

```
STANDBY LOAD SUCCEEDED NODE <number>
AUTO STANDBY UPDATES COMPLETED.
```

Notes:

- The AUTO_LOAD_STBY_MEM_ALL system parameter enables and disables the ASU feature. Set this parameter to Yes to ensure system reliability.
- The ASU feature does not apply to the CDR database. This database requires a FINIT after it is updated.
- In a system with automatic call distribution (ACD), the ASU feature does not apply to certain fields of the following databases:
  - TRUNK_GROUP
  - ACD_GROUP
  - DNIS
  - ANI

  Refer to the *9751 CBX, Release 9005/9006m, Automatic Call Distribution Supervisor Guide* for more information.
- The LOAD STBY command line interpreter (CLI) command lets you manually load software from hard disk or from active memory onto the standby processor. You can use this command regardless of whether the ASU feature is enabled or disabled.

Chapter 7. Diagnostic Aids

This chapter describes the tools that help diagnose 9751 computerized branch exchange (CBX) hardware and software failures.

7.1 System Integrity

System integrity is the part of software that detects and handles hardware failures so that telephone service is provided without interruption.

This section describes the following system integrity functions:

- Self-tests
- Card identification (ID) verification
- Command line interpreter (CLI) tests
- Error analysis

- Failing resource management
- Threshold alarms

7.1.1 Self-Tests and Monitors

The starting point of system integrity is a series of self-tests. These self-tests automatically run at scheduled intervals. They test cabinet electronics as well as telephony devices such as ROLMphone telephones. The system logs the detected hardware failures in the hardware error table (ERRH).

Scanners, also called monitors, perform a similar function to the system self-tests by continuously monitoring the cards. The system also logs problems the monitors detect in the hardware error table.

7.1.2 Card ID Verification

The card ID verification runs:

- During initialization
- After restarts and switchovers
- When a card is placed into service
- When the error analysis software requests it
- When you use the **VERIFY CARDID** CLI command

The card ID verification checks that the card physically installed in the slot is the same as the card configured in the hardware map. The test runs only on the cards with the card ID capability that are not hard-downed.

When there is a difference between the card physically installed and the card configured in software, the system logs a priority 240 error in the hardware error table.

Not all cards have the card ID capability. Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

7.1.3 Testing with CLI Commands

You can run self-tests with CLI commands at the system maintenance terminal. After you replace a card or other device, use the self-tests to verify the system.

Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

7.1.3.1 Using Diagnostic (DIAG) Mode

Type **DIAG** to enter DIAG mode and run the self-tests. If there is no input to the system after 30 minutes, the DIAG mode times out.

The system disables automatic self-tests when it is in DIAG mode. Type **DIAG OFF** to exit DIAG mode and permit the automatic tests to resume running.

7.1.3.2 Using the TEST Command

The **TEST** command initiates testing on channels or cards. Some tests have sub-tests associated with them.

Use the **TEST** command with a card name mnemonic. If you cannot remember the mnemonic, type **TEST ?** to list the card mnemonics.

Type the correct TEST command, including the card name mnemonic and physical address (PAD), and the number of times you want the test to run. The system displays PASSED or FAILED as the test runs on each channel.

Note: When you use the TEST command with a card type mnemonic (for example, TEST MW), the test goes through error analysis (refer to 7.1.4, "Error Analysis Software").

However, if you request an individual test (for example, TEST MW_LAMP), the test bypasses error analysis. For this reason, always use the card type mnemonic when running diagnostic tests.

The following are related commands:

LIST TEST — Lists the sub-tests, if any, that are associated with a given card type.

Use the LIST DISABLE DIAG command to list the disabled tests.

ABORT TEST — Terminate a test that is running on the system maintenance terminal.

DISABLE TEST — A DIAG command that disables all testing, including automatic self-tests and error analysis.

You can also use DISABLE TEST to disable a specific test—for example, DISABLE TEST RPV.

ENABLE TEST — A DIAG command that permits testing to resume.

You can also use ENABLE TEST to enable a previously disabled test—for example, ENABLE TEST RPV.

7.1.4 Error Analysis Software

Error analysis software isolates the source of hardware failures and suggests corrective actions.

When a channel on a card fails self-test, error analysis determines the cause for the failure as follows:

- Checks for occurrences of intershelf bus (ISB) errors
- Tests the advanced diagnostics card (ADC) and the expander cards
- Verifies the card ID

When an error is analyzed with further testing, the cause of the failure is isolated. A suggested action specifies a repair for the failure as follows:

- If self-tests discovered the error, a SUGGESTED ACTION entry appears in the hardware error table.
- If a test run from the terminal discovered the error, the SUGGESTED ACTION appears on the display at the test's completion.

Note: Always use the card type mnemonic when running diagnostic tests. Refer to 7.1.3.2, "Using the TEST Command" on page 7-2 for more information.

7.1.5 Failing Resource Management Software

With the diagnosis that self-tests and error analysis provide, failing resource management software takes a failing channel out of service. It also restores a channel to service when self-test determines that it is functioning normally.

If a channel fails self-test twice in a row, it is soft downed and removed from service. If the soft-downed channel passes self-test three times in a row, software returns it to service. It can also return to service when software resets the card or if the error associated with the channel in the hardware error table is cleared with the CLEAR ERRH command.

Run the card's self test with the TEST command to return a channel to service. If the card passes this test, the system returns the channel to service.

If all the channels on a card are soft downed, software resets the card (downs it and then ups it) in an attempt to rectify the problem.

7.1.6 Threshold Alarms

Threshold alarms are the part of software that limits the number of shared electronics, voice and data lines, trunks, and data groups that can be removed from service. A priority 150 or 180 error in the hardware error table alerts you when a certain percentage of these resources is out of service.

The percentage is fixed in the case of shared electronics. When 50 percent are down, a 150 (major) error is logged. When 25 percent are down, a 180 (minor) error is logged.

The percentage is configurable for voice lines, data lines, trunk groups, and data groups. Use the TRUNK_GROUP, DATA_GROUP, and PARAM configuration (CNFG) screens to configure these thresholds. Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* for more information.

For example, you can configure a priority 150 error to appear when 30 percent of the trunks in a trunk group are down. In this case, the priority 150 trunk error appears in the hardware error table without a PAD. When you list the details of the priority 150 error, the following message appears:

```
30% OF TR CHANNELS IN GROUP XXX HAVE FAILED IN THE SYSTEM
```

If a critical percentage of these resources is already out of service, the system removes no more from service.

7.2 Tables That Report Hardware Failures

The following tables provide information about hardware failures:

- Hardware error table
- Down statistics table
- Hard disk exception table
- Trunk exception table
- ROLMphone exception table

Table 7-1 lists the priority levels for hardware errors.

Table 7-1. Priority Levels for Hardware Errors

Severity	Priority
Major	1 to 150
Minor	151 to 239
Warning	240 to 250
Exception	251 to 255

7.2.1 Hardware Error Table

The hardware error table lists all the errors that the automatic self-tests, monitors, and CLI tests detect.

View the hardware error table as follows:

- Use the LIST ERRH ; ALL command for an overview of the hardware error table.
- Use the LIST ERRH command and specify the test name, priority number, or severity of the error for a detailed view of the hardware error table.

Refer to 9.10, “Troubleshooting Hardware Error Table Errors” on page 9-12 for information to troubleshoot errors that the hardware error table lists.

7.2.2 Down Statistics Table

The down statistics table gives information on the resources (channels, cards, or devices such as the hard disk or diskette drives) that are out of service. The table shows the following categories for downed resources:

- Cards courtesy downed
- Cards physically downed
- Channels soft downed

A resource is removed from service in the following ways:

- By software
- Using the DOWN CLI command

Use the DOWN command before you replace a card or other device. Choose between courtesy downing and hard downing a resource as follows:

Courtesy down Disables the card or channel if it is in the idle state. If it is busy, it is not immediately disabled. Instead, the card or channel is courtesy downed when it becomes idle.

Hard down Disables the card no matter what state it is in. A card that is hard downed appears in the down table as physically downed.

Software can take a failing resource out of service, as described in 7.1.5, “Failing Resource Management Software” on page 7-4. In this case, the resource is soft downed.

Use the LIST DOWN command for information on the resources that are not in service. Use the UP command to restore a card or device to service.

7.2.3 Hard Disk Exception Table

Use the LIST ERRORS HD command to display the hard disk exception table. It contains the 20 most severe errors that occurred while reading the hard disk since the last time the table cleared. The display includes the following:

- Error type
- Error code
- Operation type
- Track number
- Volume name
- Number of errors of that type and location
- The processor at which the error occurred
- Time and date the error occurred

7.2.4 Trunk Exception Table

A priority 248 or 252 trunk error in the hardware error table alerts you to an error in the trunk exception table.

When you list the priority 248 error, the following message appears:

```
SEE TRUNK EXCEPTION TABLE - AFACTS
```

When you list the priority 252 error, the following message appears:

```
SEE TRUNK EXCEPTION TABLE - EVENTS
```

Refer to the *9751 CBX Trunk Diagnostics Guide* for more information.

7.2.5 ROLMphone Exception Tables

The following exception tables provide information about ROLMphone telephones:

ROLMphone immediate exception table

Provides information about the current status of a specified ROLMphone interface card.

Use the LIST RP command to display this table.

ROLMphone cumulative exception table

Provides information about unusual events that occurred on any ROLMphone channel since the last time the table was cleared.

Use the LIST RPET command to display this table.

The following fields in these tables contain the most useful information:

PHONE PLUGGED? You can immediately see if the telephone on a particular channel is plugged in.

UP/DOWN This field informs you about the state of the particular ROLMphone channel.

7.3 Tables That Report Software Errors

The following tables provide information on software errors:

- System statistics table
- Software errors table

7.3.1 System Statistics Table

The system statistics table provides an overview of the system, including important information about redundancy, restarts, switchovers, and software errors. Use the LIST STATUS SYSTEM command to display this table.

The following fields in this table contain the most useful information:

SYSTEM_STATUS Indicates whether the system is in a normal state, an unknown state, or is in the midst of a restart or a full initialization (FINIT).

REDUNDANCY **Model 50:** YES must appear in this field.

RDNT_ENABLED **Model 50:** YES must appear in this field.

INDEPENDENT_SOFTWARE

Model 50: Indicates whether the standby processor is operating with the same software as the active processor. If the entry is YES, update the standby side with the LOAD STBY MEM command.

THIS DT PRIORITY and OTHER DT PRIORITY

Model 50: The THIS DT PRIORITY field indicates the decision table priorities for the processor from which you entered the LIST STATUS SYSTEM command. The OTHER DT PRIORITY field indicates the decision table priorities for the other processor.

The information in the THIS DT PRIORITY and OTHER DT PRIORITY fields permit the system to:

- Compare the status of the active and standby processors
- Determine whether to switch over from one side to the other, based on the results of the comparison

7.3.2 Software Error Table

Faulty hardware or faulty software, or both, can cause software errors. Use the LIST ERRORS SOFTWARE command to display the software error table.

The software error table shows the following:

- Area of software that logged the error
- Severity of the error
- Addresses in software where the error occurred
- Time and date the error occurred.

The severity of the error is indicated as follows:

. A period (.) indicates a caution or warning.
! An exclamation point (!) indicates a minor restart.
~ A tilde (~) indicates a standby side restart.
* An asterisk (*) indicates a major restart.

An error that appears with none of these marks is recoverable and nonfatal.

7.4 MONITOR Command

The MONITOR CLI command provides a continuous display or a one-time view of the state of a trunk, a trunk group, or an extension. Use this command to verify that an extension or a trunk works correctly.

This command is useful in troubleshooting because it displays whether the monitored device is down, idle, busy, or in any one of 18 other states.

7.5 LIST TRAIL Command

Use the LIST TRAIL CLI command to list all the CLI commands entered at the system terminal or from a remote maintenance port within a specified time period. This command helps you troubleshoot problems that may be caused by earlier activity on the 9751 CBX.

7.6 Error Reporting with the 9751 CBX Monitor and 9751 CBX Monitor II

The 9751 CBX monitor and 9751 CBX monitor II collect and report data as follows (Figure 7-1 on page 7-10 and Figure 7-2 on page 7-11):

Note: In this section only, *monitor* refers to both the 9751 CBX monitor and the 9751 CBX monitor II.

1. The monitor detects an error in one of the following ways:
   - The 9751 CBX sends a message to the monitor
   - The monitor polls and analyzes the following 9751 CBX error tables to determine if service action is required:
     - Error summary
     - Events exception
     - Trunk exception table for automatic facilities test system (AFACTS)
     - CNFG status
     - Hardware error
2. If service is required, the monitor dials a telephone number, that has been configured in the 9751 CBX software, to contact the service center.
3. The monitor uploads the national service system (NSS) or ROLM operating system (ROPS) customer number and the error information to a remote service processor when the connection is established.

   The remote service processor:

   a. Receives the uploaded error tables

   b. Checks the tables against previously stored tables for that site to determine which error occurred

   c. Correlates the error to a system reference code (SRC)

   d. Presents on a display the:
      - NSS service area
      - Customer number
      - Date and the time the problem occurred
      - SRC
      - Problem description
      - Field replaceable unit (FRU)
      - Associated PAD and node number
      - Trunk or extension number

   e. The remote service processor sends an acknowledgement to the monitor.

4. The monitor sends a command to the 9751 CBX to set the 9755 Attendant Console (9755 ATC) alarm to:
   - Light steadily if an error condition reached the threshold and was successfully reported to the remote service processor
   - Fast flash if the data was not successfully reported to the remote service processor
   - Slow flash if the customer has telephone company problems and does not have support for this problem type

   When the error is cleared from the error table, the monitor sends a command to turn off the alarm light on the 9755 ATC.

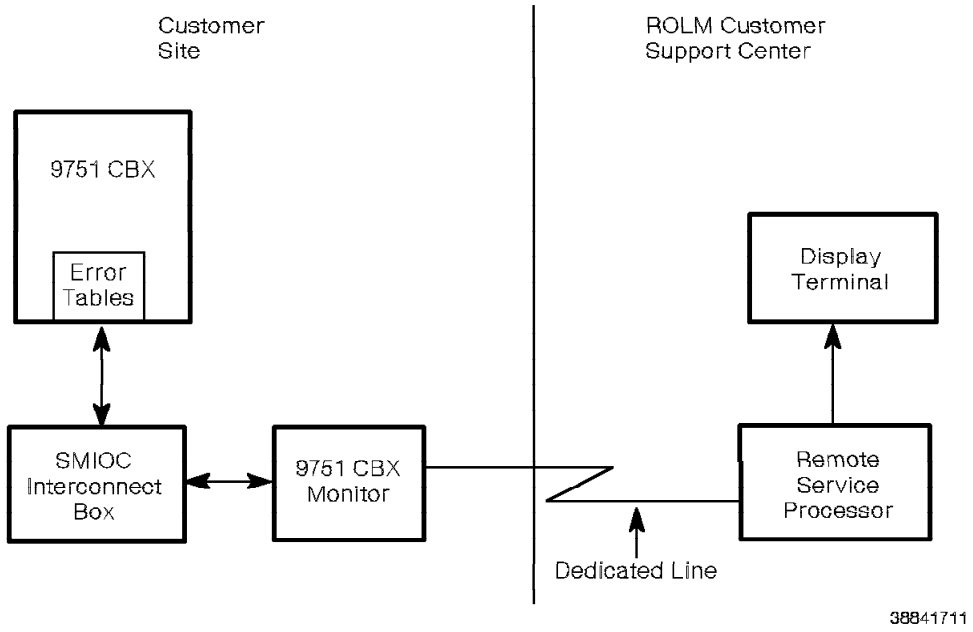


Figure 7-1. 9751 CBX Monitor Functional Diagram

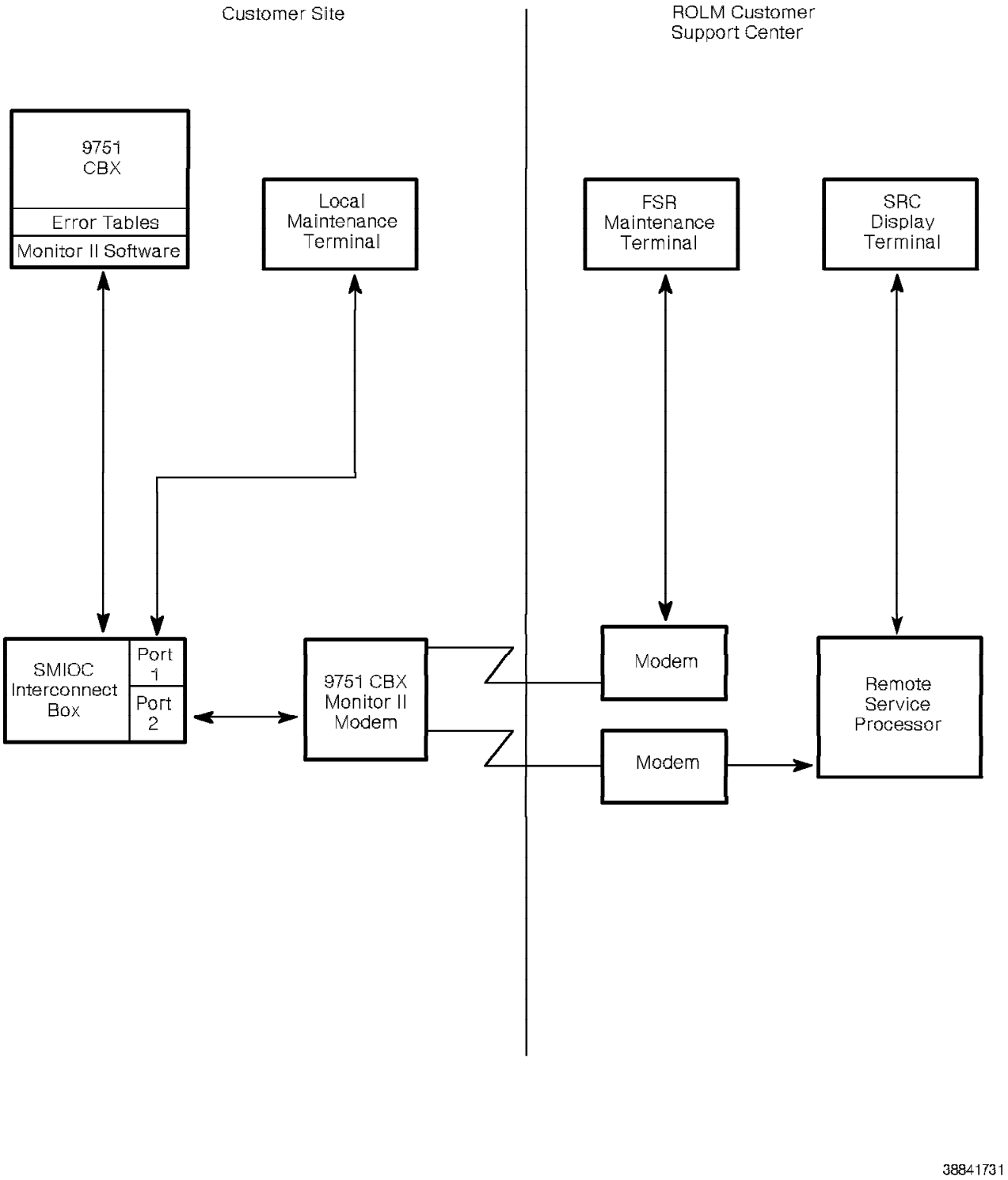


Figure 7-2. 9751 CBX Monitor II Functional Diagram

7.6.1 9751 CBX Monitor

The 9751 CBX monitor is the local connection for the maintenance terminal and functions as a modem for remote access.

If the 9751 CBX monitor is currently in use as the local connection for the maintenance terminal, you cannot use it for remote access. If the 9751 CBX monitor is currently in use for remote access, you cannot use it for a local connection. In both cases, the following message appears:

```
ACCESS DENIED - OTHER PORT IN USE
```

7.6.2 9751 CBX Monitor II Software

The 9751 CBX monitor II software and hardware have separate roles in the treatment of service-related data.

Note: The console alarm light-emitting diode (LED) remains on until the software polls the error tables and finds no errors.

The 9751 CBX monitor II software controls the 9751 CBX service LED settings (Table 7-2).

The following LEDs on the 9755 ATC and the system monitor input/output card (SMIOC) provide service indications on the status of the 9751 CBX monitor II.

Table 7-2. 9751 CBX Monitor II Service LEDs

9751 CBX Service Condition	ATC Alarm LED	SMIOC Service Alarm (DS4)	SMIOC Service Alarm (DS5)	SMIOC Service Alarm (DS6)
9751 CBX monitor II link failure	Fast flash	OFF	OFF	ON
9751 CBX monitor II remote service center link failure	Fast flash	OFF	OFF	ON
Telco problem (telco is set to NO and telco errors are found)	Slow flash	OFF	ON	OFF
Problem reported	ON	ON	OFF	OFF
No problem	OFF	OFF	OFF	OFF

Note: Whenever a fast flash appears, check the configuration steps and the entered information. Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for more information.

The 9751 CBX monitor II software terminates its polling if any of the following is true:

- The link between the 9751 CBX and the modem is down.
- A remote or local maintenance terminal connected to the 9751 CBX is in DIAG mode.
- A maintenance terminal connects to SMIOC Port 1.

CUSTOMER IMPACT

Disconnect the maintenance terminal from Port 1 when you are not using it. If it remains connected to Port 1, the 9751 CBX monitor II software does not poll the system. Without polling, the system cannot identify or report failures. Permanently fixed local maintenance terminals must use another port.

7.6.3 9751 CBX Monitor II Hardware

The 9751 CBX monitor II hardware, using intelligence built into the modem, detects and reports the following types of distress failure modes:

- Loss of the data terminal ready (DTR) signal, which indicates failure in the SMIOC interconnect box, the SMIOC, the 9751 CBX monitor II modem hardware, or the 9751 CBX
- Loss of EIA/TIA-232-E cable connection between the modem and 9751 CBX
- Loss of ac power to the modem

In case of ac power loss, a backup battery powers the modem for a limited time.

7.7 Understanding CPN Tables (Models 40 and 50)

This section describes the tables that define the connectivity of the hosts in a control packet network (CPN). CPN tables provide a useful means for diagnosing CPN problems.

7.7.1 Static and Dynamic Tables

A *static table* is a table that contains information that does not change. It defines the CPN as it was designed and configured. It remains fixed on hard disk and in memory until you change it through the configuration (CNFG) interface. The static table is the only one that can be passed to other hosts on the CPN.

The system creates the *dynamic table* at initialization. A system integrity diagnostic program in each node updates the table at regular intervals. There is one dynamic table for each static table.

Table 7-3 lists and describes the static and dynamic tables.

Table 7-3. CPN Static and Dynamic Tables

Table	Type	Description
Host address table (HAT)	Static	The HAT maps the host address to the network address. Use the CREATE CPN_HOST_TOPOLOGY CNFG command to configure it.
Host database (HDB) table	Dynamic	The HDB table contains the dynamic status information about hosts. There is one HDB table for each host processor. One HDB table covers both networks.

7.7.2 HAT-to-HDB Table Relationship

The HAT on hard disk and in memory after system configuration is the basis of comparison against the dynamic tables. The system logs discrepancies between the HAT and the HDB table in the CPN exception table.

To reconcile discrepancies between static and dynamic tables:

- Use the CREATE CPN_HOST_TOPOLOGY CNFG command to modify the HAT
- Use the LIST CPN NODE_SUMMARY CNFG command to modify the HDB
- Relocate or repair hardware to change the physical topology

7.8 System Integrity for the CPN (Models 40 and 50)

The CPN system integrity software:

- Continually monitors CPN operation
- Informs the system of errors
- Helps the CPN work around hardware faults when possible

The following software operations and commands run CPN system integrity:

- CPN host fault isolation test
- CPN exception table
- CLI commands that diagnose the CPN
- Upping and downing the CPN cards

7.8.1 CPN Host Fault Isolation Test

When communication to another host fails, the CPN host fault isolation test isolates problems. It runs:

- Automatically, when the following message appears in the CPN exception table:

  PROBLEM, BUT NO CONCLUSION

- When you type the following CLI command:

  TEST CPN HOSTS

The host fault isolation test makes two passes and saves the results internally to compare with each another.

If the two internal results agree and isolate the same area, conclusions about the cause of the problem appear in the HOST-TO-HOST COMMUNICATION PROBLEMS section of the CPN exception table.

If the two internal results do not agree, the following message appears:

NO CONCLUSION

7.8.2 Listing the CPN Exception Table

When a CPN error occurs, it appears in the hardware error table as priority 69 (for major errors) or 165 (for minor errors). When you list one of these errors in the hardware error table, it refers you to the CPN exception table. Use the LIST EXC CPN command to list the CPN exception table.

CPN exception table listings appear chronologically within each error type and network. The error types are:

- Host (control packet network interface [CPNI]) problems
- Ring interconnect problems
- Host-to-host (CPNI-to-CPNI) communication problems

Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

7.8.3 Using CLI Commands to Diagnose the CPN

Table 7-4 lists the CLI commands that diagnose the CPN. Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

Table 7-4 (Page 1 of 2). CLICommands that Diagnose the CPN

Command	Description
ACTIVATE CPN_RING_DIAG	This command activates ring diagnostics.
CLEAR CPN DIAG_PEGS	This command clears the CPN diagnostic accumulators.
CLEAR CPN DRIVER_PEGS	This command clears the pegs from the table displayed with the LIST CPN DRIVER_PEGS command.
CLEAR CPN LPL_STATISTICS	This command clears the various statistics found by the LIST CPN LPL_STATISTICS command.
CLEAR CPN RETRY_ERRORS	This command clears the various pegs used to accumulate the number of occurrences of exception conditions related to the retry and sequencing mechanisms of CPN.
CLEAR EXC CPN	This command clears the CPN exception table.
CLEAR NIEP MESSAGES	This command clears the network information exchange protocol (NIEP) message information gathered by the LIST NIEP MESSAGES command.
CLEAR NIEP PEGS	This command clears the list of error pegs found with the LIST NIEP PEGS command.
CLEAR STATUS CPNI	This command clears the status table that is listed with the STATUS CPNI command.
DEACTIVATE CPN_RING_DIAG	This command deactivates diagnostics for the CPN ring.
DOWN CPNI	This DIAG command downs the CPNI on the current processor. **Warning:** Down the CPNI on the standby side. If you down the CPNI on the active side, the system causes a switchover.
DOWN CPN_NET	This DIAG command downs the network 1 or 2 interface on the CPNI on the current processor. When a network is downed or upped, an entry is put into the CPN exception table.
LIST CPN DIAG_PEGS	This command lists the CPN diagnostics accumulators that tally errors and other conditions.

Table 7-4 (Page 2 of 2). CLICommands that Diagnose the CPN

Command	Description
LIST CPN DRIVER_PEGS	This command lists the error pegs the CPN driver software collects.
LIST CPN HAT	This command displays the information in the HAT and indicates if the active and standby processors have addressing information that is consistent with the HAT data.
LIST CPN HDB	This command lists the host data for each processor within the node range specified. It also indicates whether each HDB entry is consistent with the HAT.
LIST CPN LPL_STATISTICS	This command lists the statistics for the loopback messages sent and received on networks 1 and 2.
LIST CPN NODE_SUMMARY	This command compares the configured hosts in the HAT to the connected hosts in the HDB table and reports any discrepancies.
LIST CPN PATH	This command displays the primary and secondary paths for networks 1 and 2 for a particular processor.
LIST CPN SWITCH_SETTINGS	This command lists the meanings of the CPNI paddleboard switch settings (SW1 through SW4). It also provides information on the status of the bridge on networks 1 and 2.
LIST EXC CPN	This command lists the errors in the CPN exception table.
LIST NIEP MESSAGES	This command lists counts by message type and message kind (start or answer) of all NIEP messages sent and received.
LIST NIEP PEGS	This command lists the NIEP accumulators that tally errors and other conditions.
STATUS CPNI	This command displays the status (UP or DOWN) of the CPNI card and its associated networks: networks 1 and 2. It also lists: • The number of messages sent and received • The number of switchovers that occurred at that node • Errors the CPNI detects (class 1, class 2, or class 3)
TEST CPN HOSTS	This DIAG command performs a host fault isolation test. You can specify the network (network 1 or 2), the node, and the active or standby processor. The host fault isolation test tries to find any communication problems between the host running the test and the destination host.
TEST CPNI	This command sends a loopback message to the CPNI card being tested. If the loopback message returns, the test succeeds. Otherwise, it fails.
UP CPNI	This command ups the CPNI card on the active processor. When the card is upped, an entry is made in the CPN exception table.
UP CPN_NET	This command ups the network 1 or 2 interface on the CPNI card for the active processor. When the network is upped, an entry is made in the CPN exception table.

7.8.4 Upping and Downing CPN Cards

During initialization, the system tries to down a CPN card if it cannot proceed. The CPN cards can be upped or downed as follows:

- The CPNI is the only CPN card that can down itself by failing the internal self-test.
- The CPNI is the only CPN card that can be downed from online diagnostic tests.
- The control packet network junction (CPNJ) card cannot be downed.

7.9 System Integrity for the CorNet-N Link (Models 40 and 50)

This section describes the following system integrity functions related to the CorNet-N link:

- T1DN tests
- RPDN tests
- Upping and downing cards

Note: CPN system integrity functions also apply to the CorNet-N link. Refer to 7.8, “System Integrity for the CPN (Models 40 and 50)” on page 7-14.

7.9.1 T1DN Tests

The following describes the T1DN card tests as they apply to CorNet-N links:

T1_ALARMS, T1_INTEG
These tests can run on the B-channel of idle CorNet-N trunks.

T1_INTEG These tests can run on the D-channel.

T1_SEIZE This test *cannot* run because the CorNet-N trunk’s TEST field is set to N.

T1_CARD_LOOPBACK and T1_LINK_LOOPBACK
These tests can run on any T1DN card.

T1_LOCAL_LOOPBACK
Warning: Do *not* run this test because doing so interrupts communcations over the CorNet-N link.

7.9.2 RPDN Tests

Table 7-5 lists the CLI commands that diagnose the RPDN. Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

Table 7-5. CLI Commands that Diagnose the RPDN

Command	Description
STATUS RPDN	This command lists the status of the RPDN channels.
RPDN_INTEG	This command detects the following errors: • Firmware self-test failure • D-channel failure • CPN link failure

7.9.3 Upping and Downing Cards

The system downs the RPDN card if the card:

- Fails self-test
- Is not communicating with the CPN or the time-division multiplexing (TDM) network

The following describes the effect that other cards have on the RPDN card:

- When a T1DN card is downed, the associated D-channel on the RPDN card is also downed.
- If *both* CPNJ cards that connect to an RPDN card are down, call states cannot correctly change on the trunks the RPDN card controls.
- Similarly, if both CPNI cards that connect to the RPDN card are down, call states cannot correctly change on the trunks the RPDN card controls.

Chapter 8. Call Processing

This chapter describes the principles of call processing in the 9751 computerized branch exchange (CBX).

8.1 Call Processing Principles

The 9751 CBX uses the following methods to process calls:

- Pulse code modulation (PCM)
- Time-division multiplexing (TDM)

PCM is a method of converting analog (voice) signals to digital code that the processor can read.

Coder-decoder chips perform PCM. These chips are located:

- Within ROLMphone telephones
- On the following interface cards:
  - Analog telephone interface (ATI) card
  - Central office trunk 8-channel (COT8) card
  - Direct inward dialing 8-channel (DID8) card
  - Message waiting 8-channel (MW8) card
  - Off-premises station 8-channel (OPS8) card
  - Tie trunk interface (TTI) card

The codec card converts the signal for the remaining interface cards.

TDM enables several channels to share a common transmission path. Each channel is allotted exclusive use of the transmission path for a short time slot. The TDM network control group handles this function.

8.2 Station-to-Station Calling (Single-Line Telephones)

The following is an example of the steps that occur during a station-to-station call. In this example, extension 4428 is calling extension 5847. Both are single-line telephones connected to channels on ATI cards.

Every time a telephone changes its status (goes off-hook, dials a call, flashes, or hangs up), the processor detects the change in status. It uses a status-scanning routine that the front-end processor (FEP) software conducts that is similar to the following:

1. When extension 4428 goes off-hook, a bit is set on the ATI card to indicate that it is busy.
2. The processor instructs the time-division multiplexing controller (TC) card to write a status request command for extension 4428 to the connection table of the expander on shelf 4.
3. The TC card sends this command out to the source bus.
4. The TASA card reads the command from the source bus.
5. The TASA card buffers the command and sends it out on the destination bus.
6. The expander on shelf 4 finds an address match and writes the command in its connection table.
7. The time slot assigned to the ATI card is enabled, and the ATI card transmits a request for service (off-hook) status for extension 4428 back to the TC card.
8. The TC card processes the data and communicates the status of extension 4428 to the processor.

8.3 Station Call with Features

When the user invokes a station feature such as hold or transfer, a similar process takes place. The following steps list what happens when the user at extension 4428 puts 5847 on hold while dialing another extension for a brief conversation, then reconnects to 5847.

1. The user at extension 4428 presses the FLASH button, then * 9 to put extension 5847 on hold. The FLASH button causes the TC to recognize a temporary on-hook status. This disconnects extension 4428 from the established connection and connects it to a dual-tone receiver and a tone sender, which provides flash and holding tones.
2. Extension 5847 is disconnected from the connection and connected to silence or music on hold.
3. The processor notes the change in status, and sends commands to the tone sender to generate the correct tones.
4. When extension 4428 dials extension 3103, a dual-tone receiver collects the digits.
5. Extension 3103 rings while 4428 receives ringback.
6. The two extensions connect.
7. At the end of the conversation, one of the parties goes on-hook and the connection is broken down.
8. Extension 4428 presses * 1 to reconnect with 5847.
9. The original parties are reconnected.

Figure 8-1 on page 8-3 shows the display the appears when you use the MONITOR command line interpreter (CLI) command while these steps take place.

```
% MONITOR EXT 4428

EXT#  STATE          INL/XDI    CODE  DIGITS    PROCESS   STATUS
----- -------------- ----------  ---  --------- -------   ------
4428  CONN TO 5847
4428  DIAL TO R01/031412
4428  HOLDING E5847
4428  DIAL TO R01/031412              3
4428  HOLDING E5847
4428  DIAL TO R01/031412              31
4428  HOLDING E5847
4428  DIAL TO R01/031412              310
4428  HOLDING E5847
4428  DIAL TO R01/031412              3103
4428  HOLDING E5847
4428  DIAL TO R01/031412        3103
4428  RINGING E3103
4428  HOLDING E5847
4428  CONN TO E3103
4428  HOLDING E5847
4428  DIAL TO R01/031409
4428  HOLDING E5847
4428  DIAL TO R01/031409              *
4428  HOLDING E5847
4428  DIAL TO R01/031409              *1
4428  HOLDING E5847
4428  DIAL TO R01/031409              *1
4428  HOLDING E5847
4428  DIAL TO R01/031409
4428  CONN TO E5847
```

Figure 8-1. Monitoring a Station Call with Features

The screen shows that when extension 4428 flashes, the extension receives dial tone (actually a high-pulse tone) and a dual-tone receiver at physical address (PAD) 01/03/14/12 is assigned to receive and convert the digits.

When the connection between extensions 4428 and 3103 breaks, 4428 again receives tone, and this time a dual-tone receiver at PAD 01/03/14/09 is assigned to it. The digits *1 are translated as CONNECT, and the connection between extensions 4428 and 3103 is reestablished.

8.4 ROLMphone Telephones and Call Processing

There are some differences in call processing with the ROLMphone telephones. The ROLMphone is a digital telephone, and therefore does not require a dual-tone receiver to convert tones into digital words for the 9751 CBX.

Figure 8-2 on page 8-4 shows the display the appears when you use the MONITOR CLI command while a call from ROLMphone extension 3103 to extension 4428 takes place.

```
% MONITOR EXTEN 3103
16:12:56 on FRIDAY JUN/17/90

EXT#  STATE          DI/INL     CODE  DIGITS    PROCESS   STATUS
----- -------------- ----------  ---  --------- -------   ------
3103  IDLE
3103  DIAL TO
3103  DIAL TO                        4
3103  DIAL TO                        44
3103  DIAL TO                        442
3103  DIAL TO                        4428
3103  DIAL TO                  4428
3103  RINGING E4428
3103  CONN TO E4428
```

Figure 8-2. Monitoring a ROLMphone Call

Figure 8-2 shows that, unlike the single-line telephone in Figure 8-1 on page 8-3, the ROLMphone was not assigned a dual-tone receiver, but collected the digits and converted them itself.

8.5 Message Waiting or OPS Call Processing

A single-line telephone that connects to a message waiting or OPS card uses the codec card to perform digital-to-analog and analog-to-digital signal conversions.

A single-line telephone that connects to an MW8 or OPS8 card does not use the codec card because the coder-decoder chip contained on the card performs digital-to-analog and analog-to-digital signal conversions. The remaining steps in the call process are identical to those described in 8.2, “Station-to-Station Calling (Single-Line Telephones)” on page 8-1.

8.6 Station-to-Trunk Call Processing

The following steps describe what happens when extension 4428 dials a local call outside the 9751 CBX. It is assumed that the caller at extension 4428 has a class of service (COS) that allows calls within the local area.

The process of the processor recognizing the extension’s off-hook status is the same as that described in 8.2, “Station-to-Station Calling (Single-Line Telephones)” on page 8-1:

1. The caller presses 9 to access a trunk.
2. The system uses the FIRST_DIGIT table to identify digit 9 as the trunk access code.
3. The system uses the ring (R) lead of the direct trunk channel to signal the central office (CO) and seize a trunk by applying a ring ground.
4. The caller dials the remaining digits (7671234), which are sent out over the assigned trunk to the telephone company’s CO.
5. Equipment in the CO takes over the call processing, rings the called party, and transmits ringback to the caller.
6. When the called party answers, the ringing and ringback signals terminate and an off-hook (answer supervision) signal is sent to the 9751 CBX.

7. The codec card performs digital-to-analog and analog-to-digital conversion.

Figure 8-3 shows the display that appears when you use the MONITOR EXTEN CLI command to trace a trunk call from extension 4428 to 767-1234.

```
% MONITOR EXTEN 4428
16:01:56 on FRIDAY JAN/17/88

EXT#  STATE          DI/INL     CODE  DIGITS    PROCESS   STATUS
----- -------------- ----------  ---  --------- -------   ------
4428  IDLE
4428  DIAL TO
4428  DIAL TO                            9
4428  OUTPULS S01/03/26/01               767
4428  OUTPULS S01/03/26/01               7671
4428  OUTPULS S01/03/26/01               76712
4428  OUTPULS S01/03/26/01               767123
4428  OUTPULS S01/03/26/01               7671234
4428  CONN TO T0001
```

Figure 8-3. Monitoring a Station-to-Trunk Call

In Figure 8-3:

1. Extension 4428 goes off-hook and receives dial tone.
2. The tone sender at PAD 03/26/01 that is allocated to the device outpulses digits onto the trunk.
3. The extension is connected to trunk 1.

8.7 Software and Call Processing

The databases created through the configuration process play an essential role in call processing. They contain information about such things as the extension, the telephone type, the COS, the FEAT_CODE table, and the FIRST_DIGIT table that the 9751 CBX constantly consults when it processes a call.

In addition, there are software databases such as the transaction database and the FEP history database that contain records for all the events (such as off-hook events and digit outpulsing) that take place in the 9751 CBX. This information is vital to normal processing because it allows all stable calls to be reestablished quickly in the event of a restart.

Table 8-1 on page 8-6 lists the software response to telephony and hardware events in a call from one single-line extension to another.

Table 8-1 (Page 1 of 2). SoftwareActivity in a Single-Line Call

Hardware and Telephony Event	Software Activity
A telephone goes off-hook. The ATI card detects a loop, and sets a bit in the register on the card.	An off-hook event is detected. Software: • Consults the telephone record to get the extension number • Consults the transaction database to find out if there is a transaction associated with the extension • Finds none, creates a transaction record of the off-hook state • Updates the FEP history database
A dual-tone receiver and tone sender are assigned to the ATI. The user hears dial tone and dials a digit. The dual-tone receiver reports the digit.	A digit event is detected. After the first digit is received, software breaks down the connection between the tone sender and the ATI.
The user stops hearing dial tone and continues to dial.	The FIRST_DIGIT table, TRUNK_ACCESS table, and FEAT_CODE table classify the call. The system checks COS in the extension record. Internal call routine processes the call as follows: 1. It checks the extension record to find the PAD of the called extension. 2. It checks its status database for do not disturb (DND) or forwarding status. 3. It adds a new station to the transaction record. 4. It checks to see if the station is busy. If the station is not busy, ring commands are sent to the line card, turning ring on or off to establish ring cadence. The system makes a connection between tone sender and the originating station (for ringback), and updates the history database.
The tone sender sends a ringback tone to the originating station. Ring voltage is sent to the dialed extension. The user at the called extension goes off-hook. The line card detects an off-hook event and sets a bit in the register.	The scanner detects an off-hook event at the called extension. Software: • Records an off-hook state in the transaction database • Makes a two-way connection between stations • Puts a connection in the connection table and updates the history database

Table 8-1 (Page 2 of 2). SoftwareActivity in a Single-Line Call

Hardware and Telephony Event	Software Activity
Both channels are connected; the users speak to each other.	

Figure 8-4 on page 8-8 shows the software activity for analog station-to-station call processing.

Figure 8-5 on page 8-9 shows the software activity for ROLMphone station-to-station call processing.

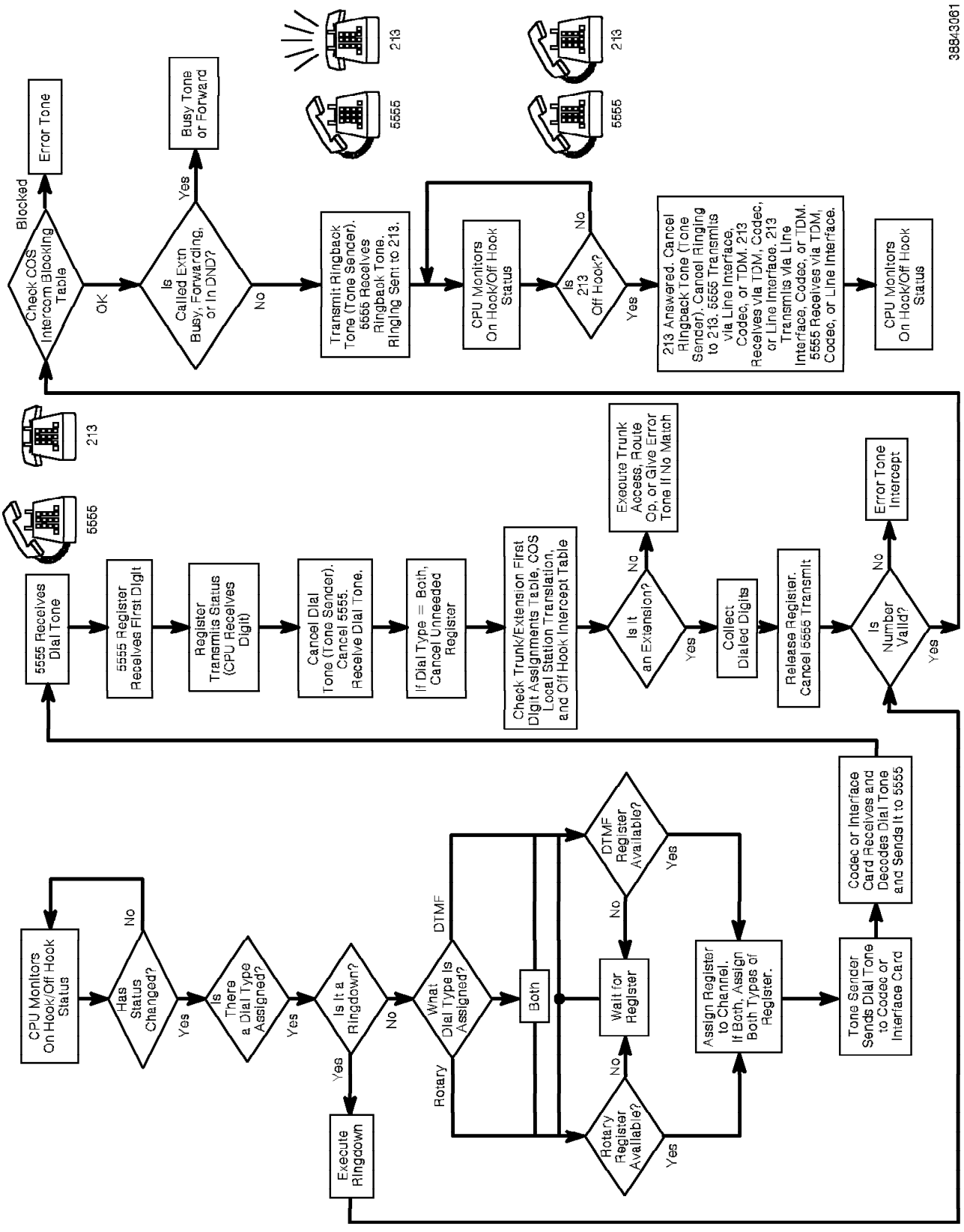


Figure 8-4. Analog Station-to-Station Call Processing

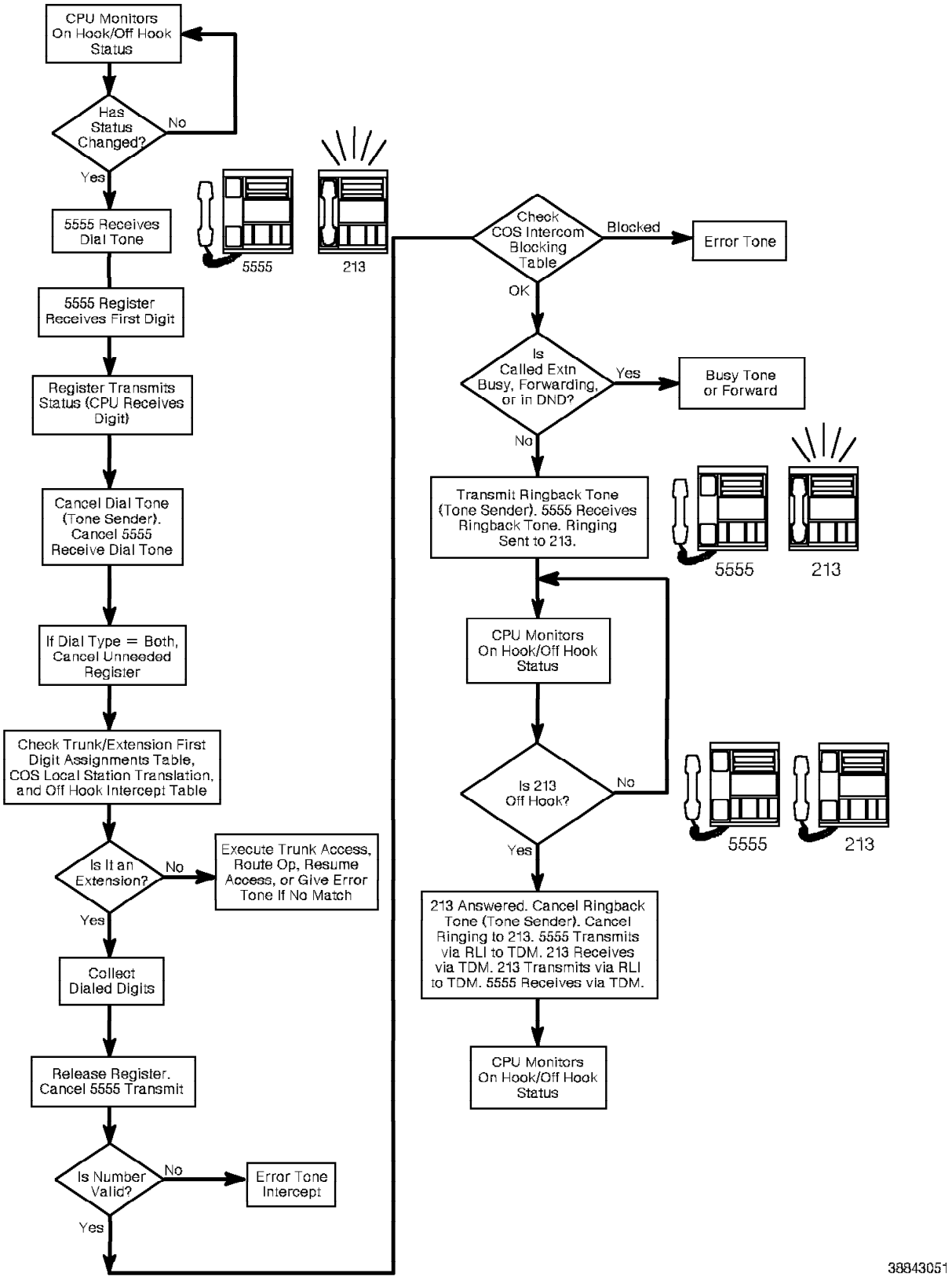


Figure 8-5. ROLMphone Station-to-Station Call Processing

8.8 CorNet-N Call Processing (Models 40 and 50)

This section describes call processing functions that are unique to Models 40 and 50 systems that have a CorNet-N link.

8.8.1 Call Collisions

Call collisions (glare) occur if the local 9751 CBX selects the same channel for an outgoing call that the remote integrated services digital network private branch exchange (ISPBX) selects for an incoming call to the 9751 CBX.

To handle call collisions:

- The 9751 CBX is designated as *master* or *slave* for a particular CorNet-N link. It can be master for one link and slave for another.
- Requests for channels are designated as *preferred* or *exclusive*. The 9751 CBX always sends exclusive requests.

Table 8-2 lists the actions that take place depending on these designations.

Table 8-2. Actions Taken For Call Collisions

	Action Taken	
Type of Channel Request	**Master 9751 CBX**	**Slave 9751 CBX**
Master exclusive, slave exclusive	The 9751 CBX is awarded the channel.	The 9751 CBX accepts the request from the network. The 9751 CBX may try to select another channel within the same trunk group.
Master preferred, slave exclusive	n/a	The 9751 CBX is awarded the channel. It then selects another channel within the same trunk group and the same RPDN B-channel for the incoming call with the preferred request.
Master exclusive, slave preferred	The 9751 CBX is awarded the channel. It then selects another channel within the same trunk group for the incoming call with the preferred request.	n/a

8.8.2 Additional CorNet-N Call Processing Functions

Table 8-3 lists other CorNet-N call processing functions.

Table 8-3 (Page 1 of 2). AdditionalCorNet-N Call Processing Functions

Function	Description
Through-connection for outgoing calls	The calling party is connected to the B-channel as soon as the 9751 CBX receives the first backward message awarding the requested channel.

Table 8-3 (Page 2 of 2). AdditionalCorNet-N Call Processing Functions

Function	Description
Through-connection for incoming calls	The calling party is connected to the B-channel as soon as the 9751 CBX sends the first backward message awarding the requested channel.
Tones and announcements for 9751 CBX-originated outgoing calls	The 9751 CBX provides the following tones: • Dial tone • Error tone • Fast busy tone • Busy tone • DND tone
Tones and announcements provided by CorNet-N	The network may disconnect the 9751 CBX-originated call with an indication that it is giving tones or announcements. If so, the 9751 CBX maintains the connection to the B-channel until either end disconnects the call.
Tones and announcements for 9751 CBX-terminated incoming calls	The 9751 CBX provides the following tones: • Ringback tone • Busy tone • Fast busy tone • Error tone
Error handling	The 9751 CBX handles the following errors according to CorNet-N specifications: • Protocol discriminator error • Message too short • Call reference error • Message type error • Duplicated information elements • Mandatory information element missing
User-to-user signaling	The 9751 CBX only supports the transport of user-user information elements within certain call control messages for circuit switched calls. No form of acceptance or rejection of this service is indicated. The only exception to this is for the passage of dialed number identification service (DNIS) information. If DNIS information is present, the 9751 CBX interprets the information for use in further call processing or display.
Non-call-related services	The 9751 CBX only supports the temporary signaling connections service. Most supplementary services use this service for their signaling.
Supplementary services	Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* for information about supplementary service timers.

Chapter 9. Common Maintenance Procedures

This chapter describes the procedures that you routinely perform during system maintenance. Performing these standard procedures in the recommended manner helps prevent system problems.

9.1 Introduction

The following contains general troubleshooting steps, as well as the procedure for replacing cards.

9.1.1 General Troubleshooting Steps

An effective troubleshooting method consists of the following steps:

1. Investigate the complaint.

   Gather detailed information about the problem from system users and the system itself. This is the most important step because all of the other steps rely on it to be successful.

Gather enough information to clarify general statements. For example, the statement “extension 4792 does not work” can mean that:

- The user did not get dial tone
- The user got dial tone, but could not break it
- The user dialed, but then got error tone

Each problem is likely to have a different cause.

You also need to find out how widespread a problem is. For example, a customer contact who receives calls from 16 users might think the entire node or system is down, when only one interface group failed. If possible, talk directly to the person who discovered the problem.

2. List and analyze the error tables to determine what the system detected.

   If it does not disrupt system operation, try to duplicate the problem. Examine the parameters associated with the failing operation. For example, determine whether *all* calls are experiencing the same problem, or if it is *only* those within a particular node or between a particular pair of nodes. A problem might appear when one processor is active but not when that processor is on standby.

3. Isolate the cause.

   List the hardware error table (ERRH). Perform the actions the system lists.

   If you cannot determine the fault, contact your next level of support.

   Notes:

   - Some faults can be intermittent. In these cases, run the test repeatedly to reveal the nature of the problem. If you cannot identify an intermittent fault by repeating the tests, use the SET TRAP TDM command line interpreter (CLI) command to catch the fault the next time it occurs.
   - If there are no error messages or other indications of a defective field replaceable unit (FRU), the problem may be due to an error in configuration or to an external condition. Examine all configuration screens that apply to the call process in question and look for any incorrect values.
   - In a system with a CorNet-N link, errors in a remote ISPBX can impact the local 9751 CBX.

4. Repair the fault.

   Clear the error or replace the defective FRU.

5. Verify the repair.

   Confirm that the replacement FRU corrected the original problem and did not introduce any new problems.

6. Follow up with the customer.

   Inform the person who discovered the problem that the cause was determined and corrected. Verify that users are no longer experiencing problems.

9.1.2 Replacing Cards

When you troubleshoot a problem, you may have to remove and replace a card. Use the following guidelines when you replace a defective card:

- When the required action is to replace a defective card, follow the instructions in Chapter 11, “Removing and Replacing Cabinet FRUs.”
- Always keep cabinet doors closed except when you are actually removing a card or inspecting light-emitting diodes (LEDs), switches, or other hardware inside the cabinet. Unnecessary disruptions of the cooling air flow cause space overheating and subsequent automatic shutdown of the cabinet.
- Always down cards before you remove them. When you replace cards, be sure to up them. This ensures that cards go through the initialization process.

9.2 Using Electrostatic Discharge Prevention Procedures

Always follow electrostatic discharge (ESD) prevention procedures when you remove and replace cards.

Warning: Failure to follow ESD prevention procedures can result in permanent or intermittent card failures.

DANGER

To avoid electrical shock, never wear the ESD wrist strap when you work on the power system or at the back of the cabinet.

9.2.1 ESD Prevention Procedures

Note: Check the ESD wrist strap weekly to ensure correct ESD protection. Refer to 9.2.2, “Maintaining the ESD Wrist Strap” on page 9-5.

Prepare to handle the cards as follows:

1. Attach the ESD wrist strap to your bare wrist. Ensure that the inside of the strap makes good contact with your skin.
2. Attach one end of the coiled wire to the wrist strap and the other end to the alligator clip, if necessary.
3. Connect the alligator clip to an unpainted portion of the cabinet frame (Figure 9-1 on page 9-4 and Figure 9-2 on page 9-4). This safely channels electrostatic charges to ground.

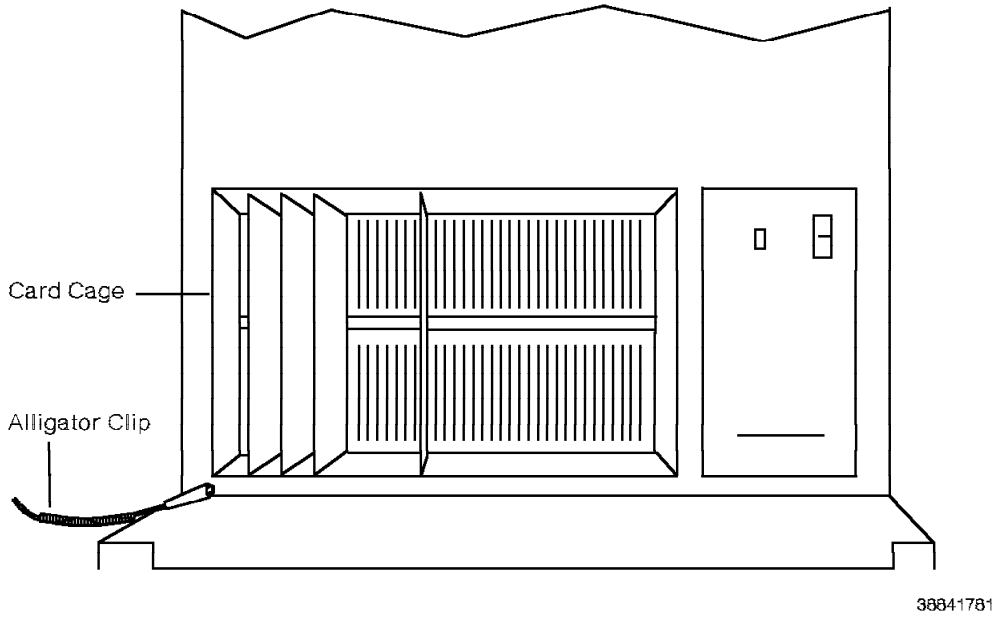


Figure 9-1. ESD Wrist Strap Connection for the Model 10

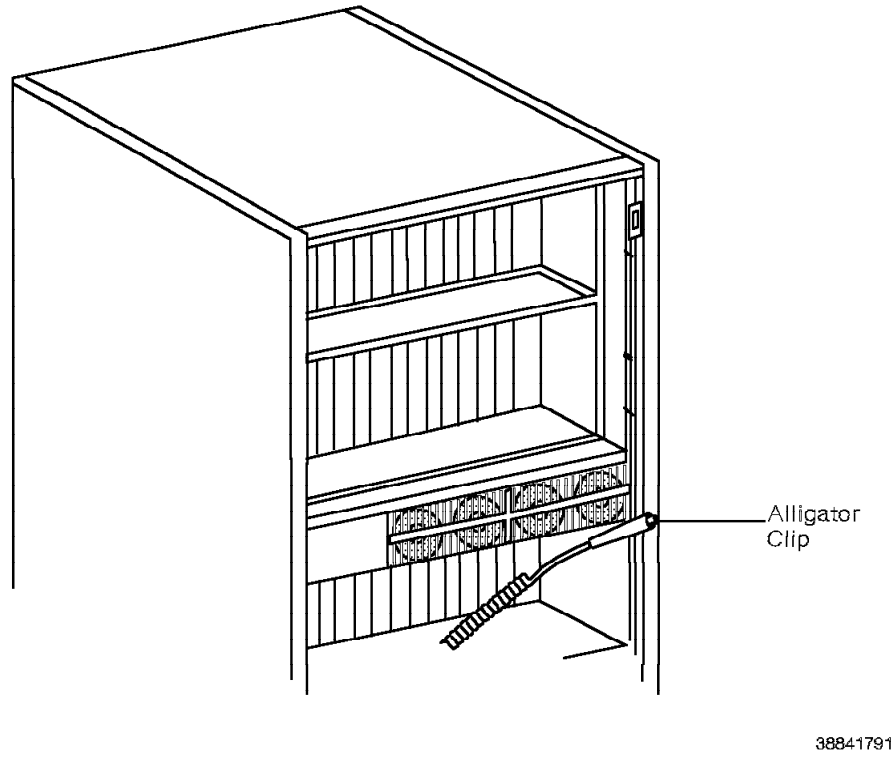


Figure 9-2. ESD Wrist Strap Connection for the Model 40 or 50

Observe the following ESD prevention guidelines when you perform system maintenance procedures:

- Handle cards by their edges only.

  Warning: Avoid contact between the card and your clothing. Electrostatic charges on clothing can damage the card. The ESD wrist strap protects the card from electrostatic charges from your body *only*.

- Immediately place any card you remove from the system into a static-shielding package. The card must remain in a static-shielding bag or static-free box until it is returned to the warehouse.
- Do not remove a replacement card from its static-shielding package until you are ready to install it.

9.2.2 Maintaining the ESD Wrist Strap

The ESD wrist strap and cord must operate correctly to guard against ESD damage and electric shocks. The wrist strap and cord assembly has a 1-megohm resistor; if the resistor fails, there is no ESD protection.

Check the wrist strap weekly to ensure ESD protection. Use a digital multimeter to test the ESD wrist strap as follows:

1. Set the ohmmeter to 2-megohm resistance (Figure 9-3 on page 9-6).
2. Connect the digital multimeter's black lead to the alligator clip at the end of the cord.
3. Connect the digital multimeter's red lead to the plate on the inner surface of the wrist strap.
4. Check the resistance reading on the meter. The meter reading must be between 0.80 and 1.20 megohms.
5. Replace the wrist strap and cord assembly if the reading is not within the permissible range.

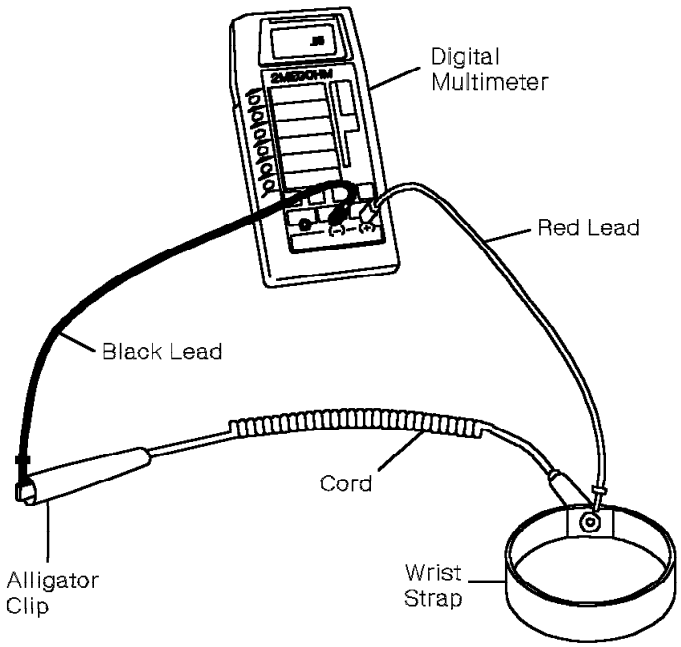


Figure 9-3. ESD Wrist Strap and Cord Assembly

9.2.3 Using the Umbilical Cord

Use the umbilical cord to prevent ESD damage when you remove and replace most cards. However, do *not* use the umbilical cord when you remove and replace the following cards:

9030 CPU card, memory card, and memory controller card
These cards do not have umbilical cord connectors.

Local shelf monitor (LSM) card
You usually connect the umbilical cord to the LSM card when you remove and replace other cards. Therefore, the procedure described below does not apply.

Use the umbilical cord (Figure 9-4) as follows:

Warning: If you do *not* use the umbilical cord as described, you can damage the cards when you remove and replace them.

1. **Model 10:** Plug the umbilical cord into the connector on the power supply.

   Models 40 and 50:

   - If you will remove a card on a time-division multiplexing (TDM) shelf, attach the umbilical cord to the P3 connector of the LSM card on the same shelf.
   - If you will remove a card on a computer common control (CCC) shelf, attach the umbilical cord to the P3 connector of the LSM card on shelf 1.

2. Ensure that the three LEDs on the umbilical cord light.

   If the LEDs do not light, reset the breaker on the back side of of the umbilical cord.

3. Attach the umbilical cord's card connector to the P3 connector of the card that you will remove.

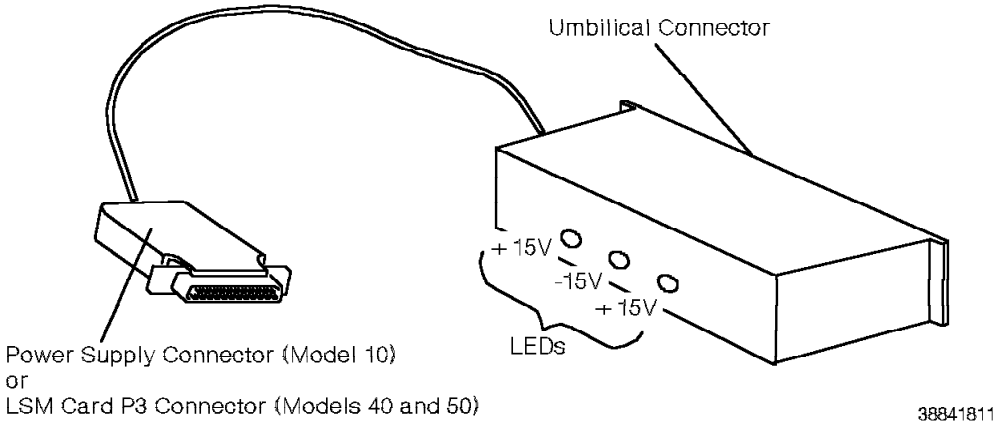


Figure 9-4. Umbilical Cord

9.3 Handling a Card in a Static-Free Box

Handle a card in a static-free box as follows:

1. Slip on the ESD wrist strap. Ensure that the strap makes good skin contact.
2. Connect the intermediate terminal to the snap on the static-free box.
3. Carefully remove the card from its box. Handle the card by its edges only.
4. Examine the card.
5. Place the card back in its static-free box.
6. Snap the box closed and remove the wrist strap.

9.4 Handling a Card in a Static-Shielding Bag

Handle a card in a static-shielding bag as follows:

1. Slip on the ESD wrist strap. Ensure that the strap makes good skin contact.
2. Carefully remove the card from its bag. Handle the card by its edges only.
3. Examine the card.
4. Place the card back in its static-shielding bag.
5. Fold the bag end flap over and secure it with a label.
6. Mark the label with the card name and model number.

9.5 Accessing the Standby Processor (Model 50)

Access the standby processor as follows:

1. Log on to CLI.
2. Type the following command:

   LOGON NODE 1 S

   You accessed the standby processor when the following appears on the maintenance terminal screen:

   1S%

9.6 Connecting the Maintenance Terminal to the 9751 CBX Monitor

The 9751 CBX monitor supports the following types of maintenance terminals:

- The IBM PC Convertible laptop computer
- The Zenith Supersport 2 laptop computer

Connect the maintenance terminal to the 9751 CBX monitor as follows:

1. Ensure that the maintenance terminal is powered off.
2. Connect the maintenance terminal's EIA/TIA-232-E cable to the Local Terminal port on the back of the 9751 CBX monitor (Figure 9-5 on page 9-9).

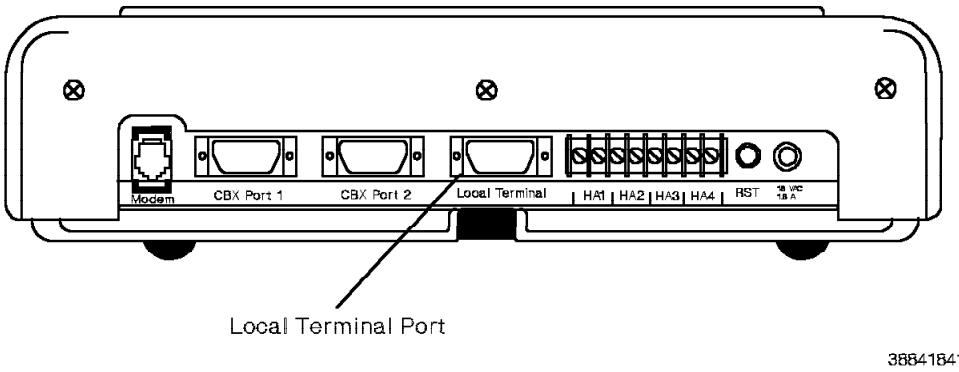


Figure 9-5. 9751 CBX Monitor—Back View

9.7 Logging On to the System

After you connect the maintenance terminal to the 9751 CBX monitor, you can log on to the system with CLI.

Note: If you are using the Zenith Supersport 2 laptop computer as a maintenance terminal, ensure that you have a maintenance analysis procedures (MAPs) system diskette before you complete the steps in this section. Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*.

Log on to CLI as follows:

1. Ensure that the maintenance terminal is off.
2. Insert one of the following diskettes in drive A:
   - Insert the MAPs system boot diskette if you use an IBM PC Convertible laptop computer.
   - Insert the MAPs system diskette if you use a Zenith Supersport 2 laptop computer.
3. Power on the maintenance terminal.
4. Press the Ctrl+Alt+Del keys to reboot the maintenance terminal.

   Note: The + between key names means that the keys must be pressed and held down in the order shown and released together.
5. Type one of the following at the Welcome screen:
   - Type 1 if you have an IBM PC Convertible laptop computer.
   - Type 2 if you have a Zenith Supersport 2 laptop computer or an IBM PC Convertible with an internal modem.

   It takes approximately 30 seconds to load the software from the diskette.
6. Press Alt+F10 to access CLI.

   If you cannot access CLI, press Ctrl+Alt+Del to reboot the system, and then type the choice (1 or 2) opposite to the one used in step 5.

7. When the system banner appears, log on to the maintenance terminal as follows:
   a. Type your user name at the USERNAME: prompt.
   b. Type your password at the PASSWORD: prompt.

   After you successfully log on, the CLI prompt (%) appears.

Type BYE at the % prompt to log off the system.

Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* to assign or change your password.

9.8 Resetting the System

Use the maintenance terminal or the system monitor input/output card (SMIOC) to reset the 9751 CBX.

9.8.1 Using the RESTART Command

The RESTART command forces the system to perform a restart. Among other things, a restart:

- Frees all memory that is not restart-retained, including tasks currently allocated
- Demounts all volumes
- Terminates most commands
- Initializes many data structures
- Terminates unstable calls—for example, ringing calls
- Interrupts the transmission of conference calls
- Disables a new system banner and requests the logon ID

Type the following CLI command to initiate a minor restart from the maintenance terminal:

```
RESTART MINOR
```

A minor restart:

- Does *not* issue the system normalize signal
- Uses software commands to reset the TDM cards
- Does *not* interrupt stable two-way voice and data calls

Type the following CLI command to initiate a major restart from the maintenance terminal:

```
RESTART MAJOR
```

A major restart:

- Issues the system normalize signal to all TDM cards, causing the cards to begin initialization
- Interrupts stable voice calls, causing audible breaks in transmission
- Interrupts stable data calls, causing data to be lost or corrupted

9.8.2 Using the SMIOC System Reset Switch

Push up on the SMIOC system reset switch (Figure 9-6) to reset the system. This causes a major restart.

CUSTOMER IMPACT

A major restart drops all voice and data calls in the setup stage.

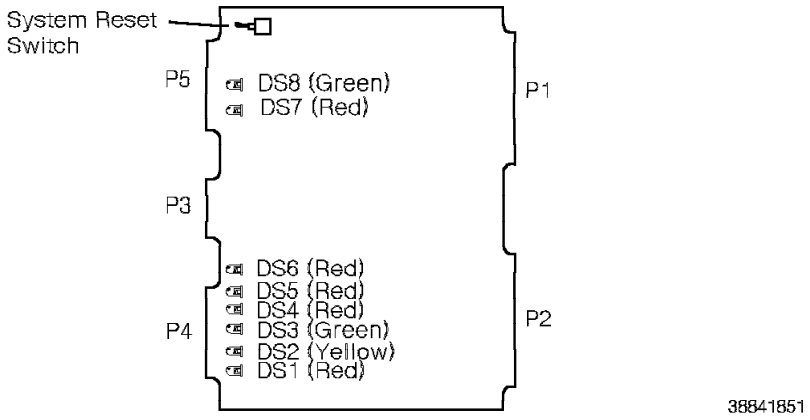


Figure 9-6. Reset Switch on the SMIOC

9.9 Performing the Bus Isolation Procedure

Model 10: Type the following system reference code (SRC) in the soft-copy MAPs SRC screen to perform the bus isolation procedure for the time-division multiplexing controller (TCL) card:

016-35

Type the following SRC in the soft-copy MAPs SRC screen to perform the bus isolation procedure for the time-division multiplexing expander (TXP) card:

016-36

Models 40 and 50: Type the following SRC in the soft-copy MAPs SRC screen to perform the Models 40 and 50 bus isolation procedure:

016-79

9.10 Troubleshooting Hardware Error Table Errors

Note: In this section only, *monitor* refers to the system integrity scanners.

Refer to 7.2.1, “Hardware Error Table” on page 7-5 for a description of the hardware error tables.

The detailed hardware error table displays DETECTED BY: MONITOR when one of the system scanners finds a problem with a card. Since the scanners run continuously, the time of occurrence for a monitor error is constantly updated in the hardware error table.

The monitor for the card stops running when self-test for that card is disabled. For example, when you type the DISABLE TEST RPV command, the system disables the ROLMphone scanner. However, if you type the DISABLE TEST RPV_KEYREV to disable only the ROLMphone keyboard revision test, the ROLMphone scanner continues to run.

It is possible that a monitor error represents a glitch in the system, such as one that occurs during a power sag, a switchover, or a similar temporary condition. For this reason, monitor errors do not down hardware.

The key to dealing with monitor errors is to consider the following questions:

- How often has the particular error occurred? The failure may represent an intermittently failing element.
- Is the error still present? After you clear the error, its immediate reappearance is a solid indication of a failure.
- When did the error occur? A temporary power sag can log an error.
- Could a previous action, such as the removal and replacement of a card, have introduced a temporary error?
- If several monitor errors are reported, do they have anything in common? If they were logged at the same time, they may indicate a brief power outage which was not otherwise detected.

To verify the repair for a monitor error, clear the monitor error by priority (CLEAR ERRH ; P <priority #>). This clears the monitor error regardless of its current status. Wait 1 minute, and list the error by priority to see if it reappears. If self-test logged an error on the same card, run the diagnostic test for that card. If the monitor error reappears, or self-test fails, consider other possible causes of the failure.

9.11 Troubleshooting the 9751 CBX Monitor II

On occasion, some 9751 CBX monitor II devices do not respond to incoming calls even though they can still make outgoing calls to the remote service processor. This can be due to a power surge or loss, which can cause the:

- Modem to become stuck in the offhook condition
- Auto-answer configuration in the modem, downloaded from the 9751 CBX, to become erased or not respond correctly

Troubleshoot this problem as follows:

1. Type the following CLI command:

   VERIFY CBX

   If you experience a timeout before completion, proceed to step 4.

2. Disconnect the modem power and remove its battery backup connector. Restore these connections and type the following:

   VERIFY CBX

   This should restore the modem to its normal functioning.

3. Verify that the SMIOC interconnect box is correctly grounded to the 9751 CBX chassis. Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*.

4. If the modem still does not function correctly:

   a. Remove the EIA/TIA-232-E connector from the back of the modem and connect a terminal to the modem.

   b. Type +++ and press Return.

   c. Type AT&V and press Return.

   This provides a list of the active profile of the modem's S registers.

5. Contact your next level of support. Provide the contents of the active profile of the S registers. If you experienced a timeout in step 1, ensure that you indicate this.

   Important Note: Before you replace a 9751 CBX monitor II modem, contact your next level of support and open a problem management record (PMR).

9.12 Logging On to the IPDN Maintenance Port

You can log on to the integrated services digital network (ISDN) primary digital network (IPDN) maintenance port locally and remotely.

Refer to 11.48.3, "Verifying the Procedure" on page 11-83 for additional commands you can use to troubleshoot the IPDN card and the T1 span it uses.

9.12.1 Logging On to the IPDN Maintenance Port Locally

Log on to the IPDN maintenance port locally as follows:

1. Connect one end of the EIA/TIA-232-E cable to the laptop computer and the other end to the J2 connector of the IPDN breakout assembly.

   Note: Use a null modem cable.

2. Insert the MAPs system boot diskette in drive A of your laptop computer.

3. Press Ctrl+Alt+Del to reboot the system.

   Note: The + between the key names means that the keys must be pressed and held down in the order shown and released together.

4. After the system loads the communication program, press the Return key once. The IPDN banner (Figure 9-7) appears.

5. If the IPDN banner does not appear, press the Return key until the banner appears. Repeat steps 3 and 4 if necessary.

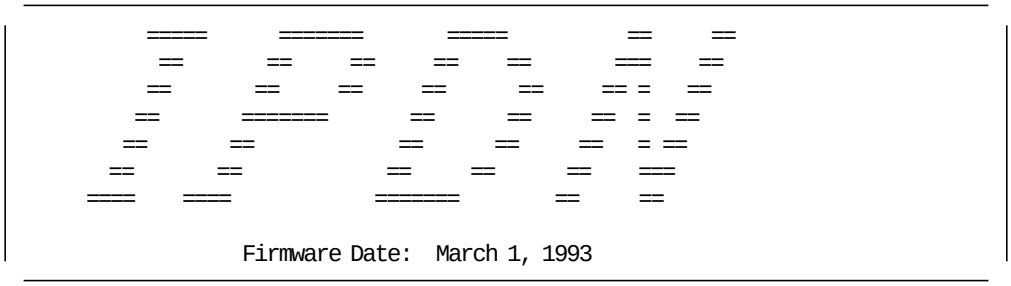


Figure 9-7. IPDN Banner

6. When the banner appears, press the Return key. The IPDN option screen (Figure 9-8) appears.

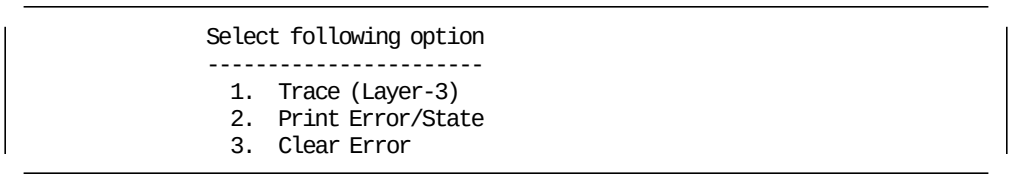


Figure 9-8. IPDN Option Screen

9.12.1.1 Understanding the Trace (Layer-3) Option

When you select Trace (Layer-3) on the IPDN option screen, the ISDN layer-3 trace function screen (Figure 9-9) appears. This screen lets you specify whether to start, stop, or print the layer-3 trace.

Figure 9-9. IPDN Option Screen—Layer-3 Trace Function Screen

Notes:

- A layer-3 trace automatically starts when you power on or reset the IPDN card.
- When you select Print Trace, the system automatically stops the trace. The trace utility restarts when:
  - You specify Start Trace
  - Ten minutes passed since the last access to the terminal
  - You disconnect the modem cable
  - You power off the terminal
- A 1-kilobyte (KB) ISDN layer-3 trace buffer is provided. It wraps to the top of the trace buffer when the data reaches the bottom.

When you select the Print Trace option, the trace/layer-3 signaling display (Figure 9-10) appears. Each line of the display represents one event.

Up to 16 events appear on the screen at a time. Press the Return key to view the next screen.

```
==>O REL CMP     20 08 02 00 01 5A 00 00 00 00 00 00 00 00 00 00 00 00
<==I RELEASE     0F 08 02 00 01 4D 00 00 00 00 00 00 00 00 00 00 00 00
==>O DISC        20 08 02 00 01 45 08 02 80 90 00 00 00 00 00 00 00 00
==>O CONN ACK    20 08 02 00 01 0F 00 00 00 00 00 00 00 00 00 00 00 00
<==I CONNECT     0F 08 02 00 01 07 00 00 00 00 00 00 00 00 00 00 00 00
<==I PROGRESS    0F 08 02 80 01 03 1E 02 83 81 00 00 00 00 00 00 00 00
<==I CALL PROC   0F 08 02 00 01 02 18 04 E9 80 83 97 00 00 00 00 00 00
==>O SETUP       20 08 02 00 01 05 04 02 80 90 18 03 A1 83 97 20 02 00 E3

                    * * * * *  T R A C E  E N D  * * * * *
[==]
```

Figure 9-10. IPDN Option Screen—Trace (Layer-3) Signaling Display

The following describes each part of the display:

Column 1 Indicates the message direction as follows:

- ==>O Indicates an outgoing message.
- <==I Indicates an incoming message.

Column 2 Describes the type of message.

Columns 3 through 7

Show layer-2 bytes that indicate the following:

- 02 IPDN established the link.
- 03 The network established the link.
- 04 IPDN released the link.
- 05 The network released the link.
- 0F The message from the ISDN is received.
- 20 The ISDN message was sent to the ISDN.

Columns 8 through 21

Show layer-3 bytes. Contact your next level of support for more information.

Notes:

- Trace data displays from the *last* event first.
- ***** TRACE END ***** indicates you reached the start of the trace.
- Press Ctrl+S to stop the display from scrolling. Press Return to advance to the next screen.

9.12.1.2 Understanding the Print Error/State Option

When you select Print Error/State on the IPDN option screen, the port selection screen (Figure 9-11) appears.

```
Which port?

1.  IPDN
```

Figure 9-11. IPDN Option Screen—Port Selection Screen

After you select the IPDN option, the print error/state display (Figure 9-12) appears.

Note: Moving from top to the bottom, read the rows 0 through 9, then A through B. Moving from left to right, read the columns 0 through 9, then A through F.

Rows 0 through 8 display in hexadecimal digits. Row 9 displays in binary digits.

```
     _0  _____________________________________> _F

0_   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
     00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 |   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 V   FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
B_   FF FF FF FF FF FF FF FF 00 00 43 3x 3x 3x 3x 3x

[==]
```

Figure 9-12. IPDN Option Screen—Print Error/State Display

Table 9-1 lists the codes that appear in the IPDN log data display.

Table 9-1 (Page 1 of 3). IPDNPrint Error/State Display Codes

Position	Indication
Row 0, column 0 through Row 2, column 7	The number of link access procedure D-channel (LAPD) controller framing errors. Refer to the *Hitachi HD64530 LAPD Controller User's Manual* for more information.

Table 9-1 (Page 2 of 3). IPDNPrint Error/State Display Codes

Position	Indication
Row 2, column 8 through Row 2, column F	The IPDN error correction (EC) level.
Row 3, column 0	The number of alarm indication signal (AIS) errors the ISDN line detected.
Row 3, column 1	The number of remote alarm indication (RAI) errors the ISDN line detected.
Row 3, column 2	The number of loss of signal (LOS) errors the ISDN line detected.
Row 3, column 3	The number of bipolar violation (BPV) errors the ISDN extended superframe (ESF) detected.
Row 3, column 4	The number of frame slip (FS) errors the ISDN ESF detected.
Row 3, column 5	The number of EA5 occurrences the ISDN ESF detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 3, column 6	The number of EA0 occurrences the ISDN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 3, column 7	The number of EA1 occurrences the ISDN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 3, column 8	The number of EA2 occurrences the ISDN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 3, column 9	The number of EA3 occurrences the ISDN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 4, column 0	The T1 digital network (T1DN) line lost synchronization.
Row 4, column 1	The number of yellow alarms the T1DN line detected.
Row 4, column 2	The number of red alarms the T1DN line detected.
Row 4, column 3	The number of BPV occurrences the T1DN superframe (SF) detected.
Row 4, column 4	The number of FS occurrences the T1DN SF detected.
Row 4, column 5	The T1DN SF multiframe synchronization is lost.
Row 4, column 6	The number of EC0 occurrences the T1DN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 4, column 7	The number of EC1 occurrences the T1DN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 4, column 8	The number of EA1 occurrences the T1DN line detected. Refer to 4.19.1, “IPDN Card Digital Display” on page 4-38.
Row 8, column 0	A read-only memory (ROM) check-summary error is detected.
Row 8, column 1	A random access memory (RAM) read or write error is detected.
Row 8, column 2	An LAPD error is detected.
Row 8, column 3	A time or space crosspoint switch error is detected.
Row 8, column 4	A frame aligner error is detected on the ISDN side.
Row 8, column 5	A frame aligner error is detected on the T1DN side.
Row 8, column 6	A DTMF sender or receiver error is detected.
Row 8, column 7	An EIA/TIA-232-E port error is detected.

Table 9-1 (Page 3 of 3). IPDNPrint Error/State Display Codes

Position	Indication
Row 9, column 0	The current ISDN line status is as follows: • Bit 0: The synchronization is lost. • Bit 1: The line is receiving RAI. • Bit 2: The line is receiving LOS. • Bit 3: Layer-2 data link (DL) is not established. **Note:** These codes are written in binary digits.
Row 9, column 1	The current T1DN line status is as follows: • Bit 0: The synchronization is lost. • Bit 1: The line is receiving yellow alarm. • Bit 2: The line is receiving red alarm. **Note:** These codes are written in binary digits.

9.12.1.3 Understanding the Clear Error Option

When you select Clear Error on the IPDN option screen, the port selection screen (Figure 9-11 on page 9-16) appears.

After you select the IPDN option, the system clears the IPDN log data.

9.12.2 Logging On to the IPDN Maintenance Port Remotely

Log on to the IPDN maintenance ports remotely as follows:

1. Connect one end of the standard EIA/TIA-232-E cable to a modem and the other end to the J2 connector of the IPDN breakout assembly.
2. Connect a telephone line to the connector labeled *Telephone Line* on the back of the modem.
3. Call the System Service Support Center (SSSC) and indicate the telephone number of the telephone line connected to the modem. SSSC can then remotely log on.

9.13 Troubleshooting CPN Hardware Errors

This section contains the troubleshooting procedures for messages that appear in the control packet network (CPN) exception table.

Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information about the CPN exception table.

9.13.1 Guidelines

Use the following guidelines when you troubleshoot CPN errors:

- Faults can produce several different error messages in the CPN exception table. First consider all error messages in which a BAD or DOWN item appears in the STATUS column, prioritized as follows:

  1. Host (control packet network interface [CPNI]) problems
  2. Host-to-host (CPNI-to-CPNI) problems
  3. Ring interconnection problems

- If you created a system network diagram at installation, use it for an overview of the system network and the location of hardware in the system.

9.13.2 Running Tests to Isolate the Problem

When possible, test replacement cards to ensure that the faults are corrected.

If you cannot clear a fault by performing the suggested actions the system provides, check other CPN exception table or hardware error table messages for probable causes.

Chapter 10. Maintenance Analysis Procedures (MAPs)

This chapter describes the MAPs you use to troubleshoot the 9751 computerized branch exchange (CBX) and peripheral equipment problems.

10.1 Types of MAPs

There are hard-copy MAPs and soft-copy MAPs. Before troubleshooting any problem, refer to 10.3.9, “MAP 0001: CE Start MAP” on page 10-7. The CE Start Map directs you to either the hard- or soft-copy MAPs.

Hard-copy MAPs Use the hard-copy MAPs as a starting point for troubleshooting 9751 CBX and peripheral equipment problems.

Soft-copy MAPs Use the soft-copy MAPs to troubleshoot 9751 CBX and peripheral equipment problems. These MAPs are on diskettes and are loaded onto the maintenance terminal.

10.2 Using Hard-Copy MAPs

The following list describes the hard-copy MAPs:

10.3.9, “MAP 0001: CE Start MAP” on page 10-7
Start all troubleshooting procedures with this MAP. This MAP guides you through the troubleshooting procedure, whether it is a customer-reported symptom, a system integrity (SI)-detected symptom, or a system reference code (SRC).

10.3.10, “MAP 0009: ROLMphone Telephone MAP Table” on page 10-10
This MAP contains a list of all the telephone MAPs in order by symptom.

10.3.11, “MAP 0100: Cannot Place Calls” on page 10-11 through 10.3.21, “MAP 0200: Volume Problem From the Handset, Headset, or Speaker” on page 10-27
These telephone isolation MAPs contain the analysis, isolation, and repair procedures.

10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30
This MAP details the steps needed to verify that a telephone problem was corrected.

10.3.23, “MAP 0299: End of Call Procedure” on page 10-31
This MAP contains the procedure for ensuring that the 9751 CBX is functioning correctly and the trouble ticket process is complete.

10.2.1 MAP Quick-Fix Table

Each hard-copy MAP has a MAP quick-fix table at the beginning of each MAP. It describes the symptom and the conditions that can cause the symptom.

Use the MAP quick-fix table as an alternative to following the detailed MAP. However, use the MAP quick-fix table only after you are familiar with using the detailed MAP to troubleshoot that particular problem.

10.2.2 MAP Notations

A dash (—) preceding a statement indicates an action that must be taken or a possible solution to the problem. When no dash precedes the statement, the information is an explanation, a question about the failing field replaceable unit (FRU), or a repair action.

10.2.3 Data Communications Problems

When there is a problem with peripheral equipment that supports both voice and data, always troubleshoot the voice problems first.

10.3 Using Soft-Copy MAPs

Use the soft-copy MAPs to troubleshoot the 9751 CBX and peripheral equipment problems. Soft-copy MAPs have two entry-point screens: the SRC screen and the symptom menu screen.

Use the SRC screen to enter the SRC code when the trouble ticket specifies one. Use the symptom menu screen to enter a customer-reported problem.

The symptom menu screen lists the following symptoms:

- ATC Problems
- Audio Problems
- Cannot Be Heard
- Cannot Break Dial Tone
- Cannot Hear
- Cannot Place Calls
- CBX Monitor Problems
- Crosstalk
- Customer Alarm Problems
- Data Communications Problems
- Dead Phone/No Dial Tone
- Desktop Device Problems
- Dial Pad Problems
- Disk Drive Problems
- Dropping Calls
- Incoming Call Problems
- LED Problems
- Message Waiting Problems
- Non-ROLM Peripherals
- Paging Problems
- Phone Does Not Ring
- PhoneMail Problems
- Power Supply Problems
- Ring No Answer
- System Down
- Tone Other Than Dial Tone
- Wrong Number Reached

10.3.1 Hardware Requirements

The hardware requirements for using the soft-copy MAPs are as follows:

- One of the following maintenance terminals:
  - IBM PC Convertible laptop computer
  - Zenith Supersport 2 laptop computer
- Two 3.5-inch diskette drives (720K) capacity
- 640K of random access memory (RAM) storage
- A serial communications port

10.3.2 Software Requirements

The software requirements for using the soft-copy MAPs are as follows:

- Depending on the type of maintenance terminal, use one of the following system boot diskettes:
  - MAPs system boot diskette for the IBM PC Convertible laptop computer
  - MAPs system boot diskette for the Zenith Supersport 2 laptop computer

    Note: If necessary, refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* to create a MAPs system boot diskette for the Zenith Supersport 2 laptop computer.
- One MAP Diskette 1
- One MAP Diskette 2
- One MAP Diskette 3
- One MAP Diskette 4

10.3.3 Loading the Soft-Copy MAPs

Before you load the soft-copy MAPs into the maintenance terminal, ensure that the maintenance terminal correctly connects to the 9751 CBX monitor. Refer to 9.6, “Connecting the Maintenance Terminal to the 9751 CBX Monitor” on page 9-8.

Load the soft-copy MAPs into the maintenance terminal as follows:

1. Insert one of the following diskettes in drive A:
   - Insert the MAPs system boot diskette if you use an IBM PC Convertible laptop computer.
   - Insert the MAPs system diskette if you use a Zenith Supersport 2 laptop computer.
2. Insert the MAP diskette 1 into drive B.

   Note: Both MAP Diskette 1 and MAP Diskette 2 have the same entry-point screen. You can use either one to enter the soft-copy MAPs.
3. Power on the maintenance terminal.
4. Press Ctrl+Alt+Del to reboot the system.
5. Type one of the following at the Welcome screen:
   - Type 1 if you have an IBM PC Convertible laptop computer.
   - Type 2 if you have a Zenith Supersport 2 laptop computer or an IBM PC Convertible with an internal modem.

   If the soft-copy MAPs do not load, press Ctrl+Alt+Del to reboot the system, and then type the choice (1 or 2) opposite to the one you just used.
6. From the FILE TRANSFER MENU screen of the Comm program, press Alt+F9, and then press Return to complete the loading procedure.

It takes approximately 90 seconds to load the soft-copy MAPs.

Note: The soft-copy MAPs must *not* be write-protected.

10.3.4 Toggling between CLI and MAPs

After the soft-copy MAP diskettes are loaded into the maintenance terminal, press Alt+F10 to log on to the 9751 CBX through CLI.

Press Alt+F9 to return to the soft-copy MAPs.

10.3.5 Using the Answer Screens

There are two types of answer screens in the soft-copy MAPs:

Multiple choice screens
Supply a number of answers to a question. Choose an answer by moving the cursor to the desired answer and press Return. The system displays up to 15 answers on the screen at a time. To view more than 15 answers, scroll the screen using the PgUp and PgDn or the and keys.

Free-form answer screens
Require the user to type the answers and press Return. The correct format is provided by examples or directions.

Note: If the program does not correctly operate, press Ctrl+Alt+Del to restart the MAPs.

10.3.6 Using the Function Keys

Use the function keys to perform different functions while using the soft-copy MAPs.

Note: Use only the following function keys. Other keys can cause the program to incorrectly operate.

The function keys are as follows:

F7 RERUN This key starts the soft-copy MAPs from the beginning of the problem. The answers already entered are highlighted.

Notes:

- Only use this key when prompted to do so.
- Instead of starting at the beginning of the problem, backtrack through the MAPs as follows:
  a. Move the cursor to the command line.
  b. Type the following:
     PREV
  c. Press Return.

  You can also return to the beginning of a MAP by going to the end of the MAP and pressing Return.

F9 EXPLAIN This key provides additional information (if available) about a question. Use the cursor keys to display more text, if necessary.

F10 END This key performs various functions, including returning to the previous screen or ending the program.

Note: Only use this key when prompted to do so.

Alt+F9 This key combination accesses the soft-copy MAPs.

Alt+F10 This key combination accesses the CLI.

10.3.7 Using the Service Call Checklist

When a problem is not resolved using the soft-copy MAPS, a screen appears on the maintenance terminal that directs you or the customer to fill out a service call checklist. Refer to Appendix E, “Forms.”

Copy and fill out this checklist before requesting assistance from the next level of support. This checklist helps the next level of support diagnose and isolate service problems. After the service call, file the service call checklist in the Sign-In/Event Log section of the *CBX II 9000/9751 CBX System Site Log*.

10.3.8 Printing CLI Screens

While using soft-copy MAPs, you may be instructed to leave the soft-copy MAP screen and go into CLI. While in CLI, print the screen information to a printer as follows:

1. Connect a printer to a parallel port on the maintenance terminal.
2. Press Alt+F8 to go to the main menu of the communication program.
3. Type 1 and press Return.
4. Type PRN and press Return.
5. Press Alt+F10 to return to the CLI screen.

Stop printing the CLI screen as follows:

1. Press Alt+F8.
2. Type the following:

   E
3. Press Alt+F10 to return to the CLI screen.

10.3.9 MAP 0001: CE Start MAP

Symptom Explanation	Conditions That Could Cause This Symptom
There is a 9751 CBX problem. **Note:** Attempt all applicable field service representative (FSR) remote procedures *before* beginning this MAP.	• Hardware problem. • Environmental problem. **Note:** These MAPs do not isolate or repair software, configuration, or user-training problems. These problems are resolved by the FSR.

001

Were you dispatched by the FSR?
Yes **No**

002

Is the same problem occurring on only one telephone?
Yes **No**

003

– Continue with Step 019 on page 10-8.

004

Go to 10.3.10, "MAP 0009: ROLMphone Telephone MAP Table" on page 10-10 and find the symptom that best describes the problem on the telephone.

005

Were you dispatched with a telephone, telephone base unit, or one of the user-installable options (data communications option [DCO], keyboard expansion option [KEO], and headset/recorder option [HRO]) as one of the FRUs?
Yes **No**

006

– Continue with Step 014.

007

A problem description with an SI type of error (RPV, 246 or RPV, 250) indicates that a hardware error was logged.
(Step **007** continues)

007 (continued)

Does the problem description indicate that a hardware error was logged?
Yes **No**

008

Go to 10.3.10, "MAP 0009: ROLMphone Telephone MAP Table" on page 10-10 and find the symptom that best describes the problem on the telephone.

009

– Remove and replace the failing FRU.

Is the problem resolved?
Yes **No**

010

Is the problem on a ROLMphone?
Yes **No**

011

Use the SRC provided by the FSR to enter the soft-copy MAPs.

012

– Continue with Step 026 on page 10-8.

013

Go to 10.3.23, "MAP 0299: End of Call Procedure" on page 10-31.

014

(From step 006)
(Step **014** continues)

014 (continued)

– From the trouble report determine if the problem was reported by the customer or by the 9751 CBX.

Is the trouble customer-reported?

Yes **No**

015

The problem is reported by the 9751 CBX and the problem need not be re-created.

Use the SRC provided to enter the soft-copy MAPs.

016

The problem is reported by the customer and the problem needs to be re-created.

– Check with the customer to confirm the problem and then re-create the problem.

Can you re-create the problem?

Yes **No**

017

Call your next level of support.

018

Use the SRC provided to enter the soft-copy MAPs.

019

(From step 003)

– List the hardware error table (CLI mode: LIST ERRH ; ; ;).

Is there an error listed?

Yes **No**

020

– Consult with the customer and re-create the problem.

Can you re-create the problem?

Yes **No**

021

(Step **021** continues)

021 (continued)

Call your next level of support.

022

1. Enter a blank SRC to go to the symptom menu.
2. Select from the menu the symptom that best describes the problem.

023

– List the long form of the hardware error table (CLI mode: LIST ERRH ; ; L) and perform the suggested actions.

Is the problem resolved?

Yes **No**

024

1. Go to the soft-copy MAP and enter a blank SRC.
2. Select from the menu the symptom that best describes the problem.

025

Go to 10.3.23, “MAP 0299: End of Call Procedure” on page 10-31.

026

(From step 012)

Is the call waiting LED flickering on a ROLMphone 120, 240, or 400—or—is the fifth LED from the top flickering on a ROLMphone 300 or 600 series telephone?

Yes **No**

027

Are the four LEDs on the lower left side of the keyboard flickering?

Yes **No**

028

– Use the SRC provided by the FSR to enter the soft-copy MAPs.

029

(Step **029** continues)

029 (continued)

– Use the SRC provided by the FSR to enter the soft-copy MAPs.

030

There is a mismatch between the installed and configured device, the ROLMphone is plugged into.

– List the ROLMphone (CNFG mode: LIST RP <pad>) and correct the mismatch.

Is the problem resolved?

Yes **No**

031

– Use the (CLI mode: TEST RPV) to see if the DCO has lost power.

Has the DCO lost power?

Yes **No**

032

– Use the SRC provided to enter the soft-copy MAPs.

033

– Replace the DCO power supply.

Is the problem resolved?

Yes **No**

034

– Verify that there is power to the receptacle the power supply is plugged into.

Is the problem resolved?

Yes **No**

035

– Use the SRC provided to enter the soft-copy MAPs.

036

– Go to 10.3.23, “MAP 0299: End of Call Procedure” on page 10-31.

037

– Go to 10.3.23, “MAP 0299: End of Call Procedure” on page 10-31.

038

– Go to 10.3.23, “MAP 0299: End of Call Procedure” on page 10-31.

10.3.10 MAP 0009: ROLMphone Telephone MAP Table

Use Table 10-1 to determine which MAP you should go to.

Table 10-1. ROLMphone Telephone MAP Table

Symptom	**Go To**
Call does not go through	MAP 0100
Cannot place calls	MAP 0110
Cannot hear, cannot be heard, or there is distortion, noise, or static	MAP 0120
Dead telephone or no dial tone	MAP 0130
Display is missing or incomplete	MAP 0140
Keypad problem	MAP 0150
LED problem	MAP 0160
Line LED does not go out	MAP 0170
Telephone does not ring	MAP 0180
Wrong number reached	MAP 0190
Volume problem from the handset, headset, or speaker	MAP 0200
Telephone checkout procedure	MAP 0295
End of call procedure	MAP 0299

10.3.11 MAP 0100: Cannot Place Calls

Symptom Explanation	Conditions That Could Cause This Symptom
When a number is dialed, the call does not go through; the caller cannot place calls.	• The telephone is defective.

001

– Dial a different number.

Does the call go through?
Yes No

002

– Dial the original number from another ROLMphone.

Does the call go through?
Yes No

003

The problem is probably *not* in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Cannot Place Calls symptom from the symptom menu.

004

The original telephone or base unit may be defective.

– Replace the telephone or base unit and KEO if applicable.

– Dial the number again.

Does the call go through?
Yes No

005

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Cannot Place Calls symptom from the symptom menu.

006

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

007

The problem is probably *not* in the telephone, but with the original number you were trying to call.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.12 MAP 0110: Callers to the Telephone Always Get Busy or No Answer

Symptom Explanation	Conditions That Could Cause This Symptom
Callers always get a busy signal or no answer when calling this telephone.	• The telephone is in forward (FWD) or do not disturb (DND) mode. • The telephone needs resetting. • The telephone is defective.

001

– Verify that the telephone is not in FWD or DND mode. Get dial tone and cancel these features as follows:

- To cancel FWD, dial # # 9.
- To cancel DND, dial # # 5.

Is the problem resolved?

Yes **No**

002

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

003

The telephone or base unit may be defective.

– Replace the telephone or base unit.

Is the problem resolved?

Yes **No**

004

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

(Step **004** continues)

004 (continued)

If not, enter the soft-copy MAPs by selecting the Incoming Call Problem symptom from the symptom menu.

005

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

006

There may have been a poor connection, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

007

The DND or FWD feature may have been accidentally activated.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.13 MAP 0120: Cannot Hear, Cannot be Heard, or there is Distortion, Noise, or Static

Symptom Explanation	Conditions That Could Cause This Symptom
There is one of the following audible problems on the line: • There is distortion, noise, or other interference on the line during a conversation. • The user has trouble hearing the other party. • The other party sounds too loud. • The other party has trouble hearing calls from this telephone. • Voices fade or cut in and out.	• The telephone needs resetting. • The trunk is noisy or bad (external calls only). • The handset cord is defective. • The handset is defective. • The headset needs resetting. • The headset is defective. • The telephone is defective.

Note: If there are problems hearing the other party's voice while using the speakerphone, try activating the mute feature to eliminate background noise. Noisy environments cause all half-duplex speakerphones to continue transmitting rather than receiving, thereby cutting off the other party. When using a half-duplex speakerphone, only one party may speak at any given time.

It may be necessary to use the volume up and volume down keys to adjust the volume of external calls.

001

– Unplug and replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

002

– Continue with Step 004.

003

There may have been a poor connection, which this action has corrected.

004

(From step 002)

– Place an internal call to another extension.

Does the problem appear during internal calls?

Yes **No**

005

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

006

– If a headset is attached to the telephone, unplug the headset and set it aside.

– Get dial tone by pressing the line key or lifting the handset.

Is the speakerphone or the one-way speaker distortion-free?

Yes **No**

007

(Step **007** continues)

007 (continued)

– Replace the telephone or base unit.

Is the problem resolved?

Yes **No**

008

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

009

The original telephone is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

010

Some telephones have handsets while others have headsets.

Does this telephone have a headset?

Yes **No**

011

– Replace the handset cord.

Is the problem resolved?

Yes **No**

012

– Reinstall the original handset cord.

– Replace the handset.

(Step **012** continues)

012 (continued)

Is the problem resolved?

Yes **No**

013

– Continue with Step 023 on page 10-15.

014

The original handset is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

015

The original handset cord is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

016

– Replug the headset connector into the telephone.

– Place the headset over your ears.

Is the headset distortion-free?

Yes **No**

017

Note: Only certain headsets are recommended for use with ROLMphone telephones. Consult your local marketing representative for a comprehensive list.

– Replace the headset with one that is recommended for ROLMphone telephones.

Is the problem resolved?

Yes **No**

018

– Reinstall the original headset.

(Step **018** continues)

018 (continued)

Is the problem resolved?
Yes **No**

019

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

020

The original telephone is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

021

The original headset is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

022

– Return to 10.3.10, “MAP 0009: ROLMphone Telephone MAP Table” on page 10-10 and find a more specific symptom.

023

(From step 013)

– Reinstall the original handset.

– Replace the telephone.

(Step **023** continues)

023 (continued)

Is the problem resolved?
Yes **No**

024

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

025

The original telephone is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.14 MAP 0130: Dead Telephone or No Dial Tone

Symptom Explanation	Conditions That Could Cause This Symptom
There is no dial tone when the: • Handset is removed from the cradle • Line button is pressed The telephone is dead when: • There is no dial tone at all • The LEDs do not light • The telephone does not ring	• The line cord needs resetting. • The line cord is defective. • The handset cord is defective. • The handset is defective. • The headset needs resetting. • The headset is defective. • The telephone is defective.

Note: Interrupted dial tone may indicate a message is waiting. If you get a clicking sound from the speaker as soon as you plug in the telephone, the telephone line was miswired. The absence of a clicking sound, however, does not guarantee a correctly wired telephone line, since some ROLMphone telephones are not sensitive to miswiring.

001

– Press the primary line key or lift the handset and check that the primary line LED lights.

Does the primary line LED light?

Yes

No

002

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes

No

003

– Replace the line cord.

Is the problem resolved?

Yes

No

004

– Continue with Step 024 on page 10-18.

005

(Step **005** continues)

005 (continued)

The original line cord is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

006

There may have been a poor connection, which this action has corrected.

007

– If a headset is attached to the telephone, unplug the headset and set it aside.

– Get dial tone by pressing the line key or lifting the handset.

Is there dial tone through the speaker?

Yes

No

008

– Replace the telephone or base unit.

Is the problem resolved?

Yes

No

009

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

(Step **009** continues)

009 (continued)

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Dead Phone/No Dial Tone symptom from the symptom menu.

010

The original telephone is defective.

– Go to 10.3.22, "MAP 0295: Telephone Checkout Procedure" on page 10-30.

011

Some telephones have handsets, while others have headsets.

Does this telephone have a headset?
Yes No

012

– Replace the handset cord.

Is the problem resolved?
Yes No

013

– Reinstall the original handset cord.

– Replace the handset.

Is the problem resolved?
Yes No

014

– Continue with Step 027 on page 10-18.

015

The original handset is defective.

– Go to 10.3.22, "MAP 0295: Telephone Checkout Procedure" on page 10-30.

016

The original handset cord is defective.

– Go to 10.3.22, "MAP 0295: Telephone Checkout Procedure" on page 10-30.

017

– Replug the headset connector into the telephone.

– Place the headset over your ears.

Is there dial tone through the headset?
Yes No

018

Note: Only certain headsets are recommended for use with ROLMphone telephones. Consult your local marketing representative for a comprehensive list.

– Replace the headset with one that is recommended for ROLMphone telephones.

Is the problem resolved?
Yes No

019

– Reinstall the original headset.

– Replace the telephone.

Is the problem resolved?
Yes No

020

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Dead Phone/No Dial Tone symptom from the symptom menu.

021

The original headset is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

022

The original headset is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

023

– Return to 10.3.10, “MAP 0009: ROLMphone Telephone MAP Table” on page 10-10 and find a more specific symptom.

024

(From step 004)

– Reinstall the original line cord.

– Replace the telephone.

Is the problem resolved?

Yes **No**

025

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Dead Phone/No Dial Tone symptom from the symptom menu.

026

The original telephone is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

027

(Step **027** continues)

027 (continued)
(From step 014)

– Reinstall the original handset.

– Replace the telephone.

Is the problem resolved?

Yes **No**

028

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– The problem is not in the telephone.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Dead Phone/No Dial Tone symptom from the symptom menu.

029

The original telephone is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.15 MAP 0140: Display Is Missing or Incomplete

Symptom Explanation	Conditions That Could Cause This Symptom
The display on the telephone is incomplete or blank.	• The telephone needs resetting. • The telephone is defective. • There is a configuration mismatch.

001

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

002

The telephone may be defective.

– Replace the telephone or base unit.

Is the problem resolved?

Yes **No**

003

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

– Return to 10.3.10, “MAP 0009: ROLMphone Telephone MAP Table” on page 10-10 and find a more specific symptom.

004

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

005

There may have been an intermittent problem, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.16 MAP 0150: Keypad Problem

Symptom Explanation	Conditions That Could Cause This Symptom
Nothing happens when a repdial or keypad button is pressed.	• The telephone needs resetting. • The telephone is defective.

Note: This symptom occurs (for some repdials) when the switch configuration for the line is set for the wrong telephone model. Ensure that this is not the case before entering this MAP. Enter CNFG mode: LIST RP <pad> and compare the configured telephone type with the installed telephone type.

001

– Lift the handset and check for dial tone.

Is there dial tone?

Yes **No**

002

– Go to 10.3.14, “MAP 0130: Dead Telephone or No Dial Tone” on page 10-16.

003

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

004

The original telephone or base unit may be defective.

– Replace the telephone or base unit and KEO if applicable.

Is the problem resolved?

Yes **No**

005

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

(Step **005** continues)

005 (continued)

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Dial Pad Problem symptom from the symptom menu.

006

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

007

There may have been an intermittent problem, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.17 MAP 0160: LED Problem

Symptom Explanation	Conditions That Could Cause This Symptom
• All of the LEDs are flashing on and off continuously. • None of the LEDs light.	• The telephone needs resetting. • The line cord is defective. • The telephone is defective.

001

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

002

The line cord may be defective.

– Replace the line cord.

Is the problem resolved?

Yes **No**

003

– Reinstall the original line cord.

The original telephone or base unit may be defective.

– Replace the telephone or base unit and KEO if applicable.

Is the problem resolved?

Yes **No**

004

– Continue with Step 008.

005

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

006

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

007

There may have been a poor connection, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

008

(From step 004)

This symptom may occur if the cabling exceeds the supported length.

– Check to ensure that the cable length is within the supported ROLMlink cable specifications.

Is the cable length within the specification?

Yes **No**

009

This is the responsibility of the installation coordinator or customer.

– Call your next level of support.

010

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the LED Problem symptom from the symptom menu.

10.3.18 MAP 0170: Line LED Does Not Go Out

Symptom Explanation	Conditions That Could Cause This Symptom
The line LED remains lit even when the handset is in its cradle, and the telephone will not hang up.	• The handset is in its cradle upside down. • There is dirt or other contamination in the line key. • The telephone needs resetting. • The handset is defective. • The telephone is defective.

Note: This symptom can occur when an extension number is shared between two telephones and one is in use. Ensure this is not the case before starting this MAP.

001

– Ensure the handset is not set upside down in its cradle. The cord end must be toward the bottom of the telephone.

Is the problem resolved?

Yes **No**

002

– Lift and then hang up the handset several times.

Is the problem resolved?

Yes **No**

003

– Press the line key several times.

Is the problem resolved?

Yes **No**

004

– Continue with Step 008.

005

There may have been dirt or other contamination in the line key, which this action has corrected.

– If this is not the first time this problem has occurred, replace the telephone.

(Step **005** continues)

005 (continued)

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

006

There may have been an intermittent problem, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

007

The handset must have been set upside down in its cradle. The cord end of the handset must be in the bottom portion of the cradle to properly operate the hookswitch mechanism.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

008

(From step 004)

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

009

The handset may be defective.

– Replace the handset.

(Step **009** continues)

009 (continued)

Is the problem resolved?

Yes **No**

010

– Continue with Step 013.

011

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

012

There may have been a poor connection, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

013

(From step 010)

– Reinstall the original handset.

The original telephone or base unit may be defective.

– Replace the telephone or base unit and KEO if applicable.

Is the problem resolved?

Yes **No**

014

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the LED Problem symptom from the symptom menu.

015

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.19 MAP 0180: Telephone Does Not Ring

Symptom Explanation	Conditions That Could Cause This Symptom
• The telephone does not ring when called. or • The volume of the ring is not loud enough.	• The telephone is in FWD or DND mode. • The telephone needs resetting. • The ring volume control has not been set correctly. • The telephone is defective.

001

– Lift the handset and check for dial tone.

Is there dial tone?

Yes **No**

002

– Go to 10.3.14, “MAP 0130: Dead Telephone or No Dial Tone” on page 10-16.

003

– Verify that the telephone is not in FWD or DND mode. Get dial tone and cancel these features as follows:

- To cancel FWD, dial # # 9.
- To cancel DND, dial # # 5.

Is the problem resolved?

Yes **No**

004

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?

Yes **No**

005

– Continue with Step 008.

006

There may have been an intermittent problem, which this action has corrected.

007

(Step **007** continues)

007 (continued)

The DND or FWD feature may have been accidentally activated.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

008

(From step 005)

– Have someone call the telephone. Adjust the ring volume control (the slide switch on the bottom of the telephone or to the left of the handset) from minimum to maximum, then adjust it to the desired level.

Is the problem resolved?

Yes **No**

009

The telephone or base unit may be defective.

– Replace the telephone or base unit.

Is the problem resolved?

Yes **No**

010

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Phone Does Not Ring symptom from the symptom menu.

011

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

012

There may have been an intermittent problem, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.20 MAP 0190: Wrong Number Reached

Symptom Explanation	Conditions That Could Cause This Symptom
The telephone dials a different number than the one that was entered.	• The telephone is defective.

Note: This symptom occurs when the telephone you are calling is in FWD mode. Ensure that the call is not being forwarded before entering this MAP.

001

– Replace the telephone or base unit.

Is the problem resolved?

Yes **No**

002

– The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Wrong Number Reached symptom from the symptom menu.

003

The original telephone is defective.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.21 MAP 0200: Volume Problem From the Handset, Headset, or Speaker

Symptom Explanation	Conditions That Could Cause This Symptom
• The other party's voice does not sound loud enough or sounds too loud. • The dial tone does not sound loud enough or sounds too loud. • There is no volume.	• The telephone needs resetting. • The handset cord is defective. • The handset is defective. • The headset needs resetting. • The headset is defective. • The telephone is defective.

001

– Ensure the telephone is off-hook by lifting the handset or pressing the line key.

– Adjust the volume using the volume up and volume down buttons.

Is the problem resolved?
Yes No

002

– Unplug then replug the line cord at the telephone body and at the wall jack.

Is the problem resolved?
Yes No

003

– Place an internal call to another extension.

Does the problem appear during internal calls?
Yes No

004

The problem is probably not in the telephone, but with an outside line.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

005

– Continue with Step 008.

006

There may have been a poor connection, which this action has corrected.

– Go to 10.3.22, "MAP 0295: Telephone Checkout Procedure" on page 10-30.

007

There may have been an intermittent problem or a sticking key, which this action has corrected.

– Go to 10.3.22, "MAP 0295: Telephone Checkout Procedure" on page 10-30.

008

(From step 005)

Is the handset volume acceptable?
Yes No

009

The handset cord may be defective.

– Replace the handset cord.

Is the problem resolved?
Yes No

010

– Continue with Step 023 on page 10-28.

011

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

012

Is the speaker volume acceptable?

Yes **No**

013

The telephone may be defective.

– or –

The telephone or base unit may be defective.

– Replace the telephone or base unit.

Is the problem resolved?

Yes **No**

014

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

015

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

016

Some telephones have handsets, others have headsets, and some have both handsets and headsets.

(Step **016** continues)

016 (continued)

Is there a headset on this telephone?

Yes **No**

017

– Return to 10.3.10, “MAP 0009: ROLMphone Telephone MAP Table” on page 10-10 and find a more specific symptom.

018

Is the headset volume acceptable?

Yes **No**

019

– Unplug then replug the headset connector into the telephone.

Is the problem resolved?

Yes **No**

020

– Continue with Step 028 on page 10-29.

021

There may have been a poor connection, which this action has corrected.

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

022

– Return to 10.3.10, “MAP 0009: ROLMphone Telephone MAP Table” on page 10-10 and find a more specific symptom.

023

(From step 010)

– Reinstall the original handset cord.

The handset may be defective.

– Replace the handset.

(Step **023** continues)

023 (continued)

Is the problem resolved?
Yes **No**

024

– Reinstall the original handset.

The telephone may be defective.

– Replace the telephone.

Is the problem resolved?
Yes **No**

025

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

026

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

027

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

028

(From step 020)

The headset may be defective.

Note: Only certain headsets are recommended for use with ROLMphone telephones. Consult your local marketing representative for a comprehensive list.

– Replace the headset with one that is recommended for ROLMphone telephones.

(Step **028** continues)

028 (continued)

Is the problem resolved?
Yes **No**

029

– Reinstall the original headset.

The telephone may be defective.

– Replace the telephone.

Is the problem resolved?
Yes **No**

030

The problem is not in the telephone.

– Reinstall the original telephone. Return the new telephone and any unused components to your spares supply.

If you have an SRC, enter it in the soft-copy MAPs.

– or –

If not, enter the soft-copy MAPs by selecting the Audio Problem symptom from the symptom menu.

031

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

032

– Go to 10.3.22, “MAP 0295: Telephone Checkout Procedure” on page 10-30.

10.3.22 MAP 0295: Telephone Checkout Procedure

This procedure ensures that the telephone is operational and the original telephone that is returned has a problem.

Reinstall the original telephone that appeared to fail and try to re-create the problem. This verifies that the returned telephone is broken and needs repair. If you are unable to re-create the problem, replace the original telephone again and call your next level of support.

After replacing any telephone with a new one, perform the following steps to ensure that the telephone is operating properly and to verify that no additional problems were overlooked. If you *do* experience another problem, return to 10.3.10, "MAP 0009: ROLMphone Telephone MAP Table" on page 10-10 and find the symptom.

The telephone checkout procedure is as follows:

1. Visually inspect the installation to ensure that all cords and cables are properly connected.
2. Place a call using the handset to verify that you can hear and be heard.
3. Place a call using the speakerphone (if applicable) to verify that you can hear and be heard.
4. Place a call using the headset (if applicable) to verify that you can hear and be heard.
5. Have someone call the extension to verify and adjust the ring volume.
6. Try to re-create the original problem using the new equipment to verify that the problem is resolved.
7. If you have replaced the ROLMphone body or base unit, remove the following items from the original telephone and reinstall them on the new telephone:
   - The clear plastic faceplate lens from the face of the telephone
   - The paper faceplate template from beneath the lens
   - All cables, cords, and applicable headsets and handsets
   - All attached features, such as the power supply, wall mount bracket, and handset slip, DCO, KEO, and HRO
8. Go to 10.3.23, "MAP 0299: End of Call Procedure" on page 10-31 to complete the trouble ticket process.

10.3.23 MAP 0299: End of Call Procedure

Perform this procedure at the end of each call to ensure the customer is satisfied, the switch is restored, and the trouble ticket is closed:

1. List the hardware error table to ensure the system is operational and error-free.
2. Close the complaint with the customer or user.
3. Replace all shields and covers removed previously from the 9751 CBX.
4. Log off the 9751 CBX.
5. Complete the on-site log.
6. Store all documentation and MAP diskettes on-site.
7. Close the trouble ticket with your personal terminal (PT).
8. If necessary, inform your next level of support of the repair action.

Chapter 11. Removing and Replacing Cabinet FRUs

This chapter provides the cabinet field replaceable units (FRUs) for the 9751 computerized branch exchange (CBX), in alphabetical order, and the procedures to remove and replace them.

Appendix A, “Parts and Assemblies Catalog” lists the part and model numbers for the cabinet FRUs.

11.1 ACC Card

Follow electrostatic discharge (ESD) prevention procedures when you remove and replace the attendant console controller (ACC) card.

11.1.1 Removing the ACC Card

CUSTOMER IMPACT

This procedure removes one 9755 Attendant Console (9755 ATC) from service.

Remove the ACC card as follows:

1. Use the following diagnostic (DIAG) command to courtesy down the ACC card:

   `DOWN PAD <pad_num> C`

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the ACC card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the time-division multiplexing (TDM) backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.1.2 Replacing the ACC Card

Replace the ACC card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   `UP PAD <pad_num>`

11.1.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the ACC card:

```
TEST ACC <pad_num>
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.2 ADC

Follow ESD prevention procedures when you remove and replace the advanced diagnostics card (ADC).

11.2.1 Removing the ADC

Remove the ADC as follows:

1. Type the following DIAG command to courtesy down the ADC:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the ADC.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.2.2 Replacing the ADC

Replace the ADC as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.2.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the ADC:

TEST ADC <pad_num> 3

The following message appears if you correctly replaced the card:

Analysis Complete: Channel passed.

Note: Test all channels on the card.

11.3 Air Flow Guide (Models 40 and 50)

Use the following procedures to remove and replace the air flow guide.

11.3.1 Removing the Air Flow Guide

Remove the air flow guide (Figure 11-1) as follows:

1. Turn the two captured fasteners on the front of the plastic air flow guide.
2. Use the captured fasteners to tilt the air flow guide out of the cabinet and away from the intershelf bus (ISB) cables.

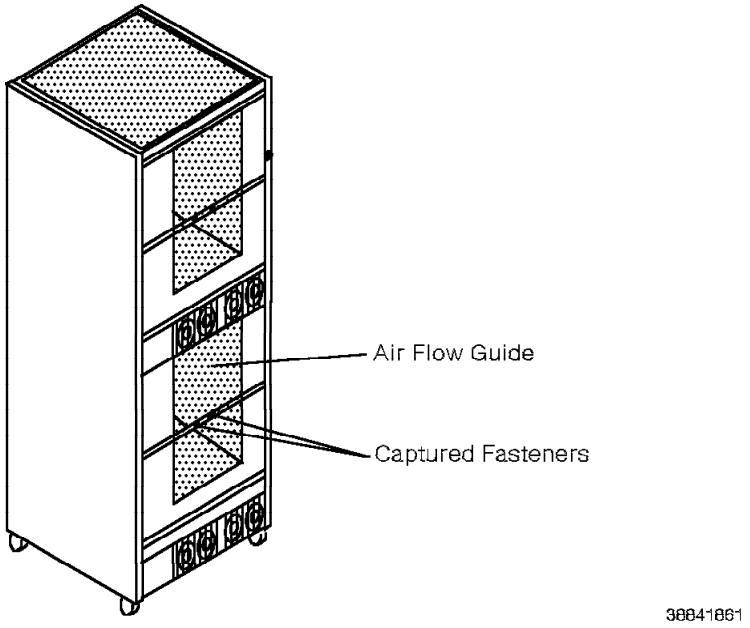


Figure 11-1. Removing the Model 40 or 50 Air Flow Guide

11.3.2 Replacing the Air Flow Guide

Replace the air flow guide from the front of the cabinet as follows:

1. Tilt the replacement air flow guide forward and up into the cabinet.
2. Line up the captured fasteners on the air flow guide with the pod shelf.
3. Press in the air flow guide and tighten the captured fasteners.
4. Ensure that the captured fasteners and the air flow guide are secure.

11.4 ATI Card

Follow ESD prevention procedures when you remove and replace the analog telephone interface (ATI) card.

11.4.1 Removing the ATI Card

CUSTOMER IMPACT

This procedure removes service from the channels on one ATI card.

Remove the ATI card as follows:

1. Type the following DIAG command to courtesy down the ATI card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the ATI card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.4.2 Replacing the ATI Card

Replace the ATI card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.4.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the ATI card:

```
TEST ATI <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete: Channel passed.
```

Note: Test all channels on the card.

11.5 Backplane (Model 10)

The backplane is an integral part of the card cage. Refer to the following:

- 11.12, “Card Cage, 9030 CCC (Model 10)” on page 11-23
- 11.13, “Card Cage, 9030A CCC (Model 10)” on page 11-25

11.6 BIM (Models 40 and 50)

Use the following procedures to remove and replace the battery input module (BIM) in a direct current (dc)-powered Model 40 or 50.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

CAUTION:
Two people, one of whom must be an electrical contractor, must be present at all times. Stop immediately if any of the procedures fail in any test. Notify your manager and the customer of the condition. Do not attempt the test again until you are notified that the situation is corrected.

DANGER

Do *not* wear the ESD wrist strap while you work on the BIM.

11.6.1 Removing the BIM

CAUTION:
The BIM weighs approximately 35 lb; lift it carefully.

CUSTOMER IMPACT

This procedure removes power to the cabinet. Removing the BIM in cabinet 1 removes telephony from the system.

From the front of the cabinet, remove the BIM (Figure 11-2 on page 11-11) as follows:

1. Unlock and remove the kick panel on the bottom of the cabinet.
2. Turn off the BIM circuit breaker.
3. **DANGER**

   Before proceeding, instruct the electrical contractor to ensure the following:

   - **The circuit breaker for the dc branch circuit conductors to the cabinet is turned off and tagged *OFF***

     or

   - **The fuse for the dc branch circuit is removed and tagged *OFF*.**

   Establish a ground reference point near the 9751 CBX cabinet.

   Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

4. Use the analog multimeter to check for less than 1 Vac and 1 Vdc between:
   - The ground reference point and the 9751 CBX frame
   - The ground reference point and each BIM conductor terminal
5. Instruct the electrical contractor to identify and tag the dc branch circuit conductors at the BIM.
6. Instruct the electrical contractor to remove the dc branch circuit conductors from the BIM terminals.
7. Instruct the electrical contractor to disconnect the green equipment grounding conductor from the ground lug.
8. Disconnect the emergency power-off (EPO) connector.

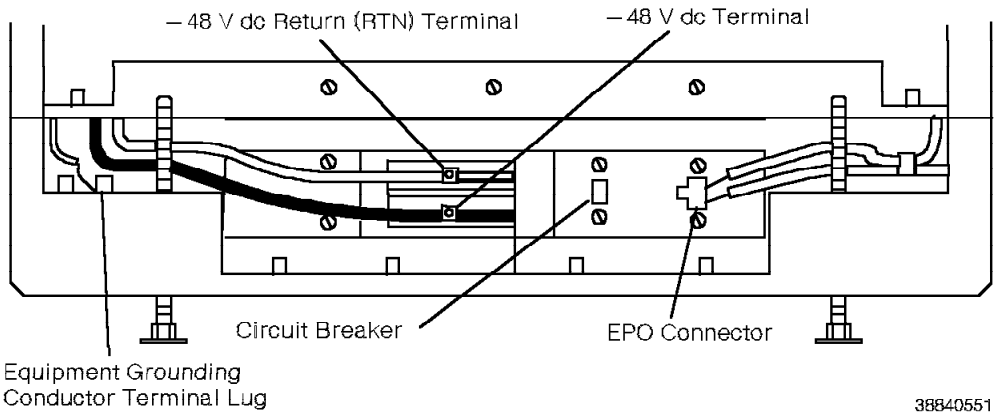


Figure 11-2. Removing the Model 40 or 50 BIM—Front View

From the back of the cabinet, do the following:

9. Remove the BIM cover (Figure 11-3 on page 11-12).
   a. Loosen the lower four screws.
   b. Remove the upper seven screws.
10. Lift the cover out of the cabinet.
11. Remove the three screws on the power bus bar tabs.
12. Carefully slide the BIM out of the back of the cabinet.

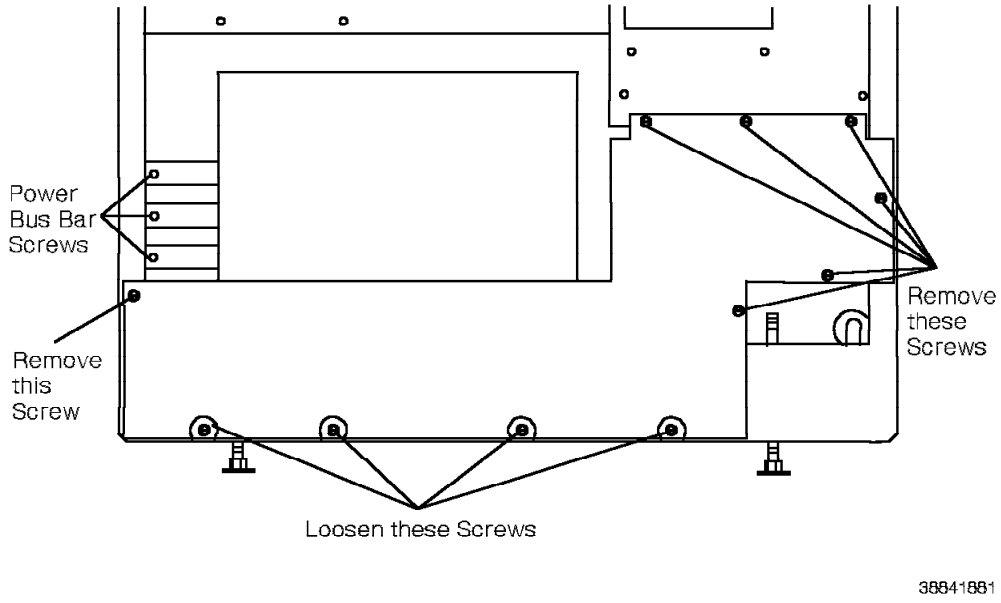


Figure 11-3. Removing the Model 40 or 50 BIM Cover

11.6.2 Replacing the BIM

From the back of the cabinet, do the following:

1. Slide the BIM into the cabinet.
2. Push the BIM all the way into the cabinet, taking care not to bend the power bus bar tabs.
3. Replace the three bus bar tabs and screws.
4. Replace the upper seven screws on the BIM cover.
5. Tighten the lower four screws on the back of the BIM cover.

From the front of the cabinet, do the following:

6. Reconnect the EPO connector.
7. Instruct the electrical contractor to reconnect the green equipment grounding conductor.
8. Instruct the electrical contractor to reconnect the dc branch circuit conductors to the BIM terminals.
9. Instruct the electrical contractor to ensure that the dc branch circuit conductors connect to the correct BIM terminals.

10. **DANGER**

    You *must* perform the following steps to ensure that the 9751 CBX is safe to touch when powered on.

    Establish a ground reference point near the 9751 CBX cabinet.

    Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

    The following are recommended ground reference points:

    - Effectively grounded metal conduit or metal receptacle outlet
    - Effectively grounded structural building steel or metal water pipe

11. **DANGER**

    Do not touch the 9751 CBX frame at this time.

    Instruct the electrical contractor to turn on the circuit breaker or install the fuse for the dc branch circuit serving the 9751 CBX, and to remove the tags.

12. Use the analog multimeter to test for less than 1 Vac and 1 Vdc between the ground reference point and the 9751 CBX frame.
13. Verify the dc input voltage at the BIM. Consult equipment specifications for correct voltages.
14. Ensure correct polarity of the dc input voltage at the BIM conductor terminals.
15. Lock and replace the kick panel on the bottom of the cabinet.
16. Verify the operation of the EPO switch as follows:
    a. Ensure that the hard disk drive unit power switch is off.
    b. Ensure the EPO switch is in the ON (*1*) position.
    c. Turn on the BIM circuit breaker.

       Wait approximately 1 minute to ensure the BIM circuit breaker does not trip.

    d. Move the EPO switch to the OFF (*0*) position. Verify that power is removed from every cabinet in the system.

       CAUTION:
       If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

    e. Restore power to all 9751 CBX cabinets as follows:
       1) Move the previously tested EPO switch to the ON (*1*) position.
       2) Turn on each BIM circuit breaker in the system.
       3) Turn on the hard disk drive unit power switch.

11.7 Cabinet Cover (Model 10)

Use the following procedures to remove and replace the front and back cabinet covers.

11.7.1 Removing the Cabinet Cover

Remove the cabinet cover (Figure 11-4) as follows:

1. Ensure that a locking pin is installed on each of the four casters.
2. Use the hand grips on either side of the cover to pull the cover toward you and disengage it from the cabinet frame.

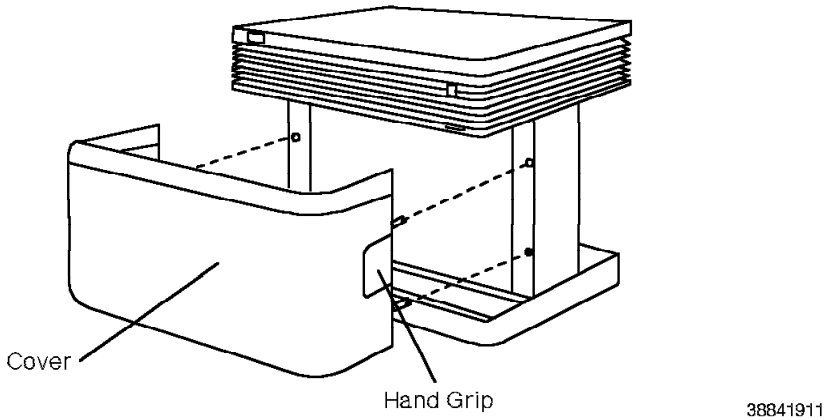


Figure 11-4. Removing the Model 10 Cabinet Cover

11.7.2 Replacing the Cabinet Cover

Replace the cabinet cover as follows:

1. Ensure that the lip around the edge of the cover is facing up.
2. Place your hands in the hand grips on either side of the cover.
3. Align the four posts on the cover with the guides on the cabinet frame.
4. Push the cover toward the cabinet frame until it snaps in place.

11.8 Cabinet Doors (Models 40 and 50)

The top and bottom doors are interchangeable. They weigh approximately 7 pounds and are key-locked. The same key opens all the cabinet doors, except for the customer access door in the upper cabinet 1 front door.

Use the following procedures to remove and replace the back and front cabinet doors.

11.8.1 Removing the Cabinet Doors

CAUTION:
Use care in removing the cabinet doors. The beryllium fingers around the inside of the door break off easily and can injure hands and fingers. The broken pieces can also fall into the cabinet and cause components to short-circuit.

Remove either cabinet door (Figure 11-5) as follows:

1. Unlock the door.
2. Use the key to pull back on the door to disengage the top and sides of the door from the cabinet frame.
3. Place one hand on each side of the door and pull up to disengage the bottom of the door from the cabinet frame.

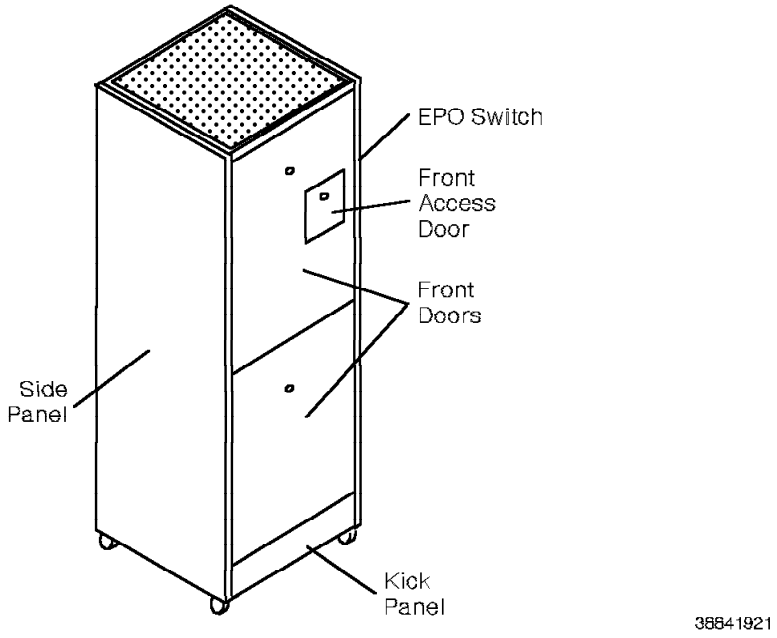


Figure 11-5. Removing the Model 40 or 50 Cabinet Doors

11.8.2 Replacing the Cabinet Doors

Replace either cabinet door as follows:

1. Place one hand on each side of the door and align the two tabs at the bottom of the door with the two slots on the cabinet frame.
2. Tilt the door toward the cabinet frame and press the perimeter of the door to ensure that it is seated on all sides.
3. Lock the cabinet door and remove the key.

11.9 Cabinet Top (Model 10)

Use the following procedures to remove and replace the cabinet top.

11.9.1 Removing the Cabinet Top

Remove the cabinet top as follows:

1. Remove the front cabinet cover that is directly below the cabinet top.
2. Use an Allen wrench to loosen the two bolts directly under the cabinet top until they are released (Figure 11-6).
3. Place your hands on either side of the cabinet top.
4. Lift up and pull to disengage the retention clips from the back of the cabinet frame.

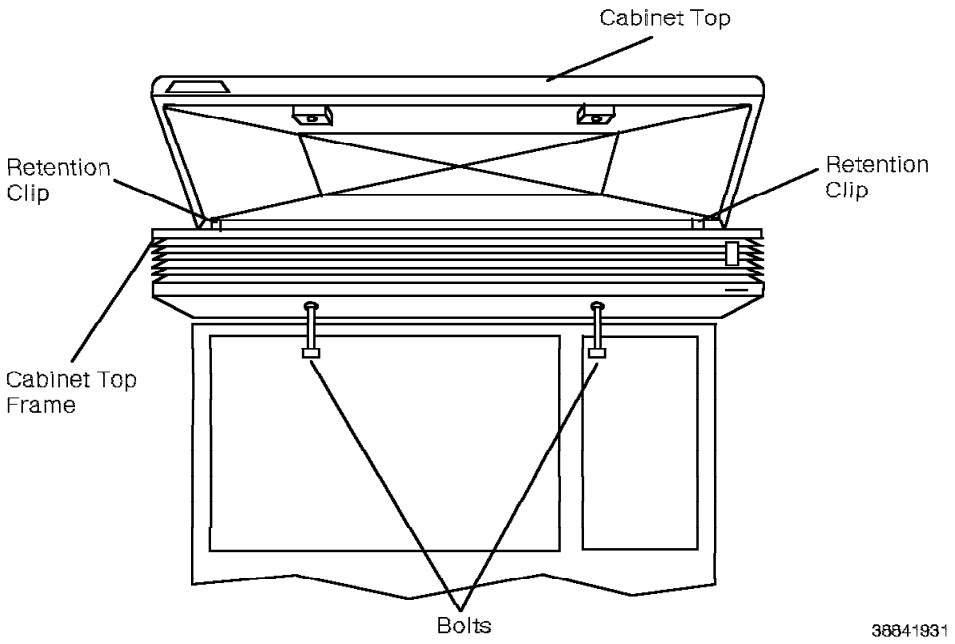


Figure 11-6. Removing the Model 10 Cabinet Top

11.9.2 Replacing the Cabinet Top

Replace the cabinet top as follows:

1. Place your hands on either side of the cabinet top and engage the two retention clips to the cabinet frame.
2. Lower the top down onto the cabinet frame.
3. Replace the front cabinet cover. Ensure the bolts are pushed up into place.

11.10 Capacitor Assembly (Models 40 and 50)

Use the following procedures to remove and replace the capacitor assembly in an alternating current (ac)-powered Model 40 or 50.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

DANGER

Do *not* wear the ESD wrist strap while you work on the capacitor assembly.

11.10.1 Removing the Capacitor Assembly

CUSTOMER IMPACT

This procedure removes power to the cabinet. Replacing the capacitor assembly in cabinet 1 removes telephony from the system.

Remove the capacitor assembly as follows:

1. **DANGER**

   Input voltage is present on the PEA until you unplug the main power supply cord in step 2.

   Turn off the main cabinet circuit breaker on the line conditioning module (LCM).

2. Unplug the main power supply cord from the receptacle.
3. Use a digital multimeter to measure the dc voltage at the bus bar tabs (Figure 11-7 on page 11-19).
4. **DANGER**

   Do not remove the capacitor assembly unless the voltage measurement from step 3 is +0.1 Vdc or less.

   Remove the two screws that connect the capacitor assembly to the power bus bar.

5. Remove the single screw at the base of the capacitor assembly.
6. Remove the capacitor assembly by pushing the assembly toward the front of the cabinet to free it from the back retaining clip.
7. Tilt the capacitor assembly up to clear the power bus connection and pull it out of the cabinet.

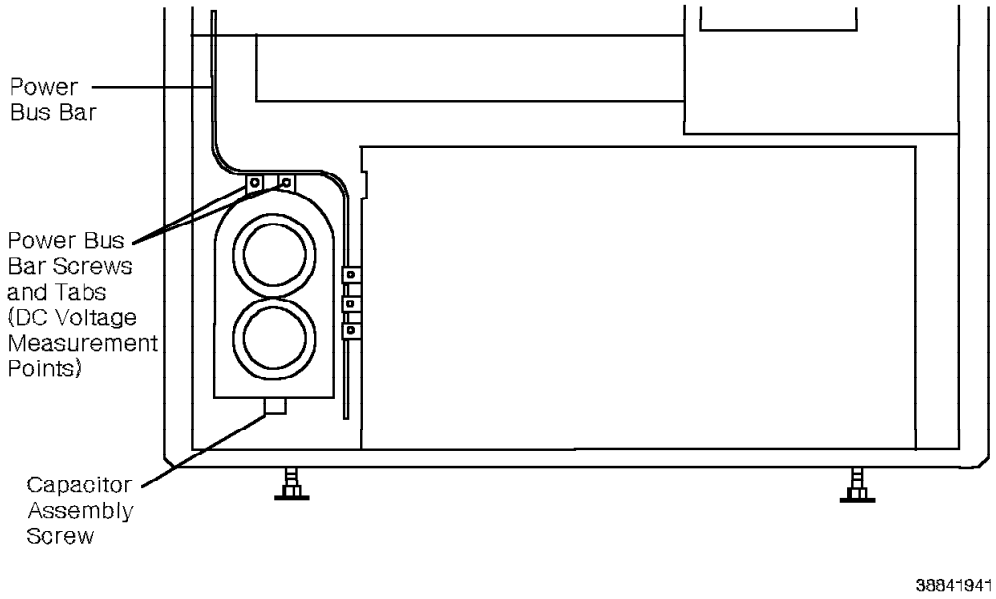


Figure 11-7. Removing the Model 40 or 50 Capacitor Assembly

11.10.2 Replacing the Capacitor Assembly

Replace the capacitor assembly from the back of the cabinet as follows:

1. Slide the capacitor assembly into the cabinet and tilt it up to clear the power bus connection.
2. Replace the single screw at the base of the capacitor assembly.
3. Replace the two screws that connect the capacitor assembly to the power bus bar.
4. **DANGER**

   You *must* perform steps 4a through 4d on page 11-20 before you power on the 9751 CBX.

   Verify as follows that the 9751 CBX cabinet frame is safe to touch when powered on:

   a. Establish a ground reference point near the 9751 CBX cabinet.

      Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

      The following are recommended ground reference points:

      - Effectively grounded metal conduit or metal receptacle outlet
      - Effectively grounded structural building steel or metal water pipe

b. **DANGER**

> **Do not touch the 9751 CBX cabinet frame at this time.**

Plug the 9751 CBX power supply cord into the branch circuit receptacle.

c. Use the analog multimeter to test for less than 1 Vac between the ground reference point and the 9751 CBX cabinet frame.

d. Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2) on the 9751 CBX cabinet frame. Refer to the power and grounding kit's instruction booklet.

5. Verify the operation of the EPO switch as follows:

a. Ensure that the hard disk drive unit power switch is off.

b. Ensure the EPO switch is in the ON (*1*) position.

c. Turn on the PEA circuit breaker.

Wait approximately 1 minute to ensure that the PEA circuit breaker does not trip.

d. Move the EPO switch to the OFF (*0*) position to power off the 9751 CBX.

Verify that power has been removed from *every cabinet* in the system.

CAUTION:
If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

e. Restore power to all 9751 CBX cabinets as follows:

1) Move the previously tested EPO switch to the ON (*1*) position.

2) Turn on each PEA circuit breaker in the system.

f. Turn on the hard disk drive unit power switch.

11.11 Card Cage, TDM (Model 10)

Follow ESD prevention procedures when you remove and replace the TDM card cage. The card cage includes the backplane.

Note: The replacement TDM card cage does *not* use the connector plate assembly. Before proceeding, ensure that you have the following FRUs so you can complete the replacement:

- Model no. 91276 power supply cable
- Model no. 91285 fan dc power supply cord

11.11.1 Removing the TDM Card Cage

Remove the TDM card cage as follows:

1. Power off the system as follows:
   a. Turn off the shelf's power supply.
   b. Turn off the PEA circuit breaker.
2. Unplug the power cable and the fan cable on the back of the PEA.
3. Disengage the cable retention bar from the back of the shelf as follows:
   a. Remove the four screws that secure the cable retention bar to the back of the shelf.
   b. Pull the bar toward you to disengage it from the backplane.
4. Label and remove all the cables connected to the backplane of the shelf.
5. **Warning:** To avoid damage to the cards, continue to use the ESD wrist strap and cord.

   Remove all cards.
6. Remove the power supply.
7. Remove the eight screws that secure the card cage to the frame (Figure 11-8 on page 11-22).
8. **Warning:** To provide stability, two people must perform this step.

   Carefully slide the card cage out the front of the cabinet frame.

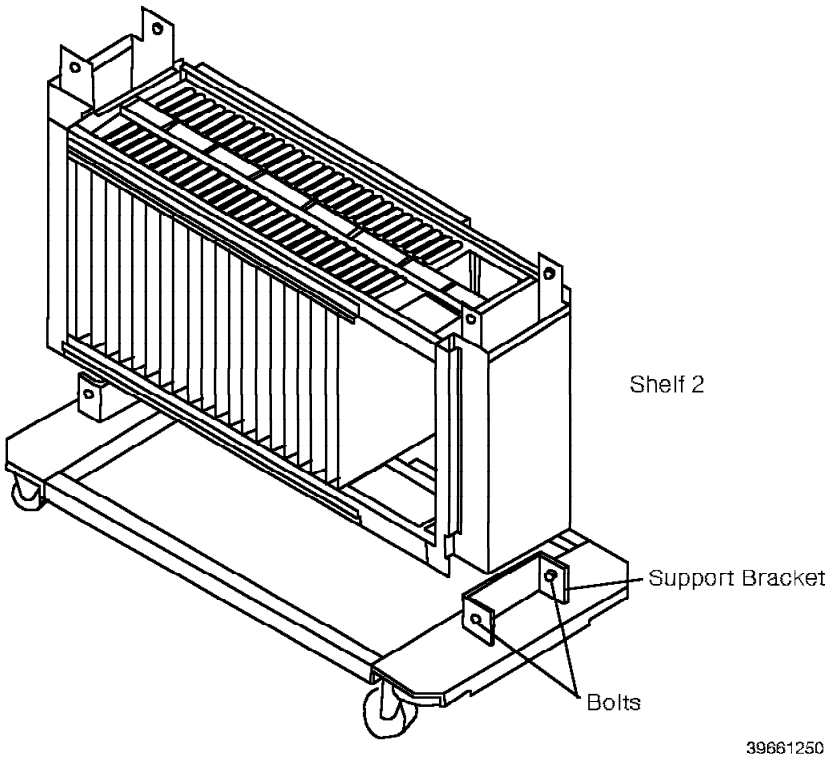


Figure 11-8. Removing and Replacing the Model 10 TDM Card Cage—Front View

11.11.2 Replacing the TDM Card Cage

Replace the TDM card cage as follows:

1. **Warning:** To provide stability, two people must perform this step.

   Place your hands on the bottom and side of the TDM card cage. Carefully slide the card cage through the front of the cabinet between the vertical supports.
2. Use the eight screws to bolt the card cage to the cabinet frame.
3. Reinstall the power supply.
4. Reseat the cards that were removed from the shelf.
5. Reinstall the labeled cables.
6. Reinstall the four screws that secure each cable retention bar to the shelf.
7. Replace the power cable and the fan cable on the power supply.
8. Turn on the shelf power supply.
9. Turn on the PEA.

11.11.3 Verifying the Procedure

You correctly replaced the TDM card cage if the system software is automatically reloaded and the system banner appears on the maintenance terminal's display.

11.12 Card Cage, 9030 CCC (Model 10)

Use the following procedures to remove and replace the 9030 CCC card cage. The card cage includes the backplane.

11.12.1 Removing the 9030 CCC Card Cage

CUSTOMER IMPACT

This procedure downs the system if it is the shelf 1 card cage.

Remove the card cage (Figure 11-9) as follows:

1. Power off the system as follows:
   a. Turn off each shelf's power supply in order (shelf 1, shelf 2, shelf 3).
   b. Turn off the power entry assembly (PEA) circuit breaker.
2. Unplug the power cable and the fan cable on the back of the power supply.
3. If this is a shelf 2 or shelf 3 card cage, remove the ISB cable.
4. Disengage the cable retention bar from the back of the shelf:
   a. Remove the four screws that secure the cable retention bar to the back of the shelf.
   b. Place your hands on the sides of the retention bar and gently pull the bar toward you to disengage it from the backplane.
5. Label and remove all the cables connected to the backplane.
6. Remove all cards and the power supply. If it is shelf 1, remove the dual drive assembly.
7. Remove the eight screws that secure the card cage to the frame.
8. Slide the card cage out the front of the cabinet frame.

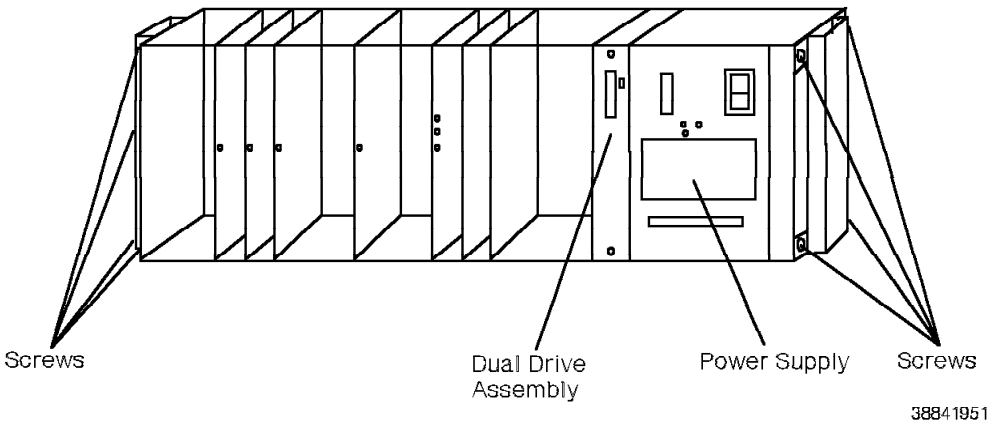


Figure 11-9. Removing the Model 10 9030 Card Cage—Front View

11.12.2 Replacing the 9030 CCC Card Cage

Replace the card cage as follows:

1. Slide the new card cage into the front of the cabinet frame.
2. Use the eight screws to bolt the card cage to the cabinet frame.
3. Reinstall the power supply.
4. If it is a shelf 1 card cage, reinstall the dual drive assembly.
5. Reseat the cards that were removed from the shelf.
6. Attach each cable to its connector on the backplane.
7. Reinstall the four screws that secure each cable retention bar to the shelf.
8. If it is a shelf 2 or shelf 3 card cage, reinstall the ISB cable.
9. Plug in the power cable and the fan cable to the power supply.
10. Turn on the shelf power supply.

    Note: Enable the time-division multiplexing expander (TXP) card before you use the light-emitting diodes (LEDs) to verify the replacement procedure.

11.12.3 Verifying the Procedure

You correctly replaced the card cage for shelf 1 if the system software automatically reloads and the system banner appears on the maintenance terminal's display.

You correctly replaced the card cage for shelves 2 and 3 if the DS3 LED on the TXP card is off.

11.13 Card Cage, 9030A CCC (Model 10)

Use the following procedures to remove and replace the 9030A CCC card cage. The card cage includes the backplane.

This procedure applies to a 1-shelf system. For a 2- or 3-shelf system, use the procedures in 11.49, “ISB Cable (Model 10)” on page 11-84 to remove and replace the ISB cables and associated FRUs.

11.13.1 Removing the 9030A CCC Card Cage

Remove the 9030A CCC card cage as follows (Figure 11-10 on page 11-26):

1. Power off the system as follows:
   a. Turn off the shelf’s power supply.
   b. Turn off the PEA circuit breaker.
2. Unplug the power cable and the fan cable on the back of the PEA.
3. Disengage the cable retention bar from the back of the shelf as follows:
   a. Remove the four screws that secure the cable retention bar to the back of the shelf.
   b. Pull the bar toward you to disengage it from the backplane.
4. Label and remove all the cables connected to the backplane of shelf 1.
5. Remove all cards, the dual drive assembly, and the power supply.
6. Remove the eight screws that secure the card cage to the frame (Figure 11-10 on page 11-26).
7. Slide the card cage out the front of the cabinet frame.

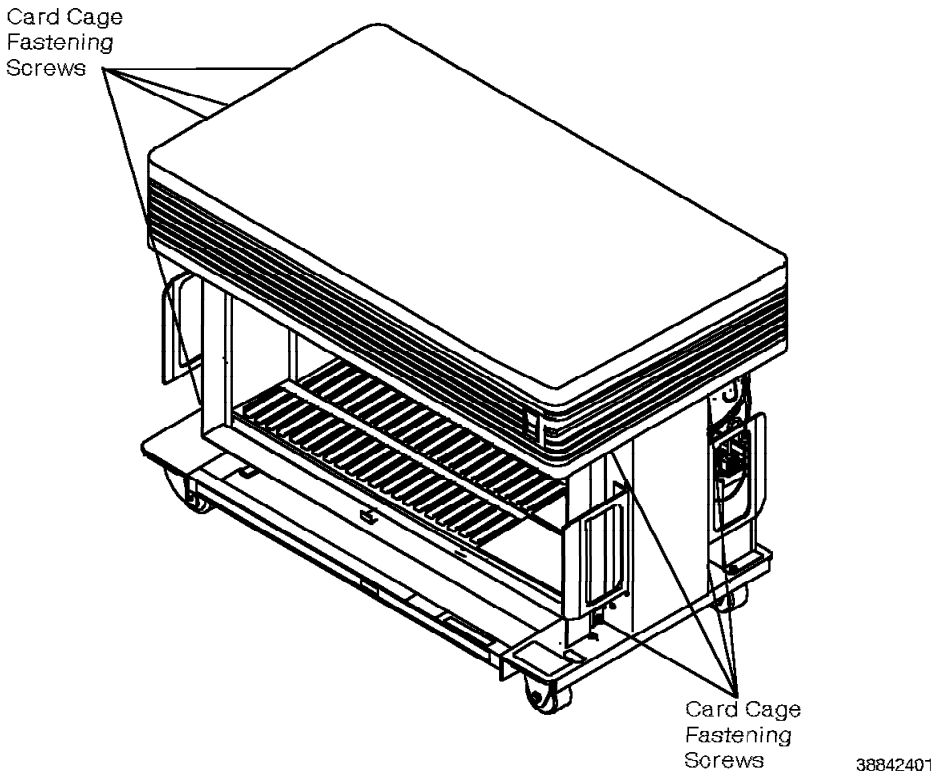


Figure 11-10. Removing and Replacing the Model 10 9030A CCC Card Cage—Front View

11.13.2 Replacing the 9030A CCC Card Cage

Replace the 9030A CCC card cage as follows (Figure 11-10):

1. Slide the card cage into the front of the cabinet frame.
2. Use the eight screws to bolt the card cage to the cabinet frame.
3. Reinstall the power supply.
4. Install the replacement dual drive assembly.
5. Reseat the cards that were removed from the shelf.
6. Reinstall the labeled cables.
7. Reinstall the four screws that secure each cable retention bar to the shelf.
8. Plug in the power cable and the fan cable to the power supply.
9. Turn on the shelf power supply.
10. Turn on the PEA.

11.13.3 Verifying the Procedure

You correctly replaced the 9030A CCC card cage if the system software is automatically reloaded and the system banner appears on the maintenance terminal's display.

11.14 Codec Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the codec card.

11.14.1 Removing the Codec Card

CUSTOMER IMPACT

This procedure removes service from the affected card group.

Remove the codec card as follows:

1. Type the following DIAG command to courtesy down the codec card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the codec card.

3. Use the card extractor to unseat the codec card from the TDM backplane.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding or static-free box.

11.14.2 Replacing the Codec Card

Replace the codec card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the TDM backplane, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card in the TDM backplane.
4. Remove the umbilical cord from the card’s P3 connector.
5. Type the following command to enable the card:

   UP PAD <pad_num>

11.14.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the codec card:

TEST <card name> <pad_num> 3

where <**card name**> is a member of the affected card group—for example, the message waiting or off-premises station (OPS) card.

The following message appears if you correctly replaced the card:

Analysis Complete: Channel passed.

Note: Test all channels on the card.

11.15 Conference Bridge Card

Follow ESD prevention procedures when you remove and replace the conference bridge card.

11.15.1 Removing the Conference Bridge Card

CUSTOMER IMPACT

This procedure removes conference call service.

Remove the conference bridge card as follows:

1. Type the following DIAG command to courtesy down the conference bridge card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the conference bridge card.

3. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.

4. Remove the umbilical cord from the card’s P3 connector.

5. Handling the card by its edges only, slide it out of the shelf.

6. Immediately place the card in a static shielding bag or static-free box.

11.15.2 Replacing the Conference Bridge Card

Replace the conference bridge card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.

2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.

3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.

4. Remove the umbilical cord from the card’s P3 connector.

5. Type the following command to enable the card:

   UP PAD <pad_num>

11.15.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the conference bridge card:

```
TEST CONF <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.16 COT8 Card

Follow ESD prevention procedures when you remove and replace the central office trunk 8-channel (COT8) card.

11.16.1 Removing the COT8 Card

Warning: Coordinate the removal and replacement of a COT8 card with the local telephone company so that the telephone company does not test and down the COT8 circuit.

CUSTOMER IMPACT

This procedure removes central office (CO) trunk access to the affected channels.

Remove the COT8 card as follows:

1. Type the following DIAG command to courtesy down the COT8 card:

   `DOWN PAD <pad_num> C`

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the COT8 card.

3. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.16.2 Replacing the COT8 Card

Replace the COT8 card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Remove the umbilical cord from the card’s P3 connector.
5. Type the following command to enable the card:

   `UP PAD <pad_num>`

11.16.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the COT8 card:

```
TEST COT8 <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.17 CPNI Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the control packet network interface (CPNI) card.

11.17.1 Removing the CPNI Card

CUSTOMER IMPACT

Model 40: This procedure removes telephony.

Model 50: This procedure does not remove telephony if you work on the standby side.

Remove the CPNI card as follows:

1. **Model 40:** Type the following command to courtesy down each T1 digital network (T1DN) card associated with the CPN:

   `DOWN PAD <pad_num> C`

2. Type the following command to down the CPNI card:

   `DOWN CPNI`

3. Verify that the DS2 LED on the CPNI card is lit.

4. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the CPNI card.

5. Use the card extractor to unseat the CPNI card from the 9030A CCC motherboard.

6. Remove the umbilical cord from the card’s P3 connector.

7. Handling the card by its edges only, slide it out of the shelf.

8. Immediately place the card in a static shielding bag or static-free box.

11.17.2 Replacing the CPNI Card

Replace the CPNI card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.

2. Slide the card into the correct slot until it is ready to be seated in the 9030A CCC motherboard, but do *not* seat the card.

3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.

4. Remove the umbilical cord from the card’s P3 connector.

5. Type the following command to enable the card:

   `UP CPNI`

6. **Model 40:** Type the following command to enable each T1DN card associated with the CPN:

   `UP PAD <pad_num>`

11.17.3 Verifying the Procedure

Verify that you correctly replaced the CPNI card as follows:

1. Verify that the card's DS2 LED is off.
2. Type the following command to clear the control packet network (CPN) status tables:

   `CLEAR STATUS CPN`
3. Type the following command to check the status of the replacement CPNI card:

   `STATUS CPNI`

   Verify that `CPNI UP` appears.
4. Type the following command to clear the CPN exception table:

   `CLEAR EXC CPN C ALL`
5. Type the following command to list the CPN exception table:

   `LIST EXC CPN ; L ; ;`

   Verify that the CPN exception table does not list any errors.
6. Type the following command:

   `TEST CPNI LOCAL`

   The following message appears if you correctly replaced the card:

   `LOCAL CPNI LOOPBACK TEST SUCCEEDED`
7. **Model 50:** Type the following command:

   `TEST CPN HOSTS`

   Verify that `*** PASSED ***` appears for each of the tests.
8. Type the following command to check the status of the RPDN channels and the two CPNs:

   `LIST STATUS RPDN <pad_num>`

   Verify that `ACTIVE` appears in the CHANNEL STATE field for the RPDN PAD.

11.18 CPNI Paddleboard (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the CPNI paddleboard.

11.18.1 Removing the CPNI Paddleboard

CUSTOMER IMPACT

Model 40: This procedure removes telephony.

Model 50: This procedure does not remove telephony if you work on the standby side.

Remove the CPNI paddleboard as follows:

1. Record the existing paddleboard switch settings so you can set the replacement paddleboard accordingly.
2. **Model 40:** Type the following command to courtesy down each T1DN card associated with the CPN:

   `DOWN PAD <pad_num> C`
3. Type the following command to down the CPNI card:

   `DOWN CPNI`
4. Verify that the red LED on the CPNI card is lit.
5. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the CPNI card.
6. Use the card extractor to unseat the CPNI card from the CCC motherboard.
7. Remove the umbilical cord from the CPNI card.
8. Label and remove the CPN cables.
9. Remove the screws.
10. Remove the paddleboard.

11.18.2 Replacing the CPNI Paddleboard

Replace the CPNI paddleboard as follows:

1. Handling the paddleboard by its edges only, remove the replacement paddleboard from its static shielding bag or static-free box.
2. Set the dual in-line package (DIP) switches on the paddleboard to correspond with those of the defective paddleboard.
3. Replace the paddleboard.
4. Replace the screws.
5. Connect the CPN cables.
6. Attach the umbilical cord to the P3 connector of the CPNI card, then reseat the card in the CCC motherboard.
7. Remove the umbilical cord from the card’s P3 connector.

8. Type the following command to enable the CPNI card:

   UP CPNI

9. **Model 40:** Type the following command to enable each T1DN card associated with the CPN:

   UP PAD <pad_num>

11.18.3 Verifying the Procedure

Verify that you correctly replaced the CPNI paddleboard as follows:

1. Verify that the CPNI card's green LED is off.
2. Type the following command to clear the CPN status tables:

   CLEAR STATUS CPN

3. Type the following command to check the status of the CPNI card:

   STATUS CPNI

   Verify that CPNI UP appears.

4. Type the following command to check the status of the RPDN channels and the two CPNs:

   LIST STATUS RPDN <pad_num>

   Verify that ACTIVE appears in the CHANNEL STATE field for the RPDN PAD.

11.19 CPNJ Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the control packet network junction (CPNJ) card.

11.19.1 Removing the CPNJ Card

CUSTOMER IMPACT

This procedure downs the CPN that connects to this CPNJ.

Remove the CPNJ card as follows:

1. Type the following command to down all hosts that connect to the CPNJ card:

   DOWN CPN_NET NET<x>

   where **< x >** is the network (1 or 2) that contains the defective hardware.
2. Repeat step 1 for all hosts that connect to this CPNJ.
3. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the CPNJ card.
4. Use the card extractor to unseat the CPNJ card from the CPNJ motherboard.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.19.2 Replacing the CPNJ Card

Replace the CPNJ card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the CPNJ motherboard, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Remove the umbilical cord from the card’s P3 connector.
5. Type the following command to enable all hosts connected to the CPNJ:

   UP CPN_NET NET<x>

   where **< x >** is the network (1 or 2) that contains the replacement CPNJ card.
6. Repeat step 5 for all hosts that connect to this CPNJ.

11.19.3 Verifying the Procedure

Verify that you correctly replaced the CPNJ card as follows:

1. Verify that the green LED is lit.
2. Verify that there is activity on all yellow LEDs with ports connected to hosts.
3. Verify that the network is operational as follows:
   a. Type the following command to clear the CPN exception table:

      `CLEAR EXC CPN C CALL`

   b. Type the following command:

      `LIST EXC CPN ALL S ; ;`

      Verify that the CPN exception table does not list any errors.

   c. **Model 40:** Type the following command:

      `STATUS CPNI`

      Verify that `CPNI UP` appears.

   d. **Model 50:** Type the following command:

      `TEST CPNI REMOTE NET<x> <node> <active or standby>`

      where **< x >** is the network (1 or 2) that contains the replacement CPNJ card.

      The following message appears if you correctly replaced the card:

      `REMOTE CPNI LOOPBACK TEST SUCCEEDED`

11.20 CPNJ Motherboard (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the CPNJ motherboard.

11.20.1 Removing the CPNJ Motherboard

Remove the CPNJ motherboard as follows:

CUSTOMER IMPACT

This procedure downs the CPN that connects to this CPNJ.

1. Type the following command to down all hosts that connect to the CPNJ motherboard:

   DOWN CPN_NET NET<x>

   where **< x >** is the network (1 or 2) that contains the defective hardware.
2. Repeat step 1 for all hosts that connect to this CPNJ.
3. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the CPNJ card.
4. Use the card extractor to unseat the CPNJ card from the CPNJ motherboard.
5. Remove the umbilical cord from the card’s P3 connector.
6. Record the existing CPNJ motherboard switch settings so you can set the new motherboard accordingly.
7. Unplug the cables that connect to the CPNJ motherboard.
8. Remove the screws.
9. Remove the CPNJ motherboard from the shelf.

11.20.2 Replacing the CPNJ Motherboard

Replace the CPNJ motherboard as follows:

1. Set the switches on the replacement CPNJ motherboard to correspond with those of the defective motherboard.
2. Position the replacement motherboard in the shelf and secure it with the screws.
3. Connect the cables to the motherboard.
4. Attach the umbilical cord to the P3 connector of the CPNJ card, then reseat the card into the CPNJ motherboard.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable all hosts that connect to this CPNJ:

   UP CPN_NET NET<x>

   where **< x >** is the network (1 or 2) that contains the replacement CPNJ motherboard.
7. Repeat step 6 for all hosts that connect to this CPNJ.

11.20.3 Verifying the Procedure

Verify that you correctly replaced the CPNJ motherboard as follows:

1. Verify that the green LED is on, and that there is activity on all yellow LEDs with ports connected to hosts.
2. Verify that the network is operational as follows:
   a. Type the following command to clear the CPN exception table:

      `CLEAR EXC CPN C ALL`

   b. Type the following command:

      `LIST EXC CPN ALL S ; ;`

      Verify that the CPN exception table does not list any errors.

   c. **Model 40:** Type the following command:

      `STATUS CPNI`

      Verify that `CPNI UP` appears.

   d. **Model 50:** Type the following command:

      `TEST CPNI REMOTE NET<x> <node> <active or standby>`

      where **< x >** is the network (1 or 2) that contains the replacement CPNJ card.

      The following message appears if you correctly replaced the card:

      `REMOTE CPNI LOOPBACK TEST SUCCEEDED`

11.21 CSM Card

Follow ESD prevention procedures when you remove and replace the clock synchronization module (CSM) card.

11.21.1 Removing the CSM Card

CUSTOMER IMPACT

Because it suspends all TDM network timing, this procedure:

- Drops all calls in the setup stage
- Causes noise on established calls
- Disrupts data connections

Remove the CSM card as follows:

1. **Warning:** This command causes an HW4 restart.

   Type the following DIAG command to down the CSM card:

   `DOWN PAD <pad_num> H`

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the CSM card.

3. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide the card out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.21.2 Replacing the CSM Card

Replace the CSM card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Remove the umbilical cord from the card’s P3 connector.
5. **Warning:** This command causes an HW4 restart.

   Type the following command to enable the card:

   `UP PAD <pad_num>`

6. After the error table is cleared, type the following command:

   `CLEAR CLKERRS`

11.21.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the CSM card:

```
LIST CLKSOURCE
```

If there are no external clocks configured, the screen shown in Figure 11-11 appears.

```
       FAR END  SOURCE NEAR END  CLOCK    CLOCK
INDEX  NODE     TYPE   PAD       PAD      INPUT     STATUS
-----  -------  ------ --------  ------   -----     ------
  1*    NA      CLK    01/0106   01/0106  INTERNAL  GOOD
  2     NA      TA     02/01     NA       INTERNAL  GOOD
```

Figure 11-11. LIST CLKSOURCE Command—No External Clocks Configured

If an external digital trunk is configured as an external clock source, the screen shown in Figure 11-12 appears.

```
       FAR END  SOURCE NEAR END  CLOCK    CLOCK
INDEX  NODE     TYPE   PAD       PAD      INPUT     STATUS
-----  -------  ------ --------  ------   -----     ------
  1     NA      DTRK   01/0107   01/0106  DT_1      GOOD
  2*    NA      CLK    01/0106   01/0106  INTERNAL  GOOD
  3     NA      TA     01/0201   NA       INTERNAL  GOOD
```

Figure 11-12. LIST CLKSOURCE Command—External Digital Trunk Configured as Clock Source

If two external digital trunks are configured as two external clock sources, the screen shown in Figure 11-13 appears.

```
       FAR END  SOURCE NEAR END  CLOCK    CLOCK
INDEX  NODE     TYPE   PAD       PAD      INPUT    STATUS
-----  -------  ------ --------  ------   -----    ------
  1     NA      DTRK   01/0107   01/0106  DT_1      GOOD
  2     NA      DTRK   01/0307†  01/0106  DT_2      GOOD
  3*    NA      CLK    01/0106   01/0106  INTERNAL  GOOD
  4     NA      TAs    01/0201   NA       INTERNAL  GOOD

†The second DTRK external clock source may be configured
in another shelf and slot using a digital trunk motherboard.
```

Figure 11-13. LIST CLKSOURCE Command—Two External Digital Trunks Configured as Clock Source

11.22 CSM Motherboard (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the CSM motherboard.

11.22.1 Removing the CSM Motherboard

Remove the CSM motherboard as follows:

1. **Warning:** This command causes an HW4 restart.

   Type the following DIAG command to down the CSM card:

   `DOWN PAD <pad_num> H`

2. Remove the CSM card from the CSM motherboard.
3. Remove the clock cables from the back of the CSM motherboard.
4. Remove the screws from the CSM motherboard.
5. Remove the CSM motherboard from the cabinet.

11.22.2 Replacing the CSM Motherboard

Replace the CSM motherboard as follows:

1. Align the CSM motherboard with the holes in the cabinet frame.
2. Replace the screws on the CSM motherboard.
3. Reconnect the clock cables to the back of the interface motherboard.
4. Replace the CSM card.
5. **Warning:** This command causes an HW4 restart.

   Type the following command to enable the card:

   `UP PAD <pad_num>`

   At this time, data front end (DFE) firmware downloads to the DFE II card.
6. When the error table is cleared, type the following command:

   `CLEAR CLKERRS`

11.22.3 Verifying the Procedure

You correctly replaced the CSM motherboard if the DS1 and DS2 LEDs on the CSM card light.

11.23 DFE II Card

Follow ESD prevention procedures when you remove and replace the DFE II card.

11.23.1 Removing the DFE II Card

CUSTOMER IMPACT

This procedure slows down calls being established through interactive call setup (ICS).

Remove the DFE II card as follows:

1. Type the following DIAG command to down the DFE II card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the DFE II card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide the card out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.23.2 Replacing the DFE II Card

Replace the DFE II card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

   The DFE firmware downloads to the DFE II card.

11.23.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the DFE II card:

```
TEST DFE <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.24 DID8 Card

Follow ESD prevention procedures when you remove and replace the direct inward dialing 8-channel (DID8) card.

11.24.1 Removing the DID8 Card

Warning: Coordinate the removal and replacement of a DID8 card with the local telephone company so that they do not test and down the DID circuit.

CUSTOMER IMPACT

This procedure removes DID trunk access to the affected channels.

Remove the DID8 card as follows:

1. Type the following DIAG command to courtesy down the DID8 card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the DID8 card.

3. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.24.2 Replacing the DID8 Card

Replace the DID8 card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.24.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the DFE II card:

```
TEST DID8 <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.25 Digital Trunk Motherboard (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the digital trunk motherboard.

11.25.1 Removing the Digital Trunk Motherboard

Remove the digital trunk motherboard as follows:

1. Remove the T1DN card.
2. Label and disconnect the cables.
3. Unscrew and remove the digital trunk motherboard.

11.25.2 Replacing the Digital Trunk Motherboard

Replace the digital trunk motherboard as follows:

1. Replace the screws and secure the digital trunk motherboard.
2. Reconnect the cables.
3. Reinstall the T1DN card.

11.25.3 Verifying the Procedure

Verify that you correctly replaced the digital trunk motherboard as follows:

1. Type the following command:

   TEST T1_CARD_LOOP <pad_num> 2

   The following message appears if you correctly replaced the motherboard:

   PASS

2. Type the following command to enable the card:

   UP PAD <pad_num>

3. Type the following command to ensure that the T1 link is stabilized:

   MON ALARM <pad_num> ON

   If the T1 link is stabilized, the following message appears:

   1) Card AVAIL
   2) No alarms present

4. Type the following command to turn off the alarm monitor:

   MON ALARM <pad_num> OFF

   The % prompts appears if the alarm is turned off.

5. Type the following command to test the T1DN card:

   TEST T1 <pad_num> 1

   The following message appears if you correctly replaced the card:

   T1_ALARMS (T1) ... Passed

   T1_INTEG (T1) ... Passed

   T1_LOCAL_LOOPBACK (T1) ... Passed

   T1_SEIZE (T1) ... Passed

   Note: If the T1DN card connects to an RPDN card, the T1_SEIZE and T1_LOCAL_LOOPBACK tests do not run.

11.26 Diskette Drive (Model 10)

The diskette drive is an integral part of the dual drive assembly. Refer to 11.29, “Dual Drive Assembly (Model 10)” on page 11-53.

11.27 Diskette Drive Unit (Models 40 and 50)

Use the following procedures to remove and replace the diskette drive unit.

11.27.1 Removing the Diskette Drive Unit

Remove the diskette drive unit as follows:

1. Remove any diskettes that are inside the diskette drive.
2. Type the following command to disable the diskette drive portion of the peripheral device controller (PDC) card:

   DOWN FL

3. Turn off the power switch on the drive electronics board.
4. Loosen the two 7.9-millimeter (5/16-inch) hex nuts on the front of the diskette drive unit.
5. Remove the drive unit from the motherboard.
6. Slide the unit out of the cabinet.

11.27.2 Replacing the Diskette Drive Unit

Replace the diskette drive unit as follows:

1. Ensure that the jumper straps on the replacement diskette drive unit are set at JMP1 and JMP5.
2. Seat the drive unit into the motherboard. Ensure that the top of the diskette drive unit seats in the correct slot.
3. Use the two 7.9-millimeter (5/16-inch) hex nuts from the previous unit to fasten the front of the drive unit to the card cage.
4. Turn on the drive unit power switch on the drive electronics board. The green LED on the drive electronics board lights.
5. Type the following command to enable access to the diskette drive:

   UP FL

11.28 Dual Drive Adapter Card (Model 10)

The dual drive adapter card is an integral part of the dual drive assembly. Refer to 11.29, “Dual Drive Assembly (Model 10)” on page 11-53.

11.29 Dual Drive Assembly (Model 10)

Use the following procedures to remove and replace the dual drive assembly.

11.29.1 Removing the Dual Drive Assembly

CUSTOMER IMPACT

This procedure disables the diskette drive and the hard disk drive. Moves, adds, and changes (MAC) cannot be performed at this time.

Remove the dual drive assembly (Figure 11-14 on page 11-54) as follows:

1. Type the following diagnostic (DIAG) command to disable the PDC card:

   ```
   DOWN PDC
   ```

2. Type the following CLI command to verify that the dual drive assembly is downed:

   ```
   LIST DOWN
   ```

3. Remove the cabinet shelf cover.
4. Remove the electromagnetic interference (EMI) shield from the shelf.
5. Locate the dual drive assembly, which is in the right side of the computer common control (CCC) card cage.
6. Use the dual drive assembly power switch (Figure 11-14 on page 11-54) to turn off the power to the hard disk drive.
7. Loosen the two captured fasteners on the front of the dual drive assembly.
8. Use the handle to gently pull and remove the dual drive assembly from the card cage.

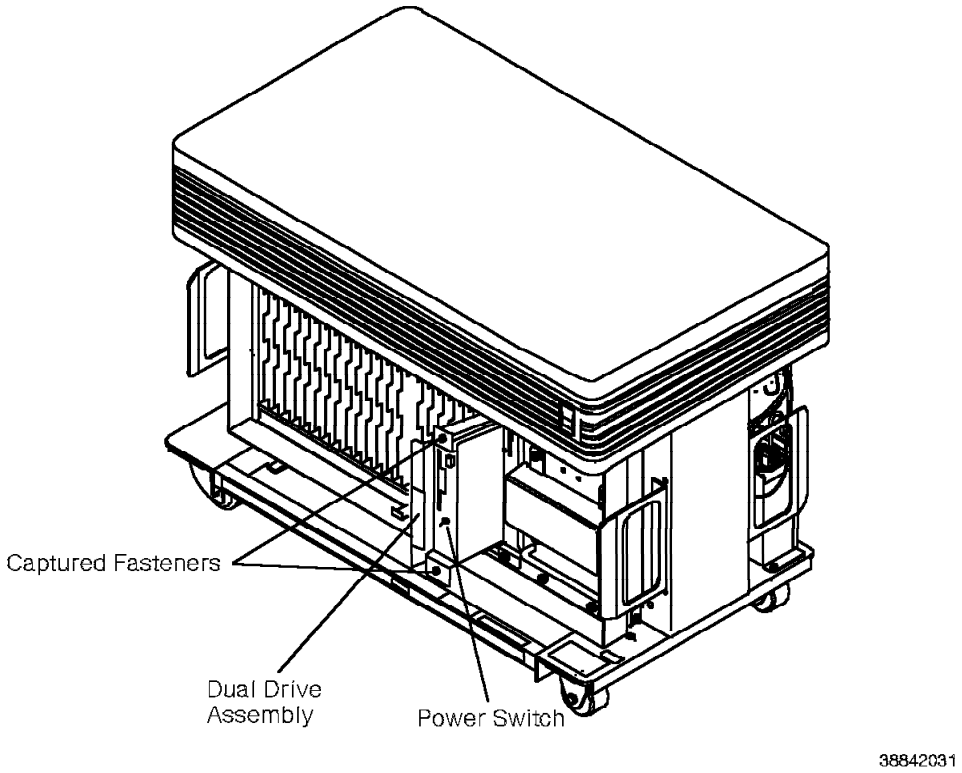


Figure 11-14. Removing and Replacing the Model 10 Dual Drive Assembly

11.29.2 Replacing the Dual Drive Assembly

Important Note: The dual drive assembly *must* be compatible with the PDC card that is installed in the 9751 CBX. Ensure this as follows:

Model no. 91215A dual drive assembly
Ensure that the 9751 CBX has a model no. 90594, Version B or above, peripheral device controller, new (PDCN), card installed.

Model no. 91216 dual drive assembly
Ensure that the 9751 CBX has a model no. 90595 peripheral device controller, enhanced (PDCE), card installed.

Refer to 11.62, “PDC Card” on page 11-110.

Replace the dual drive assembly as follows:

1. Slide and insert the dual drive assembly into the correct slot on shelf 1.
2. Secure the front of the dual drive assembly to the card cage with the two captured fasteners (Figure 11-14).
3. Turn on the dual drive assembly power switch.
4. Type the following command to enable access to the diskette drive and the hard disk drive:

   UP PDC

5. Replace the EMI shield for the shelf.
6. Replace the cabinet shelf cover.

11.29.3 Verifying the Procedure

Verify that you correctly replaced the dual drive assembly as follows:

1. Verify that the hard disk drive LED lights momentarily.
2. Type the following command:

   ```
   UP PDC
   ```

   The following message appears if the UP PDC command test was successful:

   ```
   PDC CPU test -- PASSED

   PDC ROM test -- PASSED

   Hard Disk RAM test -- PASSED

   Floppy RAM test -- PASSED

   Floppy FDC test -- PASSED
   ```

If the UP PDC test did not pass or the LED does not light momentarily, follow the soft-copy maintenance analysis procedures (MAPs).

After you replace the dual drive assembly, use the procedures in 6.3, “Loading Initial Software from Diskettes (Manual Program Load)” on page 6-2 to load the software.

11.30 Dual-Tone Receiver Card

Follow ESD prevention procedures when you remove and replace the dual-tone receiver card.

11.30.1 Removing the Dual-Tone Receiver Card

CUSTOMER IMPACT

Depending on how many dual-tone receiver cards the system requires to handle call traffic, this procedure can:

- Prevent users from making internal or external calls
- Prevent incoming calls to the PhoneMail system

Remove the dual-tone receiver card as follows:

1. Type the following DIAG command to courtesy down the dual-tone receiver card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the dual-tone receiver card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.30.2 Replacing the Dual-Tone Receiver Card

Replace the dual-tone receiver card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.30.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the dual-tone receiver card:

```
TEST DTR <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.31 EMI Shield (Model 10)

Use the following procedures to remove and replace the EMI shield on the front of the cabinet.

Note: The EMI shield on shelf 1 is smaller than the EMI shield on shelf 2 and shelf 3.

11.31.1 Removing the EMI Shield

Remove the EMI shield as follows:

1. Remove the cabinet cover.
2. Loosen the four captured fasteners on the front of the shield (Figure 11-15).
3. Pull the shield toward you to disengage it from the cabinet frame.

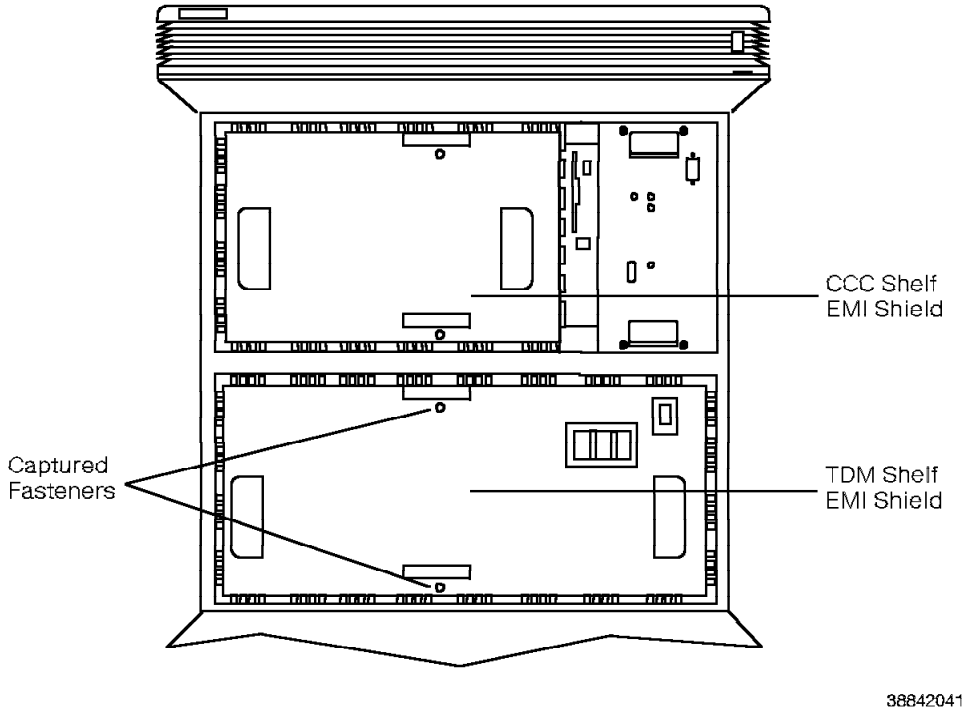


Figure 11-15. Removing the Model 10 EMI Shield—Front View

11.31.2 Replacing the EMI Shield

Replace the EMI shield as follows:

1. Align the four captured fasteners on the shield with the posts on the cabinet frame.
2. Tighten the captured fasteners until the shield is secure.

11.32 EPO Switch (Model 10)

Use the following procedures to remove and replace the EPO switch.

11.32.1 Removing the EPO Switch

CUSTOMER IMPACT

This procedure downs the system.

Remove the EPO switch (Figure 11-16) as follows:

1. Ensure that the PEA circuit breaker is set to *OFF*.
2. Unplug the main power supply cord from the receptacle.
3. Remove the cabinet top.
4. Loosen the EPO safety shield screw.
5. Pull down on the EPO safety shield and disengage it from the cabinet frame.
6. Unplug the EPO switch cable.

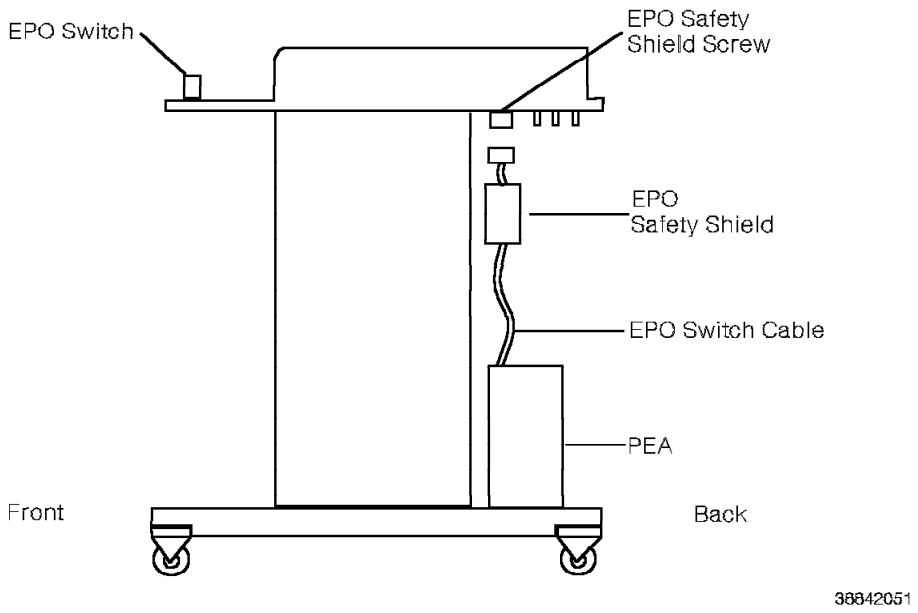


Figure 11-16. Removing the Model 10 EPO Switch Cable—Side View

7. Remove the two screws securing the EPO switch to the front of the cabinet (Figure 11-17).

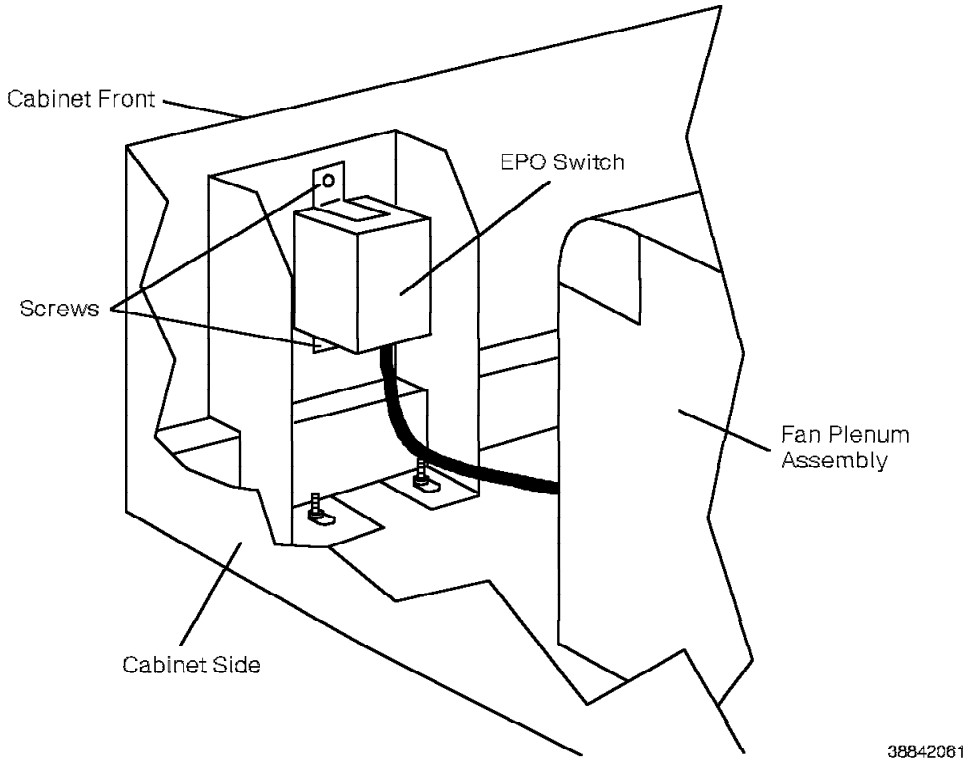


Figure 11-17. Removing the Model 10 EPO Switch

11.32.2 Replacing the EPO Switch

Replace the EPO switch as follows:

1. Position the EPO switch at the front of the cabinet.
2. Replace the two screws that secure the EPO switch to the front of the cabinet.
3. Connect the EPO switch cable to the connector at the side of the back of the fan plenum assembly.
4. Replace the EPO safety shield screw at the top of the fan plenum assembly.
5. **DANGER**

   You *must* perform safety testing to ensure that the EPO switch correctly operates.

   Verify the operation of the EPO switch as follows:

   a. Ensure that the hard disk drive unit power switch is set to *OFF*.

   b. Verify that the EPO switch is in the ON (*1*) position.

   c. Turn on the PEA circuit breaker.

      Wait approximately 1 minute to ensure that the PEA circuit breaker does not trip.

d. Move the EPO switch to the OFF (*0*) position to power off the Model 10.

CAUTION:
If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

6. Restore power to the Model 10 as follows:
   a. Move the EPO switch to the ON (*1*) position.
   b. Turn on the PEA circuit breaker.
   c. Turn on the hard disk drive unit power switch.
7. Replace the cabinet top.

11.33 EPO Switch (Models 40 and 50)

Use the following procedures to remove and replace the EPO switch.

11.33.1 Removing the EPO Switch

CUSTOMER IMPACT

This procedure downs the system.

Remove the EPO switch as follows:

1. Unlock and remove the kick panel on the bottom of the cabinet.
2. Ensure that the cabinet's LCM or BIM circuit breaker is set to *OFF*.
3. Unplug the EPO connector at the LCM or BIM to disconnect power to the EPO switch.
4. Disconnect the EPO connector from any adjacent cabinet.
5. Remove the two screws to the cover plate on the inside of the cabinet at the EPO switch.
6. Disconnect the orange and black leads (Figure 11-18) from the switch.
7. At the front of the cabinet, press the retaining clip and rock the switch. Insert your left hand in the cabinet, and push the switch out.

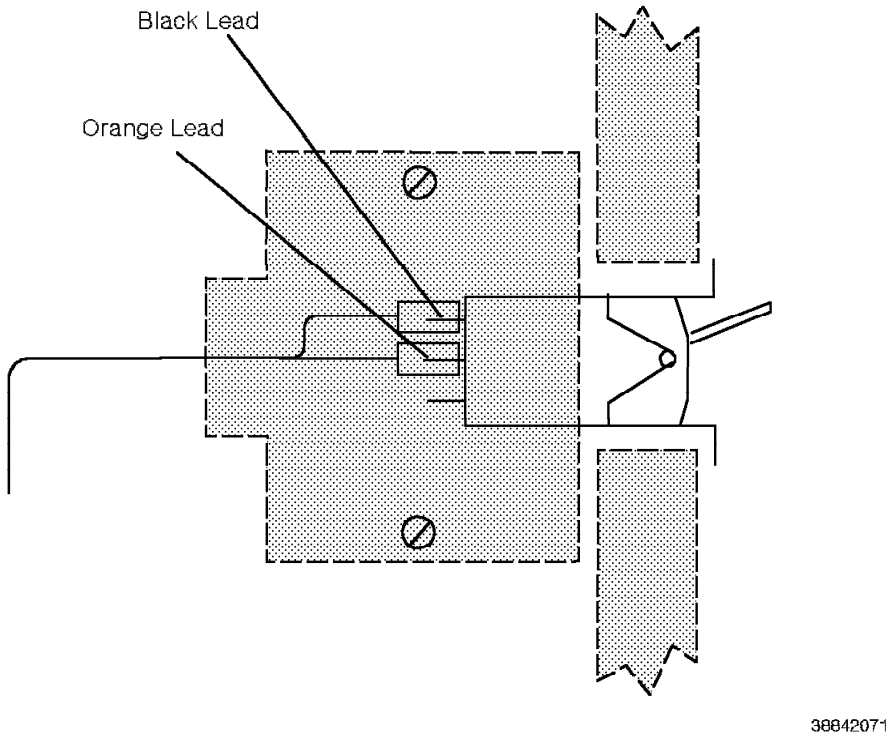


Figure 11-18. Removing the Model 40 or 50 EPO Switch—Side View

11.33.2 Replacing the EPO Switch

Replace the EPO switch as follows:

1. Position the EPO switch in the cabinet opening.
2. Reconnect the orange and black leads to the EPO switch.
3. Use the two screws to replace the cover plate.
4. Plug the EPO cable into the LCM or BIM.
5. Plug the EPO cable into the adjacent cabinet connector.
6. **DANGER**

   You *must* perform safety testing to ensure that the EPO switch correctly operates.

   Verify the operation of the EPO switch as follows:

   a. Ensure that the hard disk drive unit power switch is set to *OFF*.

   b. Ensure that each EPO switch in the system is in the ON (*1*) position.

   c. Turn on each PEA circuit breaker in the system.

      Wait approximately 1 minute to ensure that each PEA circuit breaker in the system does not trip.

   d. Move the EPO switch to the OFF (*0*) position to power off the 9751 CBX.

      Verify that power has been removed from *every cabinet* in the system.

      CAUTION:
      If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

   e. Restore power to all 9751 CBX cabinets as follows:

      1) Move the previously tested EPO switch to the ON (*1*) position.

      2) Turn on each PEA circuit breaker in the system.

   f. Turn on the hard disk drive unit power switch.

7. Lock and replace the kick panel at the front bottom of the cabinet.

11.34 Expander Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the expander card.

11.34.1 Removing the Expander Card

CUSTOMER IMPACT

Model 40: This procedure removes telephony from the affected shelf.

Model 50: This procedure does not remove telephony if the expander card is inactive.

Remove the expander card as follows:

1. Record the existing card's switch settings so you can set the replacement card accordingly.
2. **Model 40:** Type the following DIAG command to courtesy down the cards on the affected shelf:

   DOWN PAD <pad_num> C
3. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, "Using the Umbilical Cord" on page 9-7.

   Attach the umbilical cord to the P3 connector of the expander card.
4. Open the zero insertion force (ZIF) connector by gently pulling down on the handle.
5. Open the card lock levers.
6. Unseat the expander card.
7. Remove the umbilical cord from the card's P3 connector.
8. Slide the card out of the cabinet.

11.34.2 Replacing the Expander Card

Replace the expander card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Set the address switches to correspond with those of the defective card.
3. Immediately place the removed card in a static shielding bag or static-free box.
4. Slide the replacement card into the correct slot until it is ready to be seated in the TDM backplane, but do *not* seat the card.
5. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
6. Close the card lock levers.
7. Close the ZIF connector by gently pushing up on the handle.
8. Remove the umbilical cord from the card's P3 connector.

9. Type the following command to enable the cards on the shelf:

   UP PAD <pad_num>

11.34.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the expander card:

TEST EXP <pad> 3
<pad_range> 3

Note: This does *not* test the expander card on the standby side.

The following message appears if you correctly replaced the card:

Analysis Complete: Channel passed.

Note: Test all the channels on the card.

11.35 Fan (Model 10)

Use the following procedures to remove and replace the fan.

11.35.1 Removing the Fan

Remove the fan as follows:

1. Disconnect the fan cable from the connector on the fan detector card.
2. Lift the fan out of the fan slot.

11.35.2 Replacing the Fan

Replace the fan as follows:

1. Insert the new fan in the fan slot.
2. Reconnect the fan cable to the connector on the fan detector card.

11.35.3 Verifying the Procedure

You replaced the fan correctly if the LED on the fan detector card lights after approximately 5 seconds.

11.36 Fan (Models 40 and 50)

Use the following procedures to remove and replace the fan.

11.36.1 Removing the Fan

Remove the fan as follows:

1. Place a flat-blade screwdriver in the slot at either end of the fan assembly cover to remove it.
2. Tilt the screwdriver to release the clip.
3. Remove the fan wiring harness plug from the defective fan.
4. Use one finger to push the fan up from the bottom and remove it from the assembly.

11.36.2 Replacing the Fan

Replace the fan as follows:

1. Insert the new fan in the fan slot.
2. Reconnect the fan wiring harness plug.
3. Reinstall the fan assembly cover.

11.36.3 Verifying the Procedure

You replaced the fan correctly if the DS8 LED on the SMIOC lights after approximately 5 seconds.

11.37 Fan Air Filter (Models 40 and 50)

Use the following procedure to remove and replace the fan air filter.

11.37.1 Removing the Fan Air Filter

Lift the fan air filter (Figure 11-19) straight up to remove it.

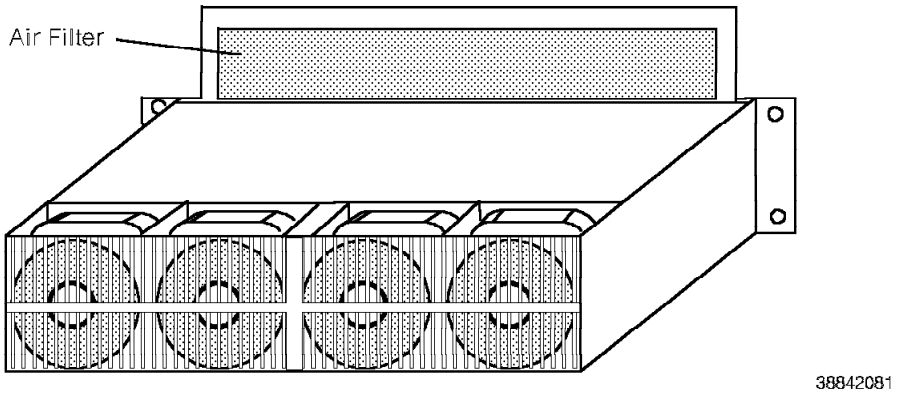


Figure 11-19. Model 40 or 50 Fan Air Filter Location

11.37.2 Replacing the Fan Air Filter

Insert the replacement fan air filter.

11.38 Fan Detector Card (Model 10)

Use the following procedures to remove and replace the fan detector card.

11.38.1 Removing the Fan Detector Card

Remove the fan detector card as follows:

1. Disconnect the five cables from the fans.
2. Disconnect the cable to the power supply.
3. Remove the four screws securing the card to the cabinet.

11.38.2 Replacing the Fan Detector Card

Replace the fan detector card as follows:

1. Replace the four screws to secure the card to the cabinet.
2. Reconnect the cable from the power supply.
3. Reconnect the cables from the five fans.

11.38.3 Verifying the Procedure

You correctly replaced the fan detector card if the fans are turning and the fan detector card LED is on.

11.39 Fan Detector Card (Models 40 and 50)

Use the following procedures to remove and replace the fan detector card.

11.39.1 Removing the Fan Detector Card

Remove the fan detector card as follows:

1. Place a flat-blade screwdriver in the slot at either end of the fan assembly cover to remove it.
2. Tilt the screwdriver to release the clip.
3. Lift the fan grill's latches.
4. Tilt the grill out of the fan assembly.
5. Disconnect the fan wiring harness plug.
6. Pull the fan detector card until it pops from its plastic bracket.
7. Remove the fan detector card.

11.39.2 Replacing the Fan Detector Card

Replace the fan detector card as follows:

1. Push the replacement card into the plastic bracket.
2. Reconnect the fan wiring harness plug.
3. Reinstall the fan grill.
4. Reinstall the fan assembly cover.

11.39.3 Verifying the Procedure

You correctly replaced the fan detector card if the fans are turning and the DS8 LED on the SMIOC lights.

11.40 Fan Wiring Harness (Models 40 and 50)

Use the following procedures to remove and replace the fan wiring harness.

11.40.1 Removing the Fan Wiring Harness

Remove the fan wiring harness (Figure 11-20) as follows:

1. Remove the plastic access cover.
2. Squeeze the tabs on the fan wiring harness connector to unplug it from the CCC motherboard or the TDM backplane.
3. Place a flat-blade screwdriver in the slot at either end of the fan assembly cover to remove it.
4. Tilt the screwdriver to release the clip.
5. Disconnect the fan wiring harness from the four fans and the fan detector card.
6. Remove the fan wiring harness.

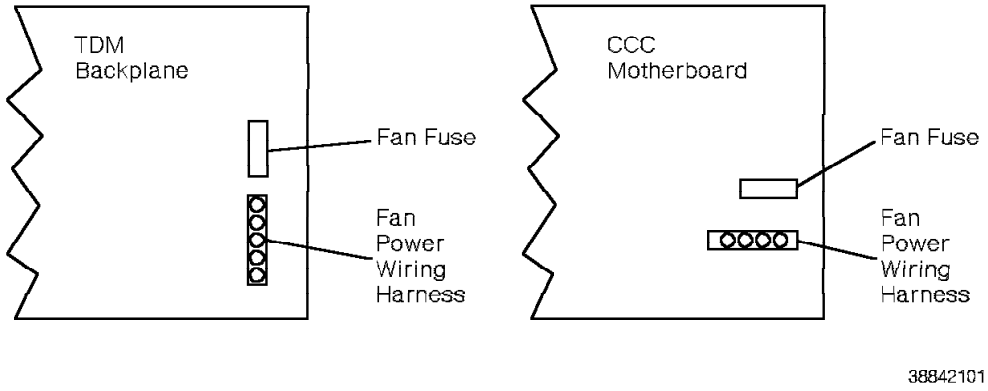


Figure 11-20. Model 40 or 50 Fan Wiring Harness Location

11.40.2 Replacing the Fan Wiring Harness

Replace the fan wiring harness as follows:

1. Connect the fan wiring harness plugs into the four fans and the air flow sensor assembly.
2. Reinstall the fan assembly cover.
3. Squeeze the tabs on the fan wiring harness connector to plug it into the CCC motherboard or the TDM backplane.

11.40.3 Verifying the Procedure

You correctly replaced the fan wiring harness if all fans are operating.

11.41 Hard Disk Drive (Model 10)

The hard disk drive is an integral part of the dual drive assembly. Refer to 11.29, “Dual Drive Assembly (Model 10)” on page 11-53.

11.42 Hard Disk Drive (Models 40 and 50)

Use the following procedures to remove and replace the hard disk drive.

11.42.1 Removing the Hard Disk Drive

CUSTOMER IMPACT

This procedure disables the diskette drive and the hard disk drive. No MAC can be performed.

Note: Ensure that you have a current copy of the software volumes such as configuration (CNFG), core image (CI), and call detail recording (CDR).

Remove the hard disk drive as follows:

1. Type the following DIAG command to disable the hard disk portion of the PDC card:

   ```
   DOWN HD
   ```

   The following warning message appears:

   ```
   WARNING!!! WHEN THE DRIVE IS UPPED, A MINOR RESTART
   WILL BE NECESSARY AFTER COMPLETION OF THE UP OPERATION.

   DO YOU WISH TO PROCEED? (Y/N)
   ```

2. Type the following:

   ```
   Y
   ```

3. Turn off the power switch.
4. Loosen the two 7.9-millimeter (5/16-inch) hex nuts on the front of the drive unit.
5. Remove the disk drive unit from the CCC motherboard.
6. Slide the disk drive unit out of the cabinet.

11.42.2 Replacing the Hard Disk Drive

Important Note: The hard disk drive *must* be compatible with the PDC card that is installed in the 9751 CBX. Ensure this as follows:

Model no. 91323 hard disk drive
Ensure that the 9751 CBX has a model no. 90594, Version B or above, PDCN card installed.

Model no. 91324 hard disk drive,
Ensure that the 9751 CBX has a model no. 90595 PDCE card installed.

Refer to 11.62, “PDC Card” on page 11-110.

Replace the hard disk drive as follows:

1. Ensure that you strap the jumper settings on the drive electronics board as follows:
   - **Model no. 91323 hard disk drive:**
     - Install one jumper plug on the two JMP1 pins.
     - Install the other jumper plug on the two JMP5 pins.
   - **Model no. 91324 hard disk drive:** Install one jumper plug on the two JMP1 pins.
2. Slide the disk drive unit into the correct slot.
3. Use the two 7.9-millimeter (5/16-inch) hex nuts to fasten the front of the disk drive unit to the card cage.
4. Turn on the power switch on the drive electronics board.
5. Type the following command to enable access to the hard disk drive:

   ```
   UP HD
   ```

   The following warning message appears:

   ```
   WARNING!!! THIS WILL CAUSE A MINOR RESTART.
   DO YOU WISH TO PROCEED? (Y/N)
   ```

6. Type the following:

   ```
   Y
   ```

   The following message appears:

   ```
   Waiting 10 seconds for hard disk to spin up...
   ```

   The minor restart begins.

11.42.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the hard disk drive:

```
LIST HD
```

Verify that the existing volumes are readable.

If the drive is not formatted, type the following command:

```
FORMAT HD
```

Follow the system prompts.

After the drive is formatted, copy the volumes from diskette to hard disk. Refer to 6.15, “Copying a Volume from Diskettes to Hard Disk” on page 6-8.

11.43 HSB Cabling for Multiple Cabinets (Models 40 and 50)

Use the following procedures to remove and replace the entire hardware status bus (HSB) in a multicabinet system.

11.43.1 Removing the HSB

CAUTION:
Do not touch the bus bar terminals (Figure 11-22 on page 11-77) next to the HSB connector on the back of the motherboard or backplane. The terminals carry voltages that can be hazardous to you.

CUSTOMER IMPACT

This procedure suspends power and temperature reporting to the SMIOC.

Remove the HSB as follows:

1. Disconnect and remove the HSB connectors from the back of all shelves in each cabinet.
2. In cabinet 2, disconnect the HSB from cabinet 1. The connection is under the bottom shelf and above the LCM or BIM.
3. In cabinet 1, pull the HSB through the left side cable opening. Guide the HSB through the right side cable opening of cabinet 2.
4. Repeat step 3 for each cabinet.

11.43.2 Replacing the HSB

Replace the HSB as follows:

1. Connect the HSB connectors to the back of each shelf in each cabinet.
2. From cabinet 1, push the end of the HSB through the left side cable exit of the cabinet (Figure 11-21 on page 11-76).
3. Guide the HSB through the right side cable exit hole of cabinet 2.

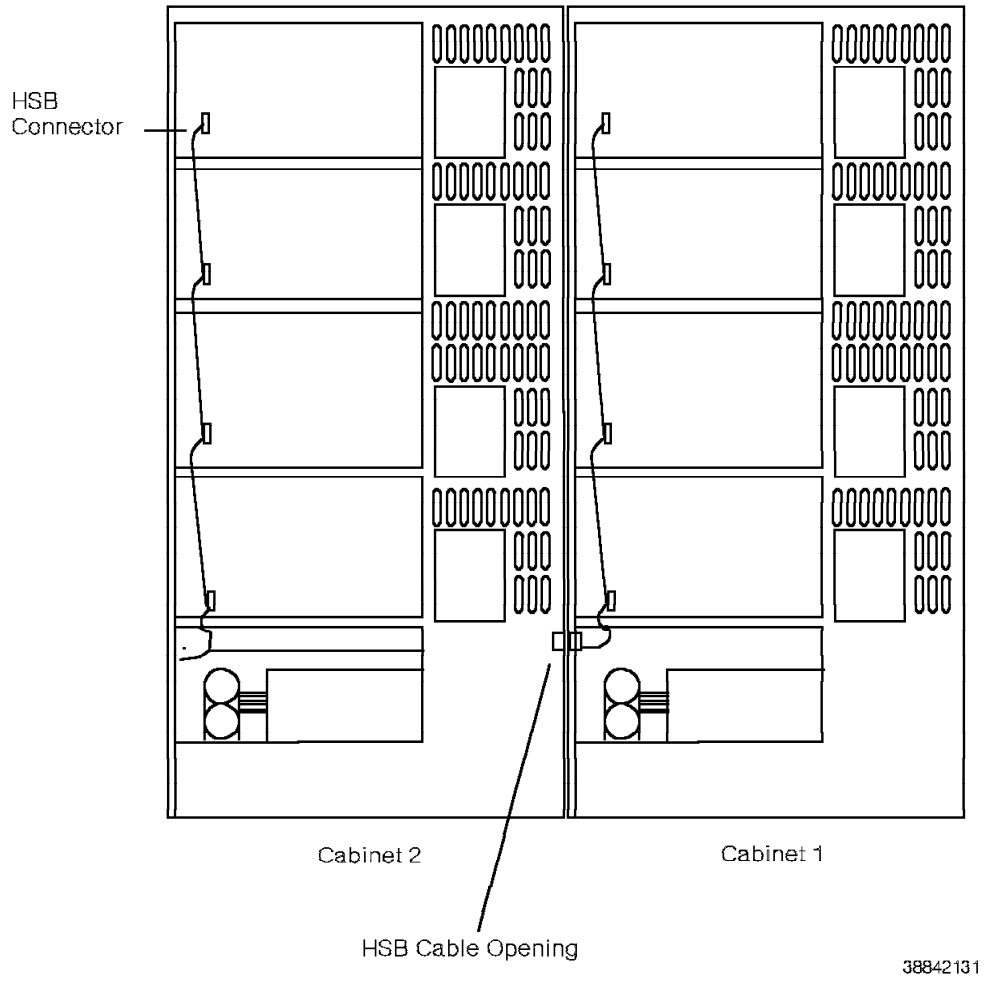


Figure 11-21. HSB Multicabinet System Routing for the Model 40 or 50

4. Thread the HSB through the right side cable exit hole of cabinet 2.
5. Slide the HSB under the bottom shelf and above the LCM or BIM.
6. Connect the HSB in cabinet 2 to the HSB for cabinet 1.
7. Repeat step 6 for each cabinet.
8. For the last cabinet, roll up the end of the HSB and tuck it in above the capacitor assembly.

11.44 HSB Cabling for a Single Cabinet (Models 40 and 50)

Use the following procedures to remove and replace the HSB in a single-cabinet system.

11.44.1 Removing the HSB

CAUTION:
Do not touch the bus bar terminals (Figure 11-22) next to the HSB connector on the back of the motherboard or backplane. The terminals carry voltages that can be hazardous to you.

CUSTOMER IMPACT

This procedure suspends power and temperature reporting to the SMIOC.

Remove the HSB (Figure 11-22) by disconnecting and removing the HSB cable from the connectors on the back of the CCC motherboard and TDM backplane.

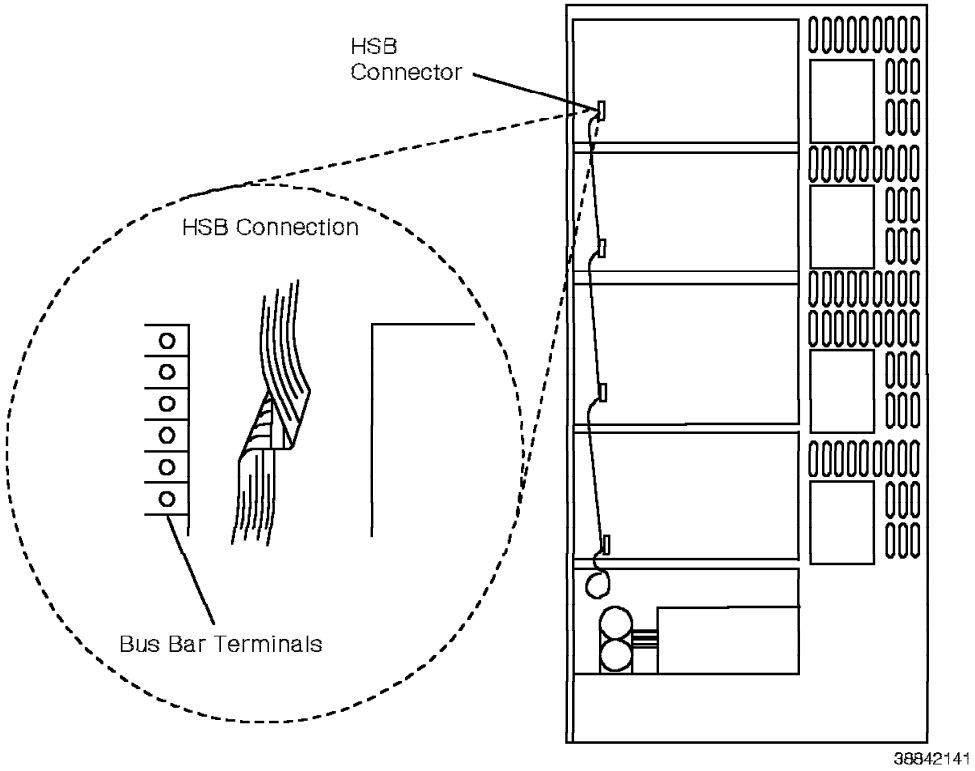


Figure 11-22. HSB Single-Cabinet Routing for the Model 40 or 50

11.44.2 Replacing the HSB

Replace the HSB as follows:

1. Connect the HSB to the connectors on all shelves.
2. Roll the excess cable up and tuck it in above the capacitor assembly.

11.45 I/O Filter Cable Assembly (Models 40 and 50)

Use the following procedures to remove and replace the input/output (I/O) filter cable assembly.

11.45.1 Removing the I/O Filter Cable Assembly

Remove the I/O filter cable assembly as follows:

1. Down the affected cards. Refer to the removal and replacement procedures for each card to determine how each card is downed (courtesy or hard down).

   DOWN PAD <pad_num> C

2. Label and disconnect the associated cables.
3. Remove the top screws.
4. Loosen the bottom screws.
5. At the inside of the I/O filter panel, lift the filter cable assembly up and away.
6. At the CCC motherboard, disconnect the cable releasing the snap latch on the connector.

11.45.2 Replacing the I/O Filter Cable Assemblies

Replace the filter cable assembly as follows:

1. From the inside of the I/O filter panel, slide the filter cable assembly onto the bottom screws.
2. From the outside of the I/O filter panel, insert and tighten the top screws.
3. Tighten the bottom screws.
4. At the motherboard, attach the cable to the connector until the snap latch locks in place.
5. At the I/O filter panel, terminate the correct cables inside and outside the panel.
6. Reinstall the cards.
7. Type the following command to enable the cards:

   UP PAD <pad_num>

11.46 Interface Motherboard (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the following interface motherboards:

- Message waiting
- OPS

11.46.1 Removing the Interface Motherboard

Remove the interface motherboard as follows:

1. Down the affected cards.
2. Remove the cards installed in the interface motherboard.
3. Remove the I/O cables from the back of the interface motherboard.
4. Remove the screws from the interface motherboard.
5. Remove the motherboard from the cabinet.

11.46.2 Replacing the Interface Motherboard

Replace the interface motherboard as follows:

1. Align the interface motherboard with the holes in the cabinet frame.
2. Replace the screws on the interface motherboard.
3. Reconnect the I/O cables to the back of the interface motherboard.
4. Reinstall the cards in the district.
5. Type the following command to enable the cards:

   UP PAD <pad_num>

11.46.3 Verifying the Procedure

You correctly replaced the interface motherboard if the red LED on the OPS or message waiting card is off.

11.47 IPDN Breakout Assembly

Follow ESD prevention procedures when you remove and replace the integrated services digital network (ISDN) primary digital network (IPDN) breakout assembly.

CUSTOMER IMPACT

These procedures remove trunk access to the T1DN card and can cause a disruption in the T1 network. If there is an alternate T1 path, the disruption is only momentary.

11.47.1 Removing the IPDN Breakout Assembly

Remove the IPDN breakout assembly as follows:

1. Type the following command to courtesy down the T1DN card:

   DOWN PAD <pad_num> C

2. Remove the IPDN breakout assembly cover.
3. Remove the IPDN cable from the J4 connector on the breakout assembly.
4. Remove the T1DN cable from the J3 connector on the breakout assembly.
5. Remove the four wood screws that attach the IPDN breakout assembly to the wall.
6. Place the IPDN breakout assembly in the static-free box.

11.47.2 Replacing the IPDN Breakout Assembly

Replace the IPDN breakout assembly as follows:

1. Verify the location of the IPDN breakout assembly within 15 meters (45 feet) of the system.

   Note: Ensure that the IPDN breakout assembly is near the main distribution frame (MDF).

2. Remove the IPDN breakout assembly from the static-free box.
3. Use four wood screws to mount the IPDN breakout assembly on the wall. Verify that the screws are a minimum of 3.8 centimeters (1-1/2 inches) in length. Use longer screws to increase stability.
4. Attach the J2 connector of the IPDN cable to the J4 connector on the IPDN breakout assembly.
5. Route the IPDN cable from the IPDN breakout assembly to the 9751 CBX.
6. **Model 10:** Attach the J1 connector of the IPDN cable to the IPDN card.

   Models 40 and 50: Attach the J1 connector of the IPDN cable to the IPDN card through the I/O filter panel.

7. **Model 10:** Attach the J3 connector of the IPDN cable to the T1DN card.

   Models 40 and 50: Attach the J3 connector of the IPDN cable to the T1DN card through the I/O filter panel.

8. Route the T1DN cable from the J3 connector on the IPDN breakout assembly and attach it to the RJ-48 connector on the channel service unit (CSU).
9. Replace the IPDN breakout assembly cover.

10. Type the following command to enable the card:

    UP PAD <pad_num>

11.47.3 Verifying the Procedure

The IPDN card diagnoses itself by running a basic assurance test (BAT) and shows the results of the test on the digital display. Refer to 4.19.2.3, “Switchpack SW2, Bits 2, 3, and 4 and Corresponding Digit Display Indications” on page 4-40 for a description of digital display indications that occur during diagnostics.

11.48 IPDN Card

Follow ESD prevention procedures when you remove and replace the IPDN card.

CUSTOMER IMPACT

These procedures remove trunk access to the T1DN card and can cause a disruption in the T1 network. If there is an alternate T1 path, the disruption is only momentary.

11.48.1 Removing the IPDN Card

Warning: Coordinate the installation of the IPDN card to ensure the ISDN facility provider does not test and down the T1 circuit. This procedure momentarily disrupts T1 data transmission.

Remove the IPDN card as follows:

1. Record the existing IPDN card switch settings so you can set the replacement card accordingly.
2. Type the following command to disable the T1DN card:

   DOWN PAD <pad_num> C
3. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the IPDN card.
4. Open the card lock levers.
5. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
6. Remove the umbilical cord from the card’s P3 connector.
7. Handling the card by its edges only, slide it out of the shelf.
8. Immediately place the card in a static shielding bag or static-free box.

11.48.2 Replacing the IPDN Card

Replace the IPDN card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Set the switches on the replacement IPDN card to correspond with those of the defective card.
3. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
4. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
5. Close the card lock levers.
6. Remove the umbilical cord from the card’s P3 connector.

7. Type the following command to enable the card:

   UP PAD <pad_num>

11.48.3 Verifying the Procedure

The IPDN card diagnoses itself by running a BAT and shows the results of the test on the digital display. Refer to 4.19.2.3, “Switchpack SW2, Bits 2, 3, and 4 and Corresponding Digit Display Indications” on page 4-40 for a description of digital display indications that occur during diagnostics.

Notes:

- When the LIST ERRH command indicates a T1DN card error, type the following command to determine whether the T1DN card is connected to an IPDN card or to a 9757 ISDN adapter:

  LIST ERRH <pad_num> TEST T1 SHORT ADAMS

  Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

- Use the LIST ALARMS T1 command to determine the status of the T1 span the IPDN card uses.

  Refer to the *9751 CBX, Release 9005/9006m, CLI Reference Manual* for more information.

11.49 ISB Cable (Model 10)

Use the following procedures to remove and replace the ISB cable.

11.49.1 Removing the ISB Cable

CUSTOMER IMPACT

This procedure removes telephony from shelves 2 and 3.

Remove the ISB cable as follows:

1. Squeeze together the connector tabs on the top and bottom of the ISB cable.
2. Pull the connector toward you.

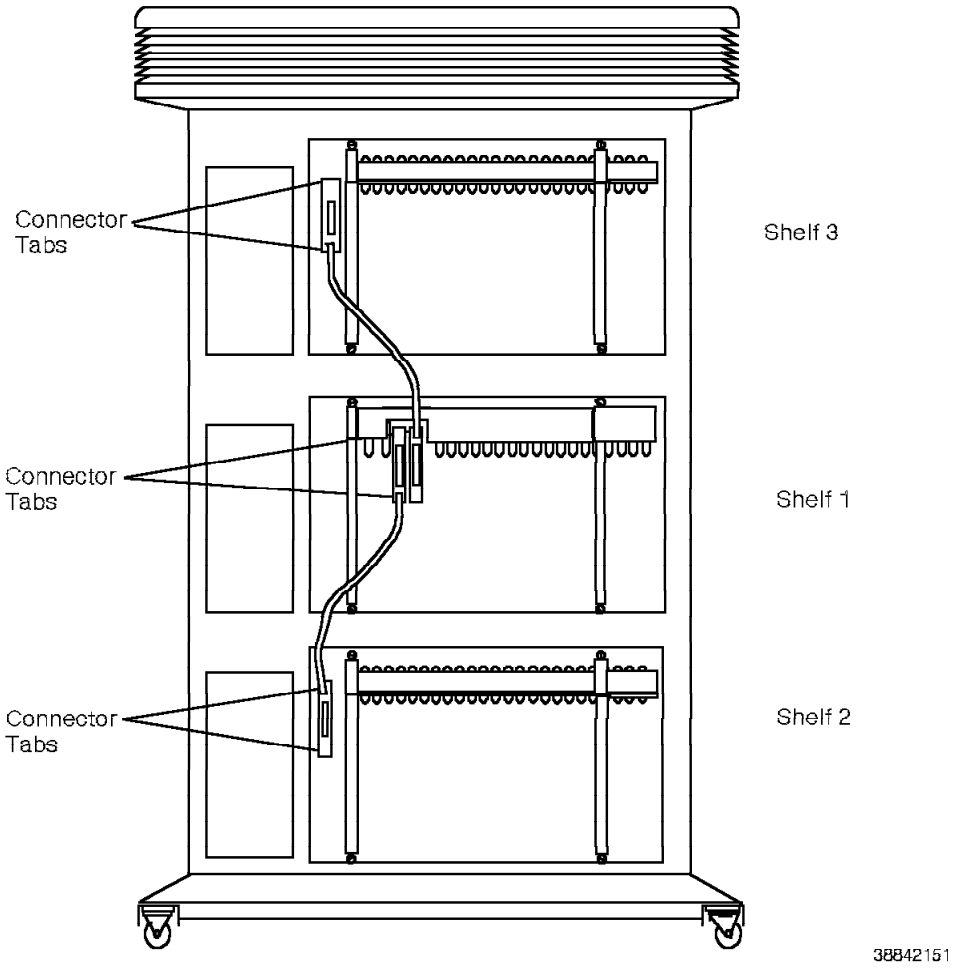


Figure 11-23. Removing the ISB Cable

11.49.2 Replacing the ISB Cable

Replace the ISB cable as follows:

1. Squeeze together the connector tabs on the top and bottom of the ISB cable.
2. Push the ISB connector into place and release the tabs.

11.50 ISB Cable Assembly (Models 40 and 50)

The components of the ISB cable assembly are as follows:

- **Model 40:**
  - Cabinet 1 ISB cable
  - Return cable for 3-cabinet system (two required)
  - Return cable for 4-cabinet system (two required)
  - Return cable for 5-cabinet system (two required)
  - ZIF connectors
- **Model 50:**
  - Cabinet 1 ISB cable
  - Jumper cable (two required)
  - Expansion cable (two required)
  - Cabinet-to-cabinet jumper (two required)
  - Return cable for 3-cabinet system (four required)
  - Return cable for 4-cabinet system (four required)
  - Return cable for 5-cabinet system (four required)
  - ZIF connectors

11.50.1 Cabinet 1 ISB Cable Assembly

Use the following procedures to remove and replace the cabinet 1 ISB cable.

CUSTOMER IMPACT

This procedure removes telephony from the system. Perform all work on the ISB cable after hours or during a customer-designated time.

11.50.1.1 Removing the Cabinet 1 ISB Cable Assembly

Remove the cabinet 1 ISB cable (Figure 11-24 on page 11-87) as follows:

1. Turn off the circuit breaker on the LCM or BIM.
2. Open the ZIF connectors.
3. Remove the extended cards from the ZIF connectors.
4. **Model 40:** Disconnect the two ends of the cabinet 1 ISB cable.

   Model 50: Disconnect the four ends of the cabinet 1 ISB cable.
5. **Model 50:** Fold down the supporting arms of the upper ISB cable support shelf if the system has more than one cabinet.
6. **Model 50:** Fold down the upper ISB cable support shelf if the system has more than one cabinet.
7. Flex the supports loose from the shelf to remove the cabinet 1 ISB cable as one piece.

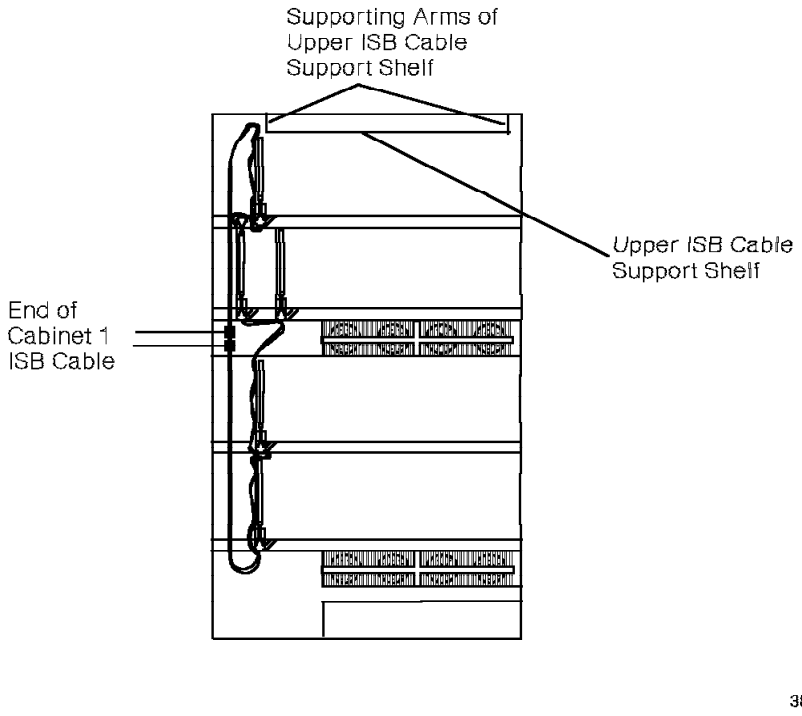


Figure 11-24. Removing the Cabinet 1 ISB Cable Assembly

11.50.1.2 Replacing the Cabinet 1 ISB Cable Assembly

Replace the cabinet 1 ISB cable assembly as follows:

1. Flex the support into location in the correct slot to install the cabinet 1 ISB cable assembly.
2. Put the cables back in the retaining clips.
3. Connect the ends of the cabinet 1 ISB cable to the correct ribbon connectors.
4. Reinstall the extended cards.
5. **Model 50:** Fold the upper ISB cable support shelf up into place if the system has more than one cabinet.
6. **Model 50:** Fold the supporting arms up into position if the system has more than one cabinet.
7. Turn on the circuit breaker on the LCM or BIM.

   Automatic software download begins.

11.50.2 Expansion ISB Cable

Use the following procedures to remove and replace the expansion ISB cable. An expansion cabinet is any cabinet in the system other than cabinet 1.

Refer to Appendix B, “Models 40 and 50 Intershelf Bus Cabling” for ISB cable routing diagrams.

11.50.2.1 Removing the Expansion ISB Cable

CUSTOMER IMPACT

This procedure removes telephony from the system. Perform all work on the ISB cable after hours or during a customer-designated time.

Remove an expansion ISB cable as follows:

1. Power off all the cabinets in the system.
2. Remove the extended cards from the ZIF connectors.
3. **Model 40:** Disconnect the two ends of the expansion ISB cable.

   Model 50: Disconnect the four ends of the expansion ISB cable.
4. Flex the supports loose from the shelf to remove the expansion ISB cable, ZIF connectors, and ZIF supports.

11.50.2.2 Replacing an Expansion ISB Cable

Replace an expansion ISB cable as follows:

1. Flex the support into location in the correct slot to install the replacement expansion ISB cable, ZIF connectors, and ZIF supports.
2. Connect the ends of the expansion ISB cable to the correct ribbon connectors.
3. Reinstall the extended cards.
4. Power on all the cabinets in the system.

11.50.3 Jumper ISB Cable

Use the following procedures to remove and replace a jumper ISB cable.

Refer to Appendix B, “Models 40 and 50 Intershelf Bus Cabling” for ISB cable routing diagrams.

11.50.3.1 Removing a Jumper ISB Cable

CUSTOMER IMPACT

This procedure removes telephony from the system. Perform all work on the ISB cable after hours or during a customer-designated time.

Remove a jumper ISB cable as follows:

1. Power off all the cabinets in the system.
2. **Model 40:** Disconnect the two ends of the jumper ISB cable.

   Model 50: Disconnect the four ends of the jumper ISB cable.
3. **Model 50:** Fold down the supporting arms of the upper ISB cable support shelf.
4. **Model 50:** Fold down the upper ISB cable support shelf.
5. Remove the jumper ISB cable.

11.50.3.2 Replacing an Expansion ISB Cable

Replace an expansion ISB cable as follows:

1. Install the new jumper ISB cable.
2. Connect the ends of the jumper ISB cable to the correct ribbon connectors.
3. **Model 50:** Fold the upper ISB cable support shelf up into place.
4. **Model 50:** Fold the supporting arms up into position.
5. Power on all the cabinets in the system.

11.50.4 Return ISB Cable

Use the following procedures to remove and replace a return ISB cable.

Refer to Appendix B, “Models 40 and 50 Intershelf Bus Cabling” for ISB cable routing diagrams.

11.50.4.1 Removing a Return ISB Cable

CUSTOMER IMPACT

This procedure removes telephony from the system. Perform all work on the ISB cable after hours or during a customer-designated time.

Remove a return ISB cable as follows:

1. Power off all the cabinets in the system.
2. Disconnect the two ends of the return ISB cable.
3. **Model 50:** Fold down the supporting arms of the upper ISB cable support shelf in all cabinets.
4. **Model 50:** Fold the upper ISB cable support shelf down in all cabinets.
5. Remove the return ISB cable.

11.50.4.2 Replacing a Return ISB Cable

Replace a return ISB cable as follows:

1. Connect the ends of the new return ISB cable to the correct ribbon connectors.
2. **Model 50:** Fold the upper ISB cable support shelf up into place in all cabinets.
3. **Model 50:** Fold the supporting arms up into position in all cabinets.
4. Power on all the cabinets in the system.

11.51 LCM (Models 40 and 50)

Use the following procedures to remove and replace the LCM.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

CAUTION:
The LCM weighs approximately 175 lb. Two people are needed to remove the LCM from the cabinet.

11.51.1 Removing the LCM

CUSTOMER IMPACT

This procedure removes power to the cabinet. Replacing the LCM in cabinet 1 removes telephony in the system.

From the front of the cabinet (Figure 11-25 on page 11-92):

1. Unlock and remove the kick panel on the bottom of the cabinet.
2. **DANGER**

   Input voltage is present on the PEA until you unplug the main power supply cord in step 3.

   Turn off the cabinet circuit breaker.
3. Unplug the main power supply cord from the receptacle.
4. **DANGER**

   Before proceeding, use an analog multimeter to verify 0 Vac between:

   - **The power supply cord conductors**
   - **Each conductor and ground**

   Label and remove the power supply cord conductors from the terminals on the front of the PEA.
5. Remove the green equipment grounding conductor from the terminal on the front of the PEA.
6. Disconnect the EPO connector from the front of the PEA.
7. Remove the screws from the lower horizontal door bracket.
8. Remove the LCM cover plate.

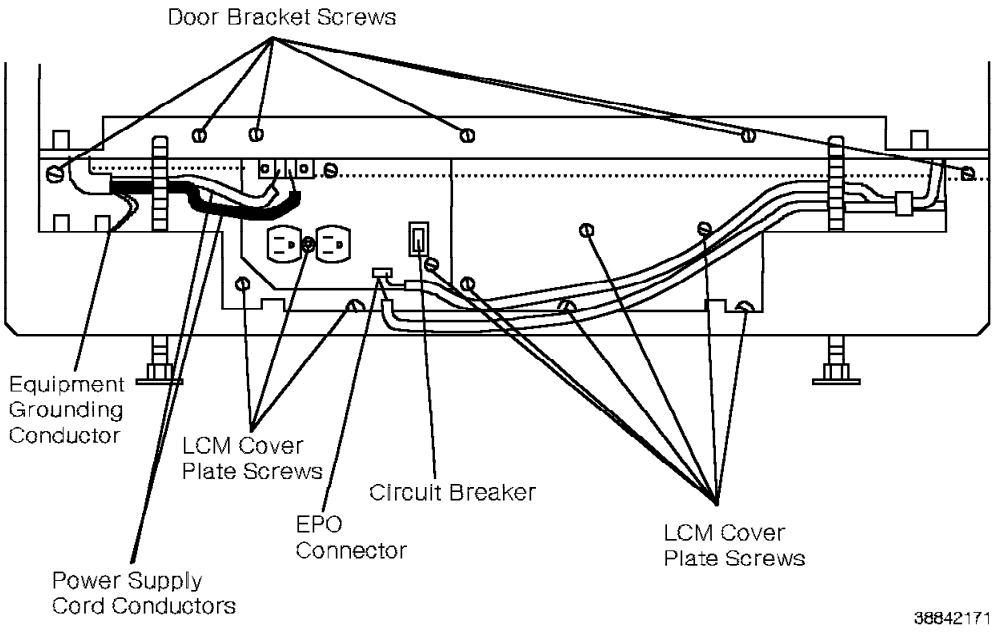


Figure 11-25. Removing the Model 40 or 50 LCM—Front View

From the back of the cabinet (Figure 11-26):

9. Remove the LCM cover as follows:
   a. Loosen the screws at the bottom of the cover.
   b. Remove the screws at the top of the cover.
   c. Lift the cover out of the cabinet.

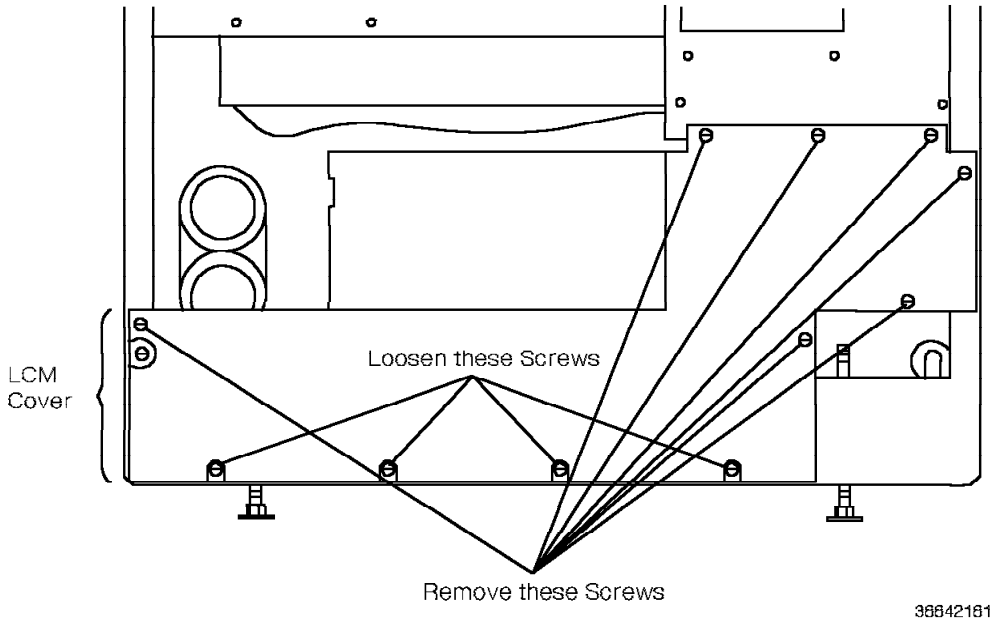


Figure 11-26. Removing the Model 40 or 50 LCM Cover—Back View

10. Remove the three screws on the power bus bar tabs (Figure 11-27).
11. **Warning:** You can cause the power bus bar tabs to short out if you bend them too far.

    Carefully bend the bus bar tabs back to allow room to slide the LCM out of the back of the cabinet.
12. Remove the L-brackets from the sides of the LCM.
13. From the back of the cabinet, with a person on either side, slide the LCM out of the cabinet until two-thirds of the front of the LCM is resting in the cabinet.
14. Use the openings in the sides of the LCM to pivot it out of the cabinet.

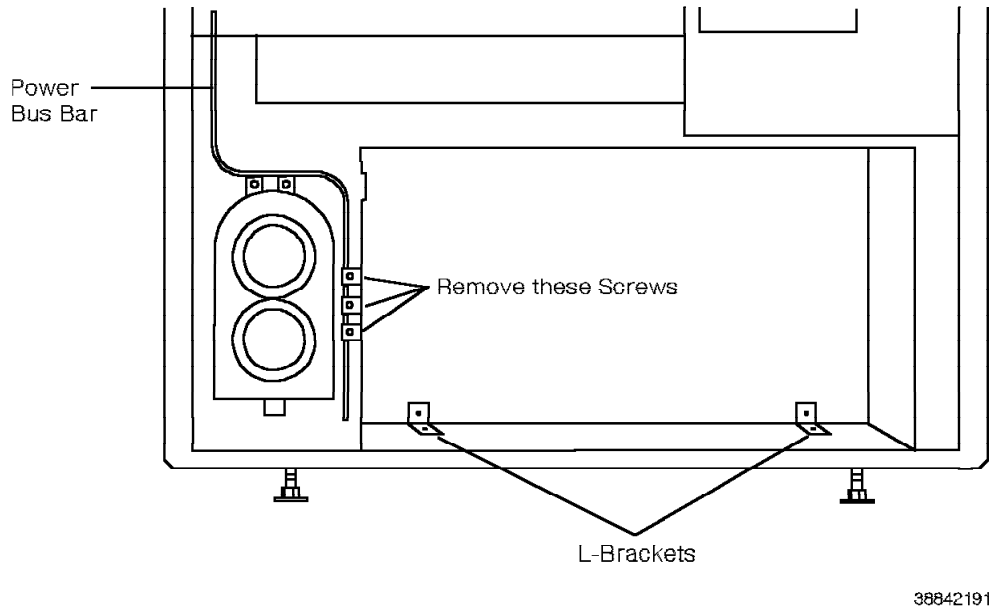


Figure 11-27. Removing the Model 40 or 50 LCM—Back View

11.51.2 Replacing the LCM

CAUTION:
The LCM weighs approximately 175 lb. Do not attempt to lift it alone.

1. Ensure that the jumper strap on the replacement LCM (Figure 11-28 on page 11-94) is correctly set:
   - For 208 Vac, the jumper should be between A1TB1-1 and A1TB1-3.
   - For 240 Vac, the jumper should be between A1TB1-1 and A1TB1-2.

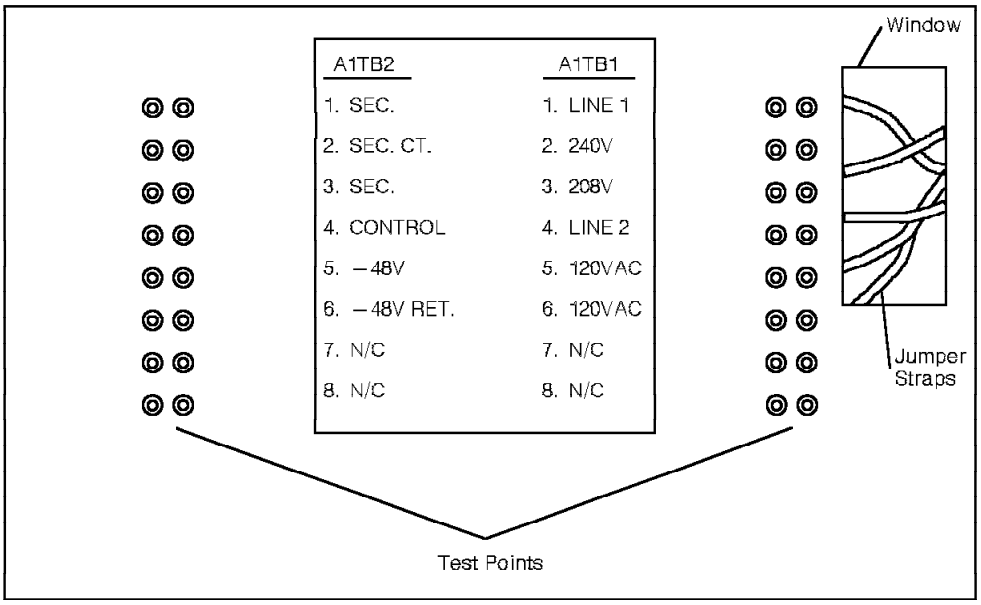


Figure 11-28. Model 40 or 50 LCM Jumper and Test Points

From the back of the cabinet:

2. Ensure that the circuit breaker on the LCM is off.
3. Use the openings in the sides of the LCM to pivot it back.
4. From the back of the cabinet, with a person on either side, slide the LCM into the cabinet until two-thirds of the front of the LCM is resting in the cabinet.
5. Push the LCM all the way into the cabinet, taking care not to bend the power bus bar tabs.
6. Reinstall the L-brackets on the sides of the LCM.
7. **Warning:** You can cause the power bus bar tabs to short out if you bend them too far.

   Reconnect the three bus bar tabs.
8. Reinstall the LCM cover.
9. Replace the upper seven screws on the LCM cover.
10. Tighten the lower four screws on the back LCM cover.

From the front of the cabinet:

11. Replace the LCM cover plate.
12. Replace the six screws on the lower horizontal door bracket.
13. Reconnect the EPO connector on the front of the PEA.
14. Reconnect the green equipment grounding conductor to the terminal on the front of the PEA.

a a
15. Reconnect the power supply cord conductors to the terminals on the front of the PEA.

Note: Tighten the terminals until they make contact, then tighten them an additional quarter turn.

16. **DANGER**

    You *must* perform steps 16a through 16d before you power on the 9751 CBX.

    Verify as follows that the 9751 CBX cabinet frame is safe to touch when powered on:

    a. Establish a ground reference point near the 9751 CBX cabinet.

       Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

       The following are recommended ground reference points:

       - Effectively grounded metal conduit or metal receptacle outlet
       - Effectively grounded structural building steel or metal water pipe

    b. **DANGER**

       Do not touch the 9751 CBX cabinet frame at this time.

       Plug the 9751 CBX power supply cord into the branch circuit receptacle.

    c. Use the analog multimeter to test for less than 1 Vac between the ground reference point and the 9751 CBX cabinet frame.

    d. Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2) on the 9751 CBX cabinet frame. Refer to the power and grounding kit's instruction booklet.

17. Verify the operation of the EPO switch as follows:

    a. Ensure that the hard disk drive unit power switch is off.

    b. Ensure the EPO switch is in the ON (*1*) position.

    c. Turn on the PEA circuit breaker.

       Wait approximately 1 minute to ensure that the PEA circuit breaker does not trip.

    d. Move the EPO switch to the OFF (*0*) position to power off the 9751 CBX.

       Verify that power has been removed from *every cabinet* in the system.

       CAUTION:
       If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

    e. Restore power to all 9751 CBX cabinets as follows:

       1) Move the previously tested EPO switch to the ON (*1*) position.

       2) Turn on each PEA circuit breaker in the system.

    f. Turn on the hard disk drive unit power switch.

11.51.3 Verifying the Procedure

Performing steps 16 and 17 in 11.51.2, “Replacing the LCM” on page 11-93 verifies correct replacement of the LCM.

Table 11-1 lists and describes the LCM test points.

Table 11-1. LCM Test Points

Terminal Block	Test Points	Explanation	Use	Range
A1TB1	1 and 4	Input power connections from PEA	Verifies input voltage from PEA	181 Vac to 221 Vac for 208 Vac system 209 Vac to 255 Vac for 240 Vac system
	2 and 3	Input voltage selection taps on primary winding of main transfomer	Selects 208 Vac or 240 Vac input to main transformer	None
	5 and 6	Windings for service outlet transformer	Verifies output from convenience receptacle	110 Vac to 120 Vac
	7 and 8	Spares	None	None
A1TB2	1 to 3	Secondary winding connections of main transformer	Verifies transformer operation	120 V (96 Vac to 144 Vac output range
	4	Secondary control winding	Internal control	No measure
	5 and 6	LCM output connections	Verifies correct output voltage to power bus bar	−40 Vdc to −70 Vdc
	7 and 8	Spares	None	None

11.52 LSM Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the LSM card.

11.52.1 Removing the LSM Card

CUSTOMER IMPACT

This procedure removes telephony from the affected shelf.

Remove the LSM card as follows:

1. Type the following DIAG command to courtesy down all cards installed on the affected shelf:

   DOWN PAD <pad_num> C

2. Turn off the −48 Vdc circuit breaker (CB2) on the LSM card.
3. Use the card extractor to unseat the LSM card from the TDM backplane.
4. Handling the card by its edges only, slide it out of the shelf.
5. Immediately place the card in a static shielding bag or static-free box.

11.52.2 Replacing the LSM Card

Replace the LSM card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Set the DIP switches according to the old one.
3. Ensure that the LSM card's −48 Vdc circuit breaker (CB2) is off.
4. Slide the card into the correct slot until it seats into the TDM backplane.
5. Turn on the −48 Vdc circuit breaker (CB2) on the LSM card.
6. Type the following command to enable the cards on the affected shelf:

   UP PAD <pad_num>

11.52.3 Verifying the Procedure

Verify that you correctly replaced the LSM card as follows:

1. Type the following command to clear the error table:

   CLEAR ERRH <node>

   where <**node**> is ALL or <current node>.

2. Type the following command to list the error table and verify that the −48 Vdc failure was reported for the correct shelf:

   LIST ERRH

11.53 Memory Battery Assembly (Models 40 and 50)

Use the following procedures to remove and replace the memory battery assembly.

11.53.1 Removing the Memory Battery Assembly

Remove the memory battery assembly (Figure 11-29) as follows:

1. **Model 40:** Unplug the battery wires from the J1 connector on the 9030A CCC motherboard.

   Model 50: Unplug the battery wires from the J1 and J2 connectors on the 9030A CCC motherboard.

2. Free the wiring from the cable clips under shelf 2.
3. Remove the nut from the top of the battery carriage.
4. **Warning:** Hold the battery carriage to prevent the battery from falling out.

   Lift the carriage and contents out of the cabinet.

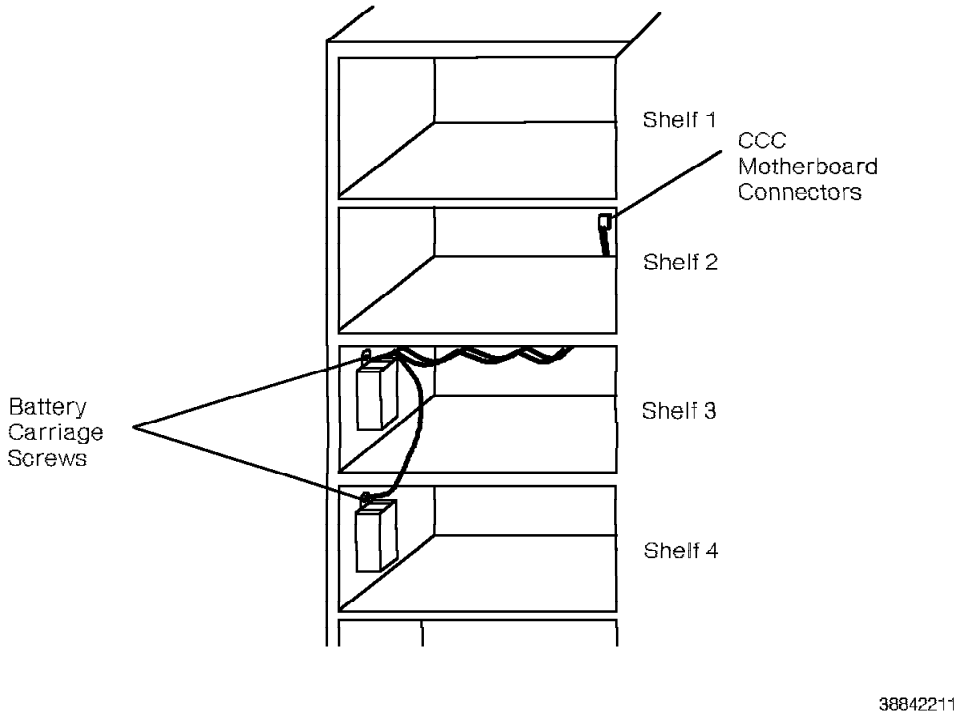


Figure 11-29. Removing the Model 40 or 50 Memory Battery Assembly

11.53.2 Replacing the Memory Battery Assembly

Replace the memory battery assembly as follows:

1. Measure the voltage on the cable connector. The voltage range should be −12 Vdc to −13.2 Vdc.
2. Insert the new battery in the carriage.
3. Mount the carriage on the left side of the cabinet.
4. Use the nut driver to tighten the nut on the top of the battery carriage.

   Note: Tighten the nut until it makes contact; then tighten it an additional quarter turn.
5. Secure the battery wire to the cable clips under shelf 2.
6. **Model 40:** Connect the battery wires to the J1 connector on the 9030A CCC motherboard.

   Model 50: Connect the battery wires to the J1 and J2 connectors on the 9030A CCC motherboard.

11.54 Memory Battery Fuse (Models 40 and 50)

Use the following procedures to remove and replace the memory retention battery fuse.

11.54.1 Removing the Memory Battery Fuse

Remove the memory battery fuse as follows:

1. **Model 40:** Unplug the battery wires from the J1 connector on the 9030A CCC motherboard.

   Model 50: Unplug the battery wires from the J1 and J2 connectors on the 9030A CCC motherboard.

2. Twist the top of the fuse holder (Figure 11-30) counterclockwise.
3. Pull the 20-amp fuse out of the holder.

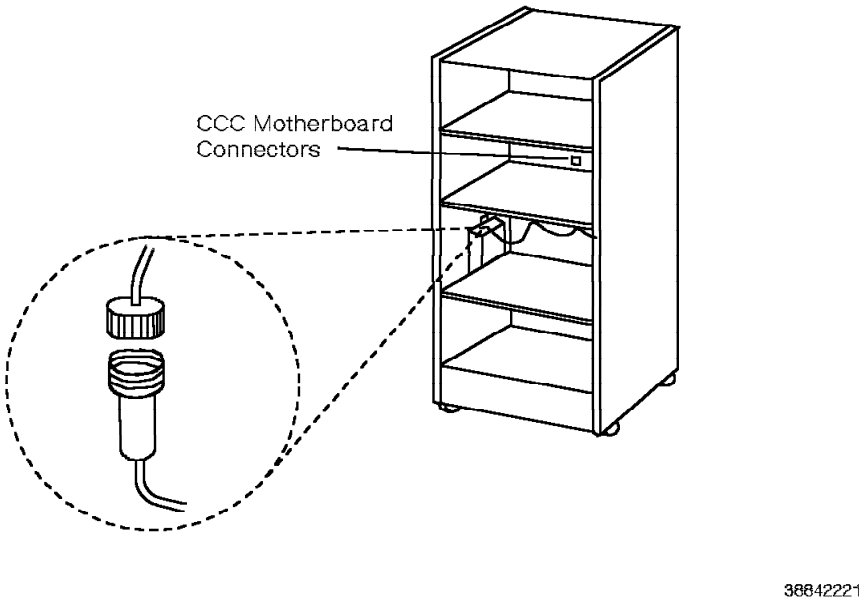


Figure 11-30. Removing the Model 40 or 50 Memory Battery Fuse

11.54.2 Replacing the Memory Battery Fuse

Replace the memory battery fuse as follows:

1. Place the replacement fuse in the fuse holder.
2. Twist the top of the fuse holder clockwise.
3. **Model 40:** Connect the battery wires to the J1 connector on the 9030A CCC motherboard.

   Model 50: Connect the battery wires to the J1 and J2 connectors on the 9030A CCC motherboard.

   Contact your next level of support if the replacement fuse blows.

11.55 Memory Card (Model 10)

Follow ESD prevention procedures when you remove and replace the memory card.

11.55.1 Removing the Memory Card

CUSTOMER IMPACT

This procedure removes telephony from the system.

Remove the memory card as follows:

1. Unplug the memory battery cable from the backplane.
2. Turn off the shelf 1 power supply.
3. Open the card lock levers.
4. Handling the card by its edges only, slide it out of the shelf.
5. Immediately place the card in a static shielding bag or static-free box.

11.55.2 Replacing the Memory Card

Replace the memory card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it seats in the backplane.
3. Close the card lock levers.
4. Plug in the memory battery cable on the backplane of the Model 10.
5. Turn on the shelf 1 power supply.

   Automatic software download begins.

11.55.3 Verifying the Procedure

You correctly replaced the memory card if the LEDs CR5 and CR6 on the memory controller card are off.

11.56 Memory Controller Card (Model 10)

Follow ESD prevention procedures when you remove and replace the memory controller card.

11.56.1 Removing the Memory Controller Card

CUSTOMER IMPACT

This procedure removes telephony from the system.

Remove the memory controller card as follows:

1. Turn off the shelf 1 power supply.
2. Remove the edge connectors.
3. Open the card lock levers.
4. Handling the card by its edges only, slide it out of the shelf.
5. Immediately place the card in a static shielding bag or static-free box.

11.56.2 Replacing the Memory Controller Card

Replace the memory controller card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it seats in the backplane.
3. Close the card lock levers.
4. Replace the edge connectors.
5. Turn on the shelf 1 power supply.

   Automatic software download begins.

11.56.3 Verifying the Procedure

You correctly replaced the memory controller card if the CR5 and CR6 LEDs are off.

11.57 Memory Retention Battery (Model 10)

Use the following procedures to remove and replace the memory retention battery.

11.57.1 Removing the Memory Retention Battery

Remove the memory retention battery (Figure 11-31) as follows:

1. Loosen the two captured fasteners at the top of the battery case.
2. Loosen the two screws on the bottom of the battery case.
3. Slide the battery case up and away from the power supply.
4. Unplug the battery.
5. Remove the battery from the case.

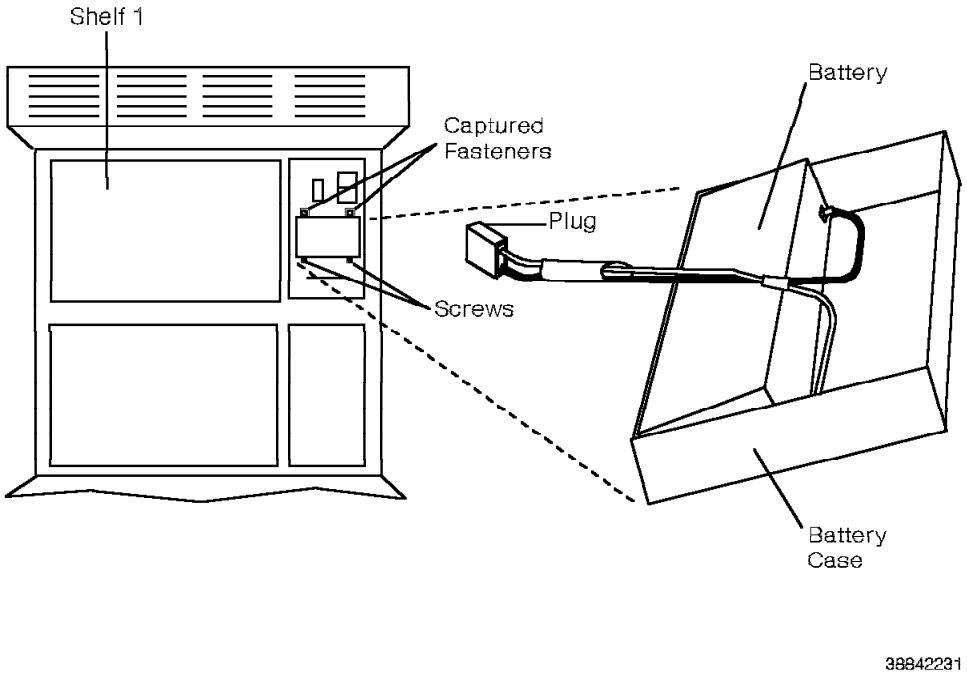


Figure 11-31. Removing the Memory Retention Battery

11.57.2 Replacing the Memory Retention Battery

Replace the memory retention battery as follows:

1. Plug the replacement battery into the battery receptacle.
2. Place the battery case on the screws on the power supply.
3. Tighten the two screws on the bottom of the battery case.
4. Tighten the two captured fasteners at the top of the battery case.

11.58 Message Waiting Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the message waiting card.

11.58.1 Removing the Message Waiting Card

CUSTOMER IMPACT

This procedure removes service from one message waiting card.

Remove the message waiting card as follows:

1. Type the following DIAG command to courtesy down the message waiting card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the message waiting card.

3. Use the card extractor to unseat the message waiting card from the TDM backplane.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.58.2 Replacing the Message Waiting Card

Replace the message waiting card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the TDM backplane, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.58.3 Verifying the Procedure

Type the following command to verify that you replaced the message waiting card correctly:

TEST MW <pad_num> 3

The following message appears if you correctly replaced the card:

Analysis Complete: Channel passed.

Note: Test all channels on the card.

11.59 MW8 Card

Follow ESD prevention procedures when you remove and replace the message waiting 8-channel (MW8) card.

11.59.1 Removing the MW8 Card

Remove the MW8 card as follows:

1. Type the following DIAG command to courtesy down the MW8 card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the MW8 card.

3. Open the card lock levers.
4. Use the card extractor to unseat the MW8 card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.59.2 Replacing the MW8 Card

Replace the MW8 card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.59.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the MW8 card:

```
TEST MW8 <start_pad..end_pad> 3
```

You can specify a single MW8 PAD or a range of PADs.

For example, if you use the TEST MW8 command for a card at PAD 030601, the system responds as follows if you correctly replaced the card:

```
% TEST MW8 030601 1

%
*** Initiating MW8 analysis
--- START TEST MW8_INTEG (MW8) 01/030601

%
*  DONE TEST MW8_INTEG (MW8) 01/030601 PASSED

--- START TEST MW8_LOCAL_LOOPBACK (MW8) 01/030601

%
*  DONE TEST MW8_LOCAL_LOOPBACK (MW8) 01/030601 PASSED

--- START TEST MW8_LAMP (MW8) 01/030601

%
*  DONE TEST MW8_LAMP (MW8) 01/030601 PASSED

*** Analysis Complete:
            Channel passed.
```

Note: Test all channels on the card.

11.60 OPS Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the OPS card.

11.60.1 Removing the OPS Card

CUSTOMER IMPACT

This procedure removes off-premises stations associated with the card from service.

Remove the OPS card as follows:

1. Type the following DIAG command to courtesy down the OPS card:

   `DOWN PAD <pad_num> C`

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the OPS card.

3. Open the card lock levers.
4. Use the card extractor to unseat the OPS card from the TDM backplane.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.60.2 Replacing the OPS Card

Replace the OPS card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the TDM backplane, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   `UP PAD <pad_num>`

11.60.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the OPS card:

`TEST OPS <pad_num> 3`

The following message appears if you correctly replaced the card:

`Analysis Complete: Channel passed.`

Note: Test all channels on the card.

11.61 OPS8 Card

Follow ESD prevention procedures when you remove and replace the off-premises station 8-channel (OPS8) card.

11.61.1 Removing the OPS8 Card

CUSTOMER IMPACT

This procedure removes off-premises stations associated with the card from service.

Remove the OPS8 card as follows:

1. Type the following DIAG command to courtesy down the OPS8 card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the OPS8 card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.61.2 Replacing the OPS8 Card

Replace the OPS card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.61.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the OPS8 card:

```
TEST OPS8 <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete: Channel passed.
```

Note: Test all channels on the card.

11.62 PDC Card

Follow ESD prevention procedures when you remove and replace the PDC card.

11.62.1 Removing the PDC Card

CUSTOMER IMPACT

This procedure disallows access to the diskette drive or the hard disk.

Remove the card as follows:

1. Type the following DIAG command to down the PDC card:

   ```
   DOWN PDC
   ```

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the PDC card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.62.2 Replacing the PDC Card

If you removed the model no. 90594 PDCN card, Version B or above, replace it with another PDCN card if one is available. Otherwise, replace it with a model no. 90595 PDCE card.

Important Note: The replacement card *must* be compatible with the Model 10 dual drive assembly or the Model 40 or 50 hard disk drive.

If you remove a PDCN card and replace it with a PDCE card:

- Remove the Model 10 model no. 91215A dual drive assembly and replace it with a model no. 91216 dual drive assembly.
- Remove the Model 40 or 50 model no. 91323 hard disk drive and replace it with a model no. 91324 hard disk drive.

Refer to 11.29, “Dual Drive Assembly (Model 10)” on page 11-53 and 11.42, “Hard Disk Drive (Models 40 and 50)” on page 11-73.

Replace the PDC card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. **PDCN card:** Ensure that DIP switch 8 on SW2 is set to *On*; all other DIP switches on both switchpacks should be set to *Off*.
3. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the CCC motherboard of the Model 40 or 50, but do *not* seat the card.

4. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
5. Close the card lock levers.
6. Remove the umbilical cord from the card's P3 connector.
7. Type the following command to enable the card:

   ```
   UP PDC
   ```

11.62.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the PDC card:

```
TEST PDC
```

The following message appears if you correctly replaced the card:

```
PDC CPU test -- PASSED

PDC ROM test -- PASSED

Hard Disk RAM test -- PASSED

Floppy RAM test -- PASSED

Floppy FDC test -- PASSED
```

Note: After you replace the PDC card, the system may require a minor restart before it recognizes the diskette and hard disk drives.

11.63 PEA, AC (Model 10)

Use the following procedures to remove and replace the ac PEA.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

DANGER

Do *not* wear the ESD wrist strap while you work on the PEA.

11.63.1 Removing the AC PEA

CUSTOMER IMPACT

This procedure downs the system.

Remove the ac PEA as follows:

1. **DANGER**

   Input voltage is present on the PEA until you unplug the power supply cord in step 2.

   Ensure that the PEA circuit breaker (Figure 11-32 on page 11-113) is set to *OFF*.

2. Unplug the main power supply cord from the receptacle. Ensure that the cord moves freely to permit easy removal of the PEA.
3. Unplug the shelf power supply cords from the PEA's power supply receptacles.
4. **PEA model no. 95535A and 95536A:** Disconnect the EPO switch cable as follows:
   a. Remove the cabinet top.
   b. Loosen the EPO safety shield screw.
   c. Pull down on the EPO safety shield and disengage it from the cabinet frame.
   d. Unplug the EPO switch cable.
5. Loosen the screw that secures the green equipment grounding conductor to the cabinet frame.
6. Remove the PEA mounting screws.
7. Remove the PEA from the frame.

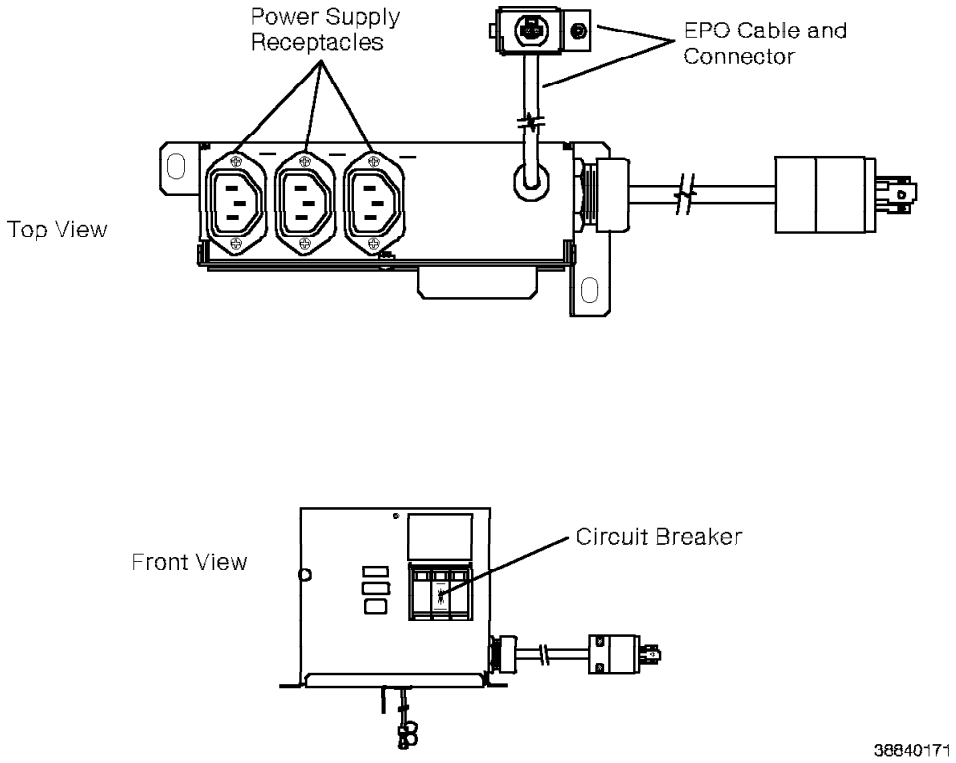


Figure 11-32. Removing the Model 10 AC PEA

11.63.2 Replacing the AC PEA

Follow these guidelines when you replace the ac PEA:

- If you removed the model no. 95535A 110 Vac PEA, replace it with another if one is available. Otherwise, replace it with a model no. 95535B 110 Vac PEA.
- If you removed the model no. 95536A 240 Vac PEA, replace it with another if one is available. Otherwise, replace it with a model no. 95536B 240 Vac PEA.

Important Note: The model no. 95535B and 95536B ac PEAs do *not* have EPO switch cable connectors. When you install either of these PEAs, the cabinet no longer has EPO capabilities.

If you remove a model no. 95535A or 95536A ac PEA and replace it with a model no. 95535B or 95536B ac PEA:

- Remove the cabinet's EPO switch. Refer to 11.32.1, "Removing the EPO Switch" on page 11-59.
- Use the model no. 95551 EPO plate to cover the cabinet's EPO switch cutout. The plate attaches with its adhesive backing.

Replace the PEA as follows:

1. Ensure that the replacement PEA's circuit breaker is set to *OFF*.
2. Place the PEA on the frame.
3. Replace the mounting screws.

4. Place the green equipment grounding conductor under the screw and then tighten the screw.
5. **PEA model no. 95535A and 95536A:** Connect the EPO switch cable as follows:
   a. Connect the EPO switch cable to the EPO switch cable connector.
   b. Replace the EPO safety shield at the top of the fan plenum assembly.
   c. Replace the cabinet top.
6. Plug the shelf power supply cords into the PEA's power supply receptacles.
7. **DANGER**

   You *must* perform steps 7a through 7d before you power on the Model 10.

   Verify as follows that the Model 10 frame is safe to touch when powered on:

   a. Establish a ground reference point near the Model 10.

      Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

      The following are recommended ground reference points:

      - Effectively grounded metal conduit or metal receptacle outlet
      - Effectively grounded structural building steel or metal water pipe

   b. **DANGER**

      Do not touch the Model 10 cabinet frame at this time.

      Plug the Model 10 power supply cord into the branch circuit receptacle.

   c. Use the analog multimeter to test for less than 1 Vac between the ground reference point and the Model 10 frame.

   d. Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2) on the Model 10 frame. Refer to the power and grounding kit's instruction booklet.
8. If the Model 10 does *not* have an EPO switch:
   a. Turn on the PEA circuit breaker.
   b. Turn on the hard disk drive unit power switch.

   If the Model 10 has an EPO switch, verify its operation as follows:

   a. Ensure that the hard disk drive unit power switch is off.
   b. Ensure the EPO switch is in the ON (*1*) position.
   c. Turn on the PEA circuit breaker.

      Wait approximately 1 minute to ensure that the PEA circuit breaker does not trip.

d. Move the EPO switch to the OFF (*0*) position to power off the Model 10.

   CAUTION:
   If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

e. Restore power to the Model 10 as follows:

   1) Move the EPO switch to the ON (*1*) position.

   2) Turn on the PEA circuit breaker.

f. Turn on the hard disk drive unit power switch.

11.64 PEA, DC (Model 10)

Use the following procedures to remove and replace the dc PEA.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

CAUTION:
Two people, one of whom must be an electrical contractor, must be present at all times. Stop immediately if any of the procedures fail in any test. Notify your manager and the customer of the condition. Do not attempt the test again until you are notified that the situation is corrected.

DANGER

Do *not* wear the ESD wrist strap while you work on the PEA.

11.64.1 Removing the DC PEA

Remove the dc PEA as follows:

1. Ensure that the PEA circuit breaker (Figure 11-33 on page 11-117) is set to *OFF*.
2. **DANGER**

   Before proceeding, instruct the electrical contractor to ensure the following:

   - **The circuit breaker for the dc branch circuit conductors to the cabinet is turned off and tagged *OFF***

     or

   - **The fuse for the dc branch circuit is removed and tagged *OFF*.**

   Remove the cover of the PEA.
3. Establish a ground reference point near the Model 10.

   Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.
4. Use the analog multimeter to check for less than 1 Vac and 1 Vdc between:
   - The PEA terminals
   - The ground reference point, the Model 10 frame, and each PEA terminal
5. Instruct the electrical contractor to identify and tag the dc branch circuit conductors at the PEA (Figure 11-34 on page 11-118).
6. Instruct the electrical contractor to loosen the terminal block screws.
7. Instruct the electrical contractor to remove the wires from the PEA terminals.
8. Instruct the electrical contractor to remove the conduit and conduit bushing.
9. Unplug the cords from the dc power supply receptacles.

10. **PEA model no. 95538:** Disconnect the EPO switch cable as follows:
    a. Remove the cabinet top.
    b. Loosen the EPO safety shield screw.
    c. Pull down on the EPO safety shield and disengage it from the cabinet frame.
    d. Unplug the EPO switch cable.
11. Loosen the mounting screw.
12. Place your hands on either side of the dc PEA and lift it from the Model 10 frame.

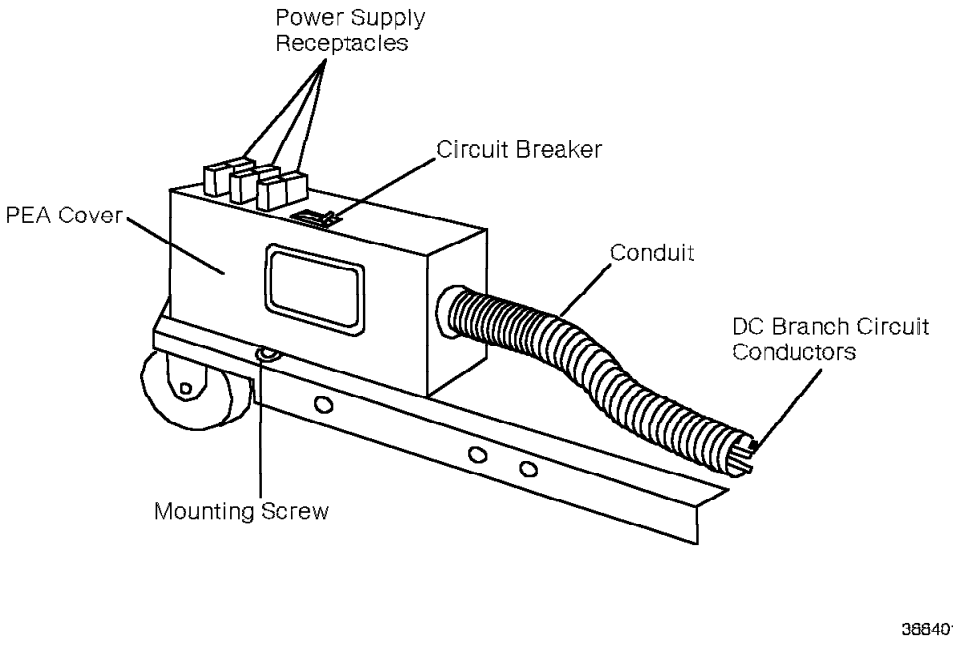


Figure 11-33. Removing the Model 10 DC PEA—Back View

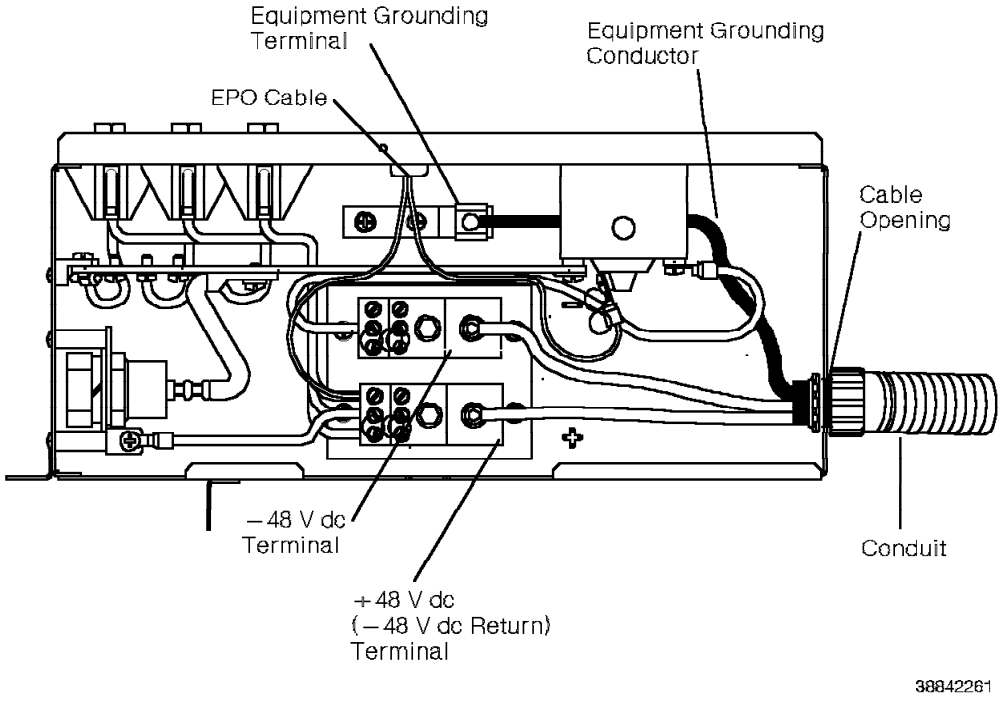


Figure 11-34. Location of the Model 10 DC PEA Conductor Terminals

11.64.2 Replacing the DC PEA

If you removed the model no. 95538 dc PEA, replace it with another if one is available. Otherwise, replace it with a model no. 95538A dc PEA.

Important Note: The model no. 95538A dc PEA does *not* have an EPO switch cable connector. When you install this PEA, the cabinet no longer has EPO capabilities.

If you remove a model no. 95538 dc PEA and replace it with a model no. 95538A dc PEA:

- Remove the cabinet's EPO switch. Refer to 11.32.1, "Removing the EPO Switch" on page 11-59.
- Use the model no. 95551 EPO plate to cover the cabinet's EPO switch cutout. The plate attaches with its adhesive backing.

Replace the dc PEA (Figure 11-34) as follows:

1. Ensure that the replacement PEA's circuit breaker is set to *OFF*.
2. Place the PEA on the frame.
3. Replace the mounting screws.

   Note: Leave the bottom mounting screw loose until you correctly position the PEA on the Model 10 frame.

4. Plug in the shelf power supplies.

5. **PEA model no. 95538:** Connect the EPO switch cable as follows:
   a. Connect the EPO switch cable to the EPO switch cable connector.
   b. Replace the EPO safety shield at the top of the fan plenum assembly.
   c. Replace the cabinet top.
6. Remove the cover from the replacement PEA.
7. Instruct the electrical contractor to attach the conduit to the PEA.
8. Instruct the electrical contractor to connect the +48 Vdc and −48 Vdc conductors to the correct terminal blocks.
9. Instruct the electrical contractor to connect the equipment grounding conductor to the PEA ground terminal block.
10. **DANGER**

    You *must* perform the following steps to ensure that the Model 10 is safe to touch when powered on.

    Establish a ground reference point near the Model 10.

    Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

    The following are recommended ground reference points:

    - Effectively grounded metal conduit or metal receptacle outlet
    - Effectively grounded structural building steel or metal water pipe

11. **DANGER**

    Do not touch the Model 10 frame at this time.

    Instruct the electrical contractor to turn on the circuit breaker or install the fuse for the dc branch circuit serving the Model 10, and to remove the tags.
12. Use the analog multimeter to test for less than 1 Vac and 1 Vdc between the ground reference point and the 9751 CBX frame.
13. Verify the dc input voltage at the PEA. Consult equipment specifications for correct voltages.
14. Ensure correct polarity of the dc input voltage at the PEA conductor terminals.
15. Replace the cover of the PEA.
16. If the Model 10 does *not* have an EPO switch:
    a. Turn on the PEA circuit breaker.
    b. Turn on the hard disk drive unit power switch.

    If the Model 10 has an EPO switch, verify its operation as follows:
    a. Ensure that the hard disk drive unit power switch is off.
    b. Ensure the EPO switch is in the ON (*1*) position.

c. Turn on the PEA circuit breaker.

   Wait approximately 1 minute to ensure the PEA circuit breaker does not trip.

d. Move the EPO switch to the OFF (*0*) position. Verify that power is removed from the Model 10.

   CAUTION:
   If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

e. Restore power to the Model 10 as follows:

   1) Move the previously tested EPO switch to the ON (*1*) position.

   2) Turn on the PEA circuit breaker.

   3) Turn on the hard disk drive unit power switch.

11.65 PEA (Models 40 and 50)

Use the following procedures to remove and replace the PEA.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

DANGER

Do *not* wear the ESD wrist strap while you work on the PEA.

11.65.1 Removing the PEA

CUSTOMER IMPACT

This procedure removes power to the cabinet. Replacing the PEA in cabinet 1 removes telephony in the system.

Remove the PEA (Figure 11-35 on page 11-122) as follows:

1. Unlock and remove the kick panel on the bottom of the cabinet.
2. **DANGER**

   Input voltage is present on the PEA until you unplug the power supply cord in step 3.

   Turn off the circuit breaker on the LCM.
3. Unplug the main power supply cord from the receptacle.
4. **DANGER**

   Before proceeding, use an analog multimeter to verify 0 Vac between:

   - **The power supply cord conductors**
   - **Each conductor and ground**

   Label and remove the power supply cord conductors from the terminals on the front of the PEA.
5. Remove the green equipment grounding conductor from the terminal on the front of the PEA.
6. Disconnect the EPO connector from the front of the PEA.
7. Remove the screws from the lower horizontal door bracket.
8. Remove the LCM cover plate.
9. With hands on either side of the PEA, pull it out until you can access the P4 connector cable.

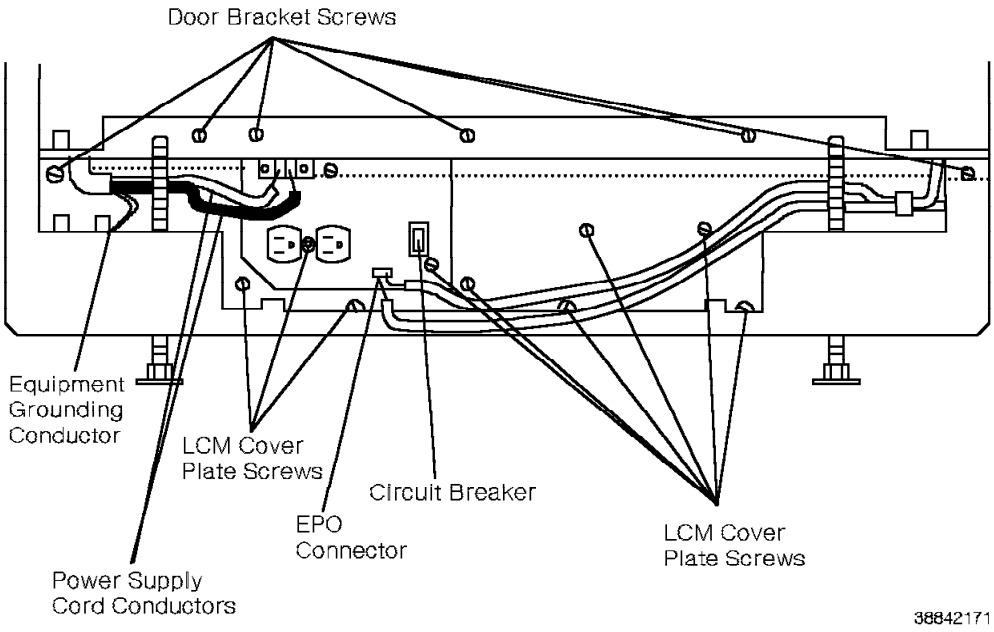


Figure 11-35. Removing the Model 40 or 50 PEA

10. Pull the P4 connector cable (Figure 11-36 on page 11-123) on the right side of the PEA toward the front of the cabinet.
11. Pull the PEA out until you can access the P1 connector cable.
12. Push the P1 connector cable on the left side of the PEA toward the back of the cabinet.
13. **CAUTION:**
    The PEA weighs 22 lb.; remove it from the cabinet carefully.

    Slide the PEA out of the cabinet.

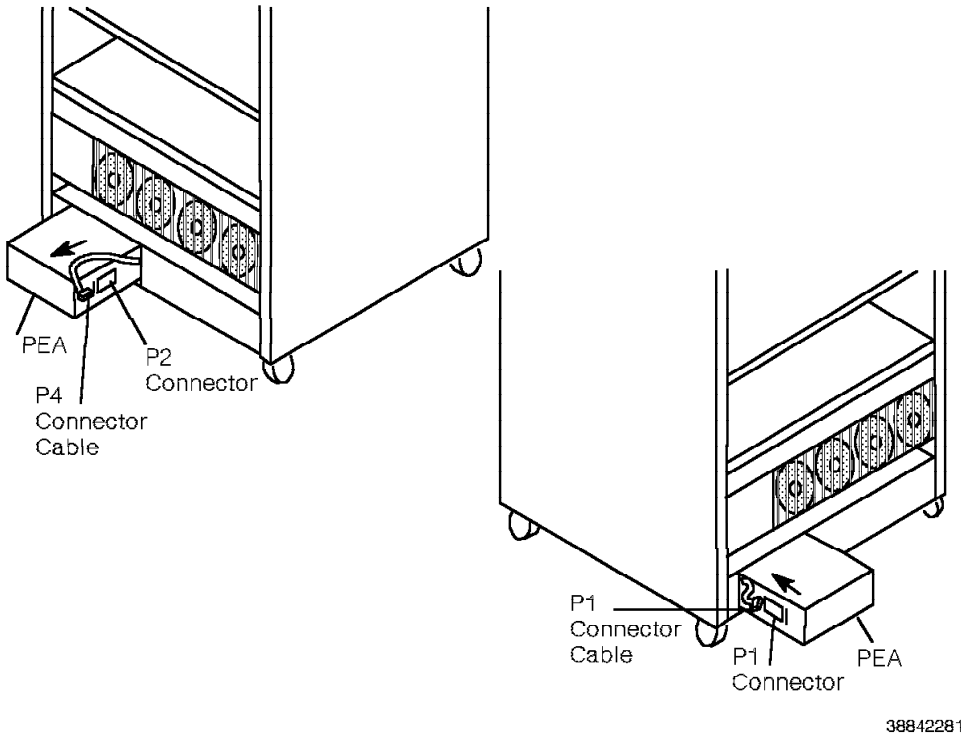


Figure 11-36. Disconnecting the P4 and P1 Connectors of the Model 40 or 50 PEA

11.65.2 Replacing the PEA

Replace the PEA as follows:

1. Ensure that the P1 connector cable is out of the way.
2. **CAUTION:**
   The PEA weighs 22 lb.; place it in the cabinet carefully.

   Slide the PEA into the cabinet until you can reconnect the P1 connector cable on the left side of the PEA.
3. Slide the PEA into the cabinet until you can reconnect the P4 connector cable to the P2 connector on the right side of the PEA.
4. Slide the PEA all the way into the cabinet.
5. Replace the LCM cover plate.
6. Replace the screws on the lower horizontal door bracket.
7. Reconnect the EPO connector on the front of the PEA.
8. Reconnect the green equipment grounding conductor to the terminal on the front of the PEA.
9. Reconnect the power supply cord conductors to the terminals on the front of the PEA.

   Note: Tighten the terminals until they make contact, then tighten them an additional quarter turn.

10. **DANGER**

> **You *must* perform steps 10a on page 11-124 through 10d on page 11-124 before you power on the 9751 CBX.**

Verify as follows that the 9751 CBX cabinet frame is safe to touch when powered on:

a. Establish a ground reference point near the 9751 CBX cabinet.

Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

The following are recommended ground reference points:

- Effectively grounded metal conduit or metal receptacle outlet
- Effectively grounded structural building steel or metal water pipe

b. **DANGER**

> **Do not touch the 9751 CBX cabinet frame at this time.**

Plug the 9751 CBX power supply cord into the branch circuit receptacle.

c. Use the analog multimeter to test for less than 1 Vac between the ground reference point and the 9751 CBX cabinet frame.

d. Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2) on the 9751 CBX cabinet frame. Refer to the power and grounding kit's instruction booklet.

11. Verify the operation of the EPO switch as follows:

a. Ensure that the hard disk drive unit power switch is off.

b. Ensure the EPO switch is in the ON (*1*) position.

c. Turn on the PEA circuit breaker.

Wait approximately 1 minute to ensure that the PEA circuit breaker does not trip.

d. Move the EPO switch to the OFF (*0*) position to power off the 9751 CBX.

Verify that power has been removed from *every cabinet* in the system.

CAUTION:
If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

e. Restore power to all 9751 CBX cabinets as follows:

1) Move the previously tested EPO switch to the ON (*1*) position.

2) Turn on each PEA circuit breaker in the system.

f. Turn on the hard disk drive unit power switch.

11.66 Political Timer Battery (Model 10)

Use the following procedures to remove and replace the political timer battery.

CAUTION:
Do not dispose of the battery in a fire; the cell can explode. Check with local codes for possible special disposal instructions.

Do not open or mutilate the battery; released electrolyte is corrosive and can cause damage to the eyes or skin. It can be toxic if swallowed.

11.66.1 Removing the Political Timer Battery

Remove the political timer battery (Figure 11-37) as follows:

1. Turn off the shelf 1 power supply.
2. Remove the shelf 1 power supply.
3. Unplug the battery from the connector.
4. Remove the battery from the Velcro strip.

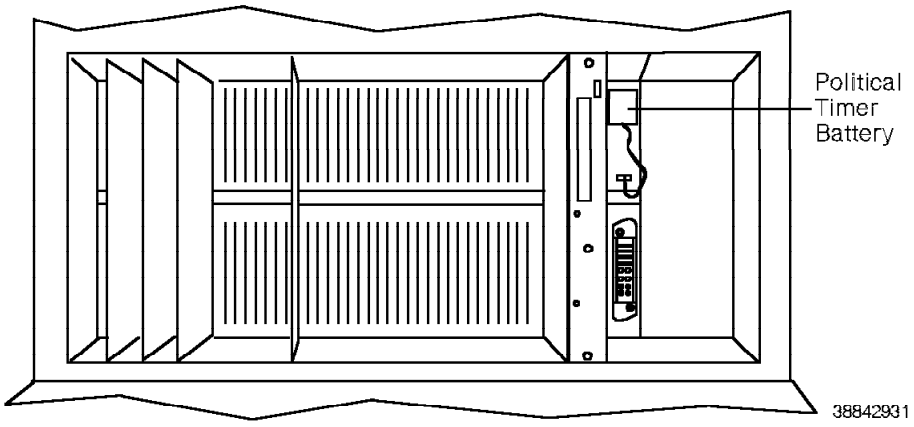


Figure 11-37. Removing the Model 10 Political Timer Battery

11.66.2 Replacing the Political Timer Battery

Replace the political timer battery as follows:

1. Place the new battery on the Velcro strip. Ensure that the red wire is on top.
2. Plug the battery into the connector.
3. Reinstall the shelf 1 power supply.
4. Turn on the shelf 1 power supply.

11.67 Political Timer Battery (Models 40 and 50)

Use the following procedures to remove and replace the political timer battery.

CAUTION:
Do not dispose of the battery in a fire; the cell can explode. Check with local codes for possible special disposal instructions.

Do not open or mutilate the battery; released electrolyte is corrosive and can cause damage to the eyes or skin. It can be toxic if swallowed.

11.67.1 Removing the Political Timer Battery

Remove the political timer battery (Figure 11-38) as follows:

1. Unplug the battery cables from the J6 or J7 connector on the back of the 9030A CCC motherboard.
2. Remove the battery from the Velcro strip.

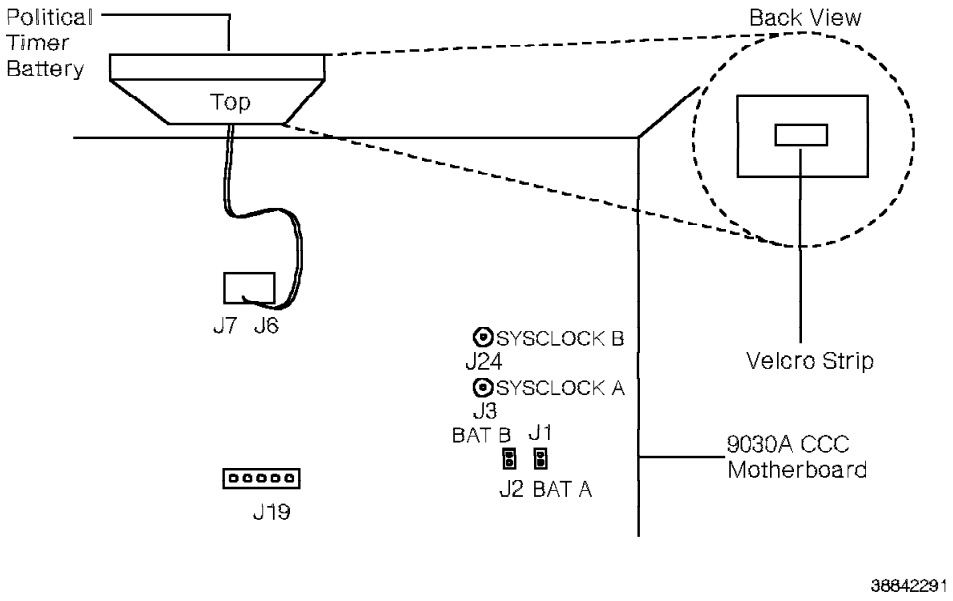


Figure 11-38. Removing the Models 40 and 50 Political Timer Battery

11.67.2 Replacing the Political Timer Battery

Replace the political timer battery as follows:

1. Place the new battery on the Velcro strip on the side of the chassis. Ensure that the red wire is on top.
2. Plug the battery cables into the J6 or J7 connector on the back of the 9030A CCC motherboard.

11.68 Power Supply, AC (Model 10)

Use the following procedures to remove and replace the power supply.

DANGER

Do *not* wear the ESD wrist strap while you work on the power supply.

11.68.1 Removing the AC Power Supply

CUSTOMER IMPACT

Downing shelf 1 downs the system. Downing any other shelf downs that shelf's telephones.

Remove the power supply (Figure 11-39) as follows:

1. Turn off the power supply.
2. Unplug the power supply cord from the PEA receptacle.
3. If the power supply is on shelf 1, remove the dual drive assembly.
4. Remove the power input and fan cables from the back of the power supply.
5. Loosen the four captured fasteners on the front of the power supply.
6. Use the power supply's handle to gently slide it out of the shelf.

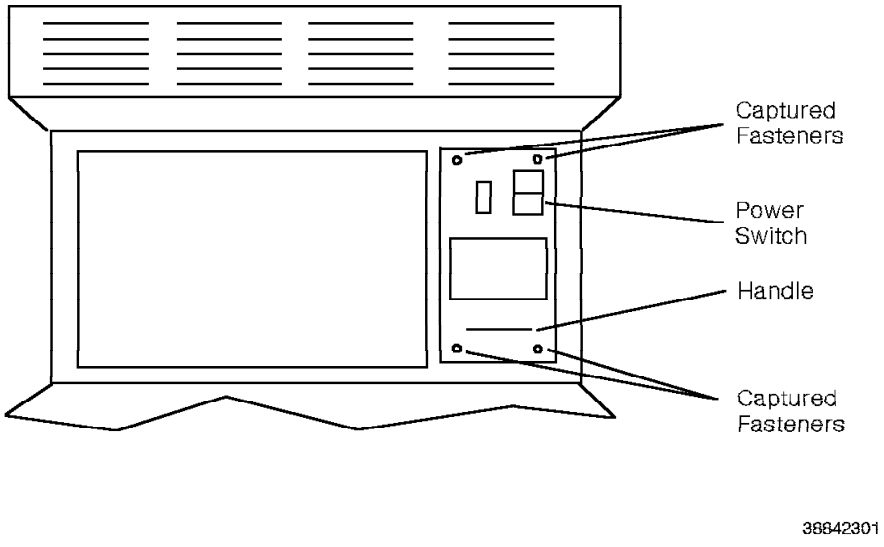


Figure 11-39. Model 10 AC Power Supply—Front View

11.68.2 Replacing the AC Power Supply

Replace the power supply as follows:

1. Ensure that the power switch is set to *OFF*.
2. Ensure that the input voltage switch (Figure 11-40) is set as follows:
   - If the input voltage is 115 Vac, set the switch to *115V*.
   - If the input voltage is 208 Vac or 240 Vac, set the switch to *230V*.

   Access the switch through the rectangular opening on the side of the power supply. Use a screwdriver or other long object to reach the switch so you can correctly set it.

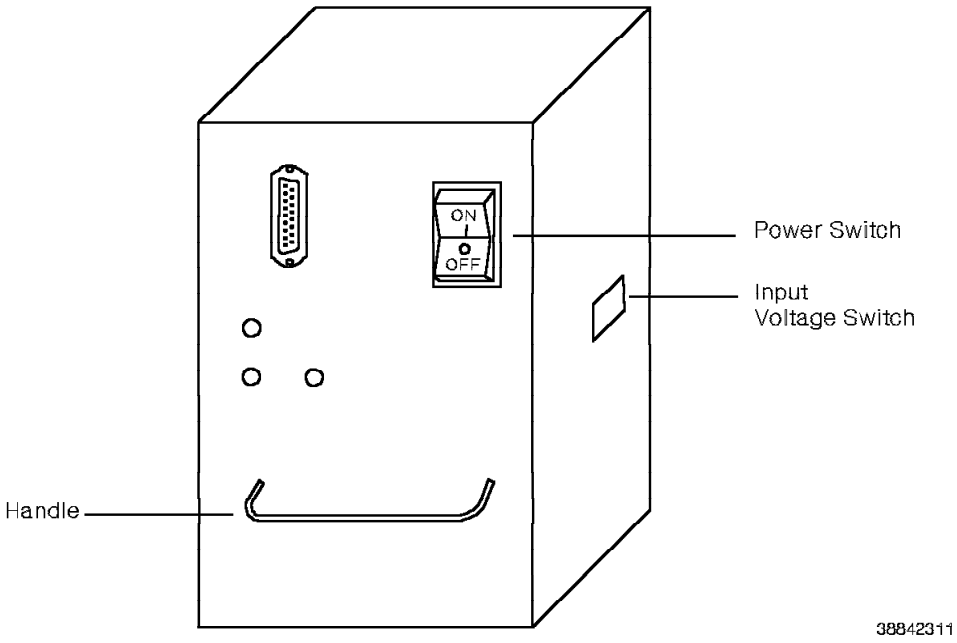


Figure 11-40. Model 10 AC Power Supply Voltage Switch

3. Slide the power supply into the shelf.
4. Seat the power supply into the connector on the backplane.
5. Tighten the four captured fasteners on the front of the power supply.
6. If the power supply is on shelf 1, reinstall the dual drive assembly.
7. Replace the power input and fan cables.
8. Plug the power supply cord into the PEA receptacle.
9. Turn on the power supply.

11.68.3 Verifying the Procedure

You correctly replaced the power supply if the three LEDs on the front of the power supply are lit.

If the replacement power supply also fails, perform the safety testing procedures described in the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*.

11.69 Power Supply, DC (Model 10)

Follow ESD prevention procedures when you remove and replace the dc power supply.

11.69.1 Removing the DC Power Supply

CUSTOMER IMPACT

Downing shelf 1 downs the system. Downing any other shelf downs that shelf's telephones.

Remove the dc power supply as follows:

1. Turn off the power supply.
2. Unplug the power supply cord from the PEA receptacle.
3. If the power supply is on shelf 1, remove the dual drive assembly.
4. Remove the power input and fan cables from the back of the power supply.
5. Loosen the four captured fasteners on the front of the power supply (Figure 11-41).
6. Use the power supply's handles to gently slide it out of the shelf.

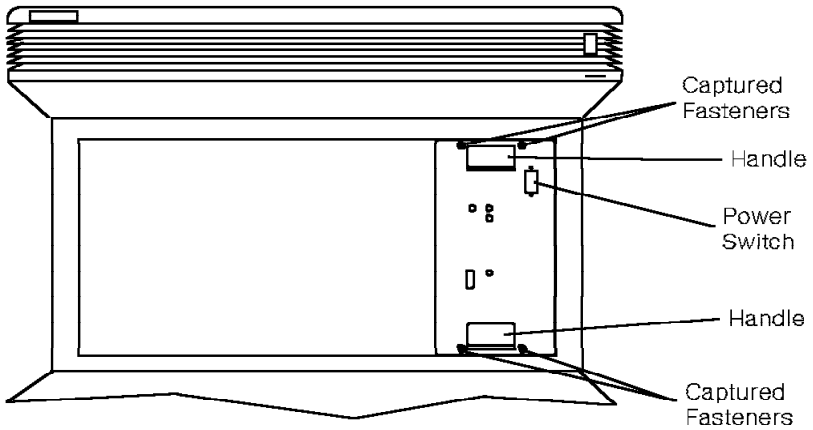


Figure 11-41. Model 10 DC Power Supply—Front View

11.69.2 Replacing the DC Power Supply

Replace the dc power supply as follows:

1. Ensure that the power switch is set to *OFF*.
2. Slide the dc power supply into the shelf.
3. Seat the dc power supply into the connector on the backplane.
4. Tighten the four captured fasteners on the front of the dc power supply.
5. If the power supply is on shelf 1, reinstall the dual drive assembly.
6. Replace the power input and fan cables.
7. Plug the power supply cord into the PEA receptacle.
8. Power on the dc power supply.

11.69.3 Verifying the Procedure

You correctly replaced the dc power supply if the three LEDs on the front of the dc power supply are lit.

If the replacement power supply also fails, perform the safety testing procedures described in the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*.

11.70 Rectifier Assembly (Models 40 and 50)

Use the following procedures to remove and replace the rectifier assembly.

These procedures require the following tools:

- Analog multimeter
- Power and grounding service kit

DANGER

Do *not* wear the ESD wrist strap while you work on the rectifier assembly.

11.70.1 Removing the Rectifier Assembly

CUSTOMER IMPACT

This procedure removes power to the cabinet. Replacing the rectifier assembly in cabinet 1 removes telephony in the system.

From the front of the cabinet (Figure 11-42 on page 11-132):

1. Unlock and remove the kick panel on the bottom of the cabinet.
2. **DANGER**

   Input voltage is present on the PEA until you unplug the main power supply cord in step 3.

   Turn off the cabinet circuit breaker on the LCM.
3. Unplug the main power supply cord from the receptacle.
4. **DANGER**

   Before proceeding, use an analog multimeter to verify 0 Vac between:

   - **The power supply cord conductors**
   - **Each conductor and ground**

   Disconnect the EPO connector from the front of the PEA.
5. Remove the screws from the lower horizontal door bracket.
6. Remove the LCM cover plate.

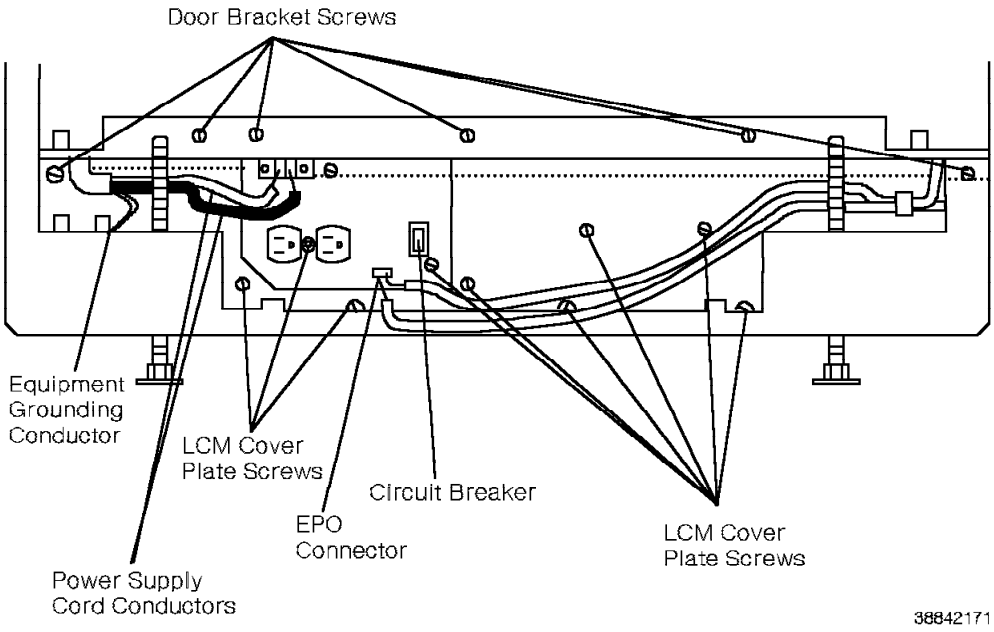


Figure 11-42. Removing the Model 40 or 50 Rectifier Assembly

From the back of the cabinet (Figure 11-43):

7. Remove the LCM cover as follows:
   a. Loosen the four screws at the bottom of the cover.
   b. Remove the seven screws at the top of the cover.
   c. Lift the cover out of the cabinet.

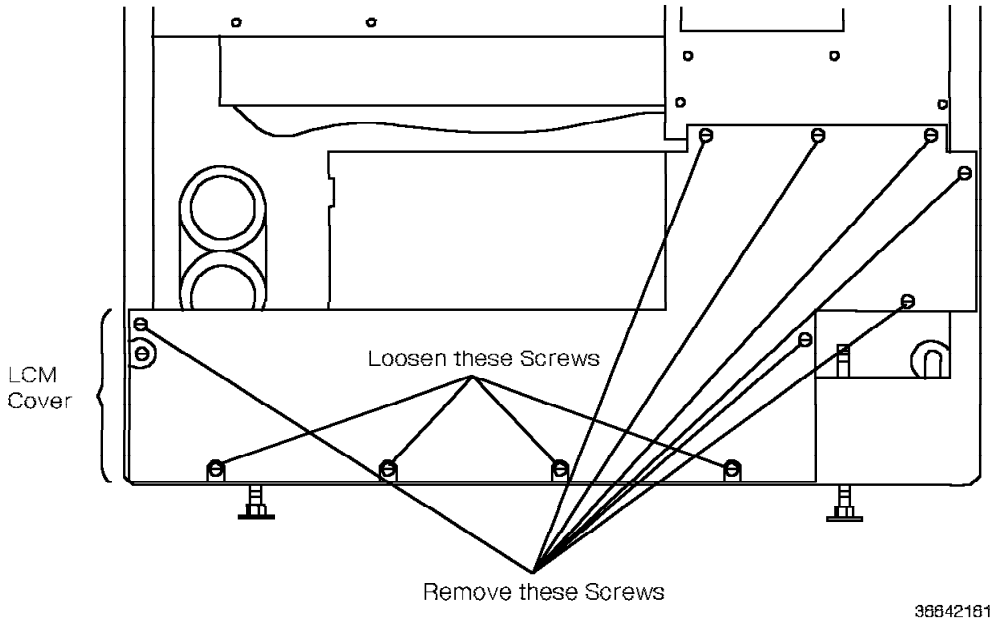


Figure 11-43. Removing the Model 40 or 50 LCM Cover

8. **Warning:** You can cause the power bus bar tabs to short out if you bend them too far.

   Remove the three screws on the power bus bar where it connects to the rectifier assembly (Figure 11-44).

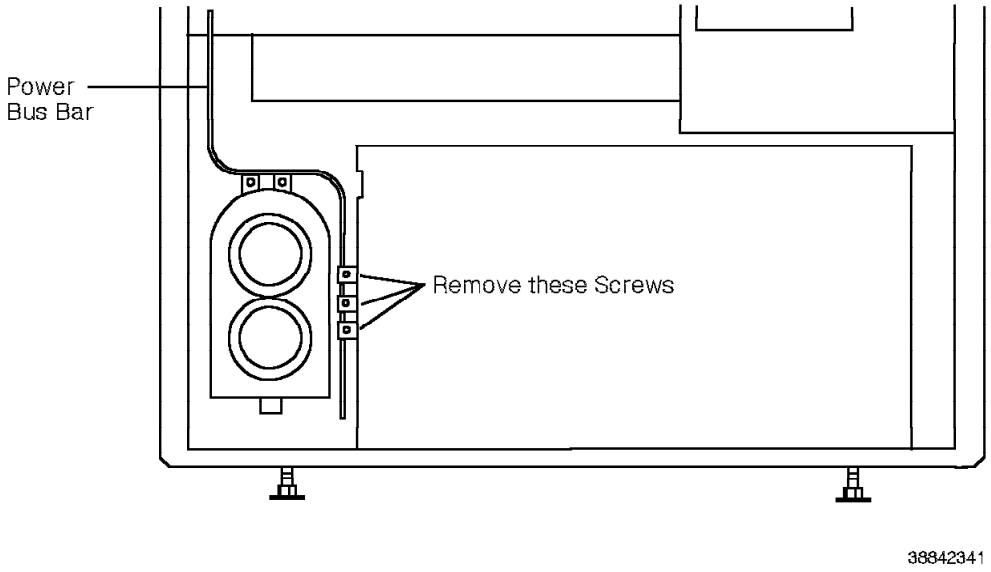


Figure 11-44. Disconnecting the Model 40 or 50 Rectifier Assembly

From the front of the cabinet:

9. Place one hand on each side of the rectifier assembly and slide it out of the cabinet until you can access the P7 connector cable.
10. Disconnect the P7 connector cable on the left side of the rectifier assembly by pushing it toward the back of the cabinet (Figure 11-45 on page 11-134).
11. Place one hand on each side of the rectifier assembly and slide it out of the cabinet.

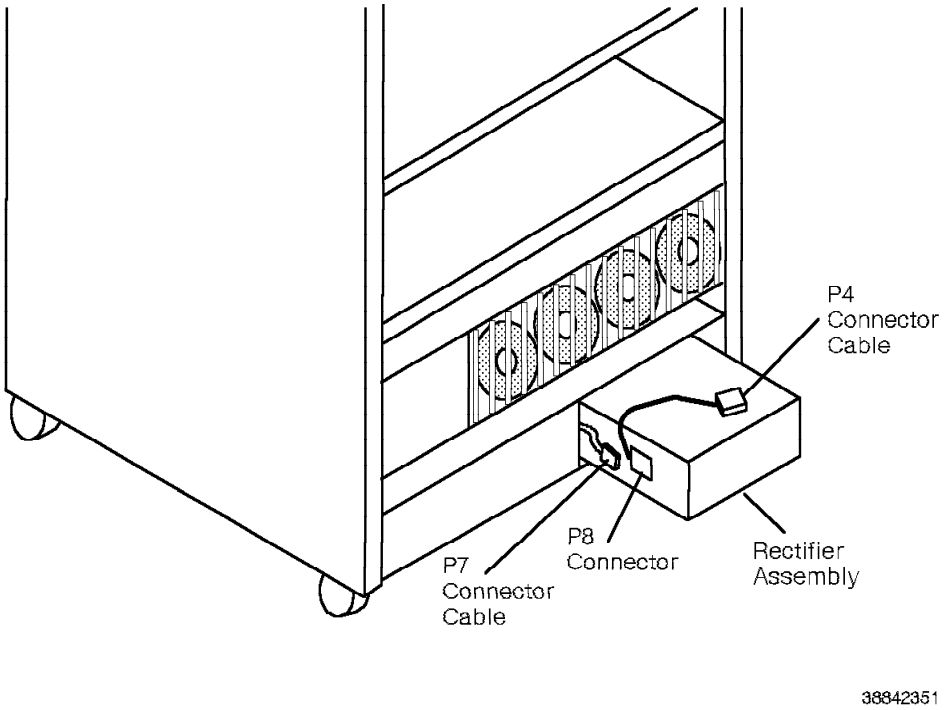


Figure 11-45. Disconnecting the P7 Connector from the Model 40 or 50 Rectifier Assembly

11.70.2 Replacing the Rectifier Assembly

From the front of the cabinet:

1. Ensure that the P7 connector cable is out of the way of the rectifier assembly area.
2. Slide the rectifier assembly into the cabinet until you can reconnect the P7 connector cable.
3. **Warning:** Plug the P7 connector cable into the P8 connector correctly. Misaligning the two connectors can damage the rectifier assembly, the capacitor assembly, and the PEA.

   Reconnect the P7 connector cable from the LCM to the P8 connector on the left of the rectifier assembly.
4. Push the rectifier assembly all the way into the cabinet.

From the back of the cabinet:

5. **Warning:** You can cause the power bus bar tabs to short out if you bend them too far.

   Carefully replace the three screws on the power bus bar.
6. Reinstall the LCM cover.
7. Replace the upper seven screws on the LCM cover.
8. Tighten the lower four screws on the LCM cover.

From the front of the cabinet:

9. Replace the LCM cover plate.
10. Replace the screws on the lower horizontal door bracket.
11. Reconnect the EPO connector on the front of the PEA.

    Note: Tighten the terminals until they make contact, then tighten them an additional quarter turn.

12. **DANGER**

    You *must* perform steps 12a through 12d before you power on the 9751 CBX.

    Verify as follows that the 9751 CBX cabinet frame is safe to touch when powered on:

    a. Establish a ground reference point near the 9751 CBX cabinet.

       Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2). Refer to the power and grounding kit's instruction booklet.

       The following are recommended ground reference points:

       - Effectively grounded metal conduit or metal receptacle outlet
       - Effectively grounded structural building steel or metal water pipe

    b. **DANGER**

       Do not touch the 9751 CBX cabinet frame at this time.

       Plug the 9751 CBX power supply cord into the branch circuit receptacle.

    c. Use the analog multimeter to test for less than 1 Vac between the ground reference point and the 9751 CBX cabinet frame.

    d. Use the power and grounding tester with the remote ground probe and a previously tested 120 Vac receptacle to perform the ECOS ground path impedance test (5A2) on the 9751 CBX cabinet frame. Refer to the power and grounding kit's instruction booklet.

13. Verify the operation of the EPO switch as follows:

    a. Ensure that the hard disk drive unit power switch is off.

    b. Ensure the EPO switch is in the ON (*1*) position.

    c. Turn on the PEA circuit breaker.

       Wait approximately 1 minute to ensure that the PEA circuit breaker does not trip.

    d. Move the EPO switch to the OFF (*0*) position to power off the 9751 CBX.

       Verify that power has been removed from *every cabinet* in the system.

       CAUTION:
       If the power-off procedure fails, DO NOT PROCEED. Contact your next level of support.

e. Restore power to all 9751 CBX cabinets as follows:

   1) Move the previously tested EPO switch to the ON (*1*) position.

   2) Turn on each PEA circuit breaker in the system.

f. Turn on the hard disk drive unit power switch.

11.71 RLI Card

Follow ESD prevention procedures when you remove and replace the ROLMlink interface (RLI) card.

11.71.1 Removing the RLI Card

CUSTOMER IMPACT

This procedure removes telephony and data from the affected card.

Remove the RLI card as follows:

1. Type the following DIAG command to courtesy down the RLI card:

   `DOWN PAD <pad_num> C`

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the RLI card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.71.2 Replacing the RLI Card

Replace the RLI card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   `UP PAD <pad_num>`

11.71.3 Verifying the Procedure

Verify that you correctly replaced the RLI card as follows:

- Type the following command if the RLI card has data equipment associated with it:

  TEST RPD <pad_num> 3

  The following message appears if you correctly replaced the card:

  Analysis Complete - Channel passed.

  Note: Test all channels on the card.

- Type the following command if the RLI card has voice-only equipment associated with it:

  TEST RPV <pad_num> 3

  The following message appears if you correctly replaced the card:

  Analysis Complete: Channel passed.

  Note: Test all channels on the card.

11.72 ROLMbridge 5250 Enable/Bypass Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the ROLMbridge 5250 enable/bypass card.

11.72.1 Removing the ROLMbridge 5250 Enable/Bypass Card

CUSTOMER IMPACT

This procedure temporarily removes the ROLMbridge 5250 link protocol converter (LPC) data card group from service.

Remove the ROLMbridge 5250 enable/bypass card as follows:

1. Type the following command to disable the ROLMbridge 5250 data card group:

   ```
   DISABLE DCG <group_num>
   ```

2. Use the card extractor to unseat the card from the ROLMbridge 5250 motherboard.
3. Handling the card by its edges only, slide it out of the shelf.
4. Immediately place the card in a static shielding bag or static-free box.

11.72.2 Replacing the ROLMbridge 5250 Enable/Bypass Card

Replace the ROLMbridge 5250 enable/bypass card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it seats into the ROLMbridge 5250 motherboard.
3. Type the following command to enable the data card group:

   ```
   ENABLE DCG <group_num>
   ```

4. Notify the system administrator and the host connection operator that the ROLMbridge 5250 LPC data group has returned to service.

11.72.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the ROLMbridge enable/bypass card:

```
TEST RB5250 <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

11.73 ROLMbridge 5250 Motherboard (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the ROLMbridge 5250 motherboard.

11.73.1 Removing the ROLMbridge 5250 Motherboard

CUSTOMER IMPACT

This procedure temporarily removes the ROLMbridge 5250 LPC data card group from service.

Remove the ROLMbridge 5250 motherboard (Figure 11-46) as follows:

1. Remove the ROLMbridge 5250 LPC cards.
2. Disconnect the twinaxial cables attached to the back of the motherboard. Label them so you know which cable goes to which (J3 and J4) connector on the replacement motherboard.
3. Remove the four mounting screws and lift out the motherboard.

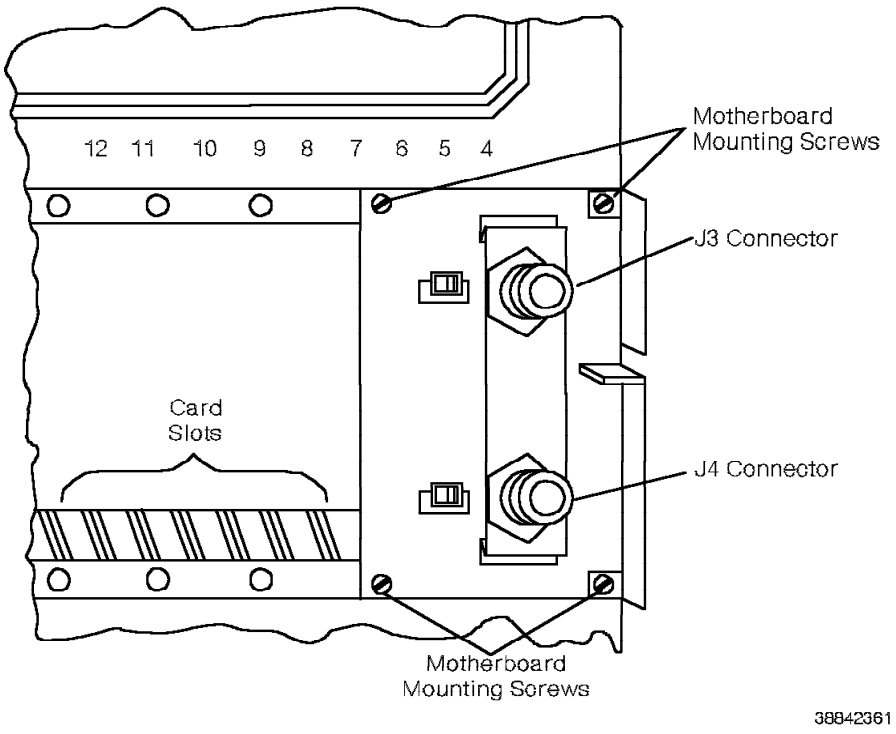


Figure 11-46. Removing the Model 40 or 50 ROLMbridge 5250 Motherboard

11.73.2 Replacing the ROLMbridge 5250 Motherboard

Replace the ROLMbridge 5250 motherboard as follows:

1. Ensure that the switch settings in the back of the motherboard correspond with those of the defective one.
2. Mount the replacement motherboard in the same location; do not tighten the four mounting screws.
3. Replace the ROLMbridge 5250 LPC cards.
4. At the back of the 9751 CBX, tighten the four mounting screws on the motherboard.
5. Reconnect the twinaxial cables.
6. Type the following data communications feature (DCF) command to enable the ROLMbridge 5250 data card group:

   ENABLE DCG <group_num>

7. Type the following DIAG command:

   UP PAD <group_num>

11.73.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the ROLMbridge 5250 motherboard:

TEST RB5250 <pad_num> 3

The following message appears if you correctly replaced the card:

Analysis Complete: Channel passed.

Note: Test all channels on the ROLMbridge 5250 7-channel cards.

11.74 ROLMbridge 5250 7-Channel Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the ROLMbridge 5250 7-channel cards (link protocol converter [LPC] 1 and LPC 2).

11.74.1 Removing the ROLMbridge 5250 7-Channel Card

CUSTOMER IMPACT

This procedure temporarily removes the ROLMbridge 5250 LPC data card group from service.

Remove ROLMbridge 5250 7-channel card as follows:

1. Type the following command to disable the ROLMbridge 5250 data card group:

   DISABLE DCG <group_num>

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the ROLMbridge 5250 7-channel card.

3. Use the card extractor to unseat the card from the ROLMbridge 5250 motherboard.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.74.2 Replacing the ROLMbridge 5250 7-Channel Card

Replace the ROLMbridge 5250 7-channel card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Ensure that the switch and jumper settings on the replacement card correspond with those of the defective card.
3. Attach the umbilical cord to the P3 connector of the replacement card.
4. Slide the card into the correct slot until it seats into the ROLMbridge 5250 motherboard.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the data card group:

   ENABLE DCG <group_num>

7. Notify the system administrator and the host connection operator that the ROLMbridge 5250 LPC data group has returned to service.

11.74.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the ROLMbridge 5250 7-channel card:

```
TEST RB5250 <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.75 Rotary Register Card

Follow ESD prevention procedures when you remove and replace the rotary register card.

11.75.1 Removing the Rotary Register Card

CUSTOMER IMPACT

This procedure affects rotary telephones and trunks in the system, depending on the number of rotary register cards that are installed in the system.

Remove the rotary register card as follows:

1. Type the following DIAG command to courtesy down the rotary register card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the rotary register card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.75.2 Replacing the Rotary Register Card

Replace the rotary register card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.75.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the rotary register card:

```
TEST ROTR <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.76 Rotary Sender Card

Follow ESD prevention procedures when you remove and replace the rotary sender card.

11.76.1 Removing the Rotary Sender Card

CUSTOMER IMPACT

This procedure affects service for rotary trunks, depending on the number of installed rotary sender cards.

Remove the rotary sender card as follows:

1. Type the following DIAG command to courtesy down the rotary sender card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the rotary sender card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.76.2 Replacing the Rotary Sender Card

Replace the rotary sender card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Model 40 or 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.76.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the rotary sender card:

```
TEST ROTS <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.77 RPDN Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the ROLM private digital network (RPDN) card.

11.77.1 Removing the RPDN Card

CUSTOMER IMPACT

This procedure downs the CorNet-N link that the card supports.

Remove the RPDN card as follows:

1. Type the following command to courtesy down the T1DN card that connects to the RPDN card:

   DOWN PAD <pad_num> C

2. Type the following command to down the RPDN card:

   DOWN PAD <pad_num> H

3. Verify that the DS2 LED on the RPDN card is lit.

4. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the RPDN card.

5. Use the card extractor to unseat the RPDN card from the RPDN motherboard.

6. Remove the umbilical cord from the card’s P3 connector.

7. Handling the card by its edges only, slide it out of the shelf.

8. Immediately place the card in a static shielding bag or static-free box.

11.77.2 Replacing the RPDN Card

Replace the RPDN card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.

2. Slide the card into the correct slot until it is ready to be seated in the RPDN motherboard, but do *not* seat the card.

3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.

4. Remove the umbilical cord from the card’s P3 connector.

5. Type the following command to enable the card:

   UP PAD <pad_num>

6. **Warning:** This command results in a full initialization of the card, new loadware, and new configuration information. The process may take several minutes.

   Type the following command to enable the T1DN card that connects to the RPDN card:

   UP PAD <pad_num>

11.77.3 Verifying the Procedure

Verify that you correctly replaced the RPDN card as follows:

1. Verify that the card's DS2 LED is off.
2. Type the following command:

   `TEST RPDN <pad_num> 1`

   Verify that the following message appears:

   `Analysis complete: Channel passed.`
3. Type the following command to check the status of the RPDN channels and the two CPNs:

   `LIST STATUS RPDN <pad_num>`

   Verify that `ACTIVE` appears in the CHANNEL STATE field for the RPDN PAD.

11.78 RPDN Motherboard (Models 40 and 50)

Use the following procedures to remove and replace the RPDN motherboard.

11.78.1 Removing the RPDN Motherboard

Remove the digital trunk motherboard as follows:

1. Type the following command to courtesy down each T1DN card associated with the CPN:

   DOWN PAD <pad_num> C

2. Remove the RPDN card.
3. Label and disconnect the cables.
4. Unscrew and remove the RPDN motherboard.

11.78.2 Replacing the RPDN Motherboard

Replace the RPDN motherboard as follows:

1. Replace the screws and secure the RPDN motherboard.
2. Reconnect the cables.
3. Reinstall the RPDN card.
4. Type the following command to enable each T1DN card associated with the CPN:

   UP PAD <pad_num>

11.78.3 Verifying the Procedure

Verify that you correctly replaced the RPDN motherboard as follows:

1. Verify that the RPDN card's DS2 LED is off.
2. Type the following command:

   TEST RPDN <pad_num> 1

   Verify that the following message appears:

   Analysis complete: Channel passed.

3. Type the following command to check the status of the RPDN channels and the two CPNs:

   LIST STATUS RPDN <pad_num>

   Verify that ACTIVE appears in the CHANNEL STATE field for the RPDN PAD.

11.79 Shelf Power Module (Models 40 and 50)

Use the following procedures to remove and replace the following shelf power modules:

- +5P
- +5 Vdc
- +12 Vdc
- ±15 Vdc
- −48 Vdc talk (−48T)
- Ring

DANGER

Do *not* wear the ESD wrist strap while you work on shelf power modules.

11.79.1 Removing the Shelf Power Module

CUSTOMER IMPACT

This procedure may remove power to the cards in the related shelves. If the shelf power modules that you are removing are on the CCC shelf of the Model 40, telephony for the entire system is affected.

Remove the shelf power module (Figure 11-47) from the back of the cabinet as follows:

1. Turn off the shelf power module switch.
2. Loosen the six module bolts on the shelf power module.
3. Loosen the tie-down bolt at the base of the shelf power module.
4. Slide the shelf power module off the shelf.

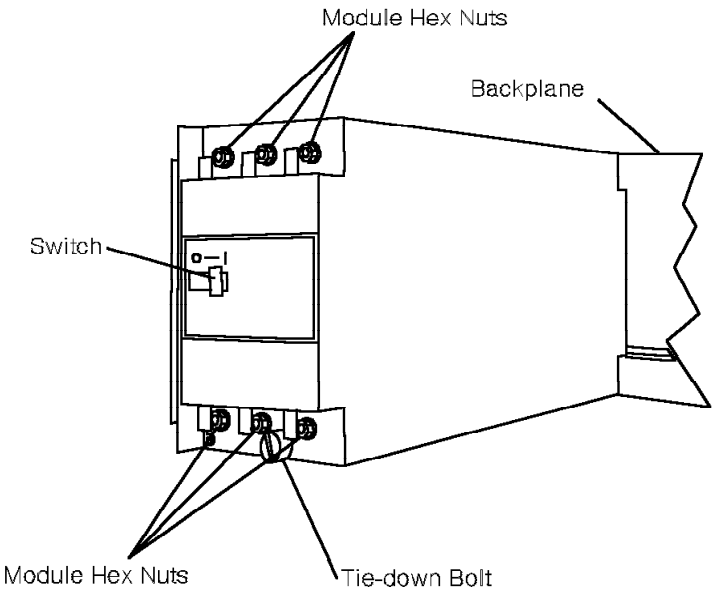


Figure 11-47. Removing the Model 40 or 50 Shelf Power Module

11.79.2 Replacing the Shelf Power Module

Replace the shelf power module as follows:

1. Seat the shelf power module into the TDM backplane or CCC motherboard connector.
2. **Warning:** The module bolts provide test points, but do *not* secure the module to the shelf. Do *not* overtighten the bolts because you can easily break them.

   Tighten each module bolt only until it makes contact with the shelf.
3. Tighten the tie-down bolt at the base of the module.
4. Tighten the six bolts in sequence (Figure 11-48). This ensures that the module correctly aligns on the shelf.
5. Turn on the shelf power module switch.

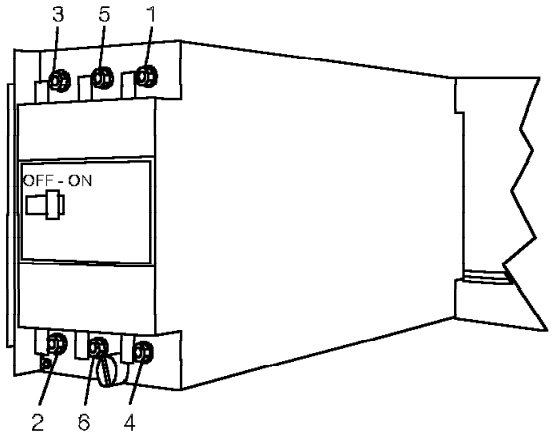


Figure 11-48. Sequence to Tighten Shelf Power Module Bolts

11.79.3 Verifying the Procedure

Verify that you correctly replaced the shelf power module as follows:

1. Verify that the module is okay (MOK) LED lights.
2. Measure the output voltage to ensure the shelf power module operates within range.

   Place the digital multimeter probes between the terminals. Table 11-2 lists the correct voltage ranges that appear on the digital multimeter screen display.

Table 11-2. Shelf Power Module Test Points

Shelf Power Module	**Output Voltage**
+5 Vdc	+5 Vdc and +5.2 Vdc
+5P	+5 Vdc and +5.2 Vdc
+12 Vdc	+11.76 Vdc and +12.24 Vdc
±15 Vdc	±14.7 Vdc and +15.3 Vdc
−48T	−47 Vdc and −48.9 Vdc
Ring	70 Vac and 105 Vac

11.80 SMIOC

Follow ESD prevention procedures when you remove and replace the SMIOC.

11.80.1 Removing the SMIOC

CUSTOMER IMPACT

This procedure removes service from any equipment associated with the card's eight application ports. It also temporarily removes visual indication of customer alarms and internal alarms.

Remove the SMIOC as follows:

1. Type the following DIAG command to down the SMIOC:

   DOWN PAD <pad_num> <channel_num> H

   You cannot down channels 1 and 2 of the primary SMIOC.

2. **Warning:** Move the BYPASS switch on the SMIOC interconnect box to the *OVERRIDE* position before you attach the umbilical cord to the SMIOC.

   Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, "Using the Umbilical Cord" on page 9-7.

   Attach the umbilical cord to the P3 connector of the SMIOC.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card's P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.80.2 Replacing the SMIOC

Replace the SMIOC as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the slot until it is ready to be seated in the backplane of the Model 10 or the CCC motherboard of the Models 40 and 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card's P3 connector.

6. **Warning:** Failure to move the BYPASS switch to the *NORM* position disables the bypass alarm contacts, which prevents reporting if the system goes down.

   Move the BYPASS switch on the SMIOC interconnect box to the *NORM* position.

11.80.3 Verifying the Procedure

Verify that you correctly replaced the SMIOC as follows:

1. Type the following command:

   TEST SMIOC <pad_num> <channel_num>

   You cannot run the test on channels 1 and 2 of the primary SMIOC.

   The following message appears if you correctly replaced the card:

   TEST SUCCEEDS FOR SMIOC PORT <port num>

2. When the test is complete, type the following DIAG command to enable the SMIOC:

   UP PAD <pad_num> <channel_num>

3. Type the following command to verify that all channels are up:

   LIST DOWN

   Verify that the card is not listed in the CARDS PHYSICALLY DOWNED section of the display.

11.81 SMIOC Interconnect Box

Follow ESD prevention procedures when you remove and replace the SMIOC interconnect box.

11.81.1 Removing the SMIOC Interconnect Box

CUSTOMER IMPACT

This procedure temporarily removes service from any equipment connected to it, and causes the external and customer alarms to become inoperative.

Remove the SMIOC interconnect box as follows:

1. Move the BYPASS switch on the SMIOC interconnect box to the *OVERRIDE* position.
2. Type the following CNFG command:

   `MODIFY PARAM SERVICE_PORT`

   Type `OFF` in the VALUE field.
3. Unscrew and remove the cover.
4. Label and remove the MDF cable.

   Note: If you do *not* remove this cable first, the 9751 CBX monitor or 9751 CBX monitor II generates a call to the remote service processor.
5. Label all remaining cables.
6. Disconnect all cables, jacks, and MDF terminations from the interconnect box.
7. **Model 10:** Disconnect the grounding wire.
8. Remove the four screws that hold the interconnect box to the MDF.

11.81.2 Replacing the SMIOC Interconnect Box

Replace the SMIOC interconnect box as follows:

1. Mount the replacement interconnect box on the MDF.
2. **Warning:** Use extreme caution when you install this cable. If you incorrectly connect it to the J9 connector, the SMIOC will be damaged.

   Reconnect the cable that comes from the SMIOC connection in the back of the CCC motherboard to the J10 connector.
3. **Warning:** Use extreme caution when you install this cable. If you incorrectly connect the cable from the SMIOC connection in the back of the CCC motherboard to the J10 connector, the SMIOC will be damaged.

   Reconnect the cable that comes from the MDF to the J10 connector.

4. Reconnect and reterminate all other cables, jacks, ground wire, and MDF terminations.
5. Ensure all the data-terminating equipment (DTE) or data-circuit terminating equipment (DCE) plugs are in the same connectors as they were in the defective interconnect box.
6. Replace the cover.
7. Move the BYPASS switch on the interconnect box to the *NORM* position.
8. Type the following CNFG command:

   `MODIFY PARAM SERVICE_PORT`

   Type `ON` in the VALUE field.

11.81.3 Verifying the Procedure

Verify that you correctly replaced the SMIOC interconnect box as follows:

1. Type the following DIAG command:

   `LIST PORT`

   Verify that for each port the customer uses, `CONNECTED` appears in the PORT STATUS field.

2. Verify operation of the 9751 CBX monitor and 9751 CBX monitor II. Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*.

11.82 TASA Card (Model 40)

Follow ESD prevention procedures when you remove and replace the turnaround standalone (TASA) card.

11.82.1 Removing the TASA Card

CUSTOMER IMPACT

This procedure removes telephony from the Model 40.

Remove the TASA card as follows:

1. Type the following DIAG command to down the TASA card:

   DOWN PAD <pad_num> H

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the TASA card.

3. Gently pull down on the bottom ZIF connector handle to open it.
4. Open the bottom card lock lever.
5. Gently push up on the top ZIF connector handle to open it.
6. Open the top card lock lever.
7. Unseat the card from the CCC motherboard.
8. Remove the umbilical cord from the card’s P3 connector.
9. Handling the card by its edges only, slide it out of the cabinet.
10. Immediately place the card in a static shielding bag or static-free box.

11.82.2 Replacing the TASA Card

Replace the TASA card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the CCC motherboard, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the bottom card lock lever.
5. Gently push up on the bottom ZIF connector handle to close it.
6. Close the top card lock lever.
7. Gently pull down on the top ZIF connector handle to close it.
8. Remove the umbilical cord from the card’s P3 connector.
9. Type the following command to enable the card:

   UP PAD <pad_num>

11.82.3 Verifying the Procedure

You correctly replaced the TASA card if the card's green DS1 LED lights.

11.83 TC Card (Model 40)

Follow ESD prevention procedures when you remove and replace the time-division multiplexing controller (TC) card.

11.83.1 Removing the TC Card

CUSTOMER IMPACT

This procedure removes telephony in the Model 40.

Remove the TC card as follows:

1. Type the following DIAG command to down the TC card:

   DOWN PAD <pad_num> H

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the TC card.

3. Gently pull down on the ZIF connector handle to open it.
4. Unseat the card from the CCC motherboard.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the cabinet.
7. Immediately place the card in a static shielding bag or static-free box.

11.83.2 Replacing the TC Card

Replace the TC card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the CCC motherboard, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Gently push up on the ZIF connector handle to close it.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.83.3 Verifying the Procedure

You correctly replaced the TC card if the card’s green LED lights.

11.84 TCL Card (Model 10)

Follow ESD prevention procedures when you remove and replace the time-division multiplexing controller (TCL) card.

11.84.1 Removing the TCL Card

CUSTOMER IMPACT

This procedure removes telephony from the system.

Remove the TCL card as follows:

1. Type the following DIAG command to down the TCL card:

   DOWN PAD <pad_num> H

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the TCL card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.84.2 Replacing the TCL Card

Note: Replacing the TCL causes an error on the ERRH.

Replace the TCL card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the slot until it is ready to be seated in the backplane, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.84.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the TCL card:

TEST TCL <pad_num> 3

The following message appears if you correctly replaced the card:

Analysis Complete: Channel passed.

11.85 TCTASA Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the time-division multiplexing controller turnaround standalone (TCTASA) card.

11.85.1 Removing the TCTASA Card

CUSTOMER IMPACT

Model 40: This procedure removes telephony from the system.

Model 50: This procedure does not remove telephony if you work on the standby side.

Remove the TCTASA card as follows:

1. Type the following command to down the TCTASA card:

   DOWN PAD <pad_num> H

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the TCTASA card.

3. Gently pull down on the bottom ZIF connector handle to open it.
4. Open the bottom card lock lever.
5. Open the top ZIF connector by gently pushing up on the handle.
6. Open the top card lock lever.
7. Unseat the card from the CCC motherboard.
8. Remove the umbilical cord from the card’s P3 connector.
9. Handling the card by its edges only, slide it out of the cabinet.
10. Immediately place the card in a static shielding bag or static-free box.

11.85.2 Replacing the TCTASA Card

Replace the TCTASA card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the CCC motherboard, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the bottom card lock lever.
5. Gently push up on the bottom ZIF connector handle to close it.
6. Close the top card lock lever.
7. Gently pull down on the top ZIF connector handle to close it.
8. Remove the umbilical cord from the card’s P3 connector.
9. Type the following command to enable the card:

   UP PAD <pad_num> <ACTIVE or STANDBY>

11.85.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the TCTASA card:

```
TEST TCTASA <pad_range> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

11.86 TDM Backplane (Models 40 and 50)

Use the following procedures to remove and replace the TDM backplane.

11.86.1 Removing the TDM Backplane

CUSTOMER IMPACT

This procedure removes all telephony from the cabinet.

Remove the TDM backplane as follows:

1. Turn off the main circuit breaker on the LCM or BIM.
2. Remove all cards on the affected shelf.
3. Remove all shelf power modules on the affected shelf.
4. Disconnect the HSB for the shelf.
5. Use the 7.9-millimeter (5/16-inch) nut driver to unscrew the shelf's power bus bar connection and carefully bend the tabs toward the back of the cabinet.
6. Label and remove all Amphenol cables that connect to the TDM backplane.
7. Remove the screw fasteners that secure the TDM backplane.
8. Remove the TDM backplane by swinging the left side toward you and slipping it out at an angle.

11.86.2 Replacing the TDM Backplane

Replace the TDM backplane as follows:

1. Replace the TDM backplane by angling it in with the right side away from you.
2. Seat one or two cards to verify correct alignment.
3. Use the screws to secure the TDM backplane.
4. Move the shelf power bus bar connection into place and use the nut driver to secure the screws.
5. Reconnect the shelf's HSB.
6. Reinstall all shelf power supplies.
7. Reconnect all Amphenol cables to the correct motherboards.
8. Reinstall all TDM shelf cards.
9. Turn on the main circuit breaker on the LCM or BIM.

11.86.3 Verifying the Procedure

Verify that you correctly replaced the TDM backplane as follows:

1. Verify that the MOK LEDs light on the shelf power modules.
2. Verify that you correctly reinstalled each card that connects to the TDM backplane.

11.87 Tone Sender Card

Follow ESD prevention procedures when you remove and replace the tone sender card.

11.87.1 Removing the Tone Sender Card

CUSTOMER IMPACT

This procedure affects telephony in the system depending on the number of installed tone sender cards.

Remove the tone sender card as follows:

1. Type the following DIAG command to courtesy down the tone sender card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the tone sender card.

3. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Models 40 and 50.

4. Remove the umbilical cord from the card’s P3 connector.

5. Handling the card by its edges only, slide it out of the shelf.

6. Immediately place the card in a static shielding bag or static-free box.

11.87.2 Replacing the Tone Sender Card

Replace the tone sender card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.

2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Models 40 and 50, but do *not* seat the card.

3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.

4. Remove the umbilical cord from the card’s P3 connector.

5. Type the following command to enable the card:

   UP PAD <pad_num>

11.87.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the tone sender card:

TEST TONE <pad_num> 3

The following message appears if you correctly replaced the card:

Analysis complete: Channel passed.

Note: Test all channels on the card.

11.88 TTI Card

Follow ESD prevention procedures when you remove and replace the tie trunk interface (TTI) card.

11.88.1 Removing the TTI Card

Warning: Coordinate the removal and replacement of a TTI trunk with the local telephone company so that the telephone company does not test and down the TTI circuit.

CUSTOMER IMPACT

This procedure removes trunk access to the affected TTI card.

Remove the TTI card as follows:

1. Type the following DIAG command to courtesy down the TTI card:

   DOWN PAD <pad_num> C

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the TTI card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Models 40 and 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.88.2 Replacing the TTI Card

Replace the TTI card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Models 40 and 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card,then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.88.3 Verifying the Procedure

Type the following command to verify that you correctly replaced the TTI card:

```
TEST TTI <pad_num> 3
```

The following message appears if you correctly replaced the card:

```
Analysis Complete:  Channel passed.
```

Note: Test all channels on the card.

11.89 TXP Card (Model 10)

Follow ESD prevention procedures when you remove and replace the time-division multiplexing expander (TXP) card.

11.89.1 Removing the TXP Card

CUSTOMER IMPACT

This procedure removes telephony from the shelf on which it is installed.

Remove the TXP card as follows:

1. Type the following command to down the TXP card:

   DOWN PAD <pad_num> H

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, "Using the Umbilical Cord" on page 9-7.

   Attach the umbilical cord to the P3 connector of the TXP card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane.
5. Remove the umbilical cord from the card's P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.89.2 Replacing the TXP Card

Replace the TXP card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the slot until it is ready to be seated in the backplane, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card's P3 connector.
6. Type the following command to enable the card:

   UP PAD <pad_num>

11.89.3 Verifying the Procedure

Verify that you correctly replaced the TXP card as follows:

1. Type the following command:

   TEST TXP <pad_num> 3

   The following message appears if you correctly replaced the card:

   Analysis Complete: Channel passed.

2. Test the cards that are on the same shelf as the TXP card.

11.90 T1DN Card (Trunk Card Only)

Follow ESD prevention procedures when you remove and replace the T1DN card.

11.90.1 Removing the T1DN Card

Warning: Coordinate the removal and replacement of a T1 trunk with the local telephone company so that the telephone company does not test and down the T1 circuit. This momentarily disrupts synchronous T1 data transmission.

CUSTOMER IMPACT

This procedure removes trunk access to the T1DN card and may cause timing disruptions in the T1 network. If there is an alternate T1 path, there will only be a momentary timing disruption.

Remove the T1DN card as follows:

1. Type the following DIAG command to courtesy down the T1DN card:

   `DOWN PAD <pad_num> C`

2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the T1DN card.

3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the TDM backplane of the Model 40 or 50.
5. Remove the umbilical cord from the card’s P3 connector.
6. Handling the card by its edges only, slide it out of the shelf.
7. Immediately place the card in a static shielding bag or static-free box.

11.90.2 Replacing the T1DN Card

Replace the T1DN card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the TDM backplane of the Models 40 and 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.

11.90.3 Verifying the Procedure

Verify that you correctly replaced the T1DN card as follows:

1. Type the following command:

   TEST T1_CARD_LOOP <pad_num> 2

   The following message appears if you correctly replaced the card:

   PASS

2. Type the following command to enable the T1DN card:

   UP PAD <pad_num>

3. Type the following command to ensure that the T1 link is stabilized:

   MON ALARM <pad_num> ON

   The following message appears if the T1 link is stabilized:

   1) Card AVAIL
   2) No alarms present

4. Type the following command to turn off the alarm monitor:

   MON ALARM <pad_num> OFF

   The % prompt appears if the alarm is turned off.

5. Type the following command to test the T1DN card:

   TEST T1 <pad_num> 1

   The following message appears if you correctly replaced the card:

   T1_ALARMS (T1) ... Passed
   T1_INTEG (T1) ... Passed
   T1_LOCAL_LOOPBACK (T1) ... Passed
   T1_SEIZE (T1) ... Passed

   Note: If the T1DN card connects to an RPDN card, the T1_SEIZE and T1_LOCAL_LOOPBACK tests do not run.

11.91 T1DN Card (Single Clock Source)

Follow ESD prevention procedures when you remove and replace the T1DN card.

11.91.1 Removing the T1DN Card

Warning: Coordinate the removal and replacement of a T1 trunk with the local telephone company so that the telephone company does not test and down the T1 circuit. This momentarily disrupts synchronous T1 data transmission.

CUSTOMER IMPACT

This procedure removes trunk access to the affected channels and may cause timing disruptions in the T1 network. If there is an alternate T1 path, there will only be a momentary timing disruption.

Remove the T1DN card as follows:

1. Type the following DIAG command:

   `CHANGE CLKSOURCE 2`

2. Type the following CLI command to verify that the 9751 CBX is using the internal CSM clock:

   `LIST CLKSOURCE`

   Figure 11-49 appears if the 9751 CBX is using the internal CSM clock.

```
       FAR END  SOURCE NEAR END  CLOCK    CLOCK
INDEX  NODE     TYPE   PAD       PAD      INPUT     STATUS
-----  -------  ------ --------  ------   -----     ------
  1     NA      DTRK   01/0107   01/0106  DT_1      GOOD
  2*    NA      CLK    01/0106   01/0106  INTERNAL  GOOD
  3     NA      TA     01/0201   NA       INTERNAL  GOOD
```

Figure 11-49. LIST CLKSOURCE Command—T1DN Card as Single Clock Source

3. Type the following DIAG command to courtesy down the T1DN card:

   `DOWN PAD <pad_num> C`

4. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the T1DN card.

5. Open the card lock levers.
6. Use the card extractor to unseat the card from the TDM backplane.
7. Remove the umbilical cord from the card’s P3 connector.
8. Handling the card by its edges only, slide it out of the shelf.
9. Immediately place the card in a static shielding bag or static-free box.

11.91.2 Replacing the T1DN Card

Replace the T1DN card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the TDM backplane, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card's P3 connector.

11.91.3 Verifying the Procedure

Verify that you correctly replaced the T1DN card as follows:

1. Type the following command:

   TEST T1_CARD_LOOP <pad_num> 2

   The following message appears if you correctly replaced the card:

   PASS

2. Type the following command to enable the T1DN card:

   UP PAD <pad_num>

3. Type the following command to ensure that the T1 link is stabilized:

   MON ALARM <pad_num> ON

   The following message appears if the T1 link is stabilized:

   1) Card AVAIL
   2) No alarms present

4. Type the following command to turn off the alarm monitor:

   MON ALARM <pad_num> OFF

   The % prompt appears if the alarm is turned off.

5. Type the following command to test the T1DN card:

   TEST T1 <pad_num> 1

   The following message appears if you correctly replaced the card:

   T1_ALARMS (T1) ... Passed

   T1_INTEG (T1) ... Passed

   T1_LOCAL_LOOPBACK (T1) ... Passed

   T1_SEIZE (T1) ... Passed

   Note: If the T1DN card connects to an RPDN card, the T1_SEIZE and T1_LOCAL_LOOPBACK tests do not run.

6. After the error table is cleared, type the following command to clear the clock switchover table:

   ```
   CLEAR CLKERRS
   ```

7. Type the following command:

   ```
   CHANGE CLKSOURCE 1
   ```

8. Type the following command:

   ```
   LIST CLKSOURCE
   ```

   Verify that `1*` appears in the INDEX field.

11.92 T1DN Card (One of Two Clock Sources)

Follow ESD prevention procedures when you remove and replace the T1DN card.

11.92.1 Removing the T1DN Card

Warning: Coordinate the removal and replacement of a T1 trunk with the local telephone company so that the telephone company does not test and down the T1 circuit. This momentarily disrupts synchronous T1 data transmission.

CUSTOMER IMPACT

This procedure removes trunk access to the T1DN card and may cause timing disruptions in the T1 network. If there is an alternate T1 path, there is only a momentary timing disruption.

Remove the T1DN card as follows:

1. Type the following DIAG command:

   `CHANGE CLKSOURCE 3`

2. Type the following CLI command to verify that the 9751 CBX is using the internal CSM clock:

   `LIST CLKSOURCE`

   Figure 11-50 appears if the 9751 CBX is using the internal CSM clock.

   Model 10: The message at the bottom of the screen does not appear.

```
       FAR END  SOURCE NEAR END  CLOCK    CLOCK
INDEX  NODE     TYPE   PAD       PAD      INPUT    STATUS
-----  -------  ------ --------  ------   -----    ------
  1     NA      DTRK   01/0107   01/0106  DT_1      GOOD
  2     NA      DTRK   01/0307†  01/0106  DT_2      GOOD
  3*    NA      CLK    01/0106   01/0106  INTERNAL  GOOD
  4     NA      TAs    01/0201   NA       INTERNAL  GOOD

†The second DTRK external clock source may be configured
in another shelf and slot using a digital trunk motherboard.
```

Figure 11-50. LIST CLKSOURCE Command—T1DN Card as One of Two Clock Sources

3. Type the following DIAG command to courtesy down the T1DN card:

   `DOWN PAD <pad_num> C`

4. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the T1DN card.

5. Open the card lock levers.
6. Use the card extractor to unseat the card from the TDM backplane.
7. Remove the umbilical cord from the card’s P3 connector.
8. Handling the card by its edges only, slide it out of the shelf.
9. Immediately place the card in a static shielding bag or static-free box.

11.92.2 Replacing the T1DN Card

Replace the T1DN card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the motherboard of the Models 40 and 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card's P3 connector.

11.92.3 Verifying the Procedure

Verify that you correctly replaced the T1DN card as follows:

1. Type the following command:

   ```
   TEST T1_CARD_LOOP <pad_num> 2
   ```

   The following message appears if you correctly replaced the card:

   ```
   PASS
   ```

2. Type the following command to enable the T1DN card:

   ```
   UP PAD <pad_num>
   ```

3. Type the following command to ensure that the T1 link is stabilized:

   ```
   MON ALARM <pad_num> ON
   ```

   The following message appears if the T1 link is stabilized:

   ```
   1) Card AVAIL
   2) No alarms present
   ```

4. Type the following command to turn off the alarm monitor:

   ```
   MON ALARM <pad_num> OFF
   ```

   The % prompt appears if the alarm is turned off.

5. Type the following command to test the T1DN card:

   ```
   TEST T1 <pad_num> 1
   ```

   The following message appears if you correctly replaced the card:

   ```
   T1_ALARMS (T1) ... Passed
   T1_INTEG (T1) ... Passed
   T1_LOCAL_LOOPBACK (T1) ... Passed
   T1_SEIZE (T1) ... Passed
   ```

   Note: If the T1DN card connects to an RPDN card, the `T1_SEIZE` and `T1_LOCAL_LOOPBACK` tests do not run.

6. After the error table is cleared, type the following command to clear the clock switchover table:

   CLEAR CLKERRS

7. Type the following command:

   CHANGE CLKSOURCE 1

8. Type the following command:

   LIST CLKSOURCE

   Verify that 1* appears in the INDEX field.

11.93 Universal Motherboard (Models 40 and 50)

Use the following procedures to remove and replace the 6x5x5 or the 24x23x23 universal motherboard.

CUSTOMER IMPACT

This procedure removes service from the cards that connect to the motherboards.

11.93.1 Removing the Universal Motherboard

Remove the universal motherboard as follows:

1. Type the following DIAG command to courtesy down the affected cards:

   DOWN PAD <pad_num> C

2. Turn off the switches on the shelf power modules of the affected shelf.
3. Remove the cards seated in the motherboard.
4. Label and remove the cables from the back of the motherboard.
5. Remove the bolts securing the motherboard to the shelf.
6. Remove the motherboard from the shelf.

11.93.2 Replacing the Universal Motherboard

Replace the universal motherboard as follows:

1. If the motherboard is a 24x23x23 universal motherboard with clock cable connectors on shelf 1, ensure that the switch labeled *S1* (on the front of the motherboard between the two connectors for the expander cards) is in the *UP* position.
2. Align the motherboard with the holes on the cabinet frame.
3. Reinstall the bolts securing the motherboard to the shelf.
4. Reconnect the cables to the back of the motherboard.
5. Reinstall the cards.
6. Type the following command to enable the cards:

   UP PAD <pad_num>

7. Turn on the switches on the shelf power modules.

11.93.3 Verifying the Procedure

Verify that you correctly replaced the universal motherboard by using the verification procedures for each card:

- Seated in the motherboard
- On the same shelf as the motherboard

11.94 9030 CPU Card (Model 10)

Follow ESD prevention procedures when you remove and replace the 9030 CPU card.

11.94.1 Removing the 9030 CPU Card

CUSTOMER IMPACT

This procedure downs the 9751 CBX.

Remove the 9030 CPU card as follows:

1. Turn off the shelf 1 power supply.
2. Open the card lock levers.
3. Remove the edge connectors.
4. Handling the card by its edges only, slide it out of the shelf.
5. Immediately place the card in a static shielding bag or static-free box.

11.94.2 Replacing the 9030 CPU Card

Replace the 9030 CPU card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the slot until it seats in the backplane.
3. Replace the edge connectors.
4. Close the card lock levers.
5. Turn on the shelf 1 power supply.

   Automatic software download begins.

11.94.3 Verifying the Procedure

You correctly replaced the 9030 CPU card if:

- After the system downloads software, LEDs CR5 and CR6 on the memory controller card are off.
- There is dial tone on the telephones.

11.95 9030A CCC Motherboard (Models 40 and 50)

Use the following procedures to remove and replace the 9030A CCC motherboard.

11.95.1 Removing the 9030A CCC Motherboard

Remove the 9030A CCC motherboard (Figure 11-51 on page 11-180) as follows:

1. Turn off the circuit breaker on the LCM or BIM.
2. Remove all the cards and disk drives from the motherboard.
3. Disconnect the fan wiring harness from the front of the motherboard.
4. Disconnect the CSM cables from the back of the motherboard.
5. Disconnect the SMIOC interconnect box cables from the back of the motherboard.
6. **DANGER**

   Do *not* wear the ESD wrist strap while you work on shelf power modules.

7. Turn off and remove all the shelf power modules from the back of the motherboard.
8. Remove the +12 Vdc shelf power module bracket from the back of the CCC motherboard.
9. Disconnect the memory retention battery cables from the back of the CCC motherboard.
10. Disconnect and remove the political timer battery cables from the back of the motherboard.
11. Disconnect the HSB cable from the front of the motherboard.
12. Remove the screws that connect the cabinet power bus bar to the motherboard.
13. From the back of the cabinet, carefully bend the power bus bar connectors towards you.
14. Remove the screws that mount the motherboard to the cabinet.
15. Remove the motherboard.

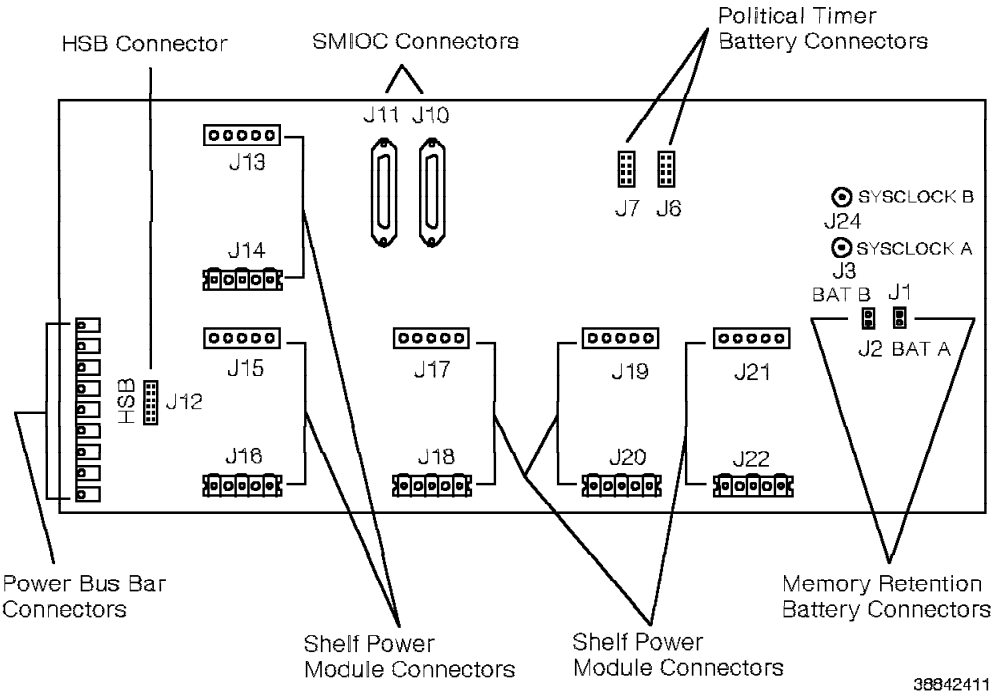


Figure 11-51. 9030A CCC Motherboard Connectors

11.95.2 Replacing the 9030A CCC Motherboard

Replace the 9030A CCC motherboard as follows:

1. Install the CCC motherboard.
2. Connect the power bus bar to the CCC motherboard.
3. Reconnect the memory retention battery cables.
4. Reconnect the HSB cable.
5. Reconnect the SMIOC interconnect box cables.
6. Reinstall and reconnect the political timer battery cables.
7. Reinstall the +12 Vdc shelf power module mounting bracket.
8. Reinstall the shelf power modules.
9. Reconnect the fan wiring harness.
10. Reconnect the CSM cables.
11. Reseat the disk drives.
12. Reseat the cards that you removed from the shelf.
13. Turn on the main circuit breaker at the LCM or BIM.
14. Turn on the shelf power modules.

    Automatic software download begins.

11.95.3 Verifying the Procedure

You correctly replaced the 9030A CCC motherboard if:

- The shelf power modules provide power to the shelf
- The digital displays on the 9030A CPU card show alternating hexadecimal digits A C and C A
- There is access to CLI
- There is dial tone on the telephones

11.96 9030A CPU Card

Follow ESD prevention procedures when you remove and replace the 9030A CPU card.

11.96.1 Removing the 9030A CPU Card

CUSTOMER IMPACT

Models 10 and 40: This procedure removes telephony from the system.

Model 50: This procedure does not remove telephony if you work on the standby side.

Remove the 9030A CPU card as follows:

1. **Models 40 and 50:** Remove the memory retention battery cables from the back of the 9030A CCC motherboard.
2. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the 9030A CPU card.
3. Open the card lock levers.
4. Use the card extractor to unseat the card from the backplane of the Model 10 or the CCC motherboard of the Model 40 or 50.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.96.2 Replacing the 9030A CPU Card

Replace the 9030A CPU card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the backplane of the Model 10 or the CCC motherboard of the Models 40 and 50, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.

   Automatic software download begins and takes approximately 4.5 minutes.
6. **Models 40 and 50:** Reconnect the memory retention battery cables to the back of the CCC motherboard.

11.96.3 Verifying the Procedure

You correctly replaced the 9030A CPU card if the hexadecimal digits A C and C A alternate on the digital display after the software is downloaded.

11.97 9030A I/O Bus Switch Card (Models 40 and 50)

Follow ESD prevention procedures when you remove and replace the 9030A I/O bus switch card.

11.97.1 Removing the 9030A I/O Bus Switch Card

CUSTOMER IMPACT

Model 40: Removing the I/O bus switch card prevents access to the disks and to peripheral equipment.

Remove the 9030A I/O bus switch card as follows:

1. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the 9030A I/O bus switch card.
2. Open the card lock levers.
3. Use the card extractor to unseat the card from the CCC motherboard.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.97.2 Replacing the 9030A I/O Bus Switch Card

Replace the 9030A I/O bus switch card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the CCC motherboard, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacment card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.

11.97.3 Verifying the Procedure

You correctly replaced the 9030A I/O bus switch card if:

- **Model 40:** The green LED on the 9030A I/O bus switch card lights.
- **Model 50:**
  - The green LED on the 9030A I/O bus switch card lights if the card is on the active side.
  - The red LED on 9030A I/O bus switch card lights if the card is on the standby side.

11.98 9030A Memory Expansion Card (Model 50)

Follow ESD prevention procedures when you remove and replace the 9030A memory expansion card.

11.98.1 Removing the 9030A Memory Expansion Card

Remove the 9030A memory expansion card as follows:

1. **Warning:** Ensure that you correctly connect the source end of the umbilical cord or the card will be damaged. Refer to 9.2.3, “Using the Umbilical Cord” on page 9-7.

   Attach the umbilical cord to the P3 connector of the standby 9030A memory expansion card.
2. Open the card lock levers.
3. Use the card extractor to unseat the card from the CCC motherboard.
4. Remove the umbilical cord from the card’s P3 connector.
5. Handling the card by its edges only, slide it out of the shelf.
6. Immediately place the card in a static shielding bag or static-free box.

11.98.2 Replacing the 9030A Memory Expansion Card

Replace the 9030A memory expansion card as follows:

1. Handling the card by its edges only, remove the replacement card from its static shielding bag or static-free box.
2. Slide the card into the correct slot until it is ready to be seated in the CCC motherboard, but do *not* seat the card.
3. Attach the umbilical cord to the P3 connector of the replacement card, then seat the card.
4. Close the card lock levers.
5. Remove the umbilical cord from the card’s P3 connector.

11.98.3 Verifying the Procedure

You correctly replaced the 9030A memory expansion card if the system banner on the maintenance terminal shows 24MB of memory.

Chapter 12. Removing and Replacing Peripheral Equipment FRUs

This chapter provides the peripheral equipment field replaceable units (FRUs) for the 9751 computerized branch exchange (CBX), in alphabetical order, and the procedures to remove and replace them.

Appendix A, “Parts and Assemblies Catalog” lists the part and model numbers for the peripheral equipment FRUs.

12.1 ADCM

Use the following procedures to remove and replace the asynchronous data communications module (ADCM).

12.1.1 Removing the ADCM

Remove the ADCM as follows:

1. Disconnect the EIA/TIA-232-E cable from the connector on the ADCM.
2. Unplug the telephone cord from the RJ-11 jack.
3. Record the DTE/DCE switch setting so you can set the replacement ADCM accordingly.

12.1.2 Replacing the ADCM

Replace the ADCM as follows:

1. Ensure that the DCE/DTE switch on the top of the ADCM is set the same way as it is on the defective ADCM.
2. Plug the telephone cord into the RJ-11 jack.
3. Connect the EIA/TIA-232-E cable to the connector on the ADCM.

12.1.3 Verifying the Procedure

You correctly replaced the ADCM if the green light-emitting diode (LED) is on and the yellow LED is off.

12.2 ARMDCM

Follow electrostatic discharge (ESD) prevention procedures when you remove and replace the asynchronous rack-mount data communications module (ARMDCM).

12.2.1 Removing the ARMDCM

Remove the ARMDCM as follows:

1. Use the finger holes to pull out and gently unseat the ARMDCM.
2. Slide the ARMDCM out of the rack-mount card cage.
3. Handling the ARMDCM by its edges only, immediately place it in a static shielding bag or static-free box.

12.2.2 Replacing the ARMDCM

Replace the ARMDCM as follows:

1. Handling the ARMDCM by its edges only, remove its replacement from its static shielding bag or static-free box.
2. Ensure that the NORM/TEST switch is in the *NORM* position.
3. Ensure that the data terminating equipment (DTE) or data-circuit terminating equipment (DCE) jumper plugs are in the same position as they are on the defective ARMDCM.
4. Slide the ARMDCM into the correct slot until it is ready to be seated in the rack-mount card cage backplane.
5. Seat the ARMDCM into the backplane.

12.2.3 Verifying the Procedure

Verify that you correctly replaced the ARMDCM as follows:

1. Type the following data communications feature (DCF) command to determine the correct physical addresses (PADs):

   ```
   STATUS LINE <data line #>
   ```

2. Type the following command using the PAD:

   ```
   TEST LINE <data line #> 3
   ```

   If you correctly replaced the ARMDCM, the following message appears:

   ```
   Analysis Complete:  Channel passed.
   ```

12.3 CDLM

Use the following procedures to remove and replace the Cedar load module (CDLM).

12.3.1 Removing the CDLM

Remove the CDLM as follows:

1. Unplug the power cord.
2. Unplug the telephone cord from the RJ-11 jack at the back of the CDLM (Figure 12-1).
3. Remove the CDLM.

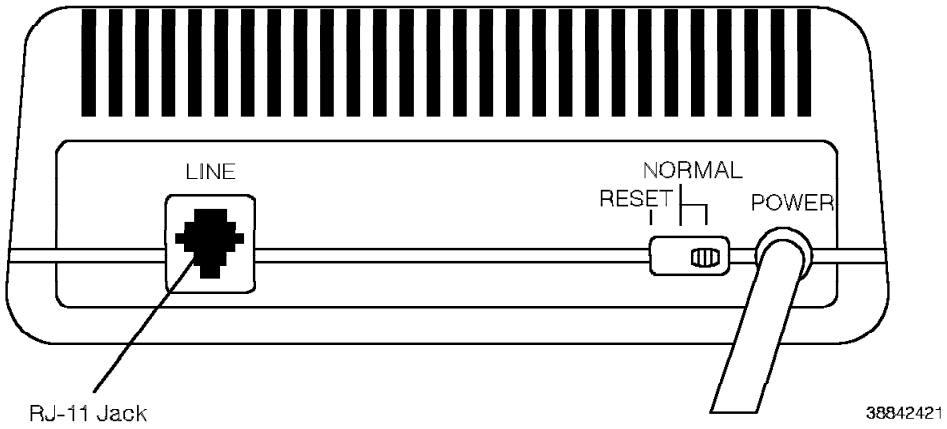


Figure 12-1. Removing the CDLM

12.3.2 Replacing the CDLM

Replace the CDLM as follows:

1. Ensure that the RESET switch on the back of the replacement CDLM is in the *NORMAL* position.
2. Plug the telephone cord into the RJ-11 jack on the back of the CDLM.
3. Plug the power cord into an alternating current (ac) power outlet.

12.3.3 Verifying the Procedure

Verify that you correctly replaced the CDLM as follows:

1. Ensure that the Power LED lights.
2. Ensure that the Ready/Active LED flickers briefly, then lights steadily.

   If the Ready/Active LED continues to flicker:

   - The CDLM did not pass self-test
   - You did not correctly plug in the telephone cord

12.4 Cedar Personal Communications Computer

Use the following procedures to remove and replace the Cedar personal communications computer.

12.4.1 Removing the Cedar Computer

Remove the Cedar computer as follows:

1. Copy the personal data module information to a blank diskette.
2. Turn off the Cedar computer.
3. Unplug the telephone cord from the RJ-11 jack on the back panel (Figure 12-2).
4. Disconnect the cable connector on the back panel.
5. **Warning:** Carefully handle the personal data module to prevent damage to the lithium battery.

   Remove the personal data module.
6. Remove the Cedar computer.

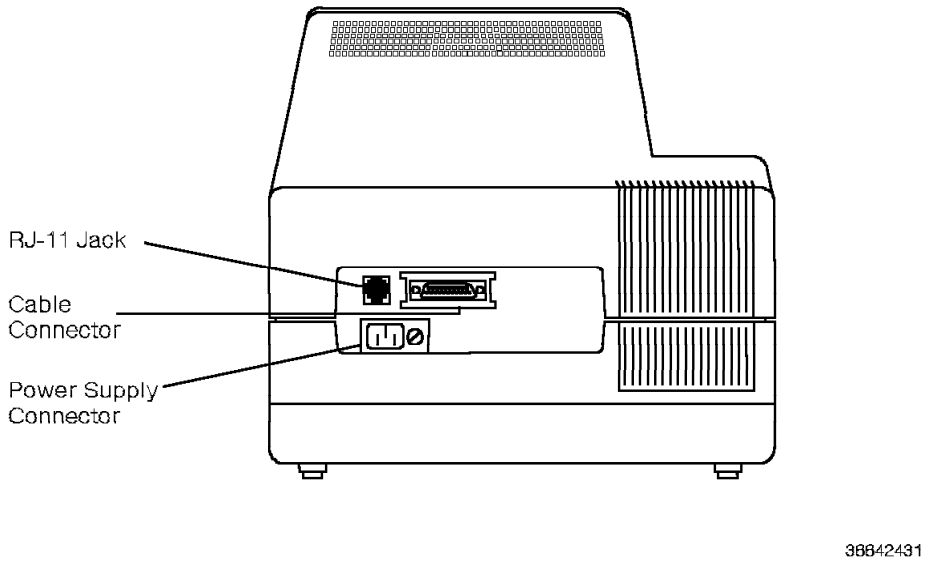


Figure 12-2. Removing the Cedar Computer

12.4.2 Replacing the Cedar Computer

Replace the Cedar computer as follows:

1. Reinstall the personal data module in the Cedar computer.
2. Plug the cord into the power connector on the back panel.
3. Connect the cable to the back panel.
4. Plug the telephone cord into the RJ-11 jack on the back panel.
5. Turn on the Cedar computer.

12.4.3 Verifying the Procedure

You correctly replaced the Cedar computer if it runs self-tests and downloads software from the CDLM when you power it on.

12.5 CLM

Use the following procedures to remove and replace the Cypress load module (CLM).

12.5.1 Removing the CLM

Remove the CLM as follows:

1. Unplug the power cord.
2. Unplug the telephone cord from the RJ-11 jack at the back of the CLM.
3. Remove the CLM.

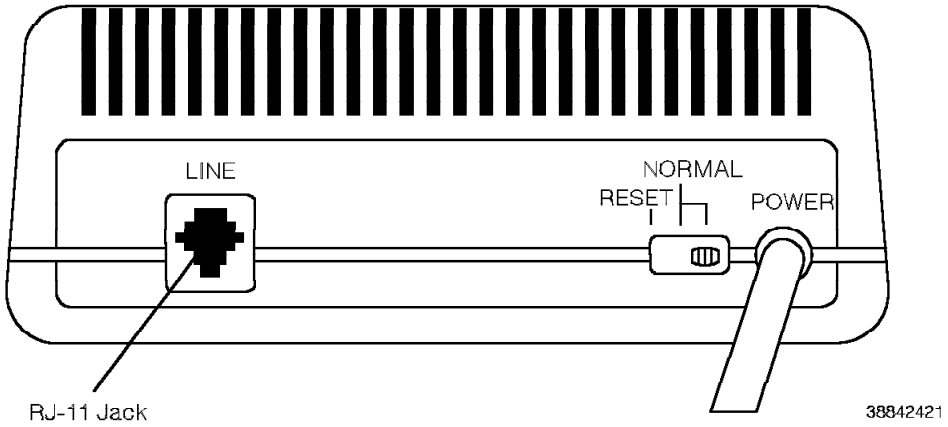


Figure 12-3. Removing the CLM

12.5.2 Replacing the CLM

Replace the CLM as follows:

1. Ensure that the RESET switch on the back of the replacement CLM is in the *NORMAL* position.
2. Plug the telephone cord into the RJ-11 jack on the back of the CLM.
3. Plug the power cord into an ac power outlet.

12.5.3 Verifying the Procedure

Verify that you correctly replaced the CLM as follows:

1. Ensure that the Power LED lights.
2. Ensure that the Ready/Active LED flickers briefly, then lights steadily.

   If the Ready/Active LED continues to flicker:

   - The CLM did not pass self-test
   - You did not correctly plug in the telephone cord

12.6 Cypress Personal Communications Terminal

Use the following procedures to remove and replace the Cypress personal communications terminal.

12.6.1 Removing the Cypress Terminal

Remove the Cypress terminal as follows:

1. Unplug the telephone cord from the RJ-11 jack on the back panel (Figure 12-4).
2. Disconnect the cable from the connector on the back panel.
3. **Warning:** Carefully handle the personal data module to prevent damage to the lithium battery.

   Remove the personal data module.
4. Remove the Cypress terminal.

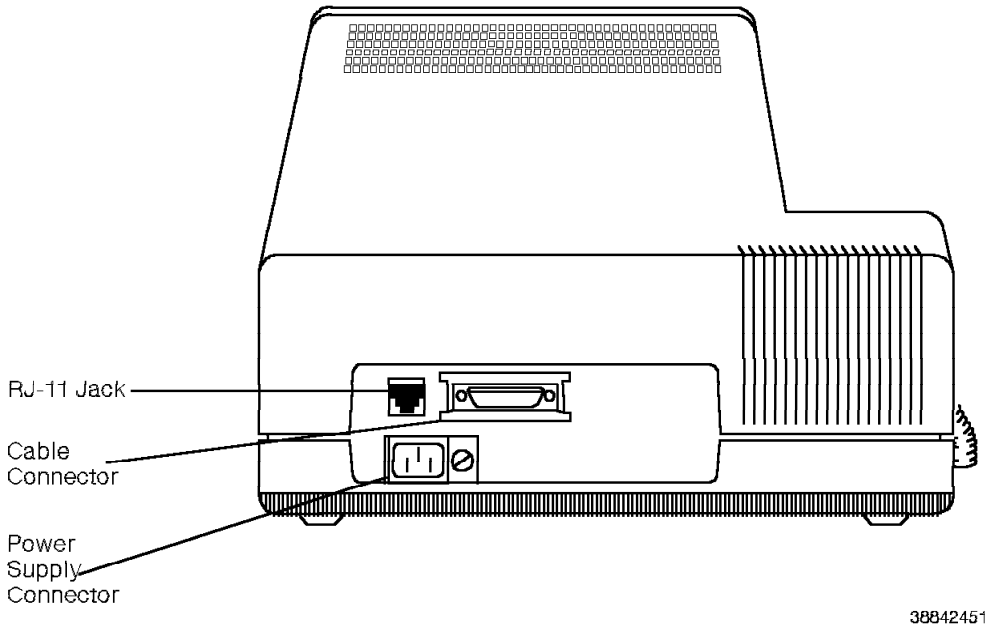


Figure 12-4. Removing the Cypress Terminal

12.6.2 Replacing the Cypress Terminal

Replace the Cypress terminal as follows:

1. Reinstall the personal data module in the Cypress terminal.
2. Plug the cord into the power connector on the back panel.
3. Lower the top on to the cabinet frame.
4. Plug the telephone cord into the RJ-11 jack on the back panel.

12.6.3 Verifying the Procedure

You correctly replaced the Cypress terminal if it runs self-tests and downloads software from the CLM when you power it on.

12.7 Juniper Battery

The customer is responsible for removing and replacing the Juniper II personal communications complement battery.

Refer to the documentation provided with the Juniper personal communications complement.

12.8 Juniper Card

The customer is responsible for removing and replacing the Juniper II card.

Refer to the documentation provided with the Juniper personal communications complement.

12.9 Juniper II Telephone

Use the following procedures to remove and replace the Juniper II telephone.

12.9.1 Removing the Juniper II Telephone

Remove the Juniper II telephone (Figure 12-5) as follows:

1. Unplug the cord from the RJ-11 jack on the back of the telephone.
2. Loosen the two screws that secure the Juniper II cable to the connector on the back of the telephone.
3. Disconnect the Juniper II cable.
4. Remove the Juniper II telephone.

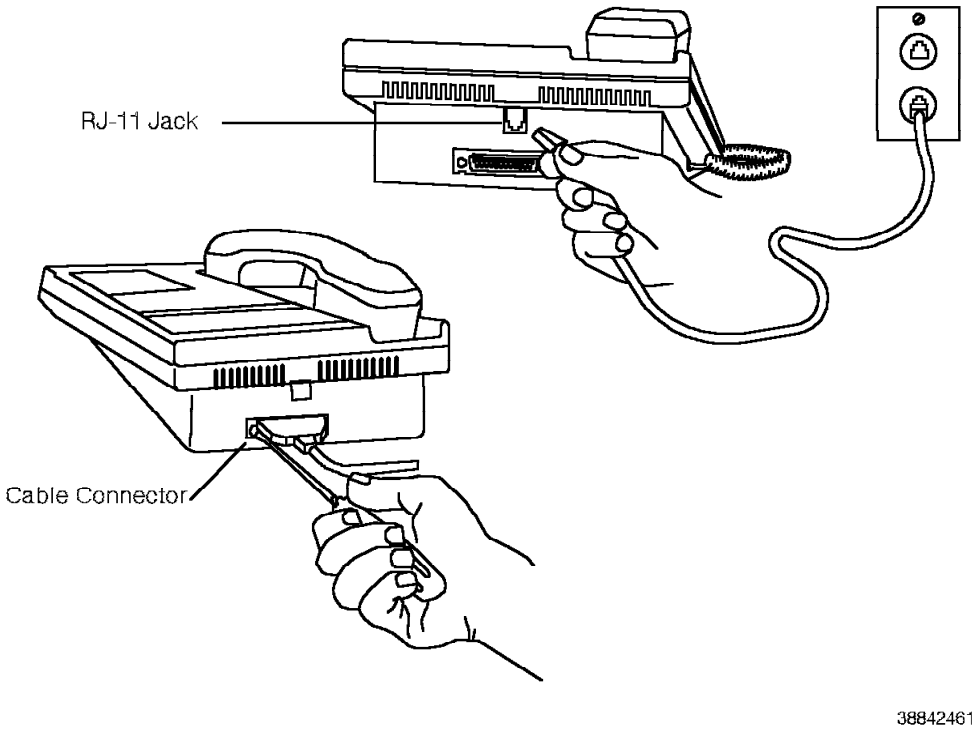


Figure 12-5. Removing the Juniper II Telephone

12.9.2 Replacing the Juniper II Telephone

Replace the Juniper II telephone as follows:

1. Attach the Juniper II cable to the connector on the back of the replacement telephone.
2. Carefully align the two screws on the cable connector with the threaded holes provided.
3. Partially tighten each screw.
4. Tighten the screws alternately to gradually seat the connector.
5. Plug the telephone cord into the RJ-11 jack on the back of the telephone.

12.10 Modem

Use the following procedures to remove and replace the modem.

12.10.1 Removing the Modem

Remove the modem as follows:

1. Unplug the telephone cord from the RJ-11 jack.
2. Disconnect the EIA/TIA-232-E cable from the connector on the modem.
3. Unplug the modem from the power source.
4. Note the modem switch settings so you can set the replacement modem's switches correctly.

12.10.2 Replacing the Modem

Replace the modem as follows:

1. Plug the modem into a power source.
2. Ensure that the replacement modem's switch settings correspond with those of the defective modem.
3. Connect the EIA/TIA-232-E cable to the connector on the modem.
4. Plug the telephone cord into the RJ-11 jack.

12.11 Music-on-Hold Interface Box

A music-on-hold interface box connects a customer-supplied music source to the 9751 CBX. This type of device prevents the music volume from increasing to levels that could impair the caller's hearing.

FCC Part 68 rules require that nonlive voice equipment such as a radio tuner, tape recorder, cable music amplifier, or announcement equipment be connected through signal power limiting circuitry or a device (such as the music-on-hold interface box) that limits the signal power of the music source.

When you replace the music-on-hold interface box, use *only* the devices approved by ROLM and registered with the FCC together with the 9751 CBX. Refer to Appendix A, "Parts and Assemblies Catalog" for the correct part number.

To remove and replace a music-on-hold interface box, refer to the documentation provided by the manufacturer of the device.

12.12 Rack-Mount Air Baffle

Use the following procedures to remove and replace the rack-mount air baffle.

12.12.1 Removing the Rack-Mount Air Baffle

CUSTOMER IMPACT

This procedure removes data channels associated with the cards in the rack-mount card cage.

Remove the rack-mount air baffle as follows:

1. Remove the four cap screws and washers from the front of the air baffle (Figure 12-6 on page 12-16).
2. Slide the air baffle out of the cabinet.

12.12.2 Replacing the Rack-Mount Air Baffle

Replace the rack-mount air baffle as follows:

1. Slide the air baffle into the cabinet.
2. Replace the four cap screws and washers on the front of the cabinet.

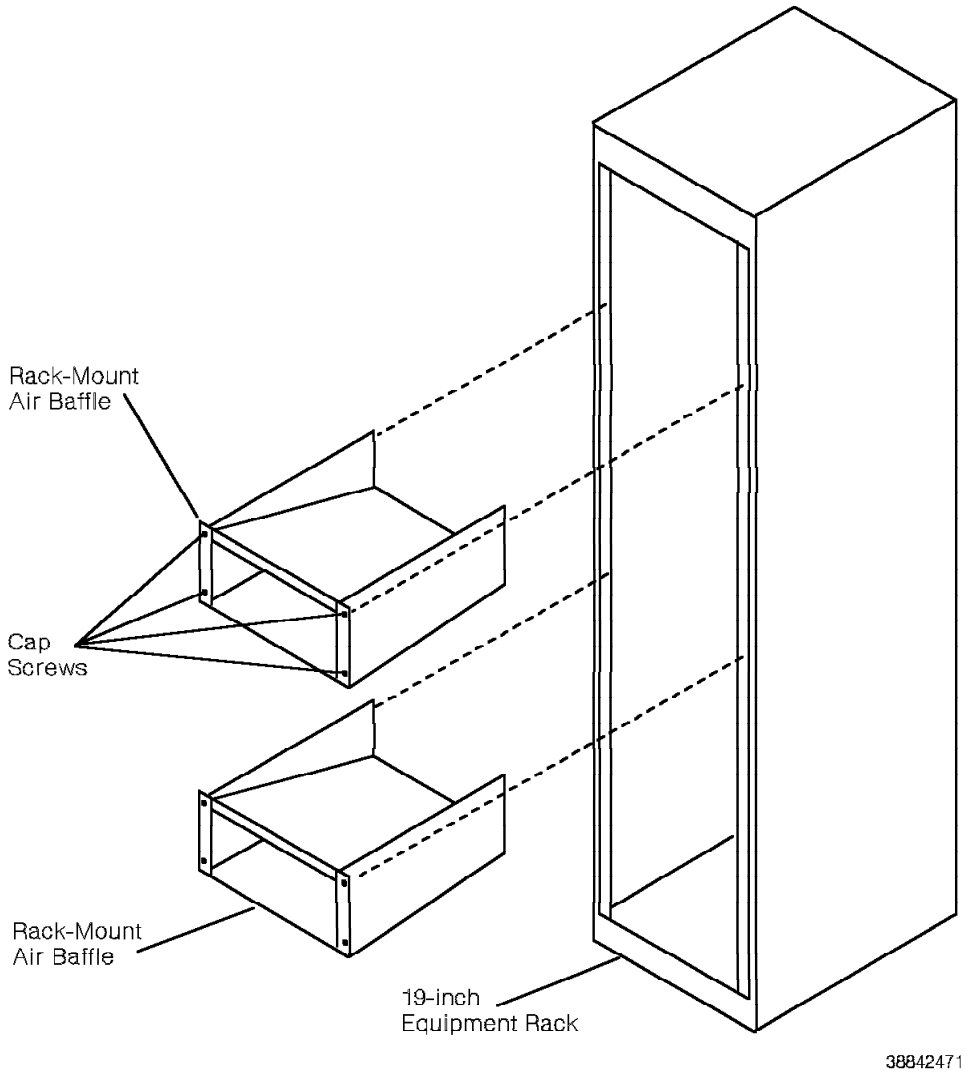


Figure 12-6. Removing the Rack-Mount Air Baffle

12.13 Rack-Mount Card Cage

Use the following procedures to remove and replace the rack-mount card cage.

12.13.1 Removing the Rack-Mount Card Cage

Remove the rack-mount card cage (Figure 12-7 on page 12-18) as follows:

1. Type the following DCF command to disable the data line associated with the rack-mount card cage:

   DISABLE DATALINE <pad_num>

2. **Warning:** Before proceeding, ensure that the card cage is supported to prevent damage to it.

   Remove the RMDCMs from the card cage, label them, and set them aside.

3. Disconnect the power cord from the back of the card cage.
4. Disconnect the fan assembly's power cord from the power cable receptacle.
5. Label and disconnect each EIA/TIA-232-E and Amphenol telephone cable from the back of the card cage.
6. Remove the cap screws with flat washers that attach the card cage to the standard 48-centimeter (19-inch) cabinet.
7. Remove the card cage from the cabinet.

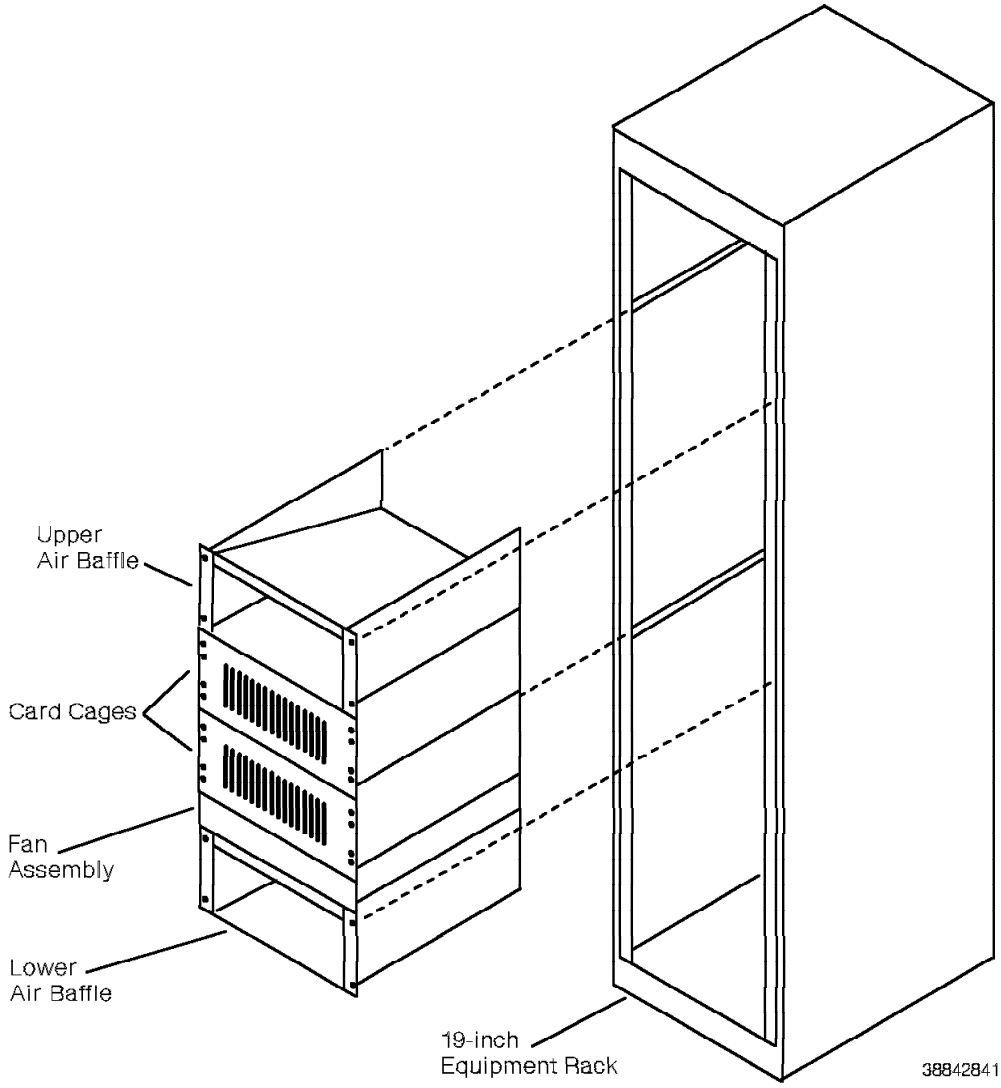


Figure 12-7. Removing the Rack-Mount Card Cage

12.13.2 Replacing the Rack-Mount Card Cage

Replace the rack-mount card cage as follows:

1. Secure the flanges on each rack-mount card cage to the rack with eight cap screws fitted with flat washers.
2. Reconnect the EIA/TIA-232-E and Amphenol telephone cables.
3. **Warning:** Do not connect the fan assembly to an isolated ground (IG) outlet.

   Replace the fan assembly. Secure its flanges to the equipment rack with cap screws with flat washers.
4. Plug the power cord of the fan assembly into a power receptacle and verify that the fan operates.
5. Plug the card cage cord into the corresponding 120 volts alternating current (Vac) or 240 Vac power receptacle.
6. Ensure that the signal frame ground strap on the back of the card cage is securely connected to both lugs (Figure 12-8 on page 12-19).

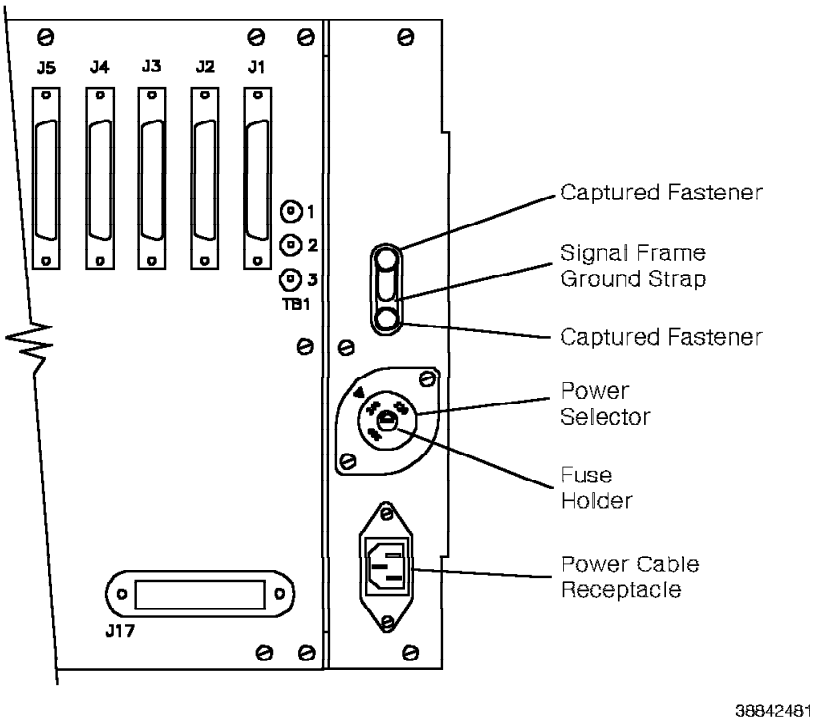


Figure 12-8. Rack-Mount Card Cage Power Selector and Ground Strap

7. Ensure that the rotary power selector on the back of the card cage is set to the correct voltage.

   Set the voltage as follows:

   a. Remove the fuse holder (Figure 12-8).

   b. Check the rating of the fuse (1 amp [A] or 2A) while the fuse holder is removed.

   c. Set the center dial of the rotary power selector to the desired line voltage as follows:

      1A fuse Set the power selector to 200, 220, or 240 Vac.
      2A fuse Set the power selector to 100, 120, or 140 Vac.

   d. Replace the fuse holder.

   e. Type the following command to enable the data line:

      ENABLE DATALINE <pad_num>

12.13.3 Verifying the Procedure

Verify that you correctly replaced the rack-mount card cage as follows:

1. Ensure that the red LED on the rack-mount card cage lights.
2. Ensure that all LEDs on the ARMDCM and RMDCM light.

12.14 Rack-Mount Card Cage Fuse

Use the following procedures to remove and replace the rack-mount card cage fuse.

12.14.1 Removing the Rack-Mount Card Cage Fuse

Remove the rack-mount card cage fuse as follows:

1. Unscrew the fuse holder.
2. Remove the fuse.

12.14.2 Replacing the Rack-Mount Card Cage Fuse

Replace the rack-mount card cage fuse (Figure 12-9) as follows:

1. Place the replacement fuse in the fuse holder.
2. Replace the fuse holder.

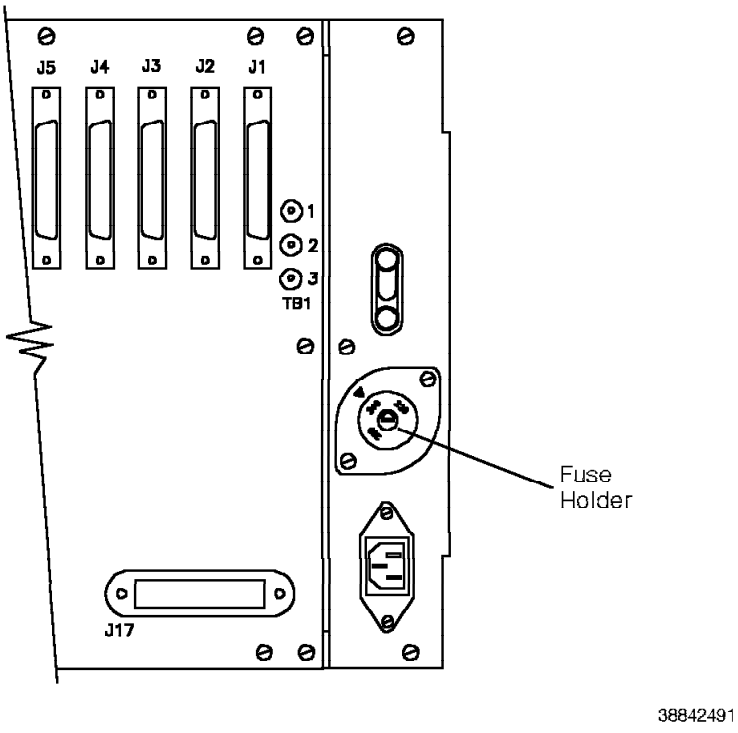


Figure 12-9. Removing the Rack-Mount Card Cage Fuse

12.14.3 Verifying the Procedure

Verify that you correctly replaced the rack-mount card fuse as follows:

1. Ensure that the red LED on the rack-mount card cage lights.
2. Ensure that all LEDs on the ARMDCM and RMDCM light.

12.15 RMDCM

Follow ESD prevention procedures when you remove and replace the rack-mount data communications module (RMDCM).

12.15.1 Removing the RMDCM

Remove the RMDCM as follows:

1. Use the finger holes to pull out and gently unseat the RMDCM.
2. Slide the RMDCM out of the rack-mount card cage.
3. Handling the RMDCM by its edges only, immediately place it in a static shielding bag or static-free box.

12.15.2 Replacing the RMDCM

Replace the RMDCM as follows:

1. Handling the RMDCM by its edges only, remove its replacement from its static shielding bag or static-free box.
2. Ensure that the NORM/TEST switch is in the *NORM* position.
3. Ensure that the X1 and X2 jumper plugs are correctly installed.
4. Ensure that the X3 jumper plug is in the upper position.
5. Slide the RMDCM into the correct slot until it is ready to be seated in the rack-mount card cage backplane.
6. Seat the RMDCM into the backplane.

12.15.3 Verifying the Procedure

Verify that you correctly replaced the RMDCM as follows:

1. Type the following DCF command to determine the correct PADs:

   ```
   STATUS LINE <data line num>
   ```

2. Type the following command using the PAD:

   ```
   TEST LINE <data line num> 3
   ```

   If you correctly replaced the RMDCM, the following message appears:

   ```
   Analysis Complete:  Channel passed.
   ```

12.16 ROLMdial S100

Use the following procedures to remove and replace the ROLMdial S100 device.

Note: These procedures assume that the ROLMdial S100 is configured as a 2-port device. If you are removing and replacing a 1-port device, ignore references to port 2.

12.16.1 Removing the ROLMdial S100

Remove the ROLMdial S100 device (Figure 12-10) as follows:

1. Label all cords with the correct port number.
2. Unplug the power cord from the receptacle outlet.
3. Disconnect the power cable from the ROLMdial S100 *POWER* connector.
4. Disconnect the telephone line cords from the port 1 and port 2 *ROLMlink* connectors.
5. Disconnect the RS-366 cables from the port 1 and port 2 *DIAL (RS-366)* connectors.
6. Disconnect the V.35 cables from the port 1 and port 2 *DATA (V.35)* connectors.

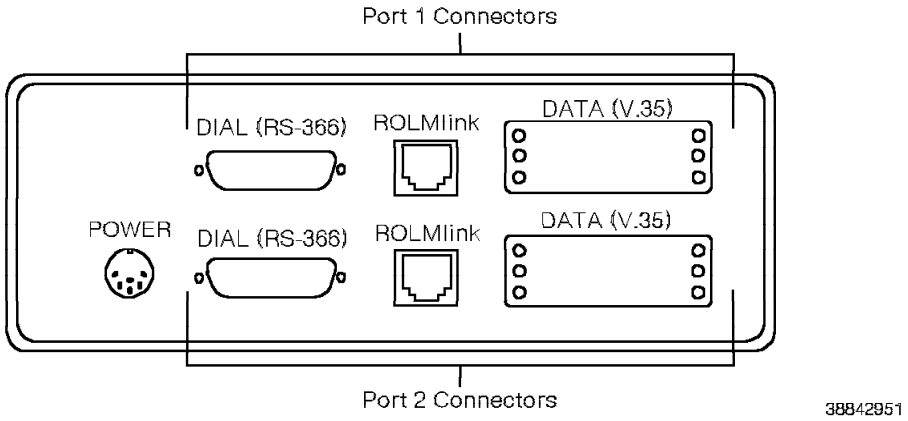


Figure 12-10. ROLMdial S100—Back View

12.16.2 Replacing the ROLMdial S100

Replace the ROLMdial S100 device as follows:

1. Connect the RS-366 cables to the port 1 and port 2 *DIAL (RS-366)* connectors.
2. Connect the V.35 cables to the port 1 and port 2 *DATA (V.35)* connectors.
3. Connect the telephone line cords to the port 1 and port 2 *ROLMlink* connectors.
4. Connect the power cable to the ROLMdial S100 *POWER* connector.
5. Plug the power cord into the receptacle outlet.
6. Ensure that all cords connect to corresponding ports on the ROLMdial S100 device and on the video equipment.
7. Ensure that all cords are labeled with the correct port number.

12.16.3 Verifying the Procedure

Verify that you correctly replaced the ROLMdial S100 device as follows:

1. Verify that the ROLMdial S100 front panel's PWR and RDY LEDs are lit.
2. Type the following command:

   ```
   TEST RPD <pad_num>
   ```

   The following message appears if you correctly replaced the ROLMdial S100 device:

   ```
   Analysis Complete:  Channel passed.
   ```

12.17 ROLMphone

Use the following procedures to remove and replace the ROLMphone. If applicable, refer to the following:

- 12.19, “ROLMphone 244PC” on page 12-26
- 12.18, “ROLMphone with DCM” on page 12-25

12.17.1 Removing the ROLMphone

Unplug the telephone cord from the RJ-11 jack (Figure 12-11) to remove the ROLMphone.

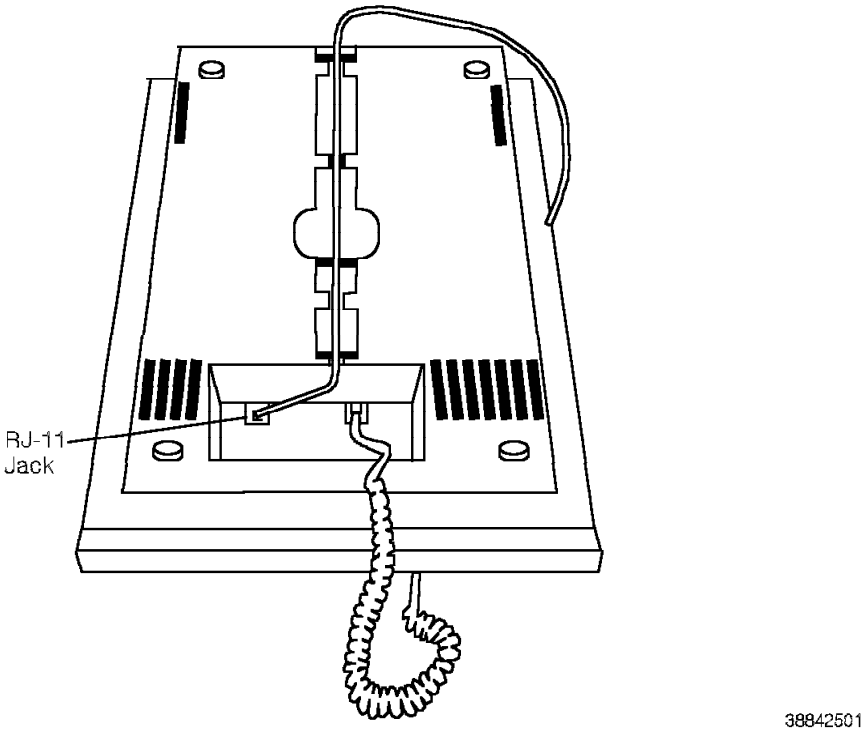


Figure 12-11. Removing the ROLMphone

12.17.2 Replacing the ROLMphone

Plug the telephone cord into the RJ-11 jack to replace the ROLMphone.

12.18 ROLMphone with DCM

Use the following procedures to remove and replace the ROLMphone with data communications module (DCM).

12.18.1 Removing the ROLMphone with DCM

Remove the ROLMphone with DCM (Figure 12-12) as follows:

1. Unplug the cord from the RJ-11 jack on the back panel.

   ROLMphone 400: The RJ-11 jack is on the underside.

2. Disconnect the EIA/TIA-232-E cable from the connector on the back panel.
3. Unplug the cord from the power jack on the back panel.

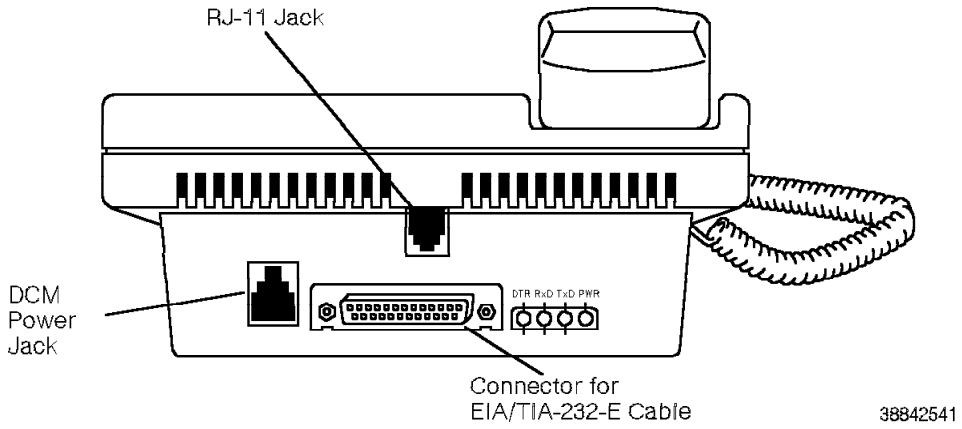


Figure 12-12. Removing the ROLMphone with DCM

12.18.2 Replacing the ROLMphone with DCM

Replace the ROLMphone with DCM as follows:

1. Plug the cord into the DCM power jack on the back panel.
2. Reconnect the EIA/TIA-232-E cable to the connector on the back panel.
3. Plug the telephone cord into the RJ-11 jack.

12.19 ROLMphone 244PC

Use the following procedures to remove and replace the ROLMphone 244PC.

12.19.1 Removing the ROLMphone 244PC

Remove the ROLMphone 244PC (Figure 12-13) as follows:

1. Unplug the telephone cord from the RJ-11 jack on the back panel.
2. Disconnect the EIA/TIA-232-E cable from the connector on the back panel.
3. Unplug the cord from the power supply connector on the back panel.

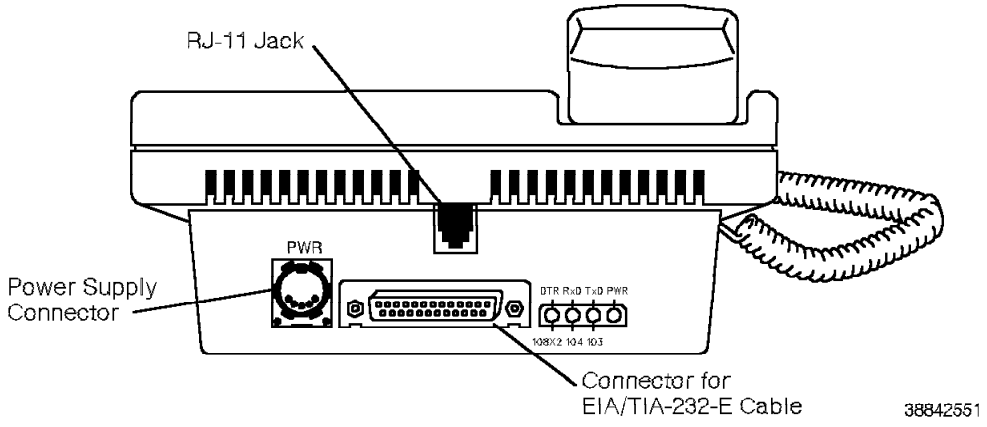


Figure 12-13. Removing the ROLMphone 244PC

12.19.2 Replacing the ROLMphone 244PC

Replace the ROLMphone 244PC as follows:

1. Plug the cord into the power connector on the back panel.
2. Reconnect the EIA/TIA-232-E cable to the connector on the back panel.
3. Plug the telephone cord into the RJ-11 jack on the back panel.

12.20 ROLMphone 244PC Power Supply

Use the following procedures to remove and replace the ROLMphone 244PC power supply.

12.20.1 Removing the ROLMphone 244PC Power Supply

CUSTOMER IMPACT

This procedure removes data service from the ROLMphone 244PC.

Remove the ROLMphone 244PC power supply as follows:

1. Unplug the power connector from the ROLMphone 244PC back panel.
2. Unplug the power supply from the wall outlet.

12.20.2 Replacing the ROLMphone 244PC Power Supply

1. Plug the cord into the power connector on the ROLMphone 244PC back panel.
2. Plug the power supply into the wall outlet.

12.21 ROLMphone 312 or 600 Series Telephone Handset Cord

Use the following procedures to remove and replace the ROLMphone 312 or 600 series telephone handset cord.

12.21.1 Removing the Handset Cord

Remove the cord from the handset as follows:

1. Remove the cord from the ROLMphone.
2. Remove the boot from the handset (Figure 12-14).
3. Use a slender screwdriver or spudger to release the cord from the handset.

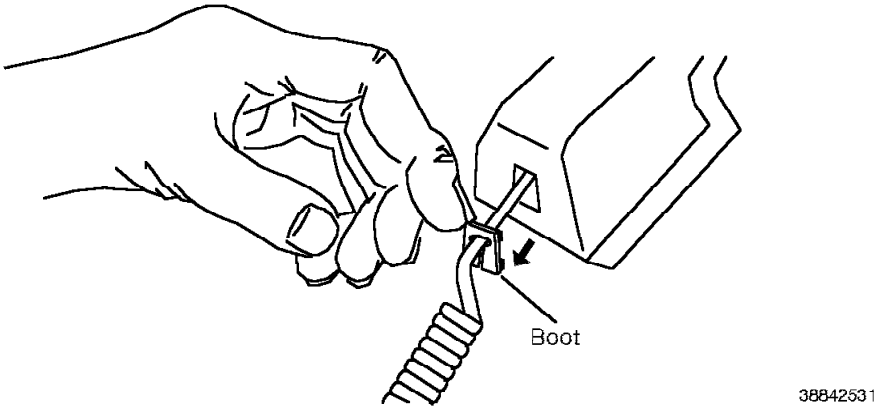


Figure 12-14. Removing the Cord from a ROLMphone 312 or 600 Series Telephone

12.21.2 Replacing the Handset Cord

Replace the handset cord as follows:

1. Insert the cord into the handset until you feel it lock into place.
2. Fit the boot over the cord near the handset.
3. Press the boot into place.
4. Insert the other end of the cord into the ROLMphone.

12.22 ROLMphone 600 Series Telephone HRO or DCO

Use the following procedures to remove and replace the ROLMphone 600 series telephone headset/recorder option (HRO) or data communications option (DCO).

12.22.1 Removing the HRO or DCO

CUSTOMER IMPACT

This procedure removes data service from the ROLMphone with DCO.

Remove the HRO or DCO as follows (Figure 12-15):

1. Locate the release tab.
2. Press the release tab to release the HRO or DCO.
3. Remove the HRO or DCO.

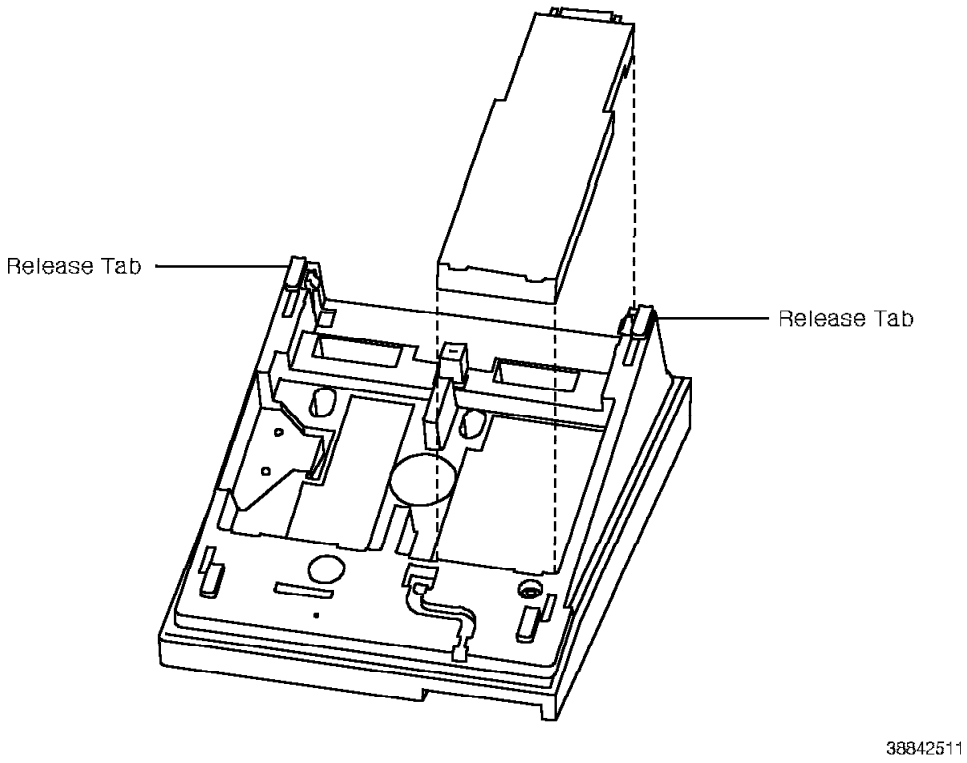


Figure 12-15. Removing the HRO or DCO from a ROLMphone 312 or 600 Series Telephone

12.22.2 Replacing the HRO or DCO

Replace the HRO or DCO as follows:

1. Locate the bays on the bottom of the telephone. You can install the HRO or DCO into either bay.
2. Fit the tabs into the two slots on the module bay.
3. Press the HRO or DCO firmly into place.

12.23 ROLMphone 600 Series Telephone KEO

Use the following procedures to remove and replace the ROLMphone 600 series telephone keyboard expansion option (KEO).

12.23.1 Removing the KEO

Remove the KEO as follows (Figure 12-16):

1. Remove the HRO or DCO if it obstructs the KEO bracket.
2. Remove the screws from the bracket.
3. Lift the KEO and bracket away from the telephone.
4. Remove the bracket from the KEO by gently prying up the clamp and sliding the bracket out.

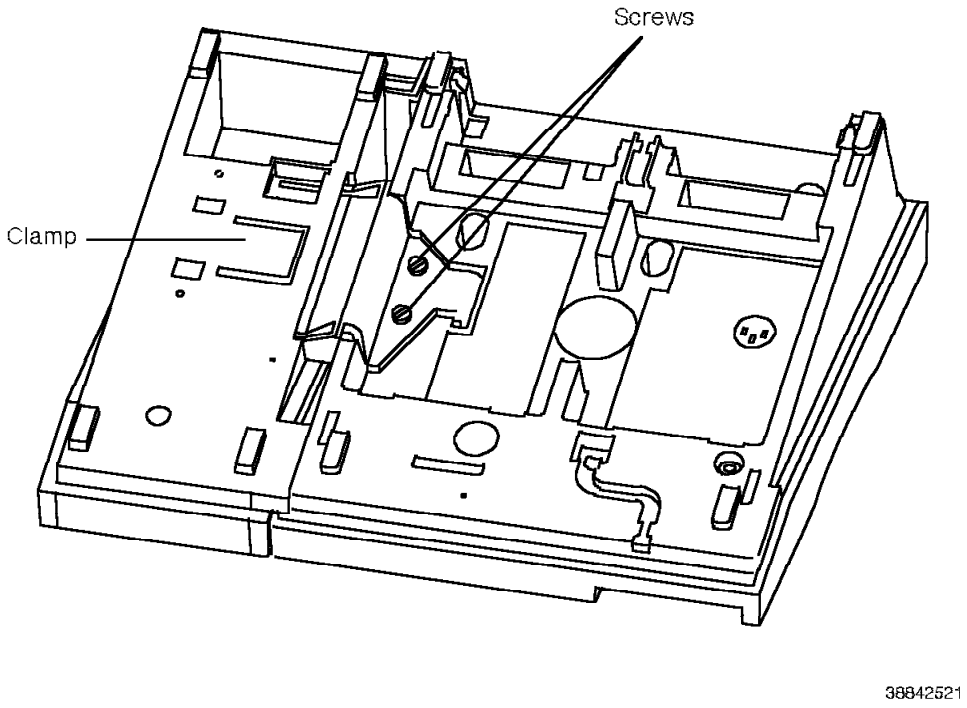


Figure 12-16. Removing the KEO from a ROLMphone 312 or 600 Series Telephone

12.23.2 Replacing the KEO

Replace the KEO as follows:

1. Attach the bracket to the telephone.
2. Slide the KEO on the bracket.
3. Replace the HRO or DCO if necessary.

12.24 Single-Line Telephone

Use the following procedures to remove and replace the single-line telephone.

12.24.1 Removing the Single-Line Telephone

Unplug the telephone cord from the RJ-11 jack to remove the single-line telephone.

12.24.2 Replacing the Single-Line Telephone

Plug the telephone cord into the RJ-11 jack to replace the single-line telephone.

12.25 9751 CBX Monitor

Follow ESD prevention procedures when you remove and replace the 9751 CBX monitor.

12.25.1 Removing the 9751 CBX Monitor

Remove the 9751 CBX monitor as follows:

1. Set the BYPASS switch on the SMIOC interconnect box to the *OVERRIDE* position.
2. Type the following configuration (CNFG) command:

   `MODIFY PARAM SERVICE_PORT`

   Type `OFF` in the VALUE field.
3. Disconnect the telephone cord from the RJ-11 jack labeled *Modem*.
4. Disconnect the power cord from the wall outlet.
5. Press the reset button labeled *RST*.
6. Disconnect the EIA/TIA-232-E cable from the CBX Port 1 connector.
7. Disconnect the EIA/TIA-232-E cable from the CBX Port 2 connector.
8. Disconnect the bypass wires from the HA3 screw terminals.

12.25.2 Replacing the 9751 CBX Monitor

Replace the 9751 CBX monitor as follows:

1. Connect the EIA/TIA-232-E cable from the Port 1 connector on the SMIOC interconnect box to the CBX Port 1 connector on the 9751 CBX monitor.
2. Connect the EIA/TIA-232-E cable from the Port 2 connector on the SMIOC interconnect box to the CBX Port 2 connector on the 9751 CBX monitor.
3. Connect the telephone cord from the RJ-11 jack to the connector labeled *Modem* on the 9751 CBX monitor.
4. Reconnect the bypass wires from the MDF to the HA3 screw terminal on the 9751 CBX monitor.
5. Connect the 9751 CBX monitor power cord to the wall outlet. The EXT and BAT LEDs on the 9751 CBX monitor light.
6. Type the following CNFG command:

   `MODIFY PARAM SERVICE_PORT`

   Type `EXTERNAL` in the VALUE field.
7. Reload the 9751 CBX monitor software. Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide*.
8. Set the BYPASS switch on the SMIOC interconnect box to the *NORM* position.

12.25.3 Verifying the Procedure

Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for procedures to verify the 9751 CBX monitor.

12.26 9751 CBX Monitor II Modem

Use the following procedures to remove and replace the 9751 CBX monitor II modem.

12.26.1 Removing the 9751 CBX Monitor II Modem

Remove the 9751 CBX monitor II modem as follows:

1. Set the BYPASS switch on the SMIOC interconnect box to the *OVERRIDE* position.
2. Type the following CNFG command:

   MODIFY PARAM SERVICE_PORT

   Type OFF in the VALUE field.
3. Disconnect the telephone line cord from the port on the modem labeled *LINE*.
4. Remove the ac power cord with ac adapter from the receptacle. then disconnect it from the back of the modem.
5. Disconnect the direct current (dc) power plug from its receptacle on the back of the modem.
6. Disconnect the EIA/TIA-232-E cable from its connector on the back of the modem.
7. Slide the modem forward out of its base, away from the battery plug. Leave the base in the wall-mount bracket on the wall.

12.26.2 Replacing the 9751 CBX Monitor II Modem

Replace the 9751 CBX monitor II modem as follows:

1. Slide the replacement modem into the existing modem battery base (Figure 12-17 on page 12-35), in the direction indicated by the arrow, still attached to the modem wall-mount bracket.
2. Connect the EIA/TIA-232-E cable attached to the Port 2 connector on the SMIOC interconnect box to its matching receptacle on the back of the modem.
3. Plug the dc power plug back into the receptacle labeled *Battery* on the back of the modem.
4. With the dc power plug connected to the modem and the ac power modem plug disconnected from the modem, press the Battery Save button and see if the icons light up.

   If the icons light up, proceed to step 5. If the icons do not light up, refer to 12.28, “9751 CBX Monitor II Modem Fuse” on page 12-37.
5. Reconnect the ac power modem plug to the receptacle labeled *Power* on the back of the modem, and plug the other end of the ac power cord into the receptacle.
6. Plug the telephone line cord to the dedicated loop-start trunk into the modem port labeled *LINE* on the back of the modem.
7. Type the following CNFG command:

   MODIFY PARAM SERVICE_PORT

   Type INTERNAL_CUSTOMIZED in the VALUE field.

8. Set the BYPASS switch on the SMIOC interconnect box to the *NORM* position.

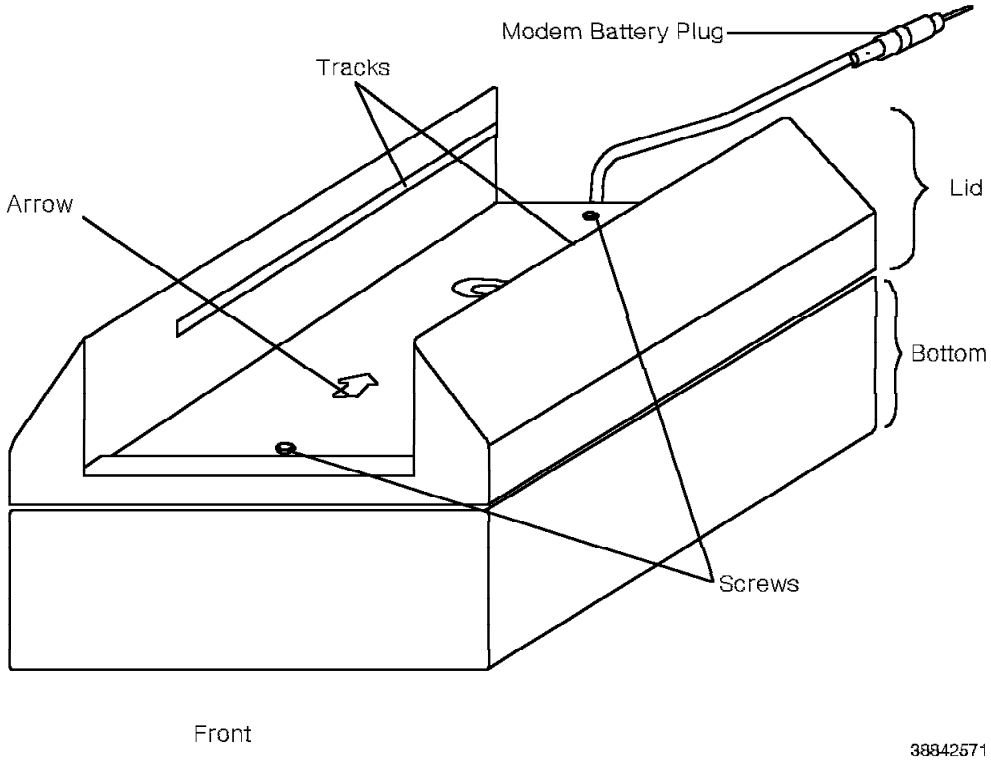


Figure 12-17. 9751 CBX Monitor II Modem Battery Base

12.26.3 Verifying the Procedure

Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for procedures to verify the 9751 CBX monitor II.

12.27 9751 CBX Monitor II Modem Battery

Use the following procedures to remove and replace the 9751 CBX monitor II modem battery.

12.27.1 Removing the 9751 CBX Monitor II Modem Battery

Note: Before you remove the 9751 CBX monitor II modem battery, determine whether the 9751 CBX monitor II modem or modem fuse is defective. Refer to 12.26, “9751 CBX Monitor II Modem” on page 12-34 and 12.28, “9751 CBX Monitor II Modem Fuse” on page 12-37.

Remove the 9751 CBX monitor II modem battery as follows:

1. Ensure that the modem is disassembled. Refer to steps 1 through 8 in 12.28.1, “Remove the 9751 CBX Monitor II Modem Fuse” on page 12-37.
2. Lift the battery (Figure 12-18 on page 12-37) out of the base, with the battery wires attached.
3. Disconnect the battery plug wires where they connect to the two battery terminals.

12.27.2 Replacing the 9751 CBX Monitor II Modem Battery

Replace the 9751 CBX monitor II modem battery as follows:

1. Reconnect the following wires to the replacement battery:
   a. Attach the red wire to the positive battery terminal, which is labeled with a plus (+) sign.
   b. Attach the black wire to the negative terminal.
2. Set the battery back into the bottom of the base, and run the battery wires from the terminals toward the small notch at one end of the base.
3. Place the modem’s lid over the bottom of the base with the arrow on the lid facing the notched end of the base. Ensure that the wire that leads from the battery terminals to the battery wire plug rests in the notch.
4. Reattach the lid with its two screws.
5. Align the grooves on the modem with the tracks on the battery base, and slide the modem toward the plug until the front edge of the modem is flush with the front edge of the base.
6. Connect the battery plug to the modem connector labeled *Battery*.
7. Hang the wall-mount bracket and the modem on the wall.
8. Connect the EIA/TIA-232-E cable to the connector on the modem.
9. Plug the telephone line cord into the modem.

12.27.3 Verifying the Procedure

Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for procedures to verify the 9751 CBX monitor II.

12.28 9751 CBX Monitor II Modem Fuse

Use the following procedures to remove and replace the 9751 CBX monitor II modem fuse.

12.28.1 Remove the 9751 CBX Monitor II Modem Fuse

Note: Before you remove the 9751 CBX monitor II modem fuse, determine whether the 9751 CBX monitor II modem is defective. Refer to 12.26, “9751 CBX Monitor II Modem” on page 12-34.

Remove the 9751 CBX monitor II modem fuse as follows:

1. Disassemble the modem to gain access to the fuse.
2. Disconnect the telephone line cord from the modem.
3. Disconnect the EIA/TIA-232-E cable from the modem.
4. Disconnect the battery connections and ac power from the modem.
5. Slide the modem out of its base (Figure 12-17 on page 12-35), away from the battery plug.
6. Loosen the two screws that hold the modem wall-mount bracket on the wall.
7. Lift the bracket, with the modem battery base still attached, away from the wall.
8. Remove the two screws that hold the lid to the bottom of the base and lift off the lid. This reveals the battery and the fuse (Figure 12-18).

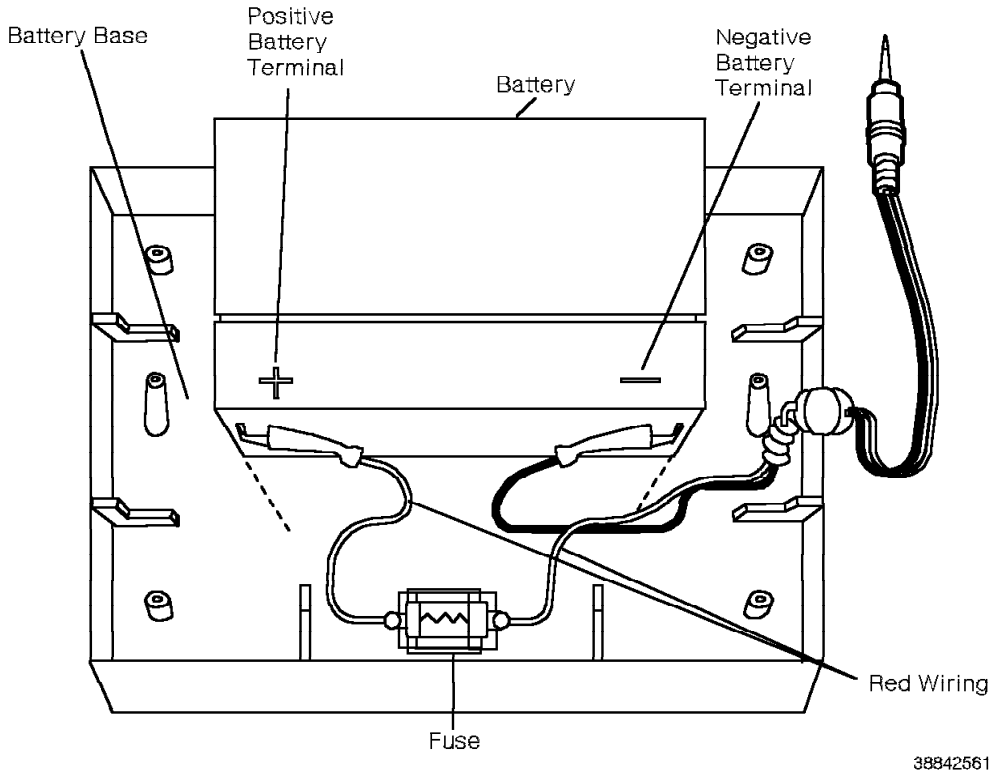


Figure 12-18. 9751 CBX Monitor II Modem Battery

9. Check the fuse to see if it functions.

   If it is blown, proceed to 12.28.2, “Replacing the 9751 CBX Monitor II Modem Fuse.” Otherwise, proceed to 12.27, “9751 CBX Monitor II Modem Battery” on page 12-36.

12.28.2 Replacing the 9751 CBX Monitor II Modem Fuse

Replace the 9751 CBX monitor II modem fuse as follows:

1. Replace the blown fuse.
2. Place the modem’s lid over the bottom of the base with the arrow on the lid facing the notched end of the base. Ensure that the wire that leads from the battery terminals to the battery wire plug rests in the notch.
3. Reattach the lid with its two screws.
4. Align the grooves on the modem with the tracks on the battery base, and slide the modem toward the plug until the front edge of modem is flush with the front edge of the base.
5. Connect the battery plug to the modem connector labeled *Battery*.
6. Hang the wall-mount bracket and the modem on the wall.
7. Connect the EIA/TIA-232-E cable to the connector on the modem.
8. Plug the telephone line cord into the modem.

12.28.3 Verifying the Procedure

Refer to the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, Installation Guide* for procedures to verify the 9751 CBX monitor II.

12.29 9755 ATC

Use the following procedure to remove and replace the 9755 Attendant Console (9755 ATC).

12.29.1 Removing the 9755 ATC

CUSTOMER IMPACT

This procedure routes incoming calls to night answer mode.

Remove the 9755 ATC (Figure 12-19) as follows:

1. Type the following DIAG command to courtesy down the attendant console controller (ACC) card:

   DOWN PAD <pad_num> C

2. **Warning:** To prevent damage to the equipment, ensure that the 9755 ATC power switch is *Off* before proceeding.

   Unplug the cord from the modular connection on the back of the 9755 ATC.

3. Remove the 9755 ATC.

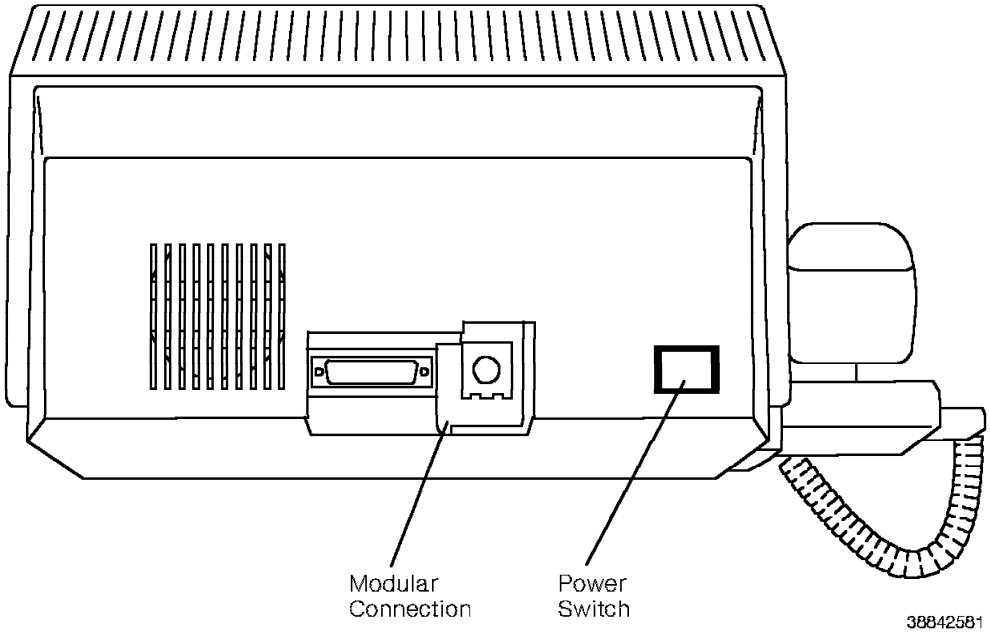


Figure 12-19. Removing the 9755 ATC

12.29.2 Replacing the 9755 ATC

Replace the 9755 ATC as follows:

1. **Warning:** To prevent damage to the equipment, ensure that the 9755 ATC power switch is *Off* before proceeding.

   Apply power to the 9755 ATC as follows (Figure 12-20 on page 12-40):

   a. Plug the cord into the modular connection at the back of the 9755 ATC.

b. Use the switch on the left side of the 9755 ATC to put the 9755 ATC into night answer mode. Verify that the LED system status displays NITE.

c. Turn on the 9755 ATC power switch.

2. Type the following command to enable the ACC card:

   UP PAD <pad_num>

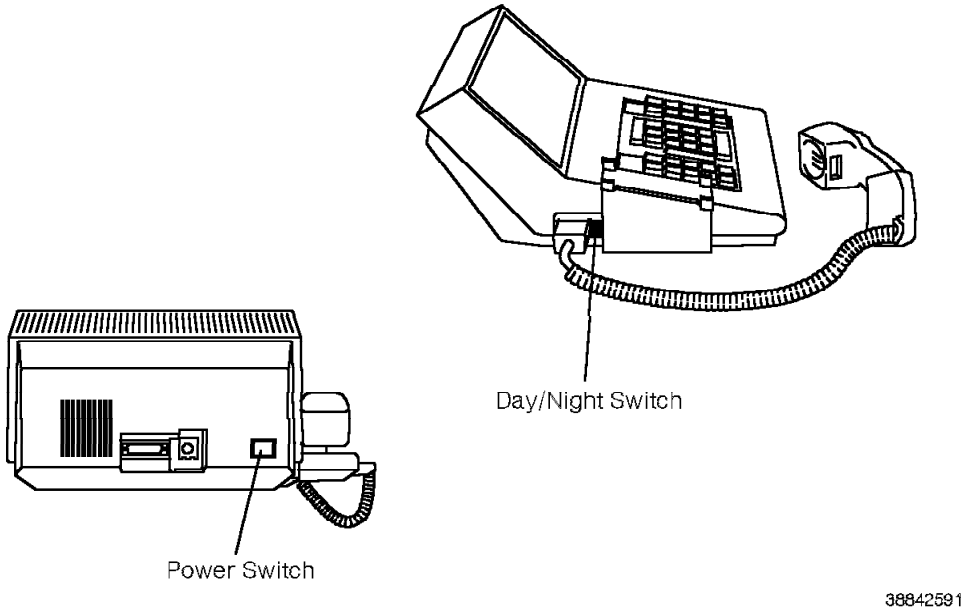


Figure 12-20. Applying Power to the 9755 ATC

12.29.3 Verifying the Procedure

Verify that you correctly replaced the 9755 ATC as follows:

1. Immediately after you turn on the power switch (approximately 2 seconds), verify that the following occurs:
   a. One short tone sounds.
   b. The following message appears on the vacuum fluorescent alphanumeric (VFA) display:

      ROLM Attendant Console-VER x.x

   c. The LED system status displays the following:

      PWR/DOWN

   d. The VFA displays the time:

      00:00

   e. The LED system status displays the following:

      NITE

      Warning: If the following conditions occur, power off the 9755 ATC, replace it, and begin the verification procedure again:

      - You hear a continuous tone and cannot stop it by pressing the SLNT key in the call process key group.
      - The NITE LED system status does not display.
      - The PWR/DOWN LED is on.

2. Place a call from the 9755 ATC to an internal party.
3. Place a call from the 9755 ATC to an external party.
4. Use the switch on the left side of the 9755 ATC to remove the 9755 ATC from night answer mode. Verify that the NITE LED system status is off.
5. Place a call from another telephone to the 9755 ATC by dialing the attendant access code or the 9755 ATC's extension number.

Appendix A. Parts and Assemblies Catalog

This chapter provides:

- An alphabetical list of 9751 computerized branch exchange (CBX) hardware including part and model numbers
- Figures and lists that show the part numbers for the 9751 CBX hardware

A.1 9751 CBX Model and Part Number List

The following is an alphabetical list of 9751 CBX hardware including model and part numbers.

Description	Model	Part
AC power cord (Models 40 and 50)	90963	96D1009
AC power kit (Model 10)	95525A	98D1885
AC power supply (Model 10)	91243B	98D6230
ACC card	90683	98D0061
ADC	90646C	98D3410
ADCM	42201	97D1108
Analog multimeter	n/a	66E5106[1]
Anchor kit, seismic (Model 10)	95545	98D0059
Anchor kit, seismic (Models 40 and 50)	90969	71D8701
ARMDCM with Y-cable	42133	97D0455
ARMDCM	42134	96D4680
ARMDCM adapter Y-Cable	42136	96D3602
ATI card	90666	93D3301
Attendant Console, 9755	51000B	97D8748
Battery, memory (Model 10)	91277	96D1720
Battery, memory retention (Models 40 and 50)	90936	96D1006
Battery, political timer	49369	97D9337
Battery assembly, ac (Model 10)	95540	96D1527
Battery assembly, memory (Models 40 and 50)	90934	94D4401
Battery fuse, 3AG 6A (Model 10)	91279	78C9425

[1] These are parts inventory management system (PIMS) service part numbers. These service parts are available only from ROLM.

Description	Model	Part
Battery fuse, 20A	n/a	66E5579[1]
BIM (Models 40 and 50)	90904	79X0924
Capacitor assembly (Models 40 and 50)	90943	96D1091
Card cage, 9030 CCC (Model 10)	91264	96D8675
Card cage, 9030A CCC (Model 10)	91266A	98D4617
Card cage, TDM (Model 10)	91270A	98D1856
Caster, fixed (Model 10)	91265	97D8871
Caster, swivel (Model 10)	91267	97D8681
Caster lock (Model 10)	91269	98D1852
CCC retention bar (Model 10)	91250	98D1692
CDLM	46750	20D2001
Cedar personal computer	46700	98C1701
CLM	46550B	21A1446
Clock cable (Models 40 and 50)	90272	36D7509
Codec card (Models 40 and 50)	90546	90C8101
Conference bridge card	90562	96D4010
COT8 card	90515D	98D1840
Cover, CPU (Models 40 and 50)	90953A	96D1309
Cover, back cabinet (Models 40 and 50)	90946A	96D1311
Cover, front and back (Model 10)	91245	96D1388
Cover, side cabinet (Models 40 and 50)	90947	96D1062
Cover, TDM (Models 40 and 50)	90949A	96D1308
Cover, top with EPO switch cutout (Model 10)	91283	96D1755
Cover, top without EPO switch cutout (Model 10)	91282	98D6288
CPN cable, 500 feet (Models 40 and 50)	90360	91D1401
CPN cable, 1000 feet (Models 40 and 50)	90362	91D1301
CPNI card (Models 40 and 50)	90302B	98D1830
CPNI paddleboard (Models 40 and 50)	90898	53D4402
CPNJ card (Models 40 and 50)	90322	10D7201
CPNJ motherboard (Models 40 and 50)	90838	45D3201
CSM card, master	90624B	98D0108
CSM card, slave	90623B	98D0111
CSM interlock cable (Model 50)	91065	97D9317
CSM motherboard (Models 40 and 50)	90828	97D8730
CSM twinaxial cable, 8 feet (Models 40 and 50)	90272	36D7509
Cypress terminal	46500A	79X0410
DC power kit (Model 10)	95530	98D4994
DCO	66990A	98D5795
DCM power supply	60938	16D2401
DFE II card	90590	96D1953
DID8 card	90520C	98D6034
Digital trunk motherboard, 2x1x4 (Models 40 and 50)	90860	97D8733
Diskette drive, 3.5-inch (Models 40 and 50)	90876	96D4474
Dual drive assembly (Model 10)	91215A	98D1858
Dual drive assembly, IDE (Model 10)	91216	98D5842
Dual-tone receiver card	90690B	98D3791
EIA/TIA-232-E internal cable	48000A	05D8201
EIA/TIA-232-E straight-through cable, 10 feet	47998	98D3427
EIA/TIA-232-E straight-through cable, 50 feet	48001	78C4001
EIA/TIA-232-E-to-V.35 cable	42106	31D4501
EIA/TIA-232-E modem interface adapter (Model 10)	42107	31D4401
EMI shield, CCC (Model 10)	91248	98D1676
EMI shield, TDM (Model 10)	91254	98D1677
EPO plate (Model 10)	95551	98D6295
EPO switch assembly (Model 10)	91263	96D1717

Description	Model	Part
EPO switch assembly (Models 40 and 50)	n/a	n/a[2]
Expander III (Models 40 and 50)	90638A	96D8548
Expander IIIE (Models 40 and 50)	90639	98D1999
Expansion EMI shield (Model 10)	91254	98D1677
Expansion final kit (Model 10)	95520A	98D1886
Expansion cabinet kit (Model 10)	95515A	98D1851
Fan (Model 10)	91259	97D8672
Fan, 48 V dc tube-axial (Models 40 and 50)	89491	62C8401
Fan air filter (Models 40 and 50)	90941	95D3601
Fan detector card (Model 10)	91261	97D8800
Fan dc power supply cord (Model 10)	91285	96D1718
Fan detector card (Models 40 and 50)	91037	96D1191
Fan plenum harness (Model 10)	91257	97D8671
Fan wiring harness (Models 40 and 50)	n/a	n/a[2]
Feeler gauge, upgrade (Models 40 and 50)	97308	98D4616
Hard disk drive, 70 Mb (Models 40 and 50)	91323	96D1798
Hard disk drive, 70 Mb IDE (Models 40 and 50)	91324	98D5849
HRO (grey)	66991A	51A4798
INL/CPN cable, 40 feet (Models 40 and 50)	90254	36D7502
INL/CPN cable, 50 feet (Models 40 and 50)	90256	36D7503
IPDN breakout assembly	91029	98D3938
IPDN cable (Model 10)	n/a	66E5507[1]
IPDN cable (Models 40 and 50)	n/a	66E5508[1]
IPDN card	90658B	98D6149
ISB cable, cabinet 1 (Models 40 and 50)	91340	98D0336
ISB cable, expansion cabinet (Models 40 and 50)	91000	96D1249
ISB intercabinet jumper cable (Models 40 and 50)	91015	79X1556
ISB return cable, 3 cabinet (Models 40 and 50)	90988	79X1551
ISB return cable, 4 cabinet (Models 40 and 50)	90991	79X1552
ISB return cable, 5 cabinet (Models 40 and 50)	90994	79X1553
ISB cable assembly (Model 10)	91272	96D1512
ISB shelf support, single (Models 40 and 50)	91341	92D9701
ISB shelf support, double (Models 40 and 50)	91342	92D9801
ISB TASA jumper (Models 40 and 50)	91018	79X1555
Juniper II terminal	46614	52D8301
KEO (grey)	66992	21A1630
LCM (Models 40 and 50)	90900	79X0911
LSM card (Models 40 and 50)	90800A	97D9068
Memory card (Model 10)	91210	97D8841
Memory controller card, 9030 (Model 10)	91205A	96D1891
Memory expansion card, 9030A (Model 50)	91320	98D1807
Message waiting card (Models 40 and 50)	90686	96D8264
Message waiting motherboard, 6x3x1 (Models 40 and 50)	90806	68D1101
Motherboard, CSM (Models 40 and 50)	90828	97D8730
Motherboard, digital trunk 2x1x4 (Models 40 and 50)	90860	97D8733
Motherboard, message waiting 6x3x1 (Models 40 and 50)	90806	68D1101
Motherboard, OPS 5x3x1 (Models 40 and 50)	90802A	96D4972
Motherboard, ROLMbridge 5250 4x2x2 (Models 40 and 50)	90885	79X0957
Motherboard, RPDN (Models 40 and 50)	91378	98D3851
Motherboard, universal 6x5x5 (Models 40 and 50)	91317	97D8911

[2] Not orderable.

Description	Model	Part
Motherboard, short universal (Models 40 and 50)	91326	98D0000
Motherboard, universal 24x23x23 w/ clock (Models 40 and 50)	91315	97D8554
Motherboard, universal 24x23x23 w/o clock (Models 40 and 50)	91325	97D9685
Motherboard, 9030A CCC (Models 40 and 50)	91327	98D1876
Music-on-hold interface box	n/a	66E5770[1]
MW8 card	90687C	98D3856
OPS card (Models 40 and 50)	90618A	96D4957
OPS motherboard, 5x3x1 (Models 40 and 50)	90802A	96D4972
OPS8 card	91240B	98D6022
PDCE card	90595	98D5740
PDCN card	90594C	96D1975
PEA, LCM (Models 40 and 50)	90967	96D7209
PEA, 110 V ac with EPO connector (Model 10)	95535A	98D1859
PEA, 110 V ac without EPO connector (Model 10)	95535B	98D6290
PEA, 240 V ac with EPO connector (Model 10)	95536A	98D1860
PEA, 240 V ac without EPO connector (Model 10)	95536B	98D6291
PEA, dc with EPO connector (Model 10)	95538	98D4995
PEA, dc without EPO connector (Model 10)	95538A	98D6292
Political timer battery	49369	98D9337
Power and grounding installation kit	n/a	66E3977
Power and grounding service kit	n/a	66E4151[1]
Power plate assembly (Model 10)	91275	96D1684
Power supply cable (Model 10)	91276	97D9677
Power supply, ac (Model 10)	91243B	98D6230
Power supply, dc (Model 10)	91244	98D1275
Power supply, DCM	60938	16D2401
Rack-mount air baffle	42104	18D0701
Rack-mount card cage	42101	18D0801
RMDCM	42130A	94C0701
Rack-mount fan	42105	18D0901
Rectifier assembly, LCM (Models 40 and 50)	90964	96D7207
Retention bar, CCC (Model 10)	91250	98D1692
Retention bar, TDM (Model 10)	91251	98D1691
Retention bracket, dc power (Model 10)	91249	98D3733
RLI card	90678B	98D4538
ROLMbridge 5250 7-channel card (Models 40 and 50)	46815B	79X1051
ROLMbridge 5250 enable/bypass card (Models 40 and 50)	46810A	79X1036
ROLMbridge 5250 motherboard, 4x2x2 (Models 40 and 50)	90885	79X0957
ROLMbridge twinaxial I/O cable (Models 40 and 50)	91071	96D1163
ROLMdial S100	56100	98D5656
ROLMdial S100 power supply	56138	98D5662
ROLMphone handset, standard	60911B	96D7491
ROLMphone handset, 312 and 600 series	66930	51A3880
ROLMphone hearing aid compatible handset	60912	21A1494
ROLMphone 120	61000	96D7600
ROLMphone 120D	61300	84C9201
ROLMphone 120H	61100	79X0425
ROLMphone 240	62000B	96D9100
ROLMphone 240 Basic	62600	70D5501
ROLMphone 240D	62300B	96D9102
ROLMphone 240E	62080	21A1310
ROLMphone 240E with DCM	62380	21A1312
ROLMphone 240E with headset adapter	62180	21A1314
ROLMphone 240H	62100B	96D9101
ROLMphone 244PC	46900D	21A1701

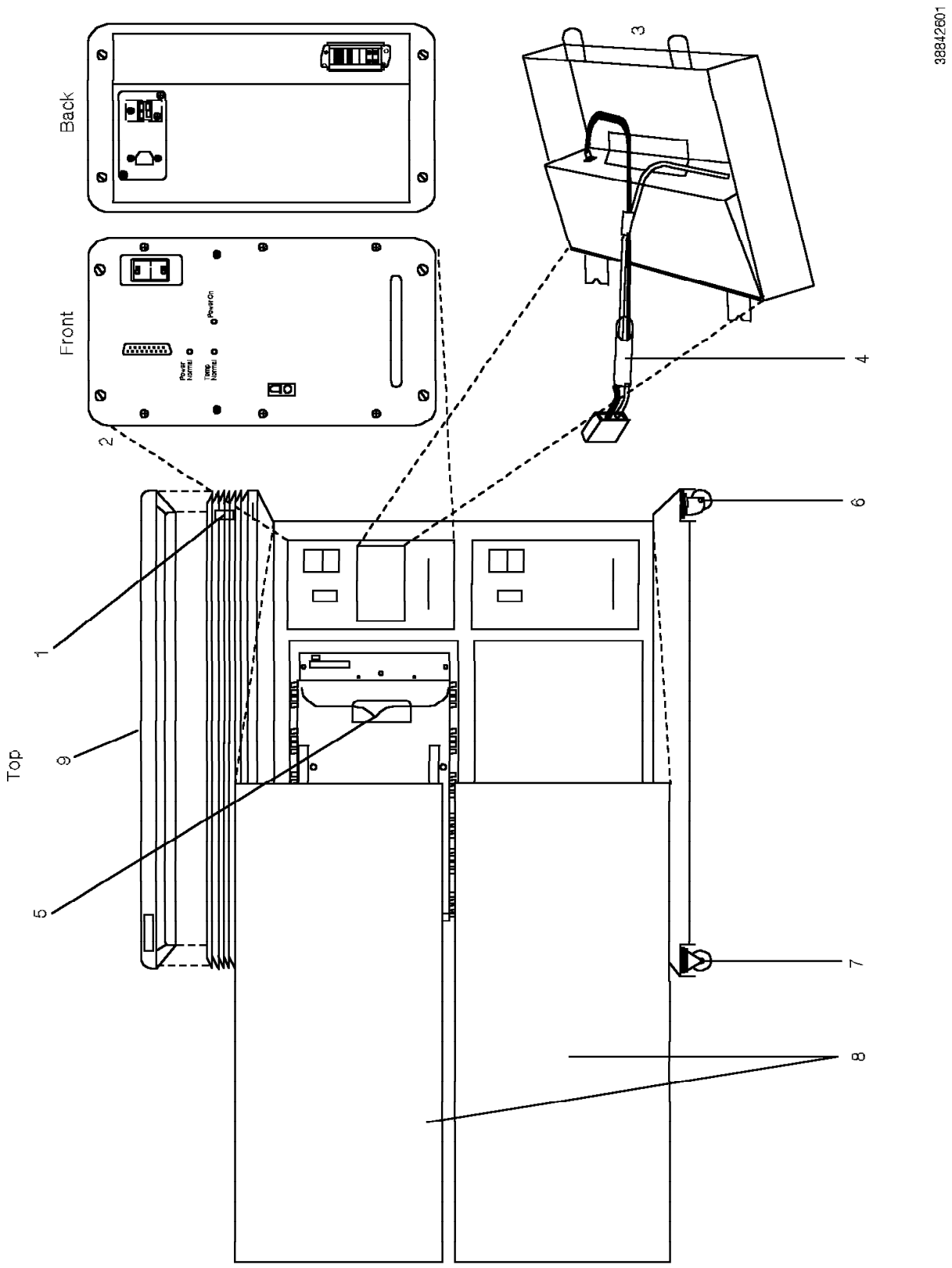
Description	Model	Part
ROLMphone 244PC power supply	46903	79X0310
ROLMphone 312	66006	21A1653
ROLMphone 312 with display	66008	21A1656
ROLMphone 400	64000A	79X0407
ROLMphone 400D	64300A	79X0408
ROLMphone 400H	64500A	79X0412
ROLMphone 612	66106	21A1676
ROLMphone 612 with display	66206	21A1682
ROLMphone 612 with display and speaker	66406	21A1688
ROLMphone 624	66108	21A1678
ROLMphone 624 with display	66208	21A1684
ROLMphone 624 with display and speaker	66408	21A1686
Rotary register card	90534A	96D1462
Rotary sender card	90538A	96D1459
RPDN card (Models 40 and 50)	91376	98D3886
RPDN motherboard (Models 40 and 50)	91378	98D3851
RS-232-C modem interface adapter (Model 10)	42107	31D4401
Seismic anchor kit (Model 10)	95545	98D0059
Seismic anchor kit (Models 40 and 50)	90969	71D8701
Serial printer cable	46517	27D8201
Shelf power module, ring generator (Models 40 and 50)	90928	79X0650
Shelf power module, +5P (6A) (Models 40 and 50)	90920A	79X0959
Shelf power module, +5 V dc (50A) (Models 40 and 50)	90908A	97D8269
Shelf power module, +5 V dc (60A) (Models 40 and 50)	90909	97D9513
Shelf power module, +12 V dc (Models 40 and 50)	90924	79X0652
Shelf power module, ±15 V dc (Models 40 and 50)	90912	79X0599
Shelf power module, −48T (Models 40 and 50)	90916	79X0654
Single-line desk telephone (Ash)	50148	96D9035
Single-line desk telephone (Brown)	50149	96D9036
Single-line desk/wall telephone (Ash)	n/a	66E6027[1]
Single-line desk/wall telephone (Brown)	n/a	66E6028[1]
SMIOC	90770A	98D0083
SMIOC interconnect box	90775A	98D1844
Spudger	n/a	66E4708[1]
TASA card (Model 40)	90675	96D4345
TC card (Model 40)	90642A	96D8747
TCL card (Model 10)	91233	96D1469
TCTASA card (Models 40 and 50)	91310	98D2534
TDM card cage (Model 10)	91270A	98D1856
TDM backplane (Models 40 and 50)	90872	96D1158
TDM retention bar (Model 10)	91251	98D1691
Telephony I/O cable, S07-S09 (Models 40 and 50)	91345	98D0198
Telephony I/O cable, S10-S12 (Models 40 and 50)	91346	98D0199
Telephony I/O cable, S13-S21 (Models 40 and 50)	91347	98D0305
Telephony I/O cable, S22-S25 (Models 40 and 50)	91348	98D0306
Telephony I/O cable, S22-S29, shelf 3 (Models 40 and 50)	91350	98D0308
Telephony I/O cable, S26-S29 (Models 40 and 50)	91349	98D0307
Terminal ac power cord (Model 10)	46515	27D7901
Tone sender card	90530A	96D1453
Top card connector	91228	73D1001
TTI card	90650A	97D1140
TXP card (Model 10)	91230	96D1466
T1DN cable, 15 feet (Model 10)	n/a	66E4967[1]
T1DN cable, 25 feet (Model 10)	n/a	66E4968[1]
T1DN cable, 50 feet (Model 10)	n/a	66E4969[1]

Description	Model	Part
T1DN cable, 75 feet (Model 10)	n/a	66E4970[1]
T1DN cable, 100 feet (Model 10)	n/a	66E4971[1]
T1DN cable, 125 feet (Model 10)	n/a	66E4972[1]
T1DN cable, 150 feet (Model 10)	n/a	66E4973[1]
T1DN cable, 15 feet (Models 40 and 50)	n/a	66E4998[1]
T1DN cable, 25 feet (Models 40 and 50)	n/a	66E4999[1]
T1DN cable, 50 feet (Models 40 and 50)	n/a	66E5000[1]
T1DN cable, 75 feet (Models 40 and 50)	n/a	66E5001[1]
T1DN cable, 100 feet (Models 40 and 50)	n/a	66E5002[1]
T1DN cable, 125 feet (Models 40 and 50)	n/a	66E5003[1]
T1DN cable, 150 feet (Models 40 and 50)	n/a	66E5004[1]
T1DN card	90635D	98D6261
T1DN plenum cable, 15 feet (Model 10)	n/a	66E5407[1]
T1DN plenum cable, 25 feet (Model 10)	n/a	66E5408[1]
T1DN plenum cable, 50 feet (Model 10)	n/a	66E5409[1]
T1DN plenum cable, 75 feet (Model 10)	n/a	66E5410[1]
T1DN plenum cable, 100 feet (Model 10)	n/a	66E5411[1]
T1DN plenum cable, 125 feet (Model 10)	n/a	66E5412[1]
T1DN plenum cable, 150 feet (Model 10)	n/a	66E5413[1]
T1DN plenum cable, 15 feet (Models 40 and 50)	n/a	66E5418[1]
T1DN plenum cable, 25 feet (Models 40 and 50)	n/a	66E5419[1]
T1DN plenum cable, 50 feet (Models 40 and 50)	n/a	66E5420[1]
T1DN plenum cable, 75 feet (Models 40 and 50)	n/a	66E5421[1]
T1DN plenum cable, 100 feet (Models 40 and 50)	n/a	66E5422[1]
T1DN plenum cable, 125 feet (Models 40 and 50)	n/a	66E5423[1]
T1DN plenum cable, 150 feet (Models 40 and 50)	n/a	66E5424[1]
Umbilical assembly	90938C	96D1497
Universal motherboard, short (Models 40 and 50)	91326	98D0000
Universal motherboard, 6x5x5 (Models 40 and 50)	91317	97D8911
Universal motherboard, 24x23x23 w/ clock (Models 40 and 50)	91315	97D8554
Universal motherboard, 24x23x23 w/o clock (Models 40 and 50)	91325	97D9685
Y-cable	42136	96D3602
ZIF bracket assembly (Models 40 and 50)	91091	96D1262
ZIF support, single (Models 40 and 50)	91341	92D9701
ZIF support, double (Models 40 and 50)	91342	92D9801
9030 CCC card cage (Model 10)	91264	96D8675
9030A CCC card cage (Model 10)	91266A	98D4617
9030A CCC motherboard (Models 40 and 50)	91327	98D1876
9030 CPU card (Model 10)	91200A	98D1656
9030A CPU card	91300F	98D5805
9030A I/O bus switch card (Models 40 and 50)	91308A	96D4381
9030A memory expansion card (Model 50)	91320	98D1807
9751 CBX monitor service kit	91290	98D0346
9751 CBX monitor software	91295D	98D4788
9751 CBX monitor II modem	55501	98D4709
9751 CBX monitor II modem battery	n/a	66E5519[1]
9751 CBX monitor II modem fuse	n/a	66E5579[1]
9751 CBX monitor II power supply	n/a	66E5520[1]
9751 CBX monitor II service kit	91291	98D3451
9755 ATC	51000B	97D8748

A.2 Parts Catalog

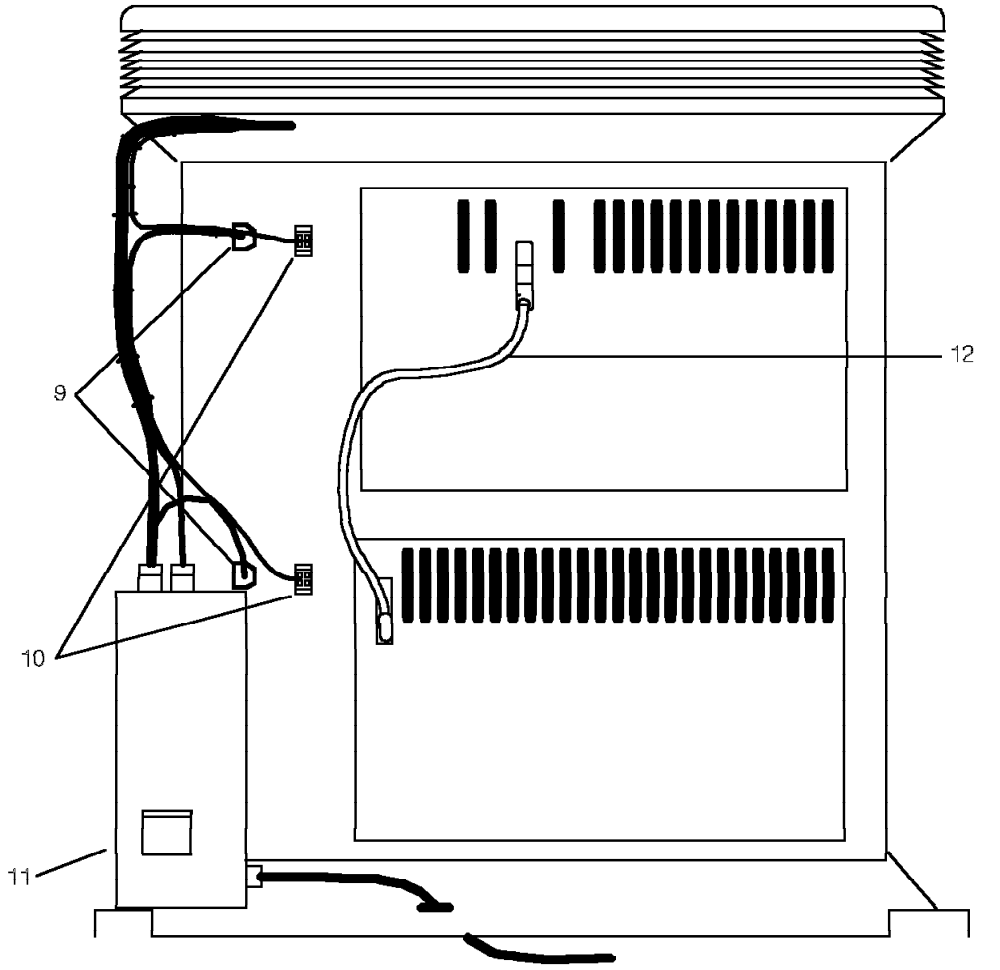
This section shows and lists part numbers for the 9751 CBX hardware.

A.2.1 Assembly 1: Model 10, Front View



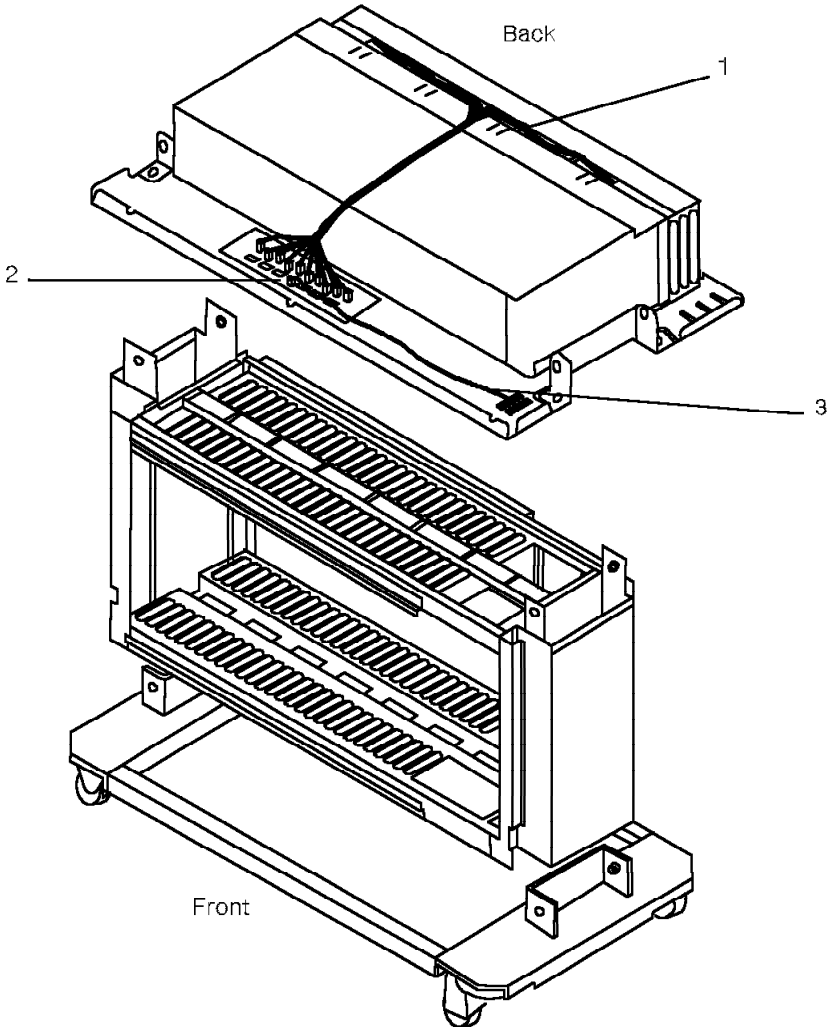
Asm – Index	Part Number	Units	Description
1 –	96D1475		9751 CBX Model 10 (2-shelf)
– 1	96D1717	1	• Emergency power-off (EPO) switch assembly
– 2	xxxxxxx	2	• Power supply There are two types of power supplies: • AC power supply, part no. 98D6230 • DC power supply, part no. 98D1275
– 3	96D1720	1	• Battery assembly, memory The memory battery assembly is located only on shelf 1.
– 4	78C9425	1	• Battery fuse, 3AG 6A
– 5	98D5842	1	• Dual drive assembly
– 6	97D8681	2	• Caster, swivel (front and back)
– 7	97D8871	2	• Caster, fixed (front and back)
– 8	96D1388	2	• Cover, front and back **Note:** There are two covers (front and back) for each shelf.
– 9	96D1755	1	• Top cover **Not shown:** The following also appear on the front of the Model 10: • EMI shield, CCC shelf, part no. 98D1676 • EMI shield, TDM shelf, part no. 98D1677

A.2.2 Assembly 2: Model 10, Back View



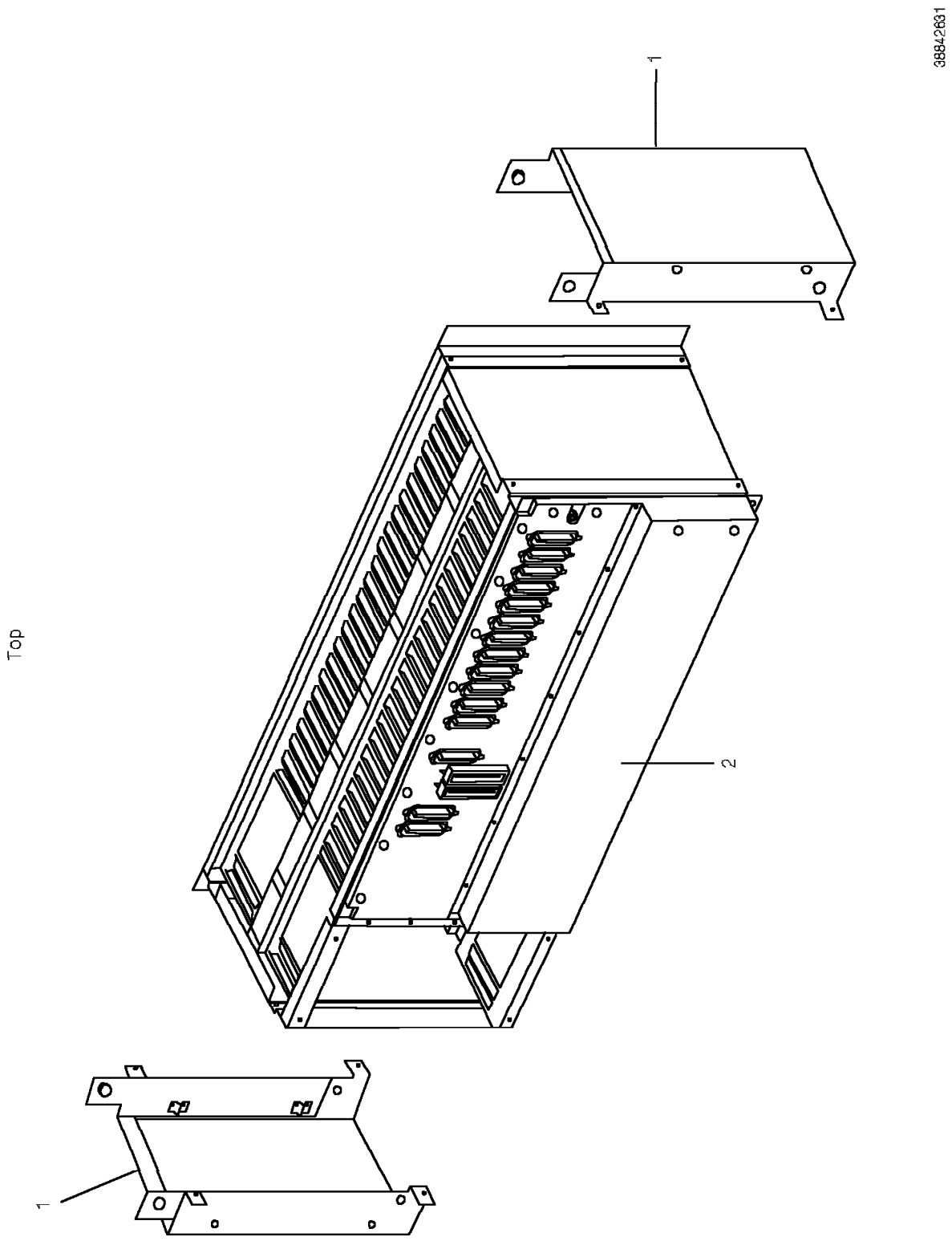
Asm – Index	Part Number	Units	Description
2 –	96D1475		9751 CBX Model 10 (2-shelf) For details see the following: • A.2.4, “Assembly 4: Model 10 9030 CCC Card Cage Assembly, Back View” on page A-14 • A.2.5, “Assembly 5: Model 10 9030A CCC Card Cage Assembly, Back View” on page A-16 • A.2.7, “Assembly 7: Model 10 TDM Card Cage Assembly” on page A-20
– 9	97D9677	1	• Power supply cable
– 1 0	98D1718	1	• Fan dc power supply cord
– 1 1	98D1859	1	• Power entry assembly, 110 V ac
– 1 2	96D1512	1	• ISB cable assembly

A.2.3 Assembly 3: Model 10 Fan Plenum Assembly



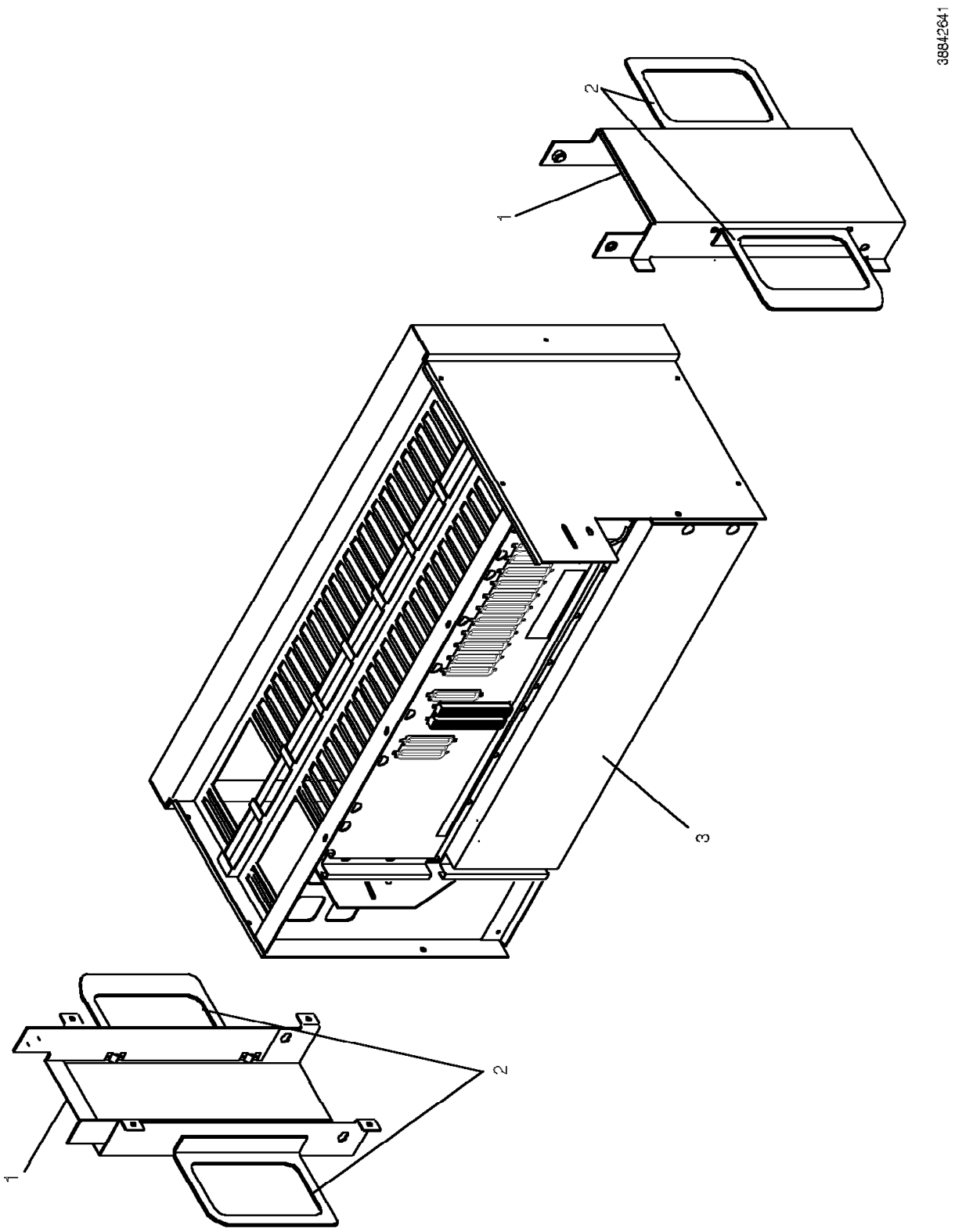
Asm – Index	Part Number	Units	Description
3 –	None		Fan plenum assembly
– 1	97D8672	5	• Fans
– 2	97D8800	1	• Fan detector card
– 3	97D8671	1	• Fan plenum harness

A.2.4 Assembly 4: Model 10 9030 CCC Card Cage Assembly, Back View



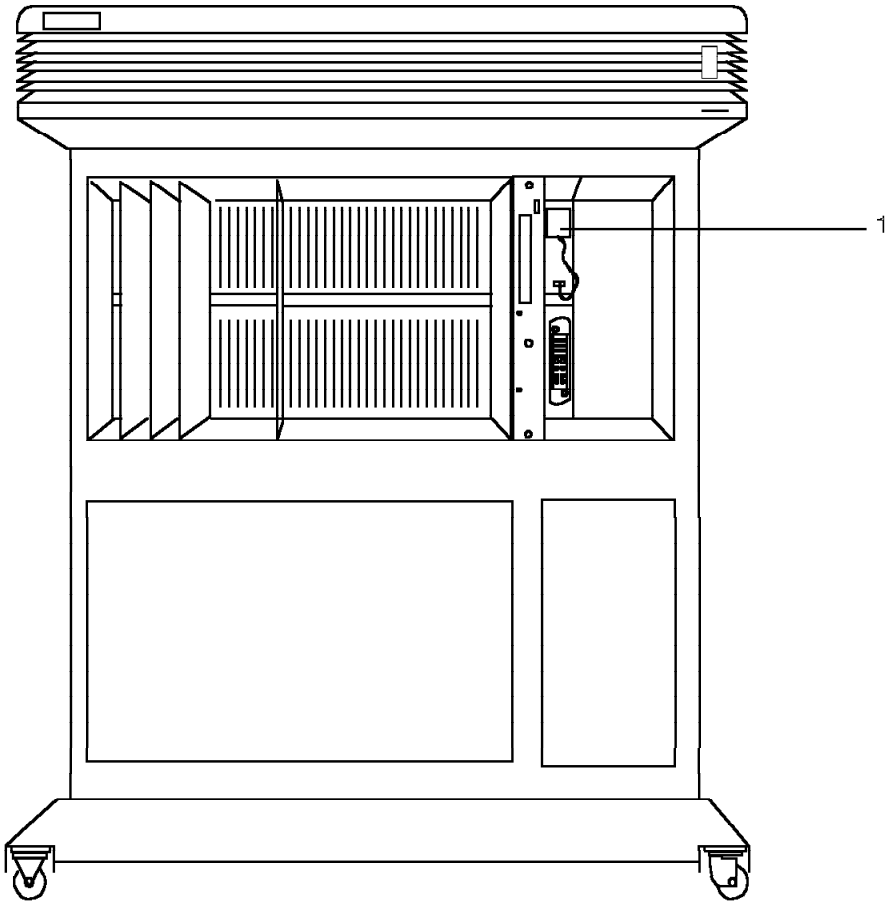
Asm – Index	Part Number	Units	Description
4 –	96D8675		9030 CCC card cage assembly
			Note: The following items are components of the 9030 CCC card cage assembly.
– 1	None	2	• Vertical support
– 2	None	1	• CCC backplane

A.2.5 Assembly 5: Model 10 9030A CCC Card Cage Assembly, Back View



Asm – Index	Part Number	Units	Description
5 –	98D4617		9030A CCC card cage assembly
			Note: The following items are components of the 9030A CCC card cage assembly.
– 1	None	2	• Vertical support
– 2	None	2	• Cover support
– 3	None	1	• 9030A CCC backplane

A.2.6 Assembly 6: Model 10 9030A CCC Card Cage Assembly, Front View



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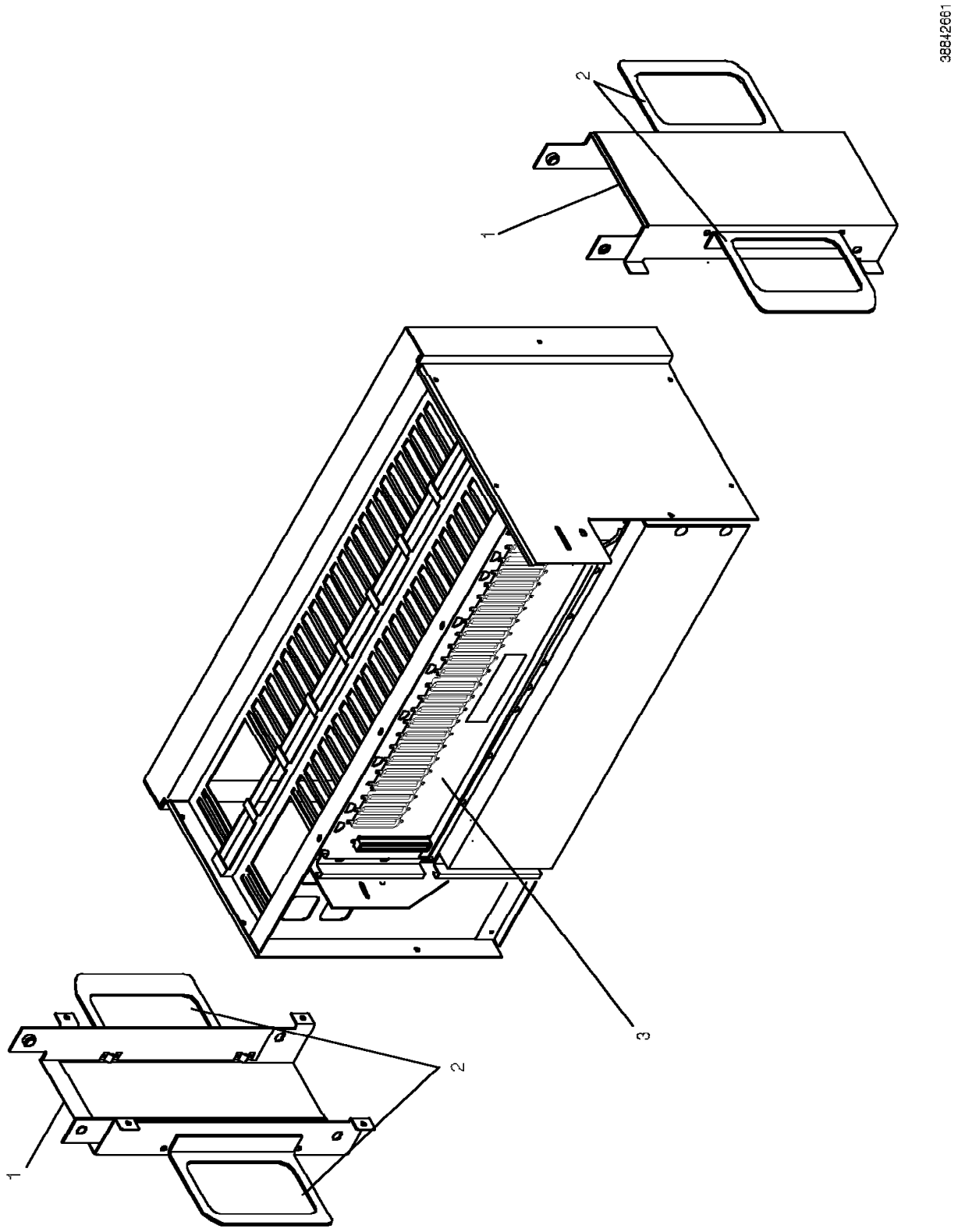
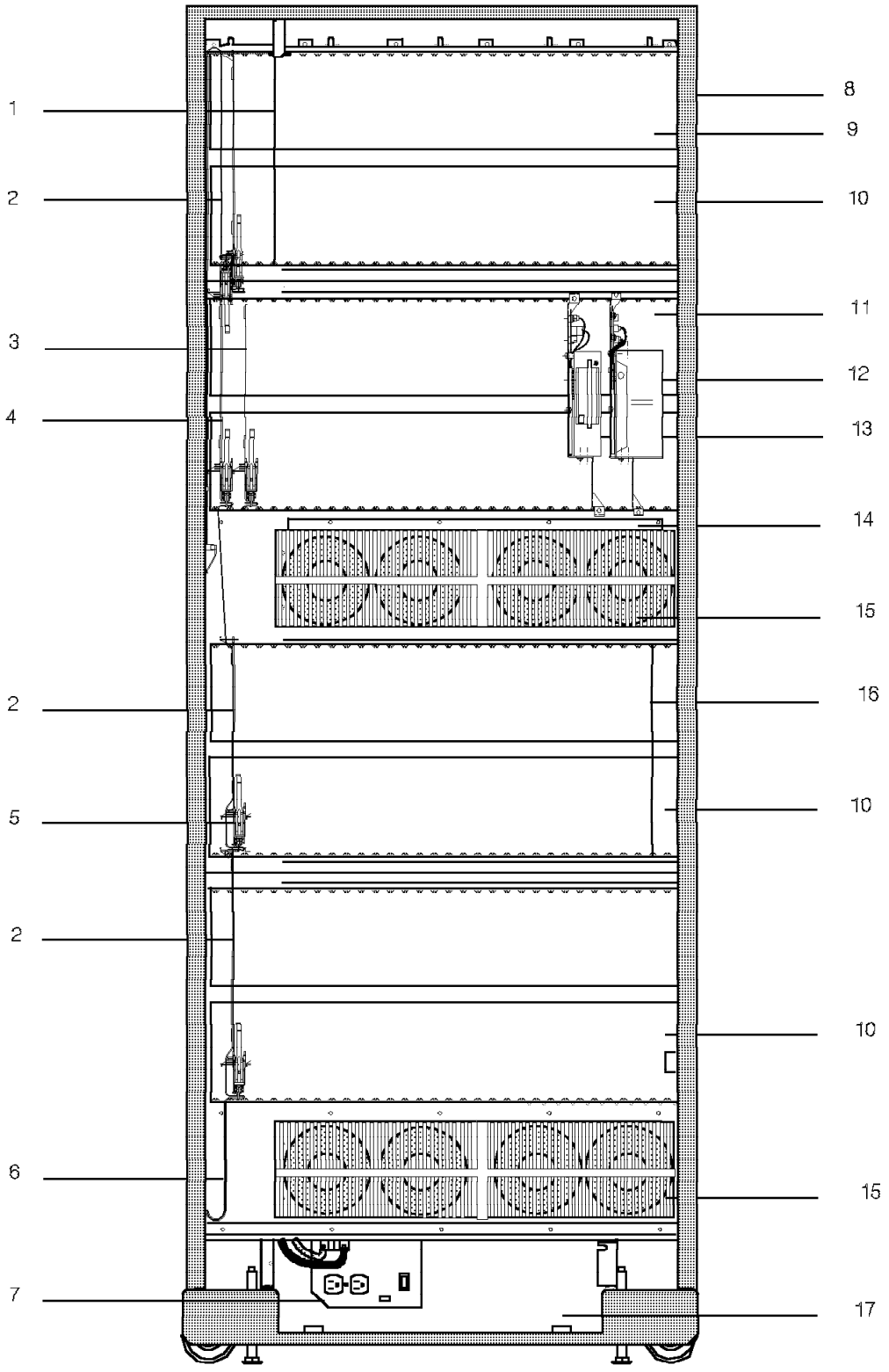
Asm – Index	Part Number	Units	Description
6 –	98D4617		9030A CCC card cage assembly
			Note: The following item is a component of the 9030A CCC card cage assembly.
– 1	97D9337	1	• Political timer battery

A.2.7 Assembly 7: Model 10 TDM Card Cage Assembly



Asm – Index	Part Number	Units	Description
7 –	98D1856		Card cage assembly, TDM
			Note: The following items are components of the TDM card cage assembly.
– 1	None	2	• Vertical support
– 2	None	2	• Cover support
– 3	None	1	• TDM backplane

A.2.8 Assembly 8: Model 40, Front View



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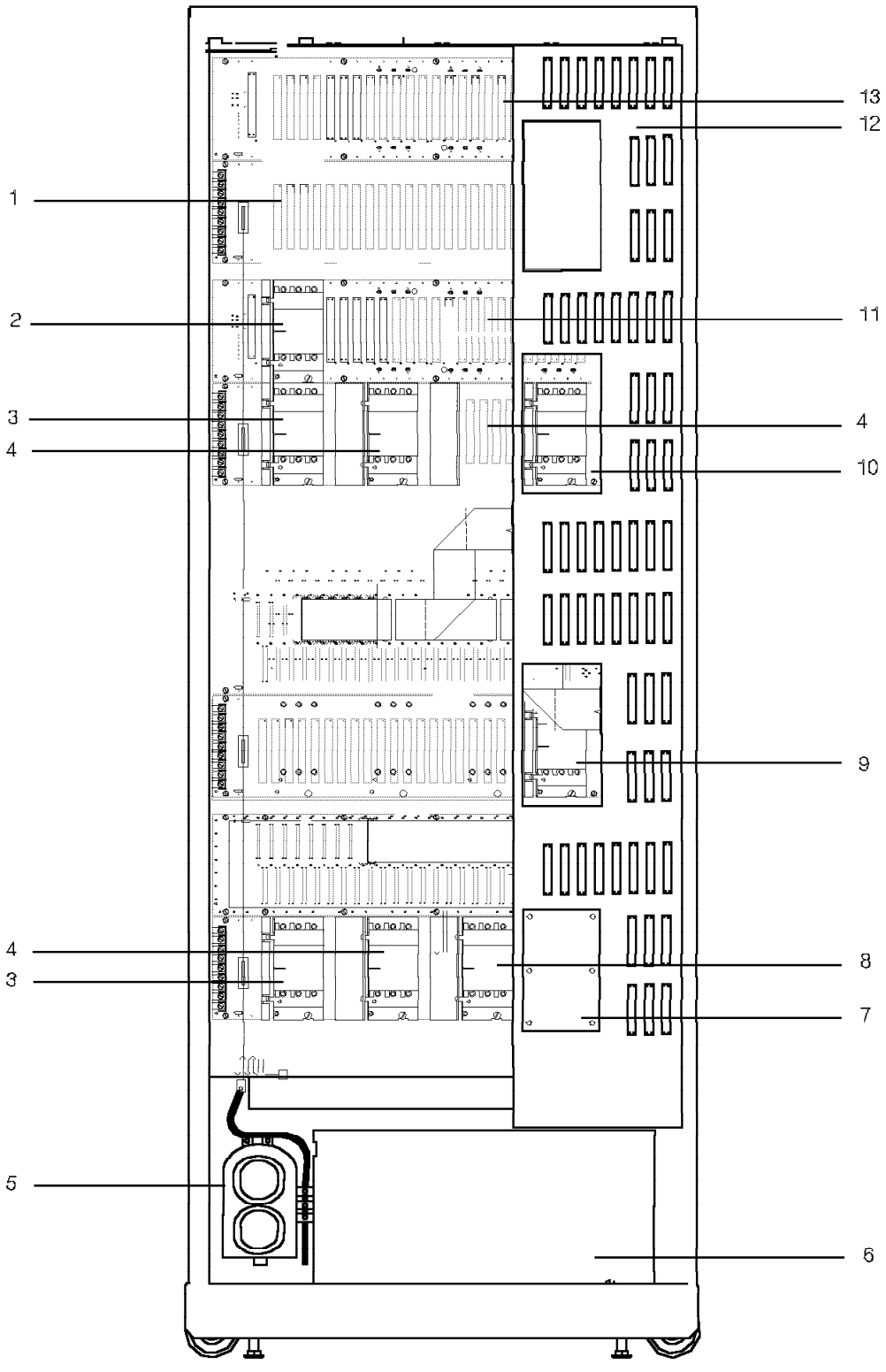
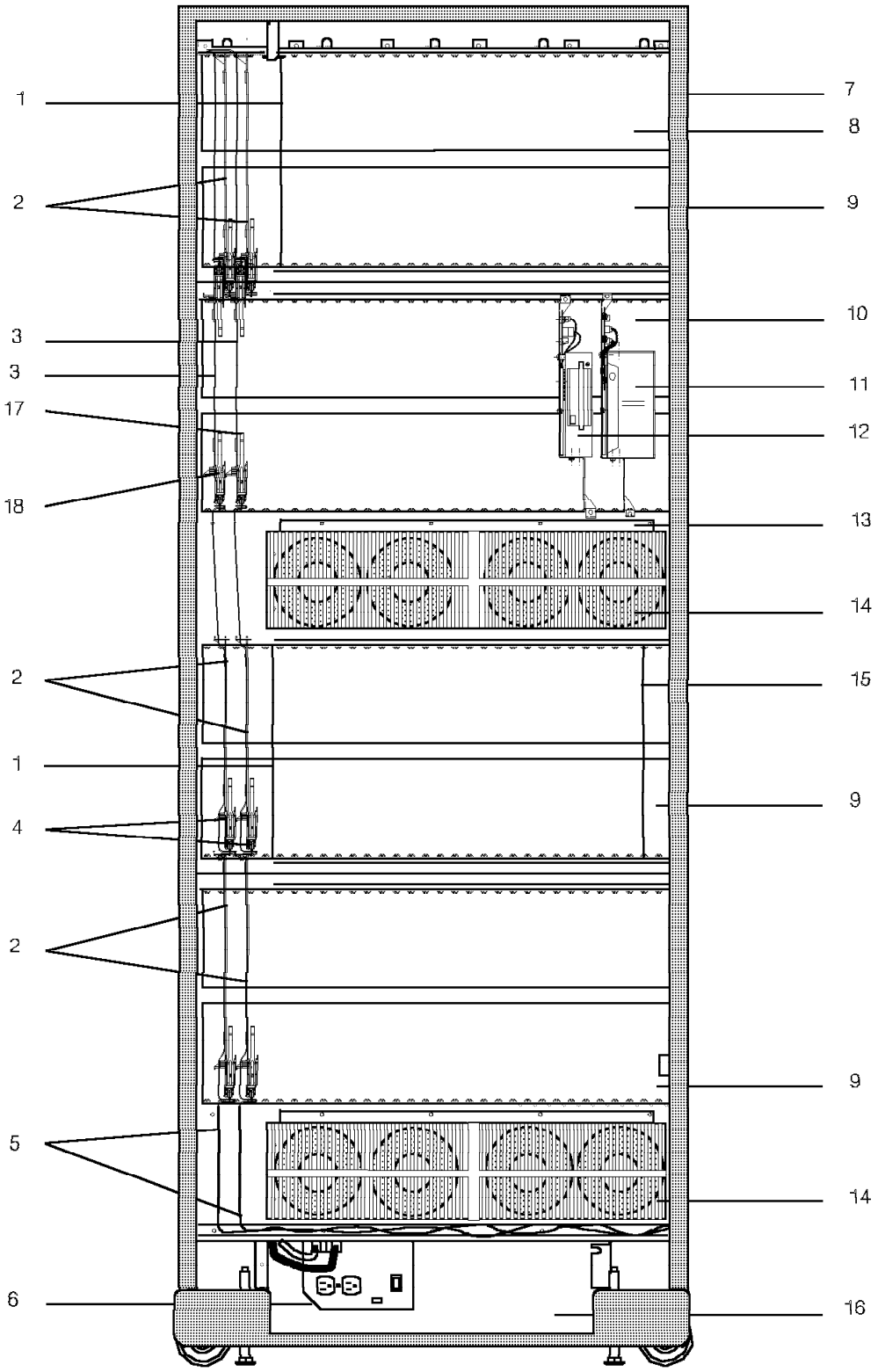
Asm – Index	Part Number	Units	Description
8 –	None		9751 CBX Model 40 **Note:** Items that do not have part numbers are for identification purposes only.
– 1	xxxxxxx	1	• CSM card There are two types of CSM cards: • Master, part no. 98D0108 • Slave, part no. 98D0111
– 2	96D8548	2	• Expander III
– 2	98D1999	2	• Expander IIIE
– 3	96D8747	1	• TC card (when TASA card is in slot 1)
– 4	96D4345	1	• TASA card (When TC card is in slot 3)
– 4	98D2534	1	• TCTASA card
– 5	96D1262	4	• 9751 CBX ZIF bracket assembly
– 6	98D0336	1	• ISB
– 7	96D7209	1	• PEA
– 8	None	1	• EPO switch assembly
– 9	xxxxxxx	2	• Universal motherboard, 24x23x23 The following are the types of universal motherboards: • With clock, part no. 97D8554 • Without clock, part no. 97D9685 • Without clock (short), part no. 98D0000 The motherboard with clock cable connectors is always installed on shelves 1 and 3 of the cabinet 1. The motherboard without clock cable connectors is installed on any other TDM shelf.
– 1 0	96D1158	1	• TDM backplane
– 1 1	98D1876	1	• 9030A CCC motherboard
– 1 2	98D5849	1	• Hard disk drive
– 1 3	96D4474	1	• Diskette drive, 3.5-inch
– 1 4	95D3601	2	• Fan air filter
– 1 5	62C8401	1	• Fans
– 1 6	97D9068	1	• LSM card
– 1 7	79X0924	1	• BIM
– 1 7	79X0911	1	• LCM

A.2.9 Assembly 9: Model 40, Back View



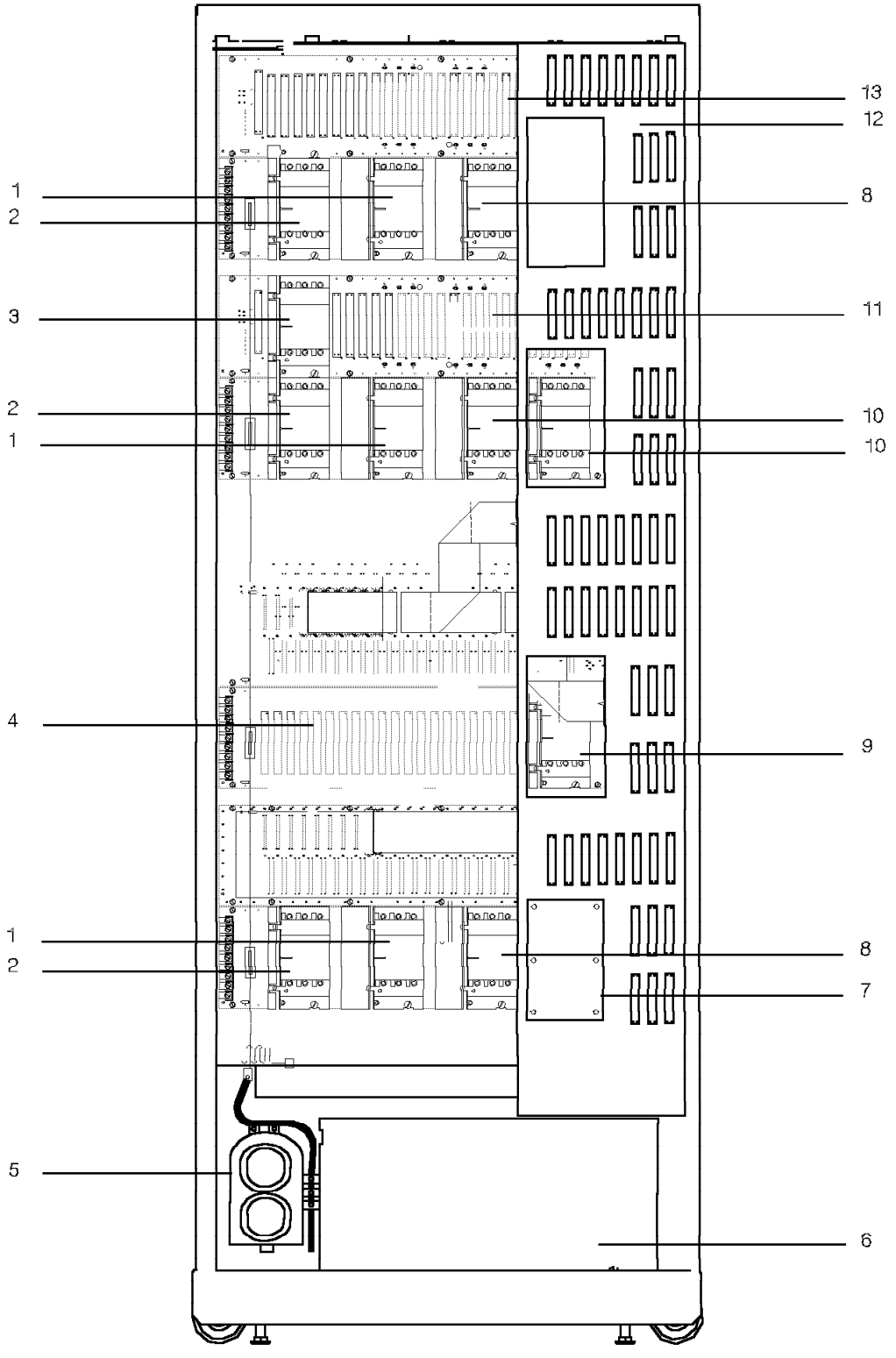
Asm – Index	Part Number	Units	Description
9 –	None		9751 CBX Model 40 (back view) **Note:** Items that do not have part numbers are for identification purposes only.
– 1	96D1158	1	• TDM backplane
– 2	79X0652	1	• Shelf power module, +12 V dc
– 3	79X0599	1	• Shelf power module, ±15 V dc
– 4	97D9513	1	• Shelf power module, +5 V dc (60A)
– 5	96D1091	1	• Capacitor assembly
– 6	79X0924	1	• BIM
– 6	79X0911	1	• LCM
– 7	None	2	• +5P/ring cover plate
– 8	79X0654	1	• Shelf power module, –48T
– 9	79X0650	1	• Shelf power module, ring generator
– 10	79X0959	1	• Shelf power module, +5P
– 11	98D1876	1	• 9030A CCC motherboard
– 12	None	1	• I/O filter panel assembly
– 13	xxxxxxx	1	• Universal motherboard, 24x23x23 For more information, refer to Asm-index numbers 8–9 on page A-23.

A.2.10 Assembly 10: Model 50, Front View



Asm – Index	Part Number	Units	Description
10 –	None		9751 CBX Model 50 **Note:** Items that do not have part numbers are for identification purposes only.
– 1	xxxxxxx	1	• CSM card There are two types of CSM cards: • Master, part no. 98D0108 • Slave, part no. 98D0111
– 2	96D8548	2	• Expander III
– 2	98D1999	2	• Expander IIIE
– 3	98D2534	1	• TCTASA card
– 4	96D1262	4	• 9751 CBX ZIF bracket assembly
– 5	98D0336	2	• ISB with TCTASA
– 6	96D7209	1	• PEA
– 7	None	1	• EPO switch assembly
– 8	xxxxxxx	1	• Universal motherboard, 24x23x23 For more information, refer to Asm-index numbers 8–9 on page A-23.
– 9	96D1158	1	• TDM backplane
– 1 0	98D1876	1	• 9030A CCC motherboard
– 1 1	98D5849	1	• Hard disk drive
– 1 2	96D4474	1	• Diskette drive, 3.5-inch
– 1 3	95D3601	2	• Fan air filter
– 1 4	62C8401	1	• Fans
– 1 5	97D9068	1	• LSM card
– 1 6	79X0924	1	• BIM
– 1 6	79X0911	1	• LCM
– 1 7	98D9701	1	• ISB shelf support, single
– 1 8	98D9801	1	• ISB shelf support, double

A.2.11 Assembly 11: Model 50, Back View



Asm – Index	Part Number	Units	Description
11 –	None		9751 CBX, Model 50 (back view) **Note:** Items that do not have part numbers are for identification purposes only.
– 1	97D8269	2	• Shelf power modules, +5 V dc (50A)
– 1	97D9513	2	• Shelf power modules, +5 V dc (60A)
– 2	79X0599	2	• Shelf power module, ±15 V dc
– 3	79X0652	2	• Shelf power module, +12 V dc
– 4	96D1158	1	• TDM backplane
– 5	96D1091	1	• Capacitor assembly
– 6	79X0924	1	• BIM
– 6	79X0911	1	• LCM
– 7	None	1	• +5P/ring cover plate
– 8	79X0654	2	• Shelf power module, –48T
– 9	79X0650	1	• Shelf power module, ring generator
– 1 0	79X0959	2	• Shelf power module, +5P
– 1 1	98D1876	1	• 9030A CCC motherboard
– 1 2	None	1	• I/O filter panel assembly
– 1 3	xxxxxxx	1	• Universal motherboard, 24x23x23 For more information, refer to Asm-index numbers 8–9 on page A-23.

Appendix B. Models 40 and 50 Intershelf Bus Cabling

This appendix provides intershelf bus (ISB) cable routing diagrams for the 9751 computerized branch exchange (CBX) Models 40 and 50.

The diagrams in this appendix include the model numbers for the correct cables. Refer to Appendix A, “Parts and Assemblies Catalog” for the cables′ part numbers and descriptions.

B.1 Routing Diagram for a 1-Cabinet Model 40

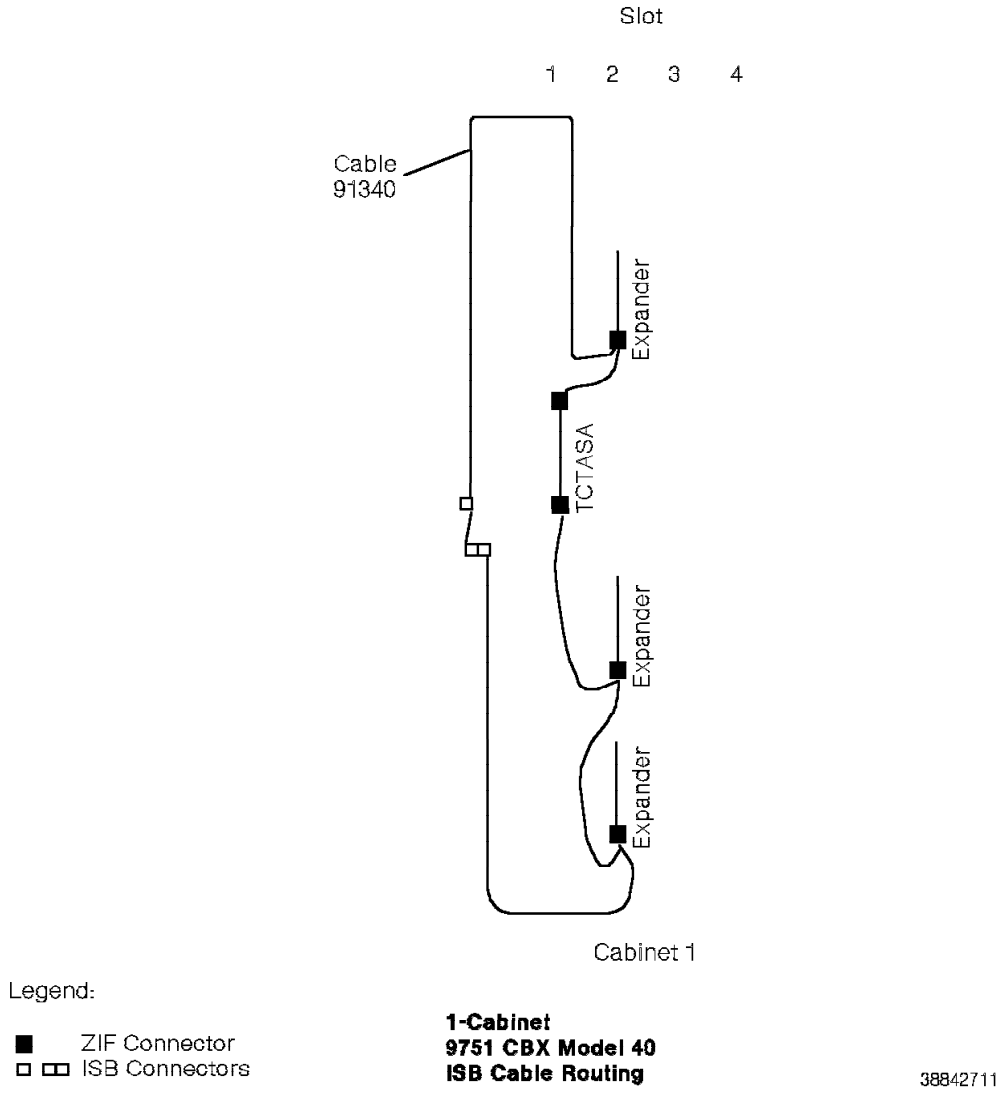


Figure B-1. Routing Diagram for a 1-Cabinet Model 40

B.2 Routing Diagram for a 2-Cabinet Model 40

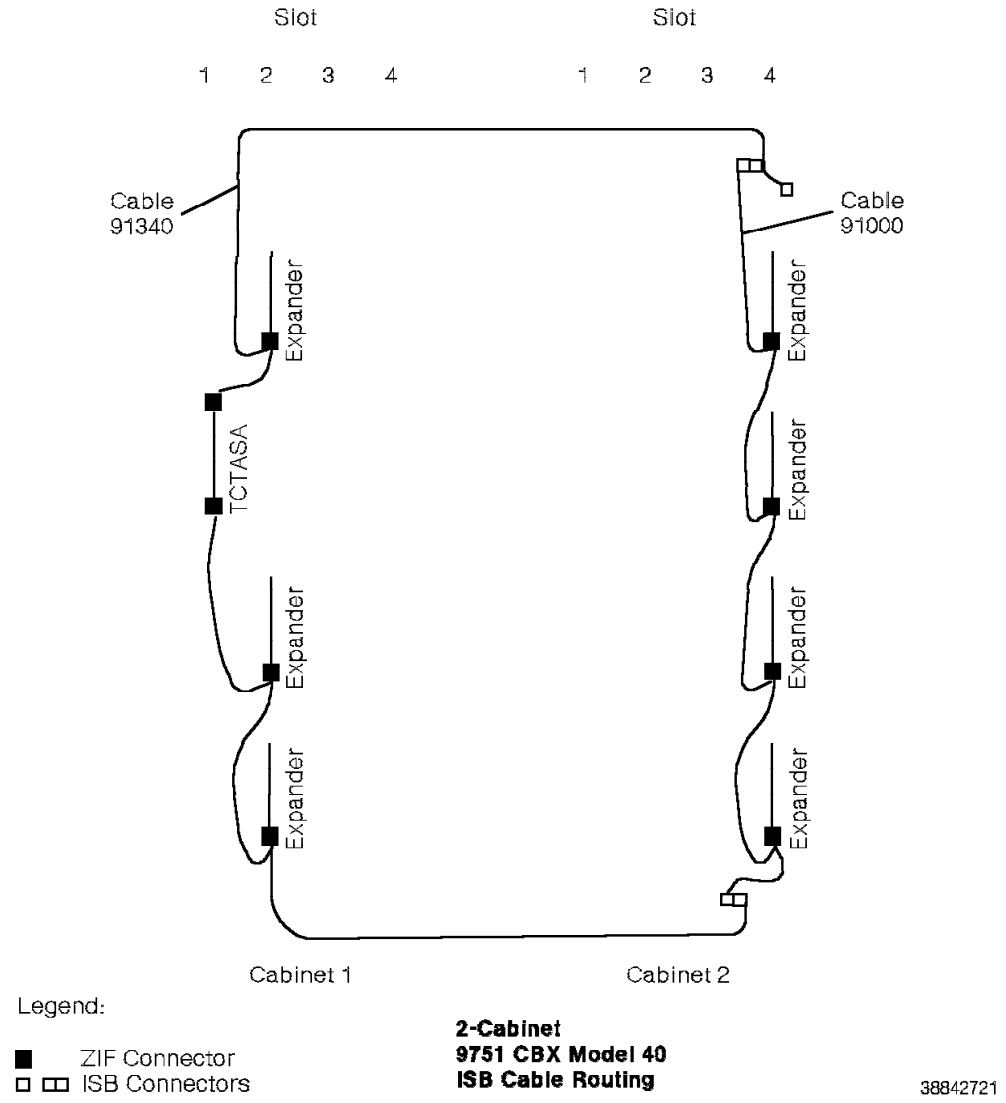


Figure B-2. Routing Diagram for a 2-Cabinet Model 40

B.3 Routing Diagram for a 3-Cabinet Model 40

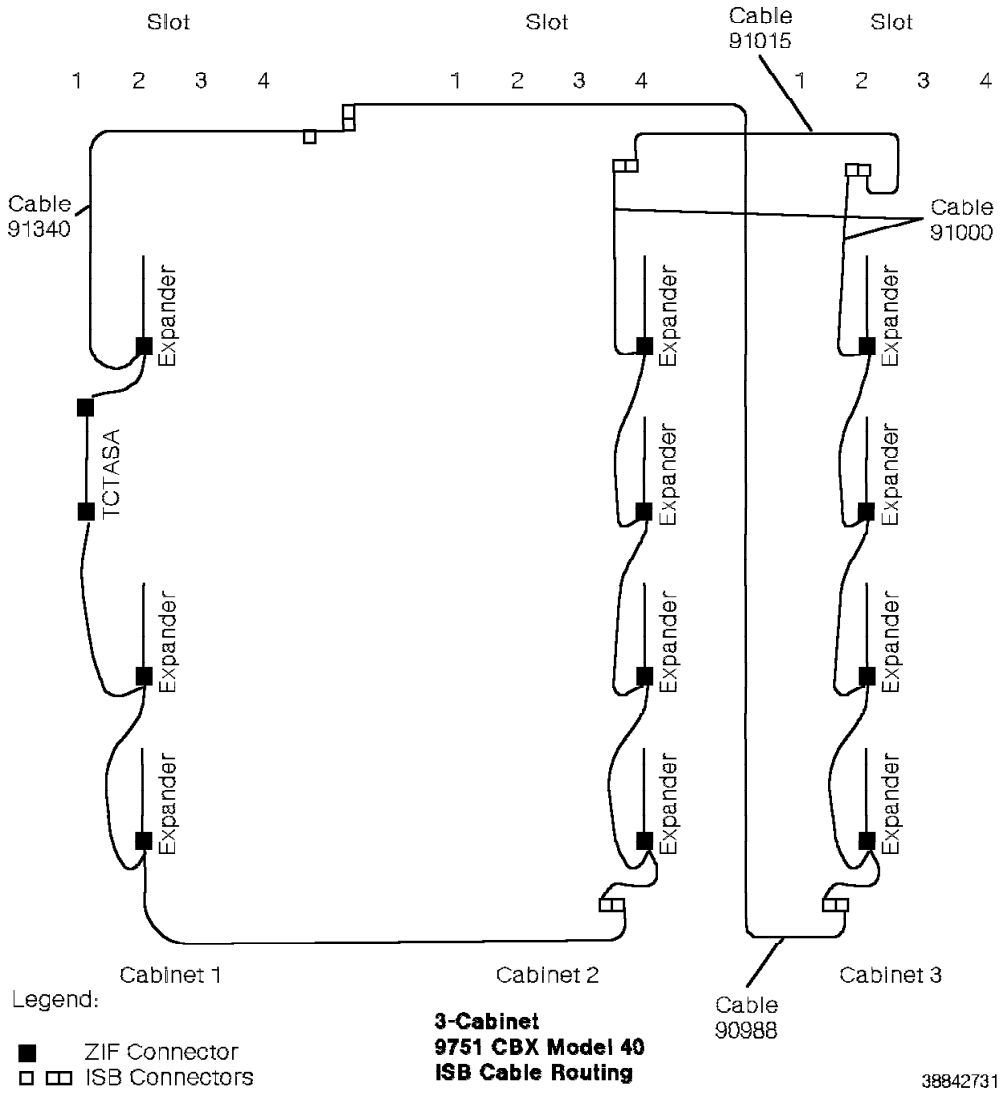


Figure B-3. Routing Diagram for a 3-Cabinet Model 40

B.4 Routing Diagram for a 4-Cabinet Model 40

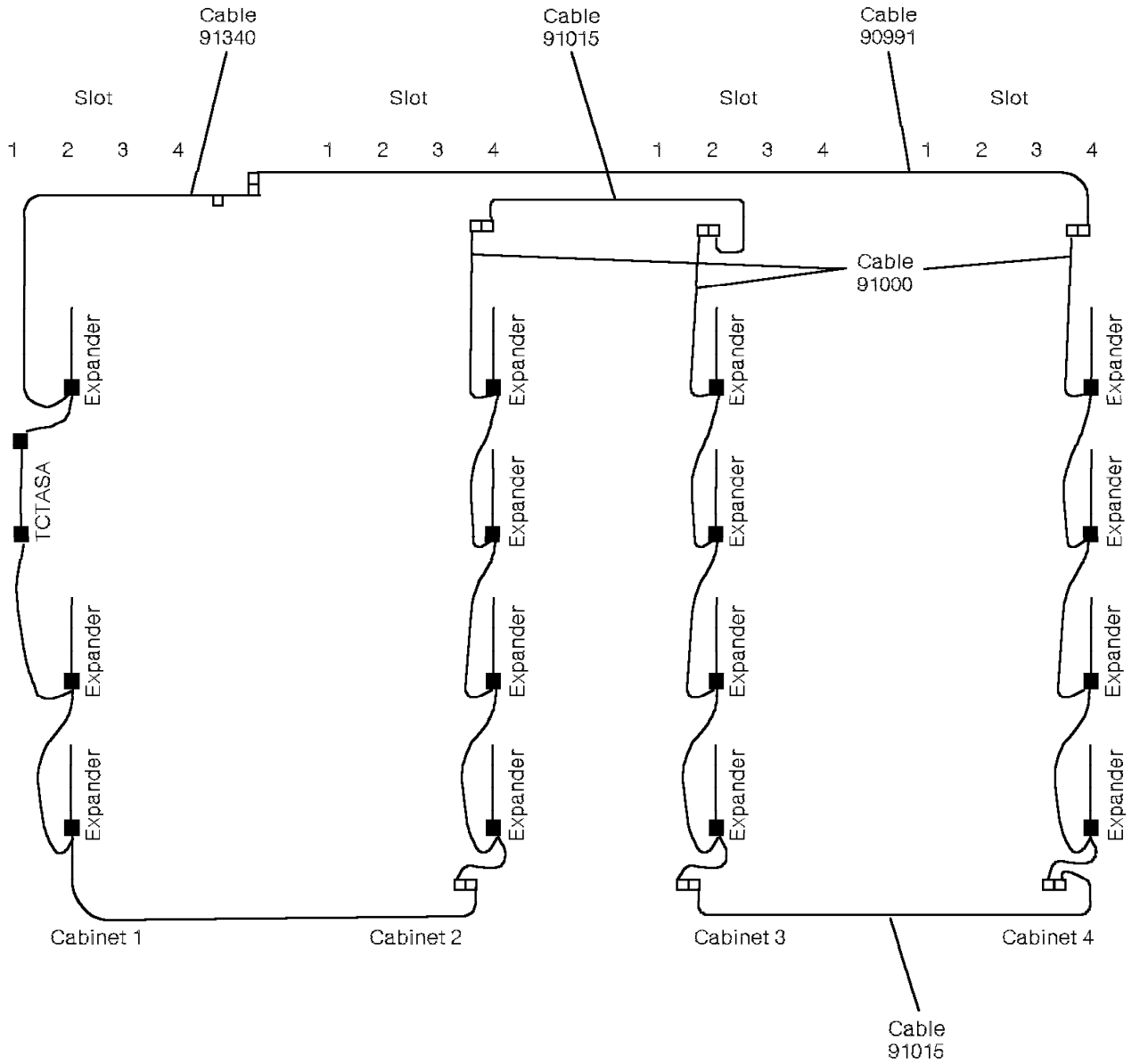


Figure B-4. Routing Diagram for a 4-Cabinet Model 40

B.5 Routing Diagram for a 5-Cabinet Model 40

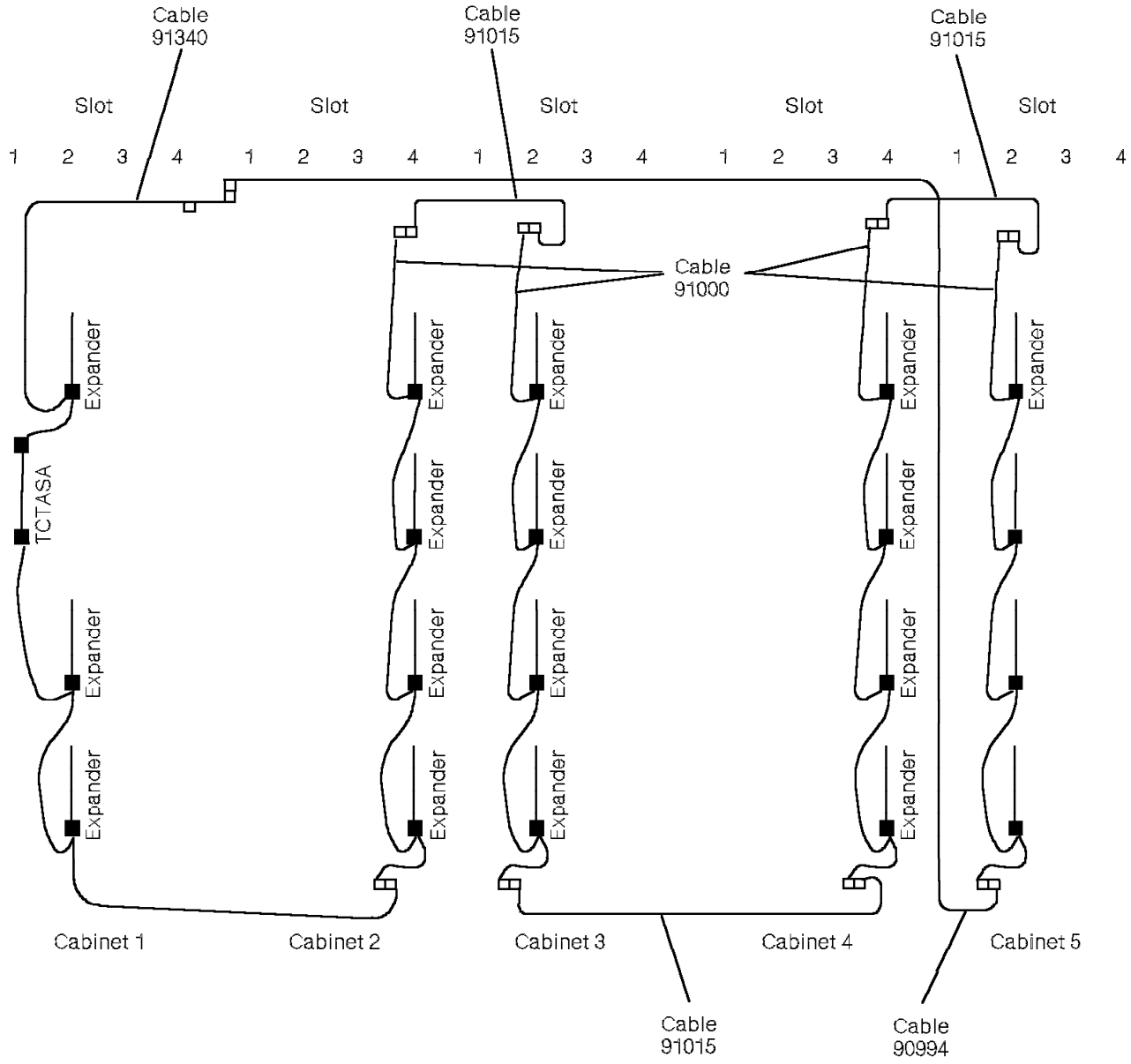


Figure B-5. Routing Diagram for a 5-Cabinet Model 40

B.6 Routing Diagram for a 1-Cabinet Model 50

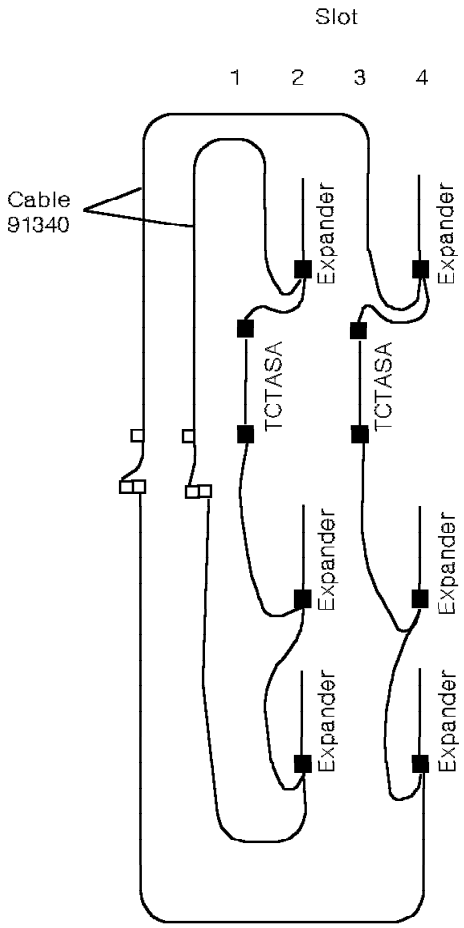


Figure B-6. Routing Diagram for a 1-Cabinet Model 50

B.7 Routing Diagram for a 2-Cabinet Model 50

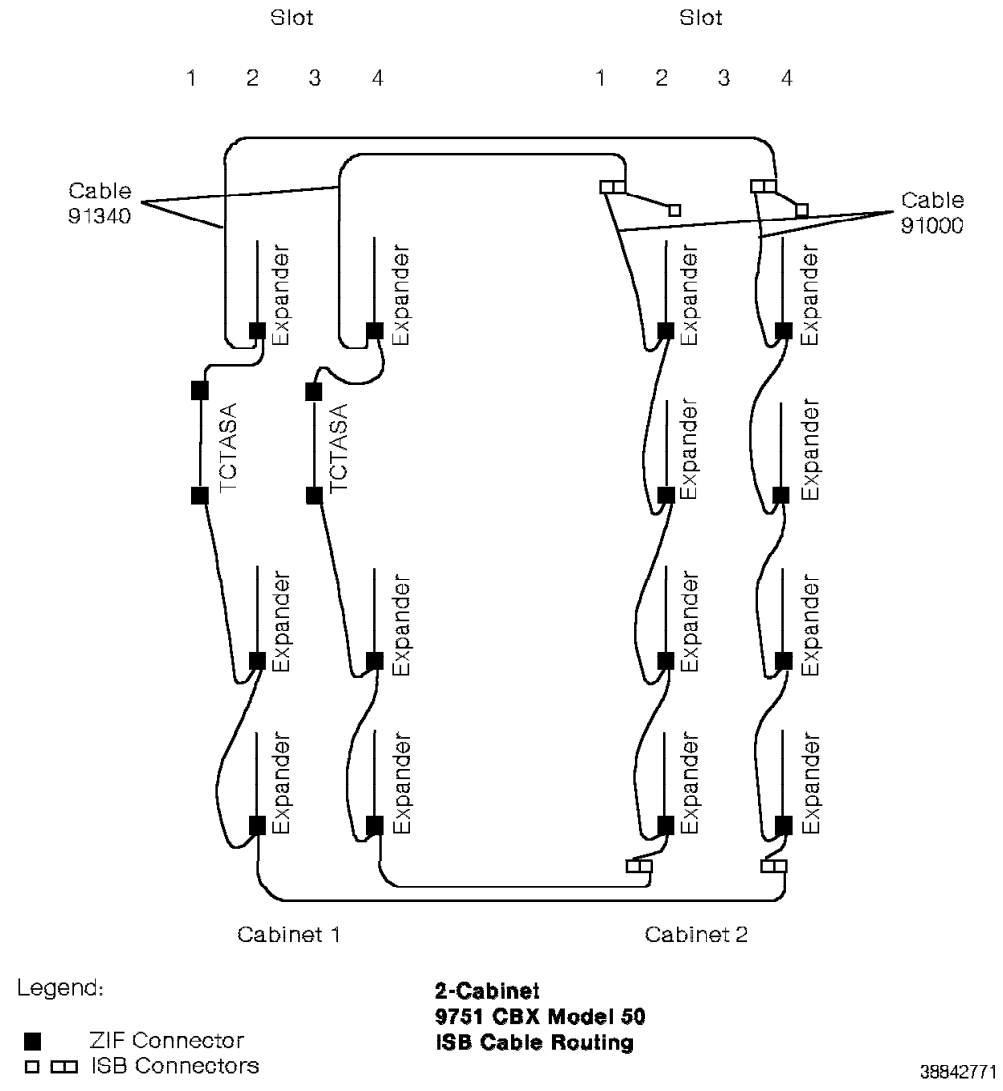


Figure B-7. Routing Diagram for a 2-Cabinet Model 50

B.8 Routing Diagram for a 3-Cabinet Model 50

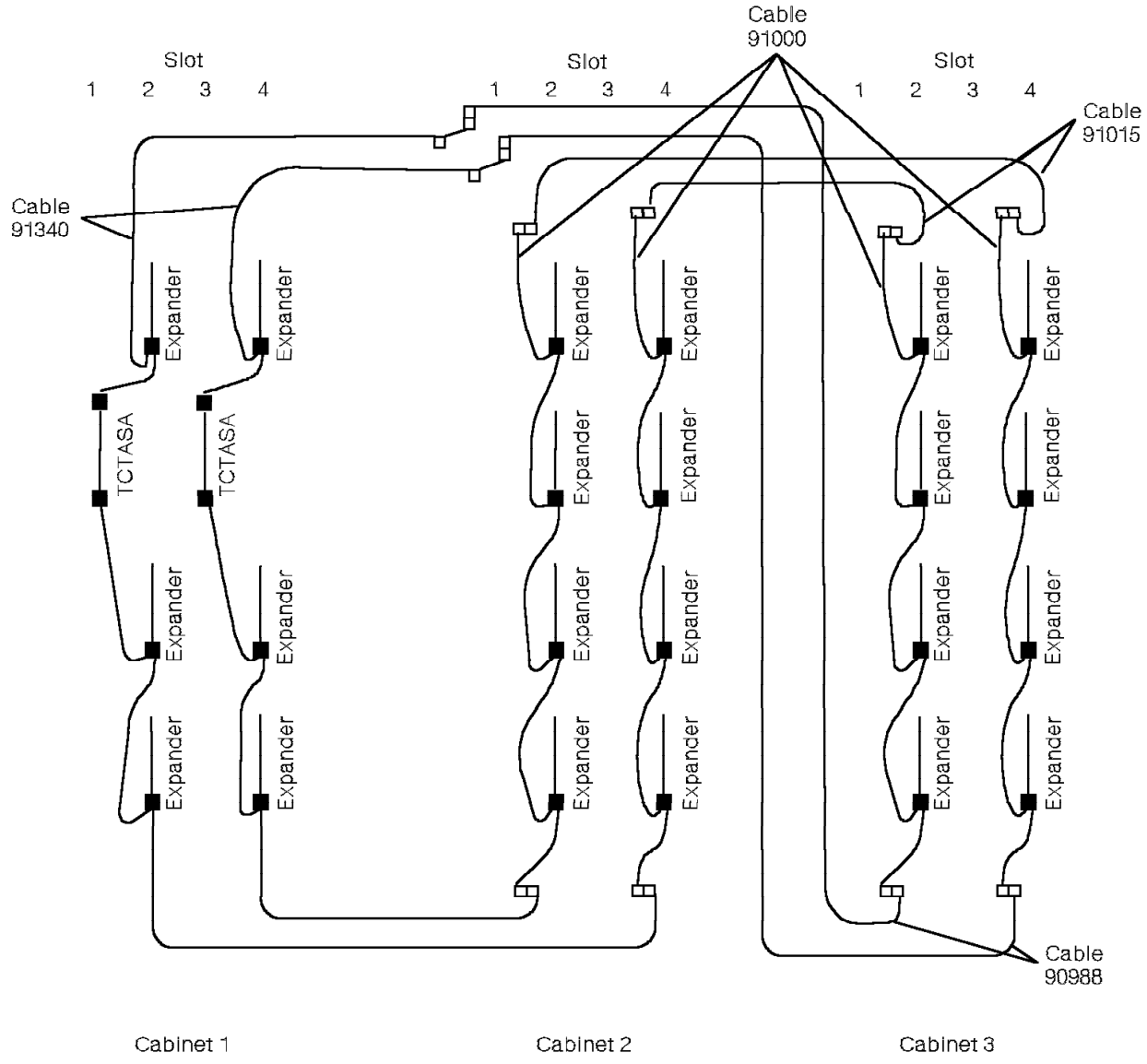
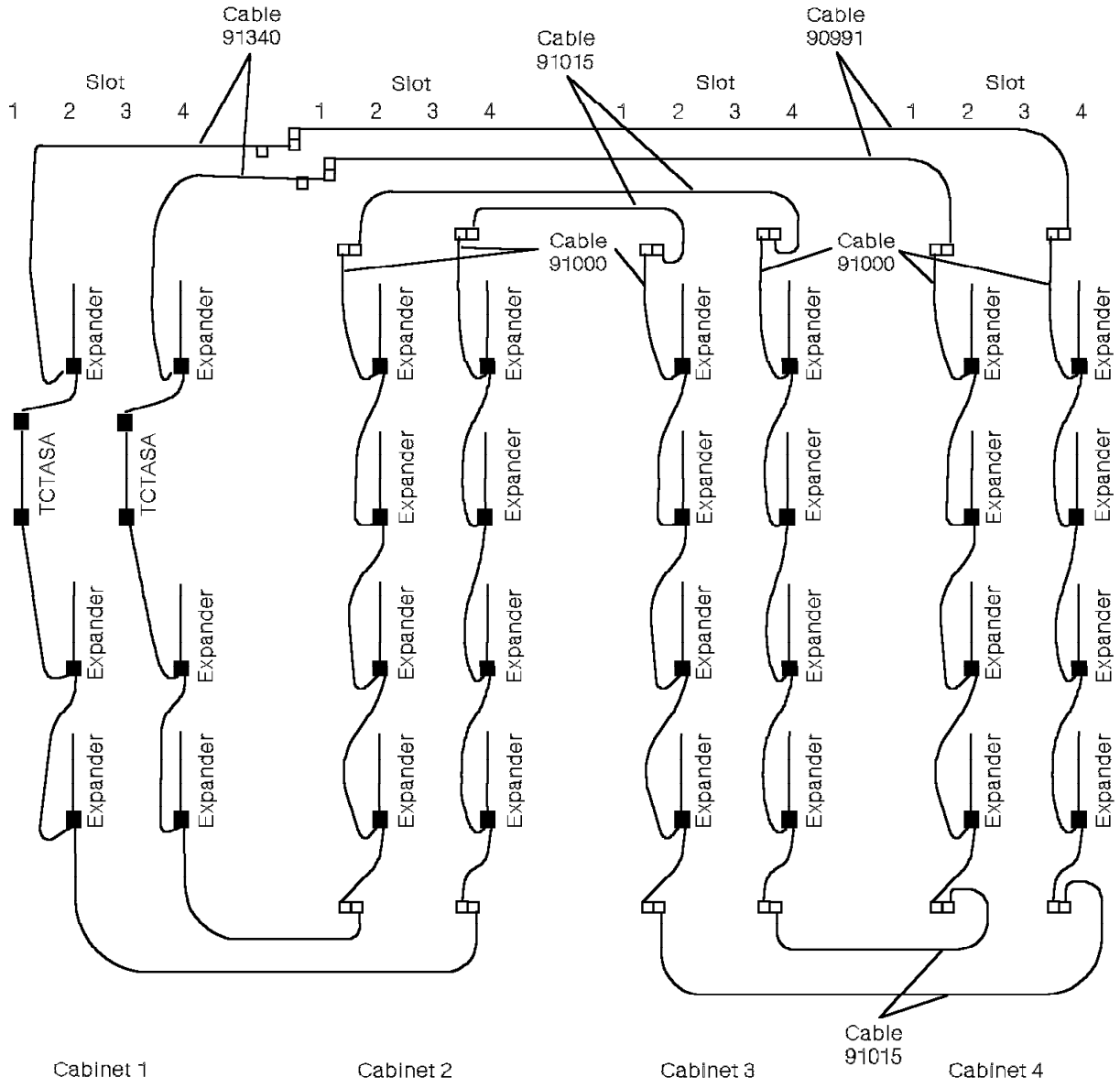


Figure B-8. Routing Diagram for a 3-Cabinet Model 50

B.9 Routing Diagram for a 4-Cabinet Model 50



4-Cabinet
9751 CBX Model 50
ISB Cable Routing

Legend:

■ ZIF Connector
□ ⊏⊐ ISB Connectors

38842791

Figure B-9. Routing Diagram for a 4-Cabinet Model 50

B.10 Routing Diagram for a 5-Cabinet Model 50

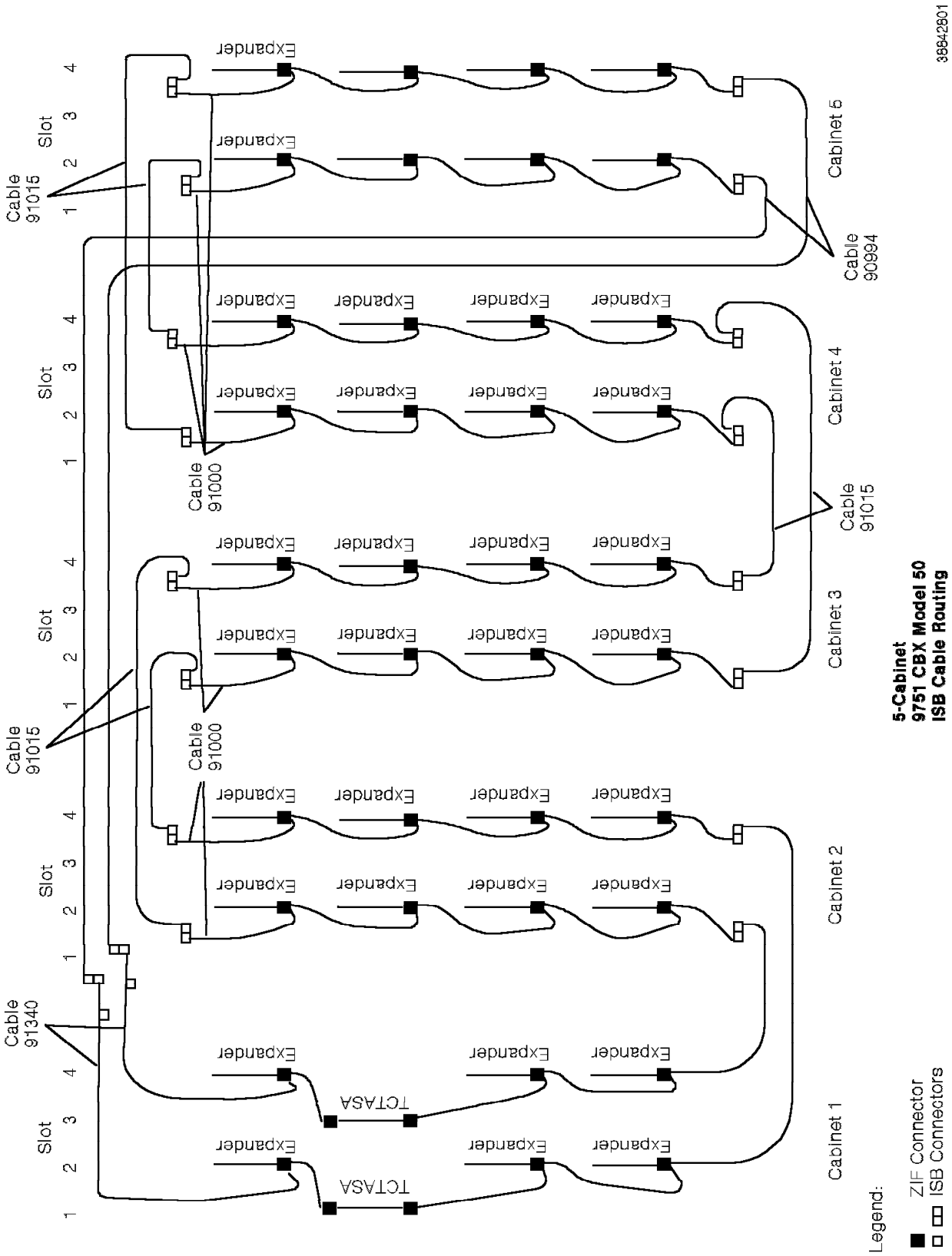


Figure B-10. Routing Diagram for a 5-Cabinet Model 50

Appendix C. System Features

Unlike station features, which a user activates at the telephone, system features are activated at the system level and are transparent to the user.

System features are designed to increase productivity, reduce costs, simplify user dialing, and provide management information on telephone usage.

Table C-1 provides an alphabetical listing and description of system features.

Table C-1 (Page 1 of 12). 9751 CBX System Features

Feature	Description
Advanced features	Loads the advanced features package on the 9751 computerized branch exchange (CBX). The advanced features package contains both system and station features.
Attendant intercept	Routes a call to an attendant when the caller dials a number that is nonexistent or out of order, or when the caller attempts a trunk call that violates the class of service (COS).
Automatic call distribution (ACD)	Maximizes call handling productivity for organizations that need to process a high volume of incoming calls quickly and efficiently—for example, banks, insurance companies, and catalog retailers. ACD is organized with a pilot number for a group of agents and a supervisor. The system uniformly distributes incoming ACD calls to the queue of idle agents in the ACD group. If all agents are busy, the system can greet callers with a recorded message and music, and can also place callers in queue for the next available agent. ACD also provides system, group, and agent statistical reports. These reports make it easy to manage changing call center conditions.
Automatic call intercept	Reroutes a call when the caller dials in error or attempts a call denied by COS or intercom blocking. Refer to “Intercepts” on page C-5.
Automatic facilities test system (AFACTS)	Tests the performance of tie and central office (CO) trunks connected to a 9751 CBX. When the trunks are installed, the customer engineer establishes trunk performance limits. When the system is operating, AFACTS performs tests and compares actual trunk performance to the established limits. When a trunk deviates from an established limit, the system logs the deviation in an exception report or downs the trunk.
Automatic network dialing (AND)	A ROLMnet III feature that permits a 9751 CBX to translate dialed extension numbers of various lengths into a uniform numbering plan. This digit translation feature operates when tie trunks or network facilities connect two or more 9751 CBX systems or when a 9751 CBX connects to non-ROLM private branch exchanges (PBXs).
Automatic number identification (ANI)	Provides the telephone number of the calling party. The 9751 CBX can process the caller’s number as follows: • Display it on a ROLMphone display • Deliver it to the correct CallPath host • Deliver it to the PhoneMail voice-processing system • Report it to a call detail recording (CDR) record • Route it to an extension or pilot number based on the trunk group table configuration
Automatic program load (APL)	This feature, also called initial program load, automatically reloads the system software in the event of an extended power failure. This feature provides continuous system operation.

Table C-1 (Page 2 of 12). 9751 CBX System Features

Feature	Description
Call waiting tone	A distinctive tone that the called party hears. The system sends the tone when a caller invokes the standby camp-on feature or parks a call onto a busy station. The called party hears one beep for an internal call and two beeps for an external call.
Call detail recording (CDR)	Records information on outgoing and incoming voice and data calls on a variety of printing devices. The printout includes the following: • Starting time and duration of the call • Calling and called party's extension or external number (for outbound calls only) • Trunk number • Access code (for outbound calls only) • Forced authorization code (FAC) or account code CDR data helps evaluate the cost of each call and provides management reports for the customer.
Communication (com) group service	Permits people within a common work group to dial each other using fewer digits than the extension number. Each extension can be a member of only one com group. Members of the com group can override the do not disturb (DND) and station forwarding condition on member extensions. A distinctive ring alerts members of a com group call. **Note:** In a system with a CorNet-N link, com groups do *not* support remote extensions.
Control of station feature (CSF)	Permits designated stations to control other stations' features. This COS is usually assigned to the 9755 Attendant Console (9755 ATC) or to an ACD supervisor. For example: • An ACD supervisor can change a state of an agent station, making it available or unavailable to take calls • An attendant can clear all station forwarding on a systemwide basis at the end of the day This feature helps control costs by restricting outgoing calls after hours, thus eliminating unauthorized use.
Class of service (COS)	Controls the trunk groups and features that an extension or trunk can use. COS is a powerful first step in controlling costs because it restricts the use of expensive trunking facilities. When the system is configured, each extension receives a COS. Each COS contains a set of features. A moves, adds, and changes (MAC) command modifies features within a COS.
Data communications feature (DCF)	Provides the connectivity, simple user interface, resource sharing, and network management capabilities required to access computerized information. **Note:** The 9751 CBX does *not* support data communications across a CorNet-N link.
Data CDR	Adds to the existing CDR capability by generating separate CDR records for data line-to-data line calls (local data calls), incoming modem calls, and outgoing data calls (network calls). Data CDR also provides data traffic statistics for data calls, data groups and modem pools.
Data line password	Enhances the data communications security option by adding a level of password protection before the system accepts a CALL, DISPLAY, or MODIFY command on originating data lines.
Data port management	Prevents data calls from queuing to a faulty port by automatically trying another port within the data group. The software disables further queuing to the faulty port and provides notification if the system administrator inquires.
Dedicated trunks	Permits incoming calls to bypass the 9755 ATC and ring through directly to a particular station, hunt group, or distribution group.

Table C-1 (Page 3 of 12). 9751 CBX System Features

Feature	Description
Dial tone	Provides a high or low pitch for external dial tone.
Dialed number identification service (DNIS)	A 2-feature option that permits the recipient of the call to identify the party that the caller is attempting to reach. DNIS I translates digits the CO sends (over most types of trunks) into a unique alphanumeric string that displays on the call recipient's ROLMphone display or Cypress set. DNIS II identifies the called party through a trunk call, an internal call, or a call extended from the 9755 ATC. These DNIS features are primarily used by an ACD agent or secretary who is answering calls from multiple screens.
Dictation equipment access	Permits ROLMphone telephones to generate the dual-tone multifrequency (DTMF) tones required to control and operate dictation equipment. **Note:** The 9751 CBX does not support dictation equipment that rotary-dial pulses control.
Direct inward dialing (DID)	Permits an external caller to directly call an extension number instead of going through an attendant.
Direct inward system access (DISA)	Permits an external caller to dial a special DISA telephone number and authorization code to access system features. This feature is especially beneficial for employees who are working offsite or traveling.
Direct outward dialing (DOD)	Permits a caller to call outside numbers without going through an attendant.
Distinctive ringing	Provides different ringing patterns for internal calls, external calls, com group calls, and callback calls.
Distribution group	Permits an equal distribution of calls among stations. The system distributes calls to the first idle station following the last group member that received a call. If all stations in a group are busy: • An internal call is forwarded to an alternate answering facility or connected to a busy tone • An external call is connected to a ringing tone Distribution occurs only when the pilot number is dialed. Each distribution group member has an individual extension number in addition to the pilot number. Dialing the extension number rings only the group member's telephone.
Dual-tone multifrequency (DTMF) to dial pulse conversion	Permits the system to convert DTMF signals to rotary dial pulses, or vice versa, for routing over rotary trunks.
Error-correcting code (ECC)	Improves the accuracy with which the system storage retains information, which minimizes the likelihood of a system failure due to a malfunctioning storage component. ECC automatically detects and corrects all single-bit storage errors. It also detects all multiple-bit errors. Also, a hardware register on the processor card permits the system to enter errors in an error table to aid in servicing.

Table C-1 (Page 4 of 12). 9751 CBX System Features

Feature	Description
Electronic tandem network (ETN) traveling class mark (TCM)	A capability of the ROLMnet feature that is available in the United States and Canada. Often in ETN and ETN-like private corporate networks, the system assigns a network class of service (NCOS) to each call processed through a tandem switching hub. The NCOS has a range of eight levels, which determine the caller's access to communications facilities throughout the network. The TCM is an identifier that sends the NCOS of each call from one tandem hub switch to another in the ETN environment. The TCM consists of an extra digit (0 through 7) sent after the normal address digits associated with the call.
Expanded traffic statistics	Collects and maintains information related to the various activities that the 9751 CBX performs. The system maintains this data in statistical form in storage and on disk. The expanded traffic statistics feature: • Provides a powerful capability for managing a 9751 CBX through ongoing traffic measurements • Provides information on excessive blockage conditions • Permits proactive management of trunking, based on indicated facilities usage • Permits measurement of attendant productivity, console group, and individual console statistics • Permits measurement of common equipment utilization (for example, DTMF registers) • Provides information on use of internode links (INLs) • Provides information on data calls, data groups, modem pools, and data hardware configuration
Feature usage statistics	Maintains peg counts indicating how often users invoke station features, such as park.
Flexible station numbering	Permits stations to be numbered or renumbered without regard to physical location.
Forced authorization code (FAC)	A route optimization III feature. Use FAC with CDR to generate reports on code usage. The following are the types of FACs: **Checked FAC** Associates a user's FAC with a COS. Checked FAC requires a user to enter a 1- to 12-digit code before placing a call that requires a higher COS than the COS assigned to the telephone. When a user enters a code, the system checks it against a defined list of codes as follows: • If the code is found on the defined list, the caller can use any extension to access features or trunks within the COS. • If the code is not found in the defined list, the user hears error tone, is intercepted to the attendant, or is assigned to a default COS. These options depend on the system configuration. **Unchecked FAC** Associates a FAC with a client. Unchecked FAC requires each user to enter a code before every telephone call unless there is no account code (NAC) in the user's COS. When a user enters a code, the system does not check the specific code dialed. It only verifies that the user dialed the correct number of digits (1 through 12). See also "Restricted forced authorization code (RFAC)" on page C-9 and "Variable forced authorization code (VFAC)" on page C-12.

Table C-1 (Page 5 of 12). 9751 CBX System Features

Feature	Description
Forced route advance	A ROLMnet III feature that is an alternative to the route optimization III feature. Forced route advance routes calls over dedicated tie trunks from one business to another, using numbering plan alternatives. It can also route the same calls over public network facilities if dedicated tie trunks are busy or unavailable.
Guest data line	Authorizes, restricts, and tracks system access by remote guest users. To handle identification and authorization control of remote guest users, the virtual data line capability requires all incoming modem calls to be configured with a password.
Hunt group	Permits the system to group stations within a particular organization function. Each hunt group has a pilot number. When a caller dials the hunt group pilot number, the system scans the configured list of extension numbers, beginning with the first number in the group, and connects the call to the first idle member. The system always assigns hunt group calls to extensions in the same sequential order, which results in heavier call volume for the first extensions in the group. If all stations in a group are busy, the system forwards the call to an alternative facility or connects it to a busy tone, according to the configuration. When a member activates station forwarding or DND, that member leaves the group. Hunting occurs only when the pilot number is dialed. Each hunt group member has an individual extension number in addition to the pilot number. Dialing the extension number rings only the group member's telephone.
Intercepts	Provides an alternative for callers who misdial or attempt calls that the COS or intercom blocking features deny. The following are the types of intercepts: **Attendant intercept** Occurs when a user: • Dials a number that is nonexistent or out of order • Attempts a trunk call that violates the COS **Recorded announcement intercept** Occurs when a user dials a nonexistent extension or access code. **Off-hook intercept by COS** Occurs when calls exceed initial digit time-out. Can have a different intercept for each COS.
Intercom blocking	Prevents stations with selected COSs from dialing stations with certain other COSs. A blocked call can connect to error tone or reroute to the attendant for interception. Use intercom blocking to prevent separate parts of an organization from calling each other, such as restricting hospital patients from calling doctors or laboratories.
Least-cost routing (LCR)	A part of the route optimization III product that is available in the United States and Canada. LCR automatically selects the most economical trunk available for an outgoing call. With route optimization III, the caller or attendant dials a 1-digit access code (usually 9) for an external call, regardless of its destination. The 9751 CBX then automatically places the call through the most economical circuit, based on customer-specified information stored in the 9751 CBX routing tables. Compared with systems that require the caller to choose the facility type manually, route optimization III can reduce the cost of long distance calls by 30 percent or more. LCR is completely transparent to the caller and requires no special knowledge of the system to use it.

Table C-1 (Page 6 of 12). 9751 CBX System Features

Feature	Description
Message waiting	Indicates that a message is waiting on a ROLMphone that connects to the 9751 CBX. The message center attendant, the PhoneMail system, and the property management system (PMS) interface can invoke this feature. **Note:** Only PhoneMail message waiting is supported across a CorNet-N link. The following are the message waiting indicators: **Analog telephones** A broken or interrupted dial tone gives an audible indication that a message is waiting. **ROLMphone** An activated message waiting lamp gives a visual indication of either a PhoneMail or message-center message. The ROLMphone also uses the broken dial tone as an audible message waiting indication. **Cypress set** An activated status line indicator gives a visual indication that a message is waiting. **ROLMphone 244PC** NEW MSG Indicates a call-me message. PHMAIL Indicates a PhoneMail system message. MSG WTG Indicates a message-center message.
Multiple trunk groups	The 9751 CBX can be configured with multiple unique trunk groups. A trunk group consists of one or more similar trunks that serve serving the same function—for example, DID, dedicated (DED), and ties. Refer to the *9751 CBX, Release 9005/9006m, Configuration Manual* for trunk group configuration limits.
Music on hold and camp-on	Provides customer-supplied music to all calls on hold and on standby camp-on.
Night call answer	Provides the following ways to handle incoming night calls or calls that arrive when the 9755 ATCs are not in operation: **Assigned night answer (ANA)** Permits incoming calls on a particular trunk to ring at a specified extension or group. For example, this feature is particularly useful when after-hours calls are sent to a guard at a security gate. An ANA extension can receive calls from more than one trunk. If the extension is busy, the extension user hears a call waiting tone. To receive the new call, the user hangs up or transfers the current call. After doing so, the extension automatically receives the new incoming call. **Offsite night answer** Permits offsite forwarding of incoming calls. The 9751 CBX seizes a specified trunk, dials a predetermined number, and connects the incoming call to the outgoing trunk. If all outgoing trunks are seized, subsequent incoming calls remain unanswered until a trunk becomes idle. **Universal night answer** Permits chimes to announce incoming calls. Anyone at any station can dial the correct access code to answer a call. The system automatically connects the caller who waited the longest. Internal callers who dial the attendant's extension at night hear a busy tone, unless the system is configured to route internal calls to an overflow location.

Table C-1 (Page 7 of 12). 9751 CBX System Features

Feature	Description
Off-premises station (OPS)	Permits integration of an offsite extension with the 9751 CBX. The offsite extension has the same operating capabilities and features as any other extension configured into the system. It can also be forwarded to a PhoneMail system mailbox.
Off-system station forwarding	Permits users to forward calls to any local or long-distance number. Users can activate this feature locally and remotely.
Off-hook routing	This feature, also called ringdown forwarding, assigns a ringdown telephone number to an extension. When a user lifts the handset of the ringdown extension, a call goes immediately to a predetermined destination. Any valid number can be the destination, including a long distance number. A typical example is a white courtesy telephone in an airport.
Paging	Permits the attendant and specified station users to access voice page equipment. The attendant uses the PAGE key and the station users enter an access code. Paging areas can be divided into several zones with separate access codes. The COS can control paging access. Each 9755 ATC can connect to a different page trunk using access codes. In a system with a CorNet-N link, an attendant cannot use the PAGE key to use the remote ISPBX paging equipment.
PhoneMail system	The PhoneMail system combines the following features: **Telephone answering** The PhoneMail system automatically answers the telephone if it is busy or there is no answer. The PhoneMail system automatically forwards the caller (user or non-user, internal or external) to the PhoneMail subscriber's voice mailbox. The caller hears a greeting (system or personal) and can leave a message when the greeting finishes. **Message notification** A blinking light or broken dial indicates a waiting message. Refer to "Message waiting" on page C-6. **Voice store and forward** Permits PhoneMail subscribers to record and return messages with the telephone. The system stores voice messages on hard disk for later retrieval. PhoneMail subscribers can record messages, listen to messages, save or delete messages, control message playback, and distribute messages to one or more users by entering commands through the telephone keypad.
Password control of changes	Requires an employee to enter a password or access code to access and make changes to certain information in the 9751 CBX.
Pick group	Permits its members to answer the extension of any other member of that group. **Note:** In a system with a CorNet-N link, pick groups do *not* support remote extensions.
Power failure transfer	Permits the 9751 CBX to transfer service automatically to predetermined locations through a bypass unit if a power failure occurs. This safeguard lets the user make and receive calls even when the system is not operating.

Table C-1 (Page 8 of 12). 9751 CBX System Features

Feature	Description
Property management system (PMS) interface	Primarily used in the hotel industry to connect the 9751 CBX to the hotel's property management accounting computer. PMS promotes hotel automation as follows: • Processes check-in and check-out messages from the PMS by: – Imposing or removing restrictions on guest telephones – Clearing or reporting message information • Directs pushbutton telephone input and room-status changes separately to the PMS • Receives and responds to messages from the PMS to update telephone restriction and message waiting status • Acknowledges or retransmits each message sent between the 9751 CBX and a host to ensure high reliability and data integrity
Radio paging	Provides an interface for radio paging devices that display the caller's extension number.
Recorded announcement intercept	Routes a call to a recorded announcement when the caller dials a nonexistent extension or access code.

Table C-1 (Page 9 of 12). 9751 CBX System Features

Feature	Description
Reduced feature mode	Permits a ROLMphone to operate in a limited capacity during malfunctions such as power loss or ROLMlink identification (ID) mismatch. The following are the reduced feature modes: **Software reduced feature mode** Occurs when the 9751 CBX detects a ROLMlink family ID mismatch between the configured device and the installed device, or when a Cypress protocol device loses power. When a ROLMphone is in software reduced feature mode, one of the following occurs: • The CONNECT button LED on the ROLMphone 300 or 600 flickers • The call waiting LED flickers on the other ROLMphone models There are two possible button table layouts: • If configured, BUTTON table 32 determines the button layout used during software reduced feature mode. • If BUTTON table 32 is *not* configured, the system′s default table is used. The system′s default table permits the ROLMphone telephone′s HOLD, CONNECT, and TRANSFER buttons, dial pad keys, and volume control keys, to continue working when the system is in software reduced feature mode. On a ROLMphone 120, 240, or 400: – The HOLD, CONNECT, and TRANSFER buttons default to the positions shown in Figure 5-21 on page 5-28, Figure 5-22 on page 5-29, and Figure 5-25 on page 5-32, respectively. – Up to four of the lower-left line buttons function as line keys. On the ROLMphone 300 and 600 series telephone: – The TRANSFER, CONNECT, and HOLD buttons (from top to bottom) are the three buttons above the volume control keys. – Up to four of the lower-left line buttons function as line keys. **Workstation reduced feature mode** Occurs when the DCO malfunctions, or the telephone is not communicating with the 9751 CBX. When a ROLMphone is in workstation reduced feature mode: • Only the numeric keypad functions. Users can still make and receive calls, but must lift the handset to do so. Hands-free dialing is not supported. • On ROLMphone telephones other than 312 and 600 series, no other symptoms occur. • On ROLMphone 312 and 600 series telephones, the LEDs associated with buttons 7 through 10 (the four buttons below the volume controls) flicker.
Restricted forced authorization code (RFAC)	Restricts FACs to an individual extension to prevent unauthorized use.
ROLMfax access	ROLMfax is a facsimile (FAX) store and forward integrated server in the 9751 CBX software Release 9006i. In a system that uses a CorNet-N link to connect to a 9751 CBX software Release 9006i, the ability of a user to access ROLMfax is restricted to basic call setup and teardown.

Table C-1 (Page 10 of 12). 9751 CBX System Features

Feature	Description
ROLMnet III	A private version of the public telephone long-distance switching system. The ROLMnet III package consists of the following: • ROLMnet • ETN TCM • Forced route advance • Ten-digit routing • Satellite operations • AND ROLMnet III is designed for large networks that require a complex on-net system. It permits the establishment of an on-network dialing plan that is independent of the constraints imposed by the public network (North American) dialing plan.
Route optimization III	Controls long-distance costs by automatically selecting the most economical route for an outgoing call. The route optimization III package consists of the following: • Route optimization • Callback queuing • Call screening • Time-of-day routing • Trunk queuing • FAC • DISA In a route optimization system, the caller dials an external access code, usually 9. The system matches the dialed number with the tables in 9751 CBX software and checks a route list for possible trunk facilities that the user's COS can access. After the system checks the route list, it selects the most economical route and alternate routes available for the call.
Roving authorization code	Temporarily upgrades the COS of any telephone in the system by using a universal access code and a FAC.
Satellite operations III (SAT OPS)	Permits companies with several locations in one regional area to achieve a unified telephone system and numbering plan previously possible only with Centrex-type systems. SAT OPS connects two or more system installations in the same area to provide centralized attendant service (CAS) operations, centralized CDR, and transfer of COS for call processing among switches. When a system has a mixture of switch types, one of the switches is designated as the main facility and all other switches in the system are designated as satellites. To eliminate expensive duplicate trunk systems at each satellite location, one location (usually the main 9751 CBX) contains most trunk lines, including wide area telephone service (WATS) lines. SAT OPS' digit translation capability permits people anywhere in the connected system to place a call by dialing only the distant station's extension number or location code followed by an extension number. Multidigit translation is an included capability.
Security group/ simultaneous call group	Permits a group of stations to ring simultaneously when the pilot number assigned to the group is called. This feature is beneficial in a situation where the people who need to answer the calls are not always in the same location.
Self-test and fault isolation	Provides dynamic testing of hardware and software to ensure maximum system reliability and availability of system features.

Table C-1 (Page 11 of 12). 9751 CBX System Features

Feature	Description
Serial calls	Eliminates the need for a caller to make multiple calls to a business. When a caller asks the attendant to make a serial call, the attendant extends the call to the first person on the caller's list. When that person hangs up, the call automatically returns to the attendant, who then extends the call to the second desired party, and so forth. This permits the caller to telephone a business and talk to several people, in sequence, without having successive called parties perform call transfer.
Serial device interfaces	Permits the 9751 CBX to be physically and logically connected to an external device such as a terminal, printer, personal computer, or modem for transmission of data.
Specialized common carrier (SCC) support	Provides access to the long-distance carriers for voice traffic, such as AT&T, MCI, and Sprint. This feature automatically outpulses the number needed to reach the SCCs.
System forwarding	Forwards internal and external calls that cannot be connected to a called party. These calls include ring no answer calls, calls that reach busy extensions, and calls that reach extensions placed in DND mode. The 9751 CBX can forward internal and external calls to different targets. The following are valid targets: • An extension • A hunt or distribution group • A 9755 ATC that functions as a message center • An off-site number Each extension can have two forwarding targets.
System speed calling	Provides systemwide dialing of frequently called external numbers. The user enters the feature access code and the correct 3-digit code (from 001 to 999) assigned to each system speed number. The system then dials the full number (which can contain up to 16 digits, including the trunk access number). The company's system speed calling directory lists the correct system speed codes.
System speed override	Permits stations with a lower COS to access a system speed number that ordinarily requires a higher COS.
Telephone message management system (TMMS) interface	Connects features such as TMMS and the voice text messaging system (VTMS) to the 9751 CBX.
Ten-digit routing	A ROLMnet III feature that permits for separate numbering plan for reaching on-network destinations. Most often, a caller makes long-distance public network calls by dialing 9, plus 10 digits in the format ***NPA-nxx-xxxx***, where: ***NPA*** is the area code ***nxx*** is the office code ***xxxx*** is the station number With ten-digit routing, a caller dials an access code (usually 8), plus seven digits in the format ***Rnx-xxxx***, where: ***Rnx*** is the location code ***xxxx*** is the station number
Time-of-day routing	A route optimization III feature that automatically changes call routing by the time of day and the day of the week. It prohibits the use of trunk circuits at the most expensive time of day.

Table C-1 (Page 12 of 12). 9751 CBX System Features

Feature	Description
Toll restriction	Permits a customer to prevent specified extensions from placing toll calls. Toll restriction works best with the LCR and queuing features of route optimization III to determine the most economical method of placing a call consistent with the caller's COS.
Trunk queuing	A route optimization III feature that queues callers when all trunks in a trunk group are busy. The following are the types of trunk queuing: **Standby queuing** The callers wait for a trunk to become idle. **Callback queuing** The system notifies callers when a trunk is available. **Note:** The 9751 CBX does *not* support onhook trunk queuing on a CorNet-N trunk group.
Trunk-to-trunk blocking	Provides more control of the system's trunk usage by preventing fraudulent calls. By correctly configuring the users' COSs and system parameter TTBLK, the system prevents users from transferring incoming trunk calls to an outside telephone. The following are the configurable options: • Trunk-to-trunk transferring is *not* blocked. • Transferring a CO- or DID-trunk call to a CO trunk is blocked. • Transferring a CO- or DID-trunk call to a CO or tie trunk is blocked. • Transferring a CO-, DID-, or tie-trunk call to a CO or tie trunk is blocked. Trunk-to-trunk blocking affects neither consultation calls nor conference calls. COS TTT controls conference calls as in systems with software Release 9005.2.77 and below.
T1 digital network (T1DN)	Supports voice connections to both tie trunk and public switched networks, and to data tie trunks. Any of the 24 channels can be used for one voice or data call.
Variable forced authorization code (VFAC)	Permits the customer to configure FACs of various lengths.
Voice paging	Permits an attendant with a paging key on the 9755 ATC to provide a direct connection to the paging equipment. The 9751 CBX can be configured for key or dial access to voice paging equipment. Employees dial an access code for connection to the equipment.

Appendix D. Station Features

Station features are features associated with individual telephones connected to the 9751 computerized branch exchange (CBX). Some of these features are accessed according to the class of service (COS) assigned to the telephone line.

Access station features as follows:

- Key in the feature access codes after using the flash feature
- Press a configured button on a ROLMphone, ROLMphone 244PC, Cypress personal communications terminal, Juniper personal communications complement, or 9755 Attendant Console (9755 ATC)
- Automatically, if the features are configured in the COS

Flashing puts the call in progress on hold and communicates to the 9751 CBX that an access code will follow. To flash, press the switchhook on a rotary dial or pushbutton telephone, or press the FLASH button on a ROLMphone. Flashing is not necessary on a 9755 ATC.

This appendix is divided into the following sections:

- Standard station features
- ROLMphone and ROLM desktop products station features

D.1 Standard Station Features

Table D-1 provides an alphabetical listing and description of standard station features.

Table D-1 (Page 1 of 5). Standard 9751 CBX Station Features

Feature	Description
Bad line	Permits a user to report excessively noisy trunks without disconnecting a call. The 9751 CBX stores information regarding bad trunks in the trunk exception table.
Call detail recording (CDR)/ account coding	Permits a user to assign an account number to a call, either before or after the call. The user can also assign an account number during a call, but doing so causes a temporary interrupt while the user enters the code. The system records the account number along with other call details in the CDR process.
Camp-on, automatic	Permits a caller to queue on a busy external trunk or internal extension. Callers *cannot* camp on to remote extensions. When a caller camps on: • The caller stays on the line during a busy tone. • After a configurable time, the busy tone changes to music or silence for the caller and the called party hears a camp-on tone. • The call rings through as soon as the called extension is idle. The caller remains on the line the entire time.
Camp-on, callback	Permits a caller to silently queue on a busy internal extension. Callers *cannot* camp on to remote extensions. The caller hears the busy tone, flashes, keys in the feature access code, and hangs up. When both the calling and called extensions are free, the 9751 CBX calls back the camped-on caller. The user can cancel the callback camp-on feature if the called party does not answer within a configurable time (the default is 15 seconds) of the callback.

Table D-1 (Page 2 of 5). Standard 9751 CBX Station Features

Feature	Description
Camp-on, standby	Permits a caller to queue on a busy internal extension. Callers *cannot* camp on to remote extensions. The caller hears the busy tone and stays on the line. The called party hears a camp-on tone that signifies a queued incoming call.
Conference call	Permits up to eight parties to engage in one telephone conversation. In a system with a CorNet-N link, two of the eight parties in a conference call can be remote extensions.
Connect	Permits a user to return to a call placed on hold at the user's extension, or to pick up a call parked at an on-hook extension before it rings. The user goes off-hook and keys in the feature access code. The connect feature also permits a user engaged in a telephone conversation to accept another call and alternate between two callers. After hearing the camp-on tone, the station user can place the first caller on hold and connect to the second party. The user can then use the connect feature to alternate between the two callers.
Consultation call	Permits a user to place a call on hold for the purpose of dialing a second number to consult with another party. The user can use the connect feature to alternate between the two parties, or use the conference call feature to combine the calls.
Control of station	Permits a 9755 ATC or other station to control station forwarding and inward call restrictions for other extensions. For example: • Hospital personnel can restrict incoming calls to a patient who should not be disturbed. • A hotel clerk can impose incoming call restrictions to provide do not disturb (DND) service for a guest or outgoing restrictions on the telephone in an unoccupied room. In a system with a CorNet-N link, a 9755 ATC cannot use this feature for remote extensions.
Data local terminal loopback	Permits a user to place a ROLMphone with data communications module (DCM) into local loopback mode. The user types characters on the keyboard and the ROLMphone echoes the typed characters to the cathode-ray tube (CRT). If the user hears a short beep and the data light-emitting diode (LED) lights, the ROLMphone is in local loopback mode. If the user hears three beeps and the data LED does *not* light, the ROLMphone failed to go into local loopback mode.
Direct pick	Permits a user to answer a call that is ringing, on hold, or parked at any extension within the system. The user keys in the feature access code and the extension number of the telephone. **Note:** In a system with a CorNet-N link, pick groups do *not* support remote extensions.
Direct trunk select (DTS)	Permits testing of specific trunks for operational problems. The customer engineer selects the trunks from an extension configured for direct trunk select (DTS), such as the maintenance telephone in the switch room. To select a trunk, the customer engineer keys in the feature access code, followed by the 4-digit number the switch assigned during configuration of trunk channels.
Do not disturb (DND)	Temporarily blocks incoming calls to an extension. Com group and executive override calls can ring through a DND condition.
Executive override	Permits a user to interrupt calls in progress or to call stations that are in DND mode. Users *cannot* use executive override on remote extensions. Executive override is intended for emergency and other high-priority calls. Generally, only stations with a high COS can use it, which prevents indiscriminate use. The interrupted party hears a barge-in tone before the override interrupts the conversation.

Table D-1 (Page 3 of 5). Standard 9751 CBX Station Features

Feature	Description
External calls	Permits a station's COS to determine whether the station user can make outside calls.
Forced route override	Permits the use of a different outside line if the first line is busy or the connection is poor. Users can invoke this feature: • Immediately after hearing the two beeps that indicate this feature is available • After a busy signal • During a conversation (but the called party must first hang up)
Forwarding, external call	This feature is similar to follow-me call forwarding, except that users with the correct COS can dial a FAC to forward calls to an offsite location (local or long-distance).
Forwarding, follow-me call	Permits users to forward calls serially from one location to subsequent locations. Users access this feature from the extension currently receiving forwarded calls, not from their desks.
Forwarding, internal call (station forwarding)	Forwards incoming calls to any extension or offsite number.
Group pick	Permits any member of the same pick group to answer a call ringing on another member's extension, without using the extension number. **Note:** In a system with a CorNet-N link, pick groups do *not* support remote extensions.
Hold	Places an in-progress call on hold. The station user can use the connect feature to return to the caller at any time. After a call is held for a configurable time period, the 9751 CBX rings the station again if it is onhook, or rings the attendant if the station is offhook or does not answer.
Hold on hold	Permits two connected parties to put each other on hard hold using the ROLMphone hold keys. The users can access another line and the system does not disconnect them. The hold on hold feature is system configurable. It operates on the 9751 CBX with the ROLMphone telephones and the Cypress set.
Internal calls	Permits users to place internal calls by dialing any extension not subject to intercom blocking. Com group members can reach one another by dialing either the extension number or the 2- or 3-digit com group number.
Message reminder	Permits a station user to leave a call-me message on a ROLMphone display telephone. Users *cannot* use the message reminder feature on remote extensions. If an internal caller receives no answer and knows that the called party has a display telephone, the caller can enter the feature access code, which causes CALL xxxx (where xxxx is the caller's extension number) to appear on the called party's display. If the caller enters the access code with an extension that does not have a display, the caller receives error tone.
Message waiting	Provides visual and audible notification of a message. The 9751 CBX activates the message waiting lamp on a Flashphone telephone or ROLMphone; it activates the status-line indicator on a Cypress set and on a ROLMphone 244PC.
Message waiting, cancel	Permits users to turn off their message waiting lights after they receive their messages. Users invoke this feature only if the message waiting lamp does not automatically stop flashing.
Night call answering	Permits any station user to answer incoming calls when the operator is off duty.

Table D-1 (Page 4 of 5). Standard 9751 CBX Station Features

Feature	Description
No flash allowed	Permits an extension to ignore the flash function. This feature also prevents the use of system features at a restricted extension, such as a patient's telephone in a hospital. It is also useful for extensions configured for offhook routing.
No howler offhook	Permits stations that remain off-hook for a predetermined period of time to receive an error tone, followed by 30 seconds of silence, and then the howler tone.
Offhook intercept	Permits the 9751 CBX to alert an attendant or someone at a predetermined destination when an extension is off-hook for a configurable period of time. The COS of the station determines the destination. The target ROLMphone display telephone or ROLM personal communications product displays the extension of the off-hook telephone. This feature is particularly useful in hospitals and hotels where attendants can receive notification of off-hook telephones and resolve the problem quickly.
Park	Permits a station user to combine the transfer and hold features. Users *cannot* use the park feature on remote extensions. The user can transfer a call to an off-hook (busy) or on-hook (idle) extension as follows: **Off-hook extension** The 9751 CBX transmits a camp-on tone to the extension and the call is held there (parked) until the called party connects or the station is idle, at which time the call rings through. **On-hook extension** The 9751 CBX waits a configurable time period, then rings the extension three or four times. The user can invoke the connect feature to answer the call before it rings at the new location.
Privacy	Prevents calls from being interrupted by camp-on tones, park tones, and executive override. The user can engage the privacy feature before or during a conversation. The 9751 CBX cancels this feature: • When the called party hangs up • If the user invokes any other feature during the conversation The always in privacy COS feature maintains the privacy condition at all times without user intervention. This feature is essential for extensions that handle data transmission.
Queuing, callback (onhook trunk queuing)	Permits a caller to queue on a trunk (similar to callback camp-on) and store a telephone number. The caller encounters a busy trunk (signaled by a fast busy tone), keys in the feature access code, and hangs up the telephone. The caller can queue one call at a time, and can make and receive calls while waiting for the callback. The 9751 CBX automatically rings the station when the trunk becomes available. The caller keys in the feature access code to initiate the automatic redialing sequence. After the trunk becomes free, the user can postpone the call by answering and hanging up. The 9751 CBX automatically rings the station again in 10 minutes. **Note:** The 9751 CBX does *not* support callback queuing for CorNet-N trunk groups.
Queuing, standby (off-hook trunk queuing)	Performs the same function for trunks that standby camp-on provides for internal extensions. After encountering a busy trunk, the station user need not redial an external number, but can stay on the line. The 9751 CBX places the call when the trunk becomes available. **Note:** The 9751 CBX does *not* support standby queuing for CorNet-N trunk groups.
Roving authorization code	Permits users to temporarily upgrade the COS of any telephone in the system to their own by using a universal access code and a FAC.

Table D-1 (Page 5 of 5). Standard 9751 CBX Station Features

Feature	Description
Save and repeat	Permits an internal or external number to be saved in memory under three conditions: busy, ring-no-answer, and in connection. To store the telephone number, the station user keys in the Save feature access code before returning to dial tone. To call the number again, the user keys in the Repeat feature access code. The save feature stores only one telephone number at a time. When the user saves another telephone number, the system erases the previous number.
Speed calling, station	Permits a user to store 10 frequently called telephone numbers in the 9751 CBX computer memory. The user assigns 1-digit code numbers to these telephone numbers and can access them only at the extension where they were entered.
Speed calling, system	Permits rapid dialing of frequently called external numbers through a 2- or 3-digit code. The 9751 CBX stores these telephone numbers and their corresponding access codes in a systemwide directory, which holds up to 999 entries. When a user dials a system speed code, the 9751 CBX translates it into the full number (which can contain up to 16 digits, including the trunk access code) and dials the number automatically.
Transfer	Permits a user to transfer calls to another extension or to the attendant.

D.2 ROLMphone and ROLM Desktop Products Station Features

The ROLMphone and ROLM desktop products provide additional station features that are not available on single-line telephones. These features can be accessed by pressing a dedicated feature button. There can be minor variations in how a feature works on different products.

Table D-2 provides an alphabetical listing and description of standard station features.

Table D-2 (Page 1 of 2). ROLMphone and ROLM Desktop Products Station Features

Feature	Description
Autodial	Permits a user to press one button to automatically dial a station speed or system speed number. Feature buttons can be assigned for station speed autodial and an unrestricted number of buttons can be configured for system speed autodial.
Automatic call distribution (ACD) emergency	Permits an ACD agent to use a ROLMphone button to send an emergency HELP message to the ACD supervisor. The message and the agent's extension appear on the supervisor's ROLMphone display telephone.
Buzz	Permits a station user to signal (buzz) a secretary or another party with a designated ROLMphone extension.
Called name display	Shows the name and extension of the called party on the liquid crystal display (LCD) of ROLMphone display telephones and on the screen of desktop products.
Change ringing tone	Permits users to select one of eight ringing tones on the ROLMphone and on the Cypress set. This is particularly useful for call pickup applications in large open-office environments. Employees who are frequently away from their desks can identify their telephone's ringing tone from a distance. Similarly, separate pick groups within large open areas can select the same ringing tone to facilitate use of the pick feature.
Intercom	Permits users to call an extension, automatically activate the speaker of the called extension, and speak through the speaker to other ROLMphone users in the same com group. To make an intercom call, a user presses the intercom feature button or the feature access code and dials the com group number.

Table D-2 (Page 2 of 2). ROLMphone and ROLM Desktop Products Station Features

Feature	Description
Mute	Disconnects the microphone of the speakerphone, handset, or headset on the ROLMphone and the Cypress set.
PhoneSpell	Permits users to place internal calls to a PhoneMail system subscriber without knowing the called party's extension. This feature requires the PhoneMail system with one of the following software releases: • Release 3.7 • Release 4.2 • Release 5.2 and above The ROLMphone must be configured with a PHONESPELL button. When a user presses PHONESPELL, the system prompts the user to spell out the called party's name using the telephone keypad. The system then determines the called party, announces the name of the called party, and asks for confirmation. When the user confirms the name, the system places the call.
Repertory dialer (Repdial)	Holds in memory a sequence of digits, station features, flashes, and delays. It is an enhancement of autodial, which holds digits only. Common repdial uses include accessing station forwarding and PhoneMail system message retrieval.
Speakerphone	Permits users to continue conversations without using the handset. Pressing the speaker button activates the speakerphone. This feature is available on the ROLMphone 240, 244PC, 400, and 600 series telephones, and on the Cypress set.
Time	Provides the time of day in hours and minutes on a display telephone.
Voice call	Connects the handset of a user's telephone to the speaker of all idle ROLMphone telephones that have a predetermined extension number.
Voice dial call	Permits a caller to talk through the speaker of a ROLMphone. Users access this feature by keying in the feature access code plus the extension number of a telephone to be called. The called party need not use the handset to hear the caller but must use the handset to respond.
Volume up or down	Permits users to adjust the listening volume on the ROLMphone and the Cypress set.

Appendix E. Forms

This section contains a service call checklist. Copy this form and fill it out before requesting assistance from the next level of support.

9751 CBX SERVICE CALL CHECKLIST

Use this form to report operational problems. Please complete this form before calling in your service request.

COMPANY NAME_____ ACCOUNT NO. _____

YOUR NAME _____ DATE/TIME CALLED _____

ALARM ON? No _____ Yes _____ Steady _____ Flashing _____

TYPE OF TELEPHONE AND DESKTOP PRODUCT

STANDARD Desk ____ Flash ____ Wall ____

PAD _____ Extension _____ Location/User _____

ROLMphone 120 ____ 240 ____ 400 ____ 300 series ____ 600 series ____

ACD ____ Data ____ Other ____

PAD _____ Extension _____ Location/User _____

Data Device Cypress ____ Juniper ____ Cedar ____ 244PC ____ Other _____

PAD _____ Extension _____ Location/User _____

EQUIPMENT PROBLEMS

_____ No lights, no ring
_____ Cannot receive calls
_____ Cannot place calls (specify if certain prefixes or area codes cannot be dialed)
_____ No dial tone
_____ Cuts off calls
_____ Other _____

TRUNK PROBLEMS (Press Flash * 5 6 3 when a trunk problem occurs)

_____ Static
_____ Noise
_____ Has bad line report been used? Yes _____ No _____
_____ Other _____

SOFTWARE PROBLEMS

_____ Route optimization (certain prefixes or area codes cannot be dialed)
_____ Software feature not working
Feature _____
Description _____
_____ Other _____

SYSTEM PROBLEMS

_____ How many telephones do not have dial tone?
_____ How many telephones cannot place or receive calls?
_____ Is the 9755 Attendant Console operational? Yes _____ No _____

Glossary of Terms and Abbreviations

This glossary defines all 9751 CBX terms that are used in this manual. If you do not find the term you are looking for, refer to the Index.

A

ac. Alternating current.

ACC. Attendant console controller.

access. The ability of a system to provide a data path between a communicating host and terminal equipment.

access code. A preassigned number a user needs to get an external line or access certain 9751 CBX system features.

account code. A preassigned number a user enters during an external call to record an account identification code for call detail recording (CDR), which permits the call to be charged to a specific project, department, or client account.

ACD. Automatic call distribution.

ADC. Advanced diagnostics card.

ADCM. Asynchronous data communications module.

advanced diagnostics card (ADC). A card used to run diagnostics on telephony cards and in automatic facilities test system (AFACTS) for testing trunks.

AFACTS. Automatic facilities test system.

alias. A nickname the system uses to facilitate software operations. During certain software operations, the system requires volumes to be mounted with specific aliases. For example, the system uses the alias CNFG for the configuration volume.

Amphenol. A communication cable connector used to interconnect 25-pair wire cables.

ANA. Assigned night answer.

analog. The representation of data by continuously variable signals, such as voice or light signals. Contrast with *digital.*

analog signal. The representation of data by continuously variable signals, such as voice or light signals. Contrast with *digital signal.*

analog telephone interface (ATI) card. A card that interfaces single-line analog telephones with the 9751 CBX.

analog-to-digital conversion. Electrical conversion of analog signals to digital information.

AND. Automatic network dialing.

ANI. Automatic number identification.

answer device. A device configured to answer data calls from the 9751 CBX. This device can be a data communications module (DCM) connected to a computer or an outgoing modem.

API. Applications processing interface.

APL. Automatic program load.

ARMDCM. Asynchronous rack-mount data communications module.

ASCII. American Standard Code for Information Interchange.

assigned night answer (ANA). An extension that receives all incoming calls during off hours.

ASU. Automatic standby update.

asynchronous. A mode of data transmission, often referred to as start-stop transmission. Each character is transmitted with its own start and stop bits to inform the receiving device of the beginning and ending of a character.

asynchronous data communications module (ADCM). A stand-alone cassette that connects asynchronous work stations through the ROLMlink interface (RLI) card to remote computing resources. The ADCM supports only data communications. It is used with data devices with communication speeds from 110 bits per second (bps) to 76 800 bps.

asynchronous rack-mount data communications module (ARMDCM). A data communications module (DCM) that is rack-mounted and supports asynchronous communications.

ATC, 9755. 9755 Attendant Console.

ATI. Analog telephone interface.

attendant console controller (ACC) card. A card that interfaces the 9755 Attendant Console (9755 ATC) with the 9751 CBX. It converts signals from digital to

analog and from analog to digital during call processing.

Attendant Console, 9755 (9755 ATC). A ROLM desktop unit that primarily functions as a communications center for incoming calls, but also performs internal call handling tasks such as paging and completing outgoing calls from restricted extensions.

autodial. A feature of the 9751 CBX that permits simplified dialing of stored telephone numbers. See also *station speed calling*.

automatic call distribution (ACD). A system feature that permits a high volume of incoming calls to be distributed efficiently.

automatic camp on. A feature that permits a party to automatically camp on to a busy station by remaining off-hook. The busy tone is replaced by music, and the called party hears a call-waiting tone; when the called extension is free, the call rings through.

automatic facilities test system (AFACTS). A feature for identifying faulty tie and central office trunks. AFACTS can pinpoint individual faulty trunks and generate exception and summary reports.

automatic queuing. A feature that automatically puts a caller in a queue until a trunk becomes available so that a connection can be made.

automatic standby update (ASU). A Model 50 system feature that loads the core image (CI) and databases for all nodes onto the standby processor. It copies memory from the active side to the standby side.

AWG. American wire gauge.

B

B-channel. See *bearer channel*.

backplane. A printed circuit board that provides hardware connections for associated printed circuit cards. It provides power, grounding, control and data signals, and common connection channels (buses) to other hardware in the system.

BAT. Basic assurance test.

battery input module (BIM). A Model 40 or 50 cabinet power module used in dc systems to filter and condition −48 Vdc from the battery bank.

baud rate. A unit of transmission speed of digital signals (the digits used in the binary numbering system; can be 0 or 1).

BCS, 9750. 9750 Business Communications System.

bearer channel. The information path between two integrated services digital network (ISDN) channels. It carries voice, data, or other digitized information. Commonly referred to as the *B-channel*.

BIM. Battery input module.

bipolar with eight zero substitution (B8ZS). A T1 line coding format supported by the T1 digital network (T1DN) card.

bit. Binary digit.

bits per second (bps). The speed at which bits are transmitted over a circuit. See also *baud rate*.

bps. Bits per second.

bus. A major electrical path consisting of one conductor or multiple conductors connected in parallel.

Business Communications System, 9750 (9750 BCS). A highly efficient, computer-controlled voice and data switching system. The system includes a digital voice and data controller, devices to provide voice and data connectivity, a variety of desktop hardware and software products, and a wide range of customer support services.

busy tone. A tone heard by the caller when the called party's extension is already engaged in a call.

bypass mode. A 9751 CBX feature that automatically connects a specified extension to a trunk when the system fails.

bypass unit. A peripheral device used in communication systems to provide telephone service in the event of normal switching equipment failure. The device connects specified telephone extensions to trunks.

byte. A group of 8 adjacent binary digits that a computer processes as a unit.

B8ZS. Bipolar with eight zero substitution.

C

cabinet. System hardware that houses electronic components and printed circuit cards.

call detail recording (CDR). A system feature that identifies outgoing calls from internal stations and records data such as start time, elapsed time, digits dialed, trunk used, account codes, and date of call.

call pickup. A station feature enabling a user to answer a call directed to another telephone.

call setup. The process of placing a call, or any activity on a line, prior to the system completing a connection to another line.

call waiting. A system feature that places a call on hold for a busy extension using the park station feature. An audible tone is heard only by the called party to indicate that a call is waiting. This tone is also heard when the attendant parks a call at a busy extension. If the called party's telephone has a call waiting light-emitting diode (LED), it flickers.

call-answering device. A device configured to answer data calls from the 9751 CBX. The device can be a data communications module (DCM) connected to a terminal, computer, or modem.

call-originating device. A data device that places data calls to the 9751 CBX. This device can be a data communications module (DCM) connected to a terminal or an incoming modem, a Cypress terminal, or a ROLMphone 244PC.

callback queuing. A system option that permits outgoing calls to queue when trunk groups are busy; when a nonbusy trunk is available, the user's telephone rings, and the user can place the call.

camp on. A station feature that permits a caller to queue on a busy internal extension.

capacitor assembly. Used in Model 40 or 50 ac systems to filter dc current from the rectifier assembly.

card. A printed circuit board with electronic components soldered in place and with circuit traces along its edges for making connections to other circuits; same as printed circuit board and printed circuit assembly.

card ID. In system integrity software, a verification that the card physically installed in the slot is the same as the card configured in the hardware map.

CAS. Centralized attendant service.

cathode ray tube (CRT). A device that presents data in visual form by means of controlled electronic beams.

CBX, 9751. 9751 computerized branch exchange.

CBX monitor, 9751. A data collecting and reporting device that monitors the 9751 CBX error table, provides on-site access to the 9751 CBX through the maintenance terminal, and provides remote access to command line interpreter (CLI).

CCC. Computer common control.

CD. Carrier detect.

CDLM. Cedar load module.

CDR. Call detail recording.

Cedar load module (CDLM). A device that contains the software for the Cedar terminal. It connects to the 9751 CBX and can service up to 50 Cedar units.

Cedar personal communications computer. An integrated telephone and ROLM computer terminal that permits simultaneous voice and data transmission. The Cedar computer has file transfer capabilities and has the ability to back up user's personal data onto diskette and personal communications software.

central office (CO). A switching system that connects lines to lines, lines to trunks, and trunks to trunks; sometimes refers to a telephone company building in which a switching system is located; may include other equipment (such as transmission system terminals) located in the building. A class 5 office serves as a network entry point for customers who call a local or end-office switch; a class 4 office has tandem trunking capability.

central office trunk 8-channel (COT8) card. A card that converts voice signals received by the 9751 CBX from analog to digital and converts voice signals transmitted by the 9751 CBX from digital to analog.

central processing unit (CPU). See *processor*.

centralized attendant service (CAS). A multinetworking feature designed for organizations that have several facilities, located in various geographical areas, each with its own switching system. A CAS center permits such a network to group its attendants in one centrally located attendant group.

centrex. Central office telephone equipment serving subscribers at one location on a private automatic branch exchange basis. The system permits such services as direct inward dialing, direct distance dialing, and console switchboards.

channel. (1) The smallest subdivision of a carrier system by which a single type of communication service is provided; for example, a voice channel, teletypewriter channel, or data channel. (2) A path for electrical transmission between two or more points. Same as *circuit*, facility, line, link, or path.

channel service unit (CSU). A type of T1 line-terminating equipment that is provided by the customer.

CI. Core image.

circuit. A configuration of electrically connected components on devices used for the transmission of electrical energy when furnishing telecommunications service; in battery circuits and generator circuits,

each pair of wires, or fraction thereof, is a separate channel.

class of service (COS). A numerical index (0 through 63) assigned to each 9751 CBX extension that determines the features and trunk access available for the user.

clear to send (CTS). A signal sent by a modem to a terminal to indicate that conditions are clear for the terminal to send data.

CLI. Command line interpreter.

CLM. Cypress load module.

clock synchronization module (CSM). A card that generates periodic signals used for synchronization.

CNFG. Configuration.

CO. Central office.

codec card. A card that converts signals from analog to digital and from digital to analog for some station and trunk groups.

collision. A condition in which two separate actions requiring the same resource are invoked at the same time.

com group. Communication group.

command line interpreter (CLI). A set of commands used to test the 9751 CBX, gather statistical information, and perform moves, adds, and changes.

communication (com) group. A department or work group whose members can call each other by dialing a 1-digit number and a 2- or 3-digit code, rather than a full extension number.

communication channel. A 2-way path for the transmission of voice and/or data signals.

communications (com) line service. A system feature that permits members of a defined group to call each other using 2- or 3-digit codes, causing a distinctive ringing to occur; available on single-line telephones and ROLMphone telephones.

computer common control (CCC) group. A group of cards that provides supervisory and control functions for the 9751 CBX.

computerized branch exchange (CBX), 9751. A computerized switching system providing telephone communications between internal stations, and between internal stations and external telephone networks.

conference bridge card. A card that permits users to have conference calls.

conference call. A call in which more than two parties can talk. The limit is eight parties, two of whom can be remote extensions or on outside lines.

configuration (CNFG). (1) A specific hardware and software arrangement that determines a system's functional characteristics and operation. (2) The command line interpreter (CLI) command used to enter the configuration mode in the 9751 CBX. (3) The software volume that contains the databases with customer-specific information.

configure. (1) To determine and assign an equipment cabinet's contents and the location of each card, class of service (COS), and other software parameters unique to a particular system. (2) A method of data entry that uses screens for input. Field entries can be decimal numbers, words, or alphanumeric names.

connect. To join a call that has been on hold, camped on, or queued; invoked by an access code.

connection. A path between terminations that permits the transmission of speech and supervisory signals.

connection table. An electronic array of registers in the time-division multiplexing (TDM) network control section of a 9751 CBX that establishes a connection between calling and called parties.

control channel. The path that handles signaling and call control information between integrated services digital network (ISDN) terminal equipment, private branch exchanges (PBXs), and the ISDN. One control channel carries signaling for many B-channels at a speed of 64 Kbps. Commonly referred to as the *D-channel*.

control of station feature (CSF). A system feature that assigns a class of service (COS) to permit one station to control another.

control packet network (CPN). A local area network that links the 9751 CBX CPUs and provides interhost control communications.

control packet network (CPN) exception table. In the Model 40 or 50, a table that logs all CPN problems. The table lists the error and status information for each CPN card for the 16 most recent scans since the table last cleared.

control packet network interface (CPNI) card. A Model 40 or 50 card that provides the interface between the processor and the control packet network (CPN). There is one CPNI card per processor. Each CPNI card has two network interfaces (network 1 and 2).

control packet network interface (CPNI) paddleboard. There is one CPNI paddleboard per CPNI card in the Model 40 or 50 system. Each CPNI paddleboard

provides twinaxial connectors for network 1 and network 2 connections. Network 1 is connected to one control packet network junction (CPNJ) motherboard and network 2 is connected to another CPNJ motherboard. The CPNI paddleboard contains switch settings for the node number and the number of nodes in the system.

control packet network junction (CPNJ) card. In the Model 40 or 50, a card that provides the control and drivers for the control packet network (CPN).

control packet network junction (CPNJ) motherboard. In the Model 40 or 50, a motherboard that provides nine ports by way of twinaxial cable connectors. These ports can connect to the control packet network interface (CPNI) card or to another CPNJ motherboard.

core image (CI). A volume stored on the hard disk on every 9751 CBX that is the basic operating system software.

CorNet. A Siemens term for Corporate Network.

CorNet-N. The integrated services digital network (ISDN) layer-3 protocol used on integrated services digital network private branch exchange (ISPBX)-to-ISPBX connections. This protocol is based on the CCITT Q.931 basic call procedures and is extended to include proprietary supplementary services.

COS. Class of service.

COT8. Central office trunk 8-channel.

CPN. Control packet network.

CPNI. Control packet network interface.

CPNJ. Control packet network junction.

CPU. Central processing unit.

CRT. Cathode-ray tube.

CSF. Control of station feature.

CSM. Clock synchronization module.

CSU. Channel service unit.

CTS. Clear to send.

Cypress load module (CLM). A data device that stores the program code for Cypress terminals. Cypress terminals automatically call a CLM when they are first turned on or when they lose power for more than 5 minutes. The CLM stores and transfers the program to the Cypress memory for day-to-day operation. One CLM can support up to 50 terminals.

Cypress personal communications terminal. A work station that combines the information retrieval capabilities of an intelligent terminal with the flexibility of a sophisticated digital telephone that is used for simultaneous voice and data calls.

D

D-channel. See *control channel*.

data. Information that can be captured in a coded representation suitable for communication, interpretation, or processing.

data link layer. In networking, the layer that converts an unreliable transmission channel into a reliable one. Commonly referred to as *layer 2*.

database. An electronic depository of data records.

data call. The transmission of data between two digital resources, such as a terminal and a computer, through a switched network.

data circuit-terminating equipment (DCE). The devices and connections of a communications network that connect the communications circuit with the end device (*data terminating equipment*).

data communications. The transfer of information between two locations over a data line.

data communications feature (DCF). (1) A set of software commands used to monitor the data communications system. (2) A feature that integrates voice and data switching. It provides terminal-to-terminal, terminal-to-computer, and computer-to-computer data communications.

data communications module (DCM). A digital data interface module that is built into the base of a ROLMphone telephone, is a stand-alone device or is installed in a rack-mount card cage. A DCM connects a keyboard data device, modem, or computer to the 9751 CBX. See also *ADCM, ARMDCM,* and *RMDCM*.

data communications option (DCO). A module that is installed at the bottom of a ROLMphone 600 series telephone. It gives the ROLMphone data communications capabilities.

data device. One of the three basic machines used in data communications: a terminal, computer, and/or modem.

data format. Character, line, or block-formatted data.

data front end (DFE) II card. A front-end processor that provides fast interactive call setup between the user terminal and the online data communication feature (DCF) software.

data group. A collection of data lines with similar characteristics, put together and assigned a 16-character data group name.

data group name. A 1- to 16-alphanumeric character name assigned to each data group, used to access any member of that group.

data group number. A 3-digit number assigned to a data group by the system customization.

data line. The connection between a data device (computer, terminal, or modem) and the 9751 CBX.

data rate. The speed at which bits are transmitted, usually expressed as *bits per second* or *baud*.

data terminating equipment (DTE). That part of a data station that serves as a data source, data destination, or both, and provides for the data communications control function according to protocols.

DCE. Data circuit-terminating equipment.

DCF. Data communications feature.

DCM. Data communications module.

DCO. Data communications option.

decibel (dB). In trunk testing, the standard unit for expressing transmission gain or loss and relative power ratios.

decode. To convert data by reversing the effect of previous encoding (see *encode*).

DED. Dedicated.

dedicated (DED) trunk. A trunk that rings directly through to any internal station, hunt group, or distribution group.

DFE. Data front end.

DIAG. Diagnostic.

diagnostic program. Software used to determine the source of faults in the common control or elsewhere in the system; not a part of system software.

dialed number identification service (DNIS). A system feature that provides the capability to identify the nature of a received call. DNIS enables the 9751 CBX to receive digits from the network and match them to the configured DNIS table entries for routing.

DID. Direct inward dialing.

DID8. Direct inward dialing 8-channel.

digital. The representation of data by discrete values as binary digits (in contrast to analog, which is continuous).

digital multimeter. A meter used to measure voltage, current, and resistance.

digital signal. A signal that has a limited number of discrete states before transmission; contrasted with an analog signal, which varies continuously and has an infinite number of states.

digital-to-analog conversion. The electronic conversion of digital information to analog signals.

DIP. Dual in-line package.

direct distance dialing. Permits long-distance calls to be made from a telephone without the need for operator assistance.

direct inward dialing (DID). A system feature that permits an incoming call from the public telephone network to reach specific extensions within a customer's premises without attendant assistance; usually includes vacant number intercept to the attendant.

direct inward system access (DISA). A service that permits a person to call the 9751 CBX from any off-system location that has a dual-tone multifrequency (DTMF) keypad and uses system features and capabilities.

direct outward dialing (DOD). A class of service (COS) feature that permits a caller to call outside numbers without going through an attendant.

direct trunk select (DTS). A system feature that permits service personnel to test specific trunks for operational problems.

DISA. Direct inward system access.

diskette drive unit. A peripheral device that loads the program from diskette to memory. In the Model 10, the diskette drive is part of the dual drive assembly.

distribution group. A group made up of stations arranged to share the call load; each group is assigned a dummy extension number called a pilot number.

district. See *interface district*.

DND. Do not disturb.

DNIS. Dialed number identification service.

do not disturb (DND). A system feature that permits users to make their extensions appear busy to incoming calls, except within a com group.

DOD. Direct outward dialing.

DSR. Data set ready.

DTE. Data terminating equipment.

DTMF. Dual-tone multifrequency.

DTR. Data terminal ready.

DTS. Direct trunk select.

dual drive adapter card. A Model 10 card that is behind the diskette drive and the hard disk drive units in shelf 1. It has a connector to the hard disk drive, through which the hard disk drive receives power.

dual drive assembly. A Model 10 field replaceable unit (FRU) that consists of the diskette drive, the hard disk drive, and the dual drive adapter card.

dual-tone multifrequency (DTMF). A method of sending numerical information using specific pairs of voice frequencies, one from a group of 4 low frequencies, the other from a group of high frequencies, to show the 10 digits and 4 precedences.

dual-tone receiver card. A card that receives digitized dual-tone multifrequency (DTMF) tones and converts them into digital words suitable for computer processing.

duplex. A method of transmission in which both stations can receive and transmit simultaneously.

dynamic table. A location in memory containing information that can be changed or moved.

E

E & M. Ear and mouth.

ear and mouth (E & M) lead signaling. An arrangement in which communication between a trunk circuit and a separate signaling unit is accomplished over two leads: an M-lead, which transmits battery or ground signals to the signaling equipment, and an E-lead, which receives open or ground signals from the signaling unit.

ECC. Error-correcting code.

electromagnetic interference (EMI). Interference caused by large generators, elevators, and other equipment that degrades 9751 CBX system performance.

electrostatic discharge (ESD). Static that can damage components in the 9751 CBX.

emergency power-off (EPO) switch. A switch that is used in an emergency to turn off all power to every cabinet in the 9751 CBX. Some Model 10 systems do not have EPO switches.

EMI. Electromagnetic interference.

EML. Expected measured loss.

encode. To convert data by use of a code or coded characters so that the data can be converted back to its original state; the opposite of *decode*.

EPO. Emergency power-off.

equipment cabinet. A hardware unit of a 9751 CBX system.

ERRH. Hardware error table.

error analysis. In system integrity software, the process that isolates the source of hardware failures and suggests corrective actions.

error-correcting code (ECC). A feature that appends derived or calculated bits to each word stored in memory and uses them to detect and correct errors when memory is read.

ESD. Electrostatic discharge.

ESF. Extended superframe.

ETN. Electronic tandem network.

executive override. A station feature that permits the user to interrupt a call in progress on the called extension.

expander card. A Model 40 or 50 card that interfaces the ISB with the TDM shelf cards.

extension. (1) A unique number assigned to a telephone station that is connected to a channel in the 9751 CBX. (2) An arbitrary number of 1 to 7 digits that matches a station to a particular user; same as *station number*.

F

FAC. Forced authorization code.

faceplate. A cover that fits around the pushbuttons or dial of a telephone.

failing resource management. The part of system integrity software that takes failing equipment out of service and restores it to service after it passes self-test.

fan assembly. The fans and fan detector card that draw fresh air in through the top of the 9751 CBX cabinet and push it through the card cage to keep the cards cool.

FCC. Federal Communications Commission.

feature access code. The keypad dialing sequence entered by a user to access a feature.

Federal Communications Commission (FCC). A federal agency that regulates all electrical communications systems originating in the United States.

FEP. Front-end processor.

field replaceable unit (FRU). A unit that is replaced by the service personnel in its entirety when any one of its components fails.

filter. A device used to suppress unwanted frequencies or noise or to separate data, signals, or material in accordance with specific criteria.

FINIT. Full initialization.

flashing. Pressing and releasing the plunger (off-hook to on-hook to off-hook) on a handset cradle. It is used to signal the 9751 CBX that an access code is to follow; may also be performed using an operator recall button on a key telephone or a FLASH button on a ROLMphone.

forced authorization code (FAC). A software feature that requires a user to enter a code before placing a long distance call.

foreign exchange (FX) service. A service that permits a user to access a remote commercial telephone exchange area without incurring a toll charge for each call.

forwarding. A system feature that redirects an incoming call to another extension or, with the correct software, to an off-site telephone.

front-end processor. The part of software that reports status information to the applications processor software.

FRU. Field replaceable unit.

full initialization (FINIT). A process that causes the databases in memory to load with data from the configuration volume on the hard disk.

FX. Foreign exchange.

G

glare. Synonym for *call collision*.

H

hard disk drive unit. A sealed storage unit used for storing large amounts of data. In the Model 10, the hard disk drive is part of the dual drive assembly.

hardware. The physical equipment used in data processing, as opposed to computer programs, procedures, rules, and associated documentation (*software*).

hardware error table (ERRH). A table in software where hardware failures are reported.

hardware status bus (HSB). A Model 40 or 50 ribbon cable that transmits power and cooling information from the local shelf monitor (LSM) card to the system monitor input/output card (SMIOC).

HAT. Host address table.

HDB. Host database.

headset/recorder option (HRO). A modular headset/recording interface that is used with a ROLMphone 600 series telephone. It has both RJ11 and PJ327 jacks.

hertz (Hz). In trunk testing, the frequency of a signal in cycles per second.

hold. The status of a line when it is in use, but in a waiting state.

holding time. The length of time for which a particular call occupies a communication channel.

host. In the Model 40 or 50, each processor is a host in the control packet network.

host address table (HAT). In the Model 40 or 50, the static control packet network (CPN) table created in configuration that maps the host address to the network address.

host database (HDB). In the Model 40 or 50, the dynamic control packet network (CPN) table that contains the status information about hosts.

howler tone. An alternating or pulsating tone of mixed frequencies.

HRO. Headset/recorder option.

HSB. Hardware status bus.

hunt group. A group made up of stations, assigned to and accessed by a dummy extension number known as a pilot number.

hunt, station. A feature that routes incoming calls to the first idle station in a preselected group (hunt

group); selection is made by initially attempting to route calls to the first member of the group.

Hz. Hertz.

I

I/O. Input/output.

ICS. Interactive call setup.

incoming modem. A modem used to originate data calls into the 9751 CBX. An incoming modem receives data calls from an outside resource and transmits to the 9751 CBX.

incoming modem pool. A group of modems that remote (off-site) users share to access data resources within the 9751 CBX.

initial program load (IPLOAD). The process of loading the initial software program.

input/output (I/O). A type of device by which data is entered or received from a computer.

input/output (I/O) filter panel. A frame with cutouts that is bolted to the cabinet back. It reduces electromagnetic interference (EMI) to the outside environment to meet Federal Communications Commission (FCC) requirements.

integrated circuit (IC). A combination of interconnected circuits inseparably associated on or within a continuous substrate.

integrated services digital network (ISDN) primary digital network (IPDN) card. A card that permits a 9751 CBX to access local and long-distance ISDNs.

integrated services digital network private branch exchange (ISPBX). A 9751 CBX or 9200 CBX that uses a CorNet-N link to connect to another 9751 CBX or 9200 CBX.

intelligent modem. A modem that contains a microprocessor and can perform additional call processing functions, such as *autodial*.

interactive call setup (ICS). An interface between the user and the 9751 CBX that provides prompts and error messages for setting up data calls, and for displaying or changing data line parameters.

intercom blocking. A system feature by which stations with a particular class of service (COS) are blocked from calling stations with the same or any other specified COS.

interface. The specifications of a connection between two systems or pieces of equipment, including type and function of interconnecting circuits and type and form of signals to be interchanged over those circuits.

interface district. A group of station of trunk cards that link the 9751 CBX to external station equipment or trunk facilities.

intershelf bus (ISB). (1) In the Model 10, a path between the time-division multiplexing controller (TCL) card and the time-division multiplexing expander (TXP) cards. (2) In the Model 40, a path between the time-division multiplexing controller (TC) and turnaround standalone (TASA) card, or the combined time-division multiplexing controller turnaround standalone (TCTASA) card, and the expander cards. (3) In the Model 50, a path between the TCTASA card and expander cards.

IPDN. Integrated services digital network (ISDN) primary digital network.

IPL. Initial program load.

IPLOAD. Initial program load.

ISB. Intershelf bus.

ISDN. Integrated services digital network.

ISPBX. Integrated services digital network private branch exchange.

J

jack. A receptacle used to connect a cord, a plug, an earphone, or a speaker.

jumper. A wire or plastic plug used to connect two pins of a plug, card, or board.

jumper plug. A connector used to connect adjacent pins.

jumper wire. Cross-connect wires used on a main or intermediate distribution frame speaker to connect quick-connect block terminals.

Juniper personal communications complement. A personal communications option that integrates the ROLM personal communications software and digital telephone technology with an IBM personal computer (PC) or PC XT. It consists of an adapter card for the IBM PC, a modified ROLMphone 240, a cable, and personal communications software supplied on a diskette.

K

kbps. Kilobits per second.

KEO. Keyboard expansion option.

key telephone. A telephone that provides access to multiple telephone lines by push-buttons, having more

than one extension button and using up to as many buttons as extensions appearing on the telephone.

key telephone adapter (KTA). A multiplexing unit of the 9751 CBX that interfaces a key telephone to a 3-pair cable.

keyboard expansion option (KEO). A modular device that attaches to ROLMphone 600 series telephones. It provides 20 additional function keys and LEDs.

kilobits per second (kbps). One thousand bits per second; used in specifying the modulation rate of a digital transmission system.

KTA. Key telephone adapter.

L

layer 1. See *physical layer*.

layer 2. See *data link layer*.

layer 3. See *network layer*.

LCD. Liquid crystal display.

LCM. Line conditioning module.

LCR. Least-cost routing.

LDU. Logical disk unit.

LED. Light-emitting diode.

light-emitting diode (LED). A solid-state device that lights under certain electrical conditions; generally used as an indicator lamp.

line conditioning module (LCM). A Model 40 or 50 cabinet power module used in ac systems to convert 208 Vac and 240&rblV;.edf#fine;ac to −48 Vdc.

lineman's test set. A piece of test equipment used by a telephone or telecommunication technician to troubleshoot communication lines and equipment. The test set is a portable, durable telephone that can produce dual-tone multifrequency (DTMF) and rotary signals to place calls, monitor traffic over a communication line, and check for the correct polarity or electrical conditions of a line or trunk.

link access procedure D-channel (LAPD). A protocol that uses the D-channel to convey information between layer-3 entities across the ISDN user-network interface.

loadware. Code that is stored on hard disk and downloaded to the ROLM private digital network (RPDN) card at initialization.

local extension. In a system with a CorNet-N link, an extension defined and residing in the local 9751 CBX. Contrast with *remote extension*.

local shelf monitor (LSM) card. A Model 40 or 50 card that detects and reports power and temperature conditions on TDM shelves.

logic circuit. A type of switching circuit such as AND, OR, or NAND; gates that can perform various logic operations or represent logic functions.

logical disk unit (LDU). A unit of measurement that defines the number of blocks of data contained in one 3.5-inch diskette. All volumes on the 9751 CBX that are measured are measured and defined in terms of LDUs. One LDU contains 608 blocks of data. Up to 4 LDUs can be contained on one 3.5-inch diskette.

loop-start. A trunk signaling method used to establish an electrical connection between a private branch exchange (PBX) and the telephone company's switching equipment. The PBX closes the trunk loop (tip and ring) to signal the telephone company for service. The telephone company in turn sends dial tone over the trunk, which signals the PBX to send digits.

loopback test. A method of testing an idle data line in which a predetermined set of characters is sent between two data devices and looped back for comparison.

loss. In trunk testing, the dissipation of energy that naturally occurs because of the electrical characteristics of transmission facilities and equipment.

LPC. Link protocol converter.

LSM. Local shelf monitor.

M

MAC. Moves, adds, and changes.

magnetics. Two transformers in the LCM.

main distribution frame (MDF). Wall-mounted quick-connect blocks that serve as an interface and trouble point for telephone switching equipment, external trunks, intermediate distribution frames, auxiliary equipment, station equipment, and accessory devices.

maintenance analysis procedure (MAP). A method of troubleshooting 9751 CBX or peripheral equipment problems. There are two types of MAPs: soft-copy MAPs and hard-copy MAPs.

maintenance terminal. A terminal used during local or remote maintenance and moves, adds, and changes operations.

MAP. Maintenance analysis procedure.

MB. Megabyte.

MDF. Main distribution frame.

memory card. A Model 10 card that provides 12 megabytes of random access memory for the 9751 CBX system software and databases.

memory controller card. A Model 10 card that acts as an interface between the memory card and processor card. It detects parity errors, corrects single-bit errors, and provides memory address protection.

memory retention battery. A sealed lead-acid type, 12 Vdc unit that provides backup power to the memory card of the Model 10, or the +5P shelf power module in the Models 40 and 50, during a power outage.

message waiting. A Model 40 or 50 card that interfaces 16 analog single-line telephones with message waiting lamps with the 9751 CBX.

message waiting 8-channel (MW8) card. A card that lights the lamp on an analog telephone to indicate that a message is waiting. Unlike the message waiting card, it has its own rotary register and codec cards, and it can be used in Model 10 systems.

millisecond (ms). One thousandth of a second.

milliwatt (mW). One thousandth of a watt; the basic unit of power measurement in telephone circuits.

modem. A device that permits remote access to a system for maintenance procedures and moves, adds, and changes by providing a means of transmitting and receiving digital data over a voice network.

module. An equipment unit that can be combined with other related units to form a larger unit.

module is okay (MOK). An LED that indicates the shelf power module correctly operates.

MOK. Module is okay.

motherboard. A circuit board into which other functional cards connect. It provides power, grounding, control and data signals, and common connection channels (buses) to other hardware in the system.

moves, adds, and changes (MAC). Commands entered into the 9751 CBX to make changes in the configuration software; for example, changes to extension numbers, locations, and so forth.

ms. Millisecond.

MTS. Mobile telephone service.

music on camp on. A system feature that provides access to audio equipment when a party is camped on to an extension by the attendant.

music on hold. A system feature that provides access to audio equipment when a party is holding for an extension.

music-on-hold interface box. A device that is mounted near the MDF that is used to connect a customer-supplied music source to the 9751 CBX.

mute. The state of a station when the audio receiver is active and the station microphone or headset is inactive.

mW. Milliwatt.

MW8. Message waiting 8-channel.

N

NCOS. Network class of service.

network. A set of nodes and links that provide connections between two or more defined points to facilitate communication between them.

network layer. In networking, the layer that routes data through a communications network. Commonly referred to as *layer 3*.

network node. A 9751 CBX or 9200 CBX that uses CorNet-N links to connects to another node. Nodes serve as originating, terminating, tandem, gateway, or transit points in the CorNet-N network.

night chime. An auxiliary ringer, usually wall-mounted, that shows a ringing trunk during night operations or is used as a phantom extension for overflow (forwarding, busy, and do-not-answer) applications.

night service. A feature for answering incoming calls when the 9755 Attendant Console (9755 ATC) is unattended.

no account code (NAC). A class of service (COS) feature that permits a call to be placed without entering an authorization code, although the system has the forced authorization code (FAC) feature.

node. One independent portion of a 9751 CBX. A node includes up to five cabinets.

nonintelligent modem. A modem that performs no additional call-processing functions.

NSD/NSS. National Service Division/National Service System.

NSS/ROPS. National Service System/ROLM Operating System.

O

off-hook. The condition indicating a closed electrical current loop or the active state of a line (data or voice).

off-premises station (OPS). Station equipment not located on customer premises where the switching equipment is located. These stations or extensions are located more than 2.2 miles from the switching equipment.

offline. A state when a functional unit, such as peripheral equipment, is not under direct control of a processor.

online. The state when a functional unit, such as a terminal, is under direct, continuous control of a processor.

operating system program. A program that perform supervisory functions and controlling operations such as resource allocation, scheduling, input/output (I/O) control, and data management; usually loaded as software, but may reside in hardware.

OPS. Off-premise station.

OPS8. Off-premises station 8-channel.

optional features. Nonstandard features of a ROLM product that are software-configured, sometimes requiring additional hardware.

outgoing call. Any call initiated over an external line by a station user or system operator.

outgoing modem. A modem used to answer data calls from within the 9751 CBX. A data call exits the 9751 CBX through an outgoing modem.

outpulsing. Sending direct current or tone pulses out on a circuit.

P

P connector. Plug connector.

packet. A message consisting of a set of data bytes that identifies who the sender is, who the receiver is, the route the message should take to get to the destination, how to process the message, and the message text itself.

PAD. Physical address.

pair. Two conductors of electric current.

panel. A set of data entry fields.

parameter. A software instruction that specifies system timing, counters, thresholds, maximum values, or feature availability.

park. A user feature that permits a caller to queue on hold at another extension.

patch volume. A software volume that contains software fixes and enhancements.

PBX. Private branch exchange.

PC. Personal computer.

PCM. Pulse code modulation.

PDC. Peripheral device controller.

PDCE. Peripheral device controller, enhanced.

PDCN. Peripheral device controller, new.

PEA. Power entry assembly.

peripheral device. A hard disk or diskette drive assembly controlled by the peripheral device controller (PDC) card. Contrast with *peripheral equipment*.

peripheral device controller (PDC) card. A card that provides the interface between the processor and the hard and diskette drive units in the 9751 CBX operating system.

peripheral equipment. External equipment such as single-line telephones, ROLMphone telephones, 9755 ATCs, printers, magnetic tape recorders, and maintenance terminals that interface with the 9751 CBX. Contrast with *peripheral device*.

personal communications software. A program that provides desktop products automatic logon to host computers or databases, dynamic operation (permits one soft key to hold several features), a personal telephone list, a reminder file, a call-me display, a calculator, and a security lock.

personal computer (PC). A desktop, floor-standing, or portable microcomputer that usually consists of a system unit, a display monitor, a keyboard, one or more diskette drives, internal fixed-disk storage, and an operational printer.

PhoneSpell. A feature that lets a user place an internal call to a PhoneMail subscriber without knowing the called party's extension.

physical address (PAD). The location of a card, according to shelf, slot, and channel number, expressed in 8 digits.

physical layer. In networking, the layer that handles the electrical, mechanical, and timing aspects of

signal transmission over a medium. Commonly referred to as *layer 1*.

pick group. A station feature that permits members of a group to answer calls directed to any other extension of that group.

pickup. A station feature that permits the user to answer any ringing telephone in the same work group (group pickup) or any telephone in the facility (direct call pickup).

pilot number. An extension number that appears only in software (not assigned to a physical channel) that is used to access a group of telephones. Pilot numbers are used for hunt, distribution, automatic call distribution (ACD), control, and security groups.

PL. Private line.

PMS. Property management system.

pod. A section of a Model 40 or 50 cabinet that includes two shelves, one set of fans, and shelf power modules.

political timer battery. A battery that supplies power for the circuitry in the 9030A CPU card that provides the current date and time.

port. A connection or interface point on a computer or other data device.

power bus bar. A bus bar that runs horizontally along the backside of the backplane, used to distribute −48 Vdc power to the 9751 CBX.

power entry assembly (PEA). (1) The main power entry point to the Model 10. (2) A subcomponent of the LCM that is the main power entry point to a Model 40 or 50 cabinet.

power supply. A piece of equipment that converts ac power to the voltages necessary to power the memory retention batteries, disk drive assembly, fans, and the cards on each shelf. The power supply also provides the umbilical connector for removing and replacing cards.

privacy (or private call). A user feature preventing camp-on tones, barge-in tones, and other interruptions during a call.

private branch exchange (PBX). A switching system providing telephone communications between internal stations, and between internal stations and external networks; generally refers to manually operated switching equipment as opposed to computer-operated switching, such as that in the 9751 CBX.

processor. A functional unit that performs all the data manipulation and control functions of the processor card, memory controller card, and memory card. It also controls the external input/output (I/O) devices such as the command line interpreter (CLI) terminal and the diskette and hard disk controllers.

program. A coded set of instructions that controls the operations of a computer; usually refers to instructions used in controlling the 9751 CBX networking and switching systems.

protocol. Defines the rules for electrical, physical, and functional characteristics of the data link. Contains the control procedures required to facilitate data transfer across the link interfaces and to and from the user's application programs.

pulse code modulation (PCM). One method of converting an analog signal to a digital code for transmission between points.

Q

queue. A series of calls waiting for a computer port, a modem, or data group access.

R

rack-mount air baffle. A plenum that provides fresh air to the rack-mount card cage and diverts heated air from any equipment that is mounted below it.

rack-mount card cage. A metal cage that provides mounting spaces for ADCMs, RMDCMs, and ARMDCMs. By providing space for concentrated amounts of rack-mount DCMs, the rack-mount card cage permits for connection to multiple modems and computer ports.

rack-mount data communications module (RMDCM). A DCM that is located only in a rack-mount card cage and connects to an external data device. It provides asynchronous and synchronous data transmission. It connects to a computer port by an EIA/TIA-232-E cable or to a modem by a modem interface cable.

rack-mount fan assembly. An assembly of fans mounted just below the bottom card cage that facilitates cooling by forcing fresh air up through the cages.

rack-mount modem plug adapter. Provides an interface to modems that use a modular telephone connector for tip (T) and ring (R) wire and mode indication/mode indication common (MI/MIC) leads.

RAM. Random access memory.

random access memory (RAM). A type of computer memory organization in which each location can be accessed directly, rather than sequentially; access time is independent of the location.

RCSC. ROLM Customer Support Center.

read-only memory (ROM). A type of computer storage that cannot be altered in normal use. Usually a small memory that contains often-used instructions such as microprograms or system software.

recorded intercept. A procedure that permits calls to nonexistent extensions, downed extensions, and class-of-service violations to be routed to a recorded announcement device telling the caller that the call cannot be completed.

rectifier assembly. A subcomponent of the Model 40 or 50 line conditioning module (LCM) that converts ac power to dc power.

reduced feature mode. A condition caused by certain malfunctions of the 9751 CBX. When a ROLMphone is in reduced feature mode, users can still make and receive calls, but other features are limited or unavailable.

redundancy. The use of backup equipment to provide service during power outages or equipment malfunctions.

register. A binary word repository or device for temporary storage of binary words in control units.

remote extension. In a system with a CorNet-N link, an extension defined in the local 9751 CBX and residing in a remote integrated services digital network private branch exchange (ISPBX). Contrast with *local extension*.

remote private branch exchange (PBX). A 9751 CBX or ISPBX that connects to the local 9751 CBX through a CorNet-N trunk or through CorNet-N trunks and transit nodes.

REN. Ringer equivalence number.

reset. To restore a processing or storage device to a prescribed state that is opposite to the set state.

RFAC. Restricted forced authorization code.

ribbon cable. A flat cable made of normal round insulated wires arranged side-by-side and fastened together by a cohesion process to form a flexible ribbon.

ring. (1) One of the two conductors (tip and ring) of a communications line or trunk, designated as R. (2) An audible signal to a telephone user. (3) In the Model 40 or 50, a set of hosts that are connected together. One token is shared among this group. See also *token*.

ring-no-answer. A forwarding condition where a telephone is forwarded to another number if it is not answered within a specified number of rings or amount of time.

ringback tone. A tone heard by the calling party to indicate that the called party is being rung.

ringdown modem. (1) An outgoing modem that always rings down to a specific number. (2) A trunk that is configured to ring a specific number.

RLI. ROLMlink interface.

RNA. Ring no answer.

ROLM private digital network (RPDN) card. A Model 40 or 50 card that permits a 9751 CBX to use a CorNet-N link to connect to another 9751 CBX or 9200 CBX. It converts ISDN D-channel protocol to CPN protocol.

ROLMlink. A digital serial communications pathway between ROLM desktop products and the 9751 CBX. ROLMlink carries voice, data, power, and control information simultaneously over a single twisted-pair of telephone wires, at a rate of 256 kilobits per second (kbps).

ROLMlink interface (RLI) card. A card that provides the 9751 CBX interface with ROLMlink devices such as ROLMphone telephones or rack-mount data communications modules (RMDCMs).

ROLMnet. A private switch service network (usually a large nationwide company) providing direct station-to-station inward and outward dialing, along with other features normally found in the public telephone network; the ability to connect to such private networks over trunk circuits.

ROLMphone. A digital telephone with multiple line and feature buttons that provides maximum flexibility for a variety of applications.

ROLMphone with DCM. A ROLMphone 120, 240, or 400 with a printed circuit assembly installed at the base. A ribbon cable connects the data communications module (DCM) to the digital telephone integrated circuit on the main circuit card of the ROLMphone. This connection permits the telephone to be used for both voice and data communications simultaneously.

ROLMphone with DCO. A ROLMphone 612 or 624 telephone with a data communications option (DCO) installed at the bottom of the set. Depending on how it is configured, it can combine the station features of the ROLMphone 240 and 400 with the data communications features of the ROLMphone 244PC. An EIA/TIA-232-E cable connects the ROLMphone with DCO to an asynchronous communications port in a personal computer.

ROLMphone 120. A single-line telephone with 10 configurable feature buttons, of which one may be a line key. Available with or without a data communications module (DCM).

ROLMphone 240. A multiline telephone with 22 configurable feature buttons (of which 11 may be line keys) and an integral speakerphone. Available as voice-only or with either an optional data communications module (DCM) or headset.

ROLMphone 240E. A ROLMphone 240 with a liquid crystal display (LCD).

ROLMphone 240H. A ROLMphone 240 with a headset.

ROLMphone 244PC. A digital voice and data communications device designed to work with any IBM personal computer or with any other personal computer (PC) that is 100% IBM PC-compatible.

ROLMphone 312. A single-line telephone with 12 function keys and ten LEDs. It provides basic telephone features equivalent to the ROLMphone 120.

ROLMphone 400. A multinumber telephone with 38 configurable feature buttons (of which 29 may be line keys), an integral speakerphone, and a liquid crystal display (LCD). Available as voice-only or with an optional data communications module (DCM) or headset.

ROLMphone 400H. A ROLMphone 400 with a headset.

ROLMphone 600 series. A line of ROLMphone telephones with many factory- and user-installed options, including liquid crystal display (LCD), keyboard expansion option (KEO), headset/recorder option (HRO), and data communications option (DCO).

ROLMphone 612. A multiline telephone with 12 function keys and ten LEDs. It supports up to ten lines without a KEO.

ROLMphone 624. A multiline telephone with 24 function keys and 22 LEDs. It supports up to 11 lines without a KEO.

ROM. Read-only memory.

rotary. A type of telephone signaling that uses pulses of current to represent digits 0 through 9.

rotary register card. A card that converts dial pulses from rotary telephones and rotary trunks into digital words suitable for computer processing.

rotary sender card. A card that receives digital code words from the computer and converts them into rotary pulses for trunk outpulsing.

route advance. A system feature that permits a call attempt to use one of three predetermined overflow groups when a trunk access code has been dialed and all trunks in a group are busy; the groups are searched sequentially by trunk group number, as with hunt groups, and within the configured trunk group.

route optimization. A system feature that automatically selects the most economical of available circuits over which to make an outgoing call.

RPDN. ROLM private digital network.

S

SAT OPS. Satellite operations.

satellite operations (SAT OPS). A purchasable software application that enables companies with several locations in one regional area to achieve a unified telephone system and numbering plan.

save. A station feature used to store a dialed number that is either busy or unattended. The same button is used later to automatically redial.

SCC. specialized common carrier.

screen. (1) A series of panels. (2) The physical surface of a workstation or terminal on which information is presented to users.

SE. Systems engineer.

security call group. A group of station extensions that ring simultaneously when the assigned pilot number to the group is called.

self-test. A 9751 CBX system feature that provides for continual, automatic testing and reporting of system performance data; permits a user to query self-test results manually through the use of commands.

self-test programs. The coded instructions that produce and control the self-test feature.

serial call. A system feature that permits a series of calls for the same party. The external call automatically returns to the attendant after each call in the series is completed. If a data line has serial call permission, the user of that data line can make a series of data calls without disconnecting from the 9751 CBX.

serial port. Connecting point or other receptacle for attaching terminals or supporting serial communications.

service terminal. A terminal used during local or remote maintenance operations and moves, adds, and changes.

set. To place a storage device in a prescribed state that is the opposite of the reset state.

SF. Superframe.

shared electronics. Functional units (exclusive of common control electronics) common to system operation, any one of which, if malfunctioning, impairs or inhibits operation.

shelf. The horizontal dividers of a card cage or equipment cabinet used to hold cards or other equipment.

shelf power module. A Model 40 or 50 device that converts ac power to the voltages necessary to power the memory retention batteries, disk drive assembly, fans, and the cards on each shelf. The shelf power module also provides the umbilical connector for removing and replacing cards.

SI. System integrity.

signal, supervisory. A signal that shows the status of a circuit, such as on- or off-hook.

single-line telephone. A telephone that provides access to one telephone line; in 9751 CBX systems, may be augmented by a communication line identification number.

single-node system. A system that is made up of only one node.

slot. The cabinet shelf location of a card; there are 25 slots per shelf.

SMIOC. System monitor input/output card.

software. The programs and routines used to begin the capabilities of computers and such systems programs and utilities as compilers, assemblers, systems, narrators; contrast with hardware.

speaker. (1) A device used to convert varying electrical signals into sound. (2) A loudspeaker (receiver) associated with a telephone permitting hands-free communication for the user.

speakerphone. A microphone (transmitter) and loudspeaker (receiver) associated with a telephone permitting hands-free conversation for the user.

specialized common carrier (SCC). A carrier used when route optimization software is routing a call over a network.

speed calling. A station feature that permits frequently dialed numbers to be dialed with abbreviated codes (system speed calling and station speed calling).

SRC. System reference code.

SSO. System speed override.

SSSC. System Service Support Center.

station forwarding. A station feature that permits a user to temporarily forward calls to another extension.

static table. A location in memory containing information that remains fixed and cannot be changed.

station speed calling. A station feature that permits a user to quickly dial a telephone number by only dialing a 2-digit station speed code.

supplementary service. The transport of information related to the invocation of features to other user-to-user data.

synchronous. A mode of data transmission in which the data is synchronized by a clock.

system. A configuration of operations, procedures, or equipment that accomplishes a specific objective; a telephone system as a minimum consists of the basic switching equipment, telephones, other station equipment, trunks, tie lines, and interconnecting loops.

system feature. A switching system ability typically available to all users.

system forwarding. A system feature that automatically sends a call to a console, a preassigned extension, or a hunt or distribution group when the extension called is busy or does not answer.

system integrity. A background program that continually tests the 9751 CBX.

system monitor input/output card (SMIOC). A card that provides eight ports for peripheral equipment and permits the processor to communicate with the system status and alarms such as power supply failure, fan failure, and overtemperature.

system monitor input/output card (SMIOC) interconnect box. A device that connects peripheral equipment and alarms to the 9751 CBX.

system node. A 9751 CBX node that is one part of a multinode 9751 CBX.

system option. A feature that requires additional hardware or software (see *optional features).*

system parameter. A value that determines a system feature and its values or limitations.

system reference code (SRC). A code that is entered on the soft-copy maintenance analysis procedures (MAPs).

System Service Support Center (SSSC). A ROLM service center for 9751 CBX error-related questions and problems.

system software. The system operating program, self-test programs, and configuration tables that reside in the memory.

system speed. A system feature that permits a user to key in # 6 and a shortened code to signify telephone number sequences of up to 16 digits (local, long distance, or international).

system speed dialing. A system feature that permits a station user to quickly dial a telephone number by dialing only a 2-digit system speed code.

system speed number. A telephone number accessed by entering an access code on a single-line telephone or by pressing a system speed feature button on a ROLMphone.

system speed override (SSO). A parameter that permits a user to override a restricted class of service (COS) to place a system speed call.

systems engineer (SE). The engineer who tailors the 9751 CBX system to the customer. The SE provides assistance with system/network planning, system configuration and customization, negotiation of carrier tests and agreements, installation planning, and connectivity planning. The SE is familiar with carrier rules and regulations to assist the customer in correct installation.

T

T-R. Tip and ring.

tandem node. A node that provides a trunk-to-trunk connection for routing a call without invoking supplementary services.

TASA. Turnaround standalone.

TC. Time-division multiplexing controller.

TCL. Time-division multiplexing controller.

TCM. Traveling class mark.

TCTASA. Time-division multiplexing controller turnaround standalone.

TDM. Time-division multiplexing.

telco. Telephone company.

telecommunication. Any transmission, emission, or reception of signs, signals, writing, images, and sounds or information of any nature by wire, radio, visual, or other electromagnetic systems; electromagnetic communication.

telephone. A station device for transmitting and receiving voice communication.

telephone company. Any vendor that provides communication services to customers.

terminal. (1) The terminus of any equipment or circuit. (2) The screws or soldering lugs to which an external circuit can be connected. (3) A point at which information can enter or leave a system. (4) An input/output (I/O) display or printing device connected to a computer.

terminal block. A device used to connect station equipment wiring to house cable. The wires connect to the block with fastening screws.

test point. A place on a card where voltage can be checked.

threshold alarms. The part of system integrity software that alerts service personnel when a critical percentage of hardware resources is out of service. This feature also limits the amount of these resources that can be removed from service.

tie line. A private or leased voice-grade communication line of the type provided by communications common carriers for linking two or more points.

tie trunk interface (TTI) card. A card that interfaces the 9751 CBX 4-wire tie trunks with the type I E & M signaling that connects to any switch with 4-wire tie trunk capability or other ROLM systems.

time-division multiplexing (TDM). A method of serving several simultaneous channels over a common transmission path by assigning the transmission path sequentially to the various channels, each assignment for a discrete interval; interleaving several message channels that are separated from each other in time on a single transmission media.

time-division multiplexing controller (TC) card. A Model 40 card located on the processor shelf that controls the entire time-division multiplexing (TDM) network. It connects the intershelf bus (ISB) source and destination buses, and it interfaces with the ISB and the TDM cards.

time-division multiplexing controller (TCL) card. A Model 10 card located on the processor shelf that controls the entire time-division multiplexing (TDM) network. It connects the intershelf bus (ISB) source and destination buses, and it interfaces with the ISB and the TDM cards.

time-division multiplexing expander (TXP) card. A Model 10 card that provides an interface between the intershelf bus (ISB) and the shelf 2 and 3 cards.

time-division multiplexing (TDM) network. The assembly of interface cards and buses used to facilitate the connection of station equipment to each

other, to outside trunks, and to certain shared electronics within the 9751 CBX.

Time-division multiplexing (TDM) switching. Switching technology used by the 9751 CBX product. See *time-division multiplexing.*

time-division multiplexing turnaround standalone (TCTASA) card. A single card combination of the TC card and the TASA card that the Model 40 or 50 uses. It provides an interface between the computer input/output (I/O) and the intershelf bus (ISB).

tip. One of the two conductors (tip and ring) of a communication line or trunk, designated as T.

tip and ring (T-R). Name for circuit transmission leads; may also be suffixed by a letter or number (for example, T1, TA, R1, RA) to show other input.

TMMS. Telephone message management system.

token. In the Model 40 or 50, the floating master message that coordinates which processor, or host, can send information over the control packet network (CPN). When a node receives the token, it can either deposit a packet of information on the network or simply pass on the token to the next host in the ring.

tone sender card. A card that supplies digital representation of dial, ringback, busy, error, pulse, and howler tones, and dual-tone multifrequency (DTMF) digits during call processing.

transit node. A node that provides a CorNet-N trunk-to-trunk connection and can also provide supplementary services if necessary.

transmission. The process of communicating by electrical signals over a distance (to a receiver of the transmission) without unacceptable attenuation, distortion, masking by noise, crosstalk, or echo, and without losing the integrity of the information sent.

transmission facilities. The cable and radio facilities consisting of interswitch trunks and access lines; an element of a physical telephone plant that carries out the function of transmission, for example, a multipair cable, a coaxial cable system, or a microwave radio system.

trunk. (1) A message circuit between two points, both of which are switching centers or individual message distribution points. (2) A communications channel between two different offices or between groups of equipment within the same office.

TTI. Tie trunk interface.

Turnaround stand-alone (TASA) card. A card that connects the ISB source and destination buses in the Model 40.

TXP. Time-division multiplexing expander.

T1 trunk. A high-speed digital facility that operates at 1.544 megabits per second for both voice and data communication.

T1 digital network (T1DN) card. A card that transmits voice and data information over a digital facility at the rate of 1.544 megabits per second. The T1DN card multiplexes information from up to 24 channels into a single digital bit stream.

T1DN. T1 digital network.

U

umbilical cord. A cord used to remove and replace time-division multiplexing (TDM) cards to prevent electrostatic discharge (ESD) damage.

V

V ac. Volts alternating current.

V dc. Volts direct current.

VFA. Vacuum fluorescent alphanumeric.

voice grade. An access line suitable for voice and low-speed data and telegraph service.

voice grade channel. A channel suitable for the transmission of speech, digital or analog data, or facsimile, generally with a frequency range of about 300 to 3000 hertz (Hz).

VRU. Voice response unit.

VTMS. Voice text messaging system.

W

WATS. Wide area telephone service.

wide area telephone service (WATS). A trunk tariffed for wide area communication at measured monthly rates or a flat rate; available by geographic location.

word (binary word). A set of binary digits (0 and 1) used to express units of information in computer instruction.

Z

ZCS. zero code suppression.

zero code suppression (ZCS). A T1 line coding format supported by the T1DN card.

zero insertion force (ZIF) connectors. Connectors

that hold the tops and bottoms of cards to keep them securely in place.

ZIF. zero insertion force.

Numerics

9030A I/O bus switch card. A Model 40 or 50 card that interfaces the I/O cards with the 9030A CPU card.

9030A memory expansion card. A Model 50 card that increases the 9030A CPU cards′ memory from 12MB to 24 MB.

9750 BCS. 9750 Business Communications System.

9750 Business Communications System (9750 BCS). A highly efficient, computer-controlled voice and data switching system. The system includes a digital voice and data controller, devices to provide voice and data connectivity, a variety of desktop hardware and software products, and a wide range of customer support services.

9751 CBX. 9751 computerized branch exchange.

9751 computerized branch exchange (9751 CBX). See *computerized branch exchange (CBX), 9751*.

9751 CBX monitor. A data collecting and reporting device that monitors the 9751 CBX error table, provides on-site access to the 9751 CBX through the maintenance terminal, and provides remote access to command line interpreter (CLI).

9755 Attendant Console (9755 ATC). A ROLM desktop unit that primarily functions as a communications center for incoming calls, but also performs internal call handling tasks such as paging and completing outgoing calls from restricted extensions.

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Numerics

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Field Service Note FNCX5606
9751 CBX Models 40 and 50
Release 9005/9006m

System Service Manual Update
Power Entry Assembly

GN25-2784-00
October 3, 1994

Purpose

This field service note (FSN) updates the service information for the ROLM 9751 computerized branch exchange (CBX) Models 40 and 50, Release 9005/9006m.

This FSN updates the manual listed below. The **a** in the left margin indicates new or changed information.

Manual

This FSN updates the *ROLM 9751 CBX Models 10, 40, and 50, Release 9005/9006m, System Service Manual*, **G281-0209-01**. The next revision of the manual will include this information.

Summary

This FSN removes references to the colors of the Model 40 or 50 power entry assembly (PEA) power supply cord conductors.

Instructions

If you are incorporating more than one FSN into the manual:

1. Place the notes in order by date.
2. Incorporate the *oldest* note first.

Table 1-1 lists instructions to update the *9751 CBX Models 10, 40, and 50, Release 9005/9006m, System Service Manual*.

Table 1-1. Incorporating This FSN into the 9751 CBX Models 10, 40, and 50, Release 9005/9006m, System Service Manual

Action and Page Number
Remove and replace pages xxi and xxii.
Remove and replace pages 11-91 through 11-94.
Remove and replace pages 11-121 through 11-124.

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ROLM Communications

Field Service Note
FNCX5630

ROLM 9751 CBX Models 50 and 70

Release 9005/9006m

System Service Manual Update
9030B CPU Card

GN25-2844-00
September 16, 1996

Purpose

This field service note (FSN) provides the following:

- A description of the 9030B central processing unit (CPU) card
- A listing of the model and part numbers for the 12/16 megabytes (MB) and 32 MB 9030B CPU card
- Procedures for upgrading to the 9030B CPU card
- Procedures for removing and replacing the 9030B CPU card

Manuals

The manual affected by the FSN is the *ROLM 9751 CBX, Models 10, 40, and 50, Release 9005/9006m, System Service Manual*, **G281-0209-01**. The next revision of the manual will include this information.

Instructions

Insert this field service note at the front of the manual.

Make a note in the manual's main table of contents to refer to this FSN for the model and part number information on the 9030B CPU card.

Make a note in the manual's main table of contents to refer to this FSN for the installation, removal, and replacement procedures of the 9030B CPU card.

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In an effort to continuously improve our documentation, Siemens Rolm provides a documentation feedback line. You can use this line to report documentation errors or make suggestions on how we can improve our documents.

To use the Documentation Feedback line:

1. Call toll free (800) 445-ROLM
2. Provide the following information when you call:
   - Your name, address, telephone number
   - Document name, *ROLM 9751 CBX Models 50 and 70, Release 9005/9006m, System Service Manual Update, 9030B CPU Card Field Service Note FNCX5630*
   - Document number, GN25-2844-00
   - The page or section number you are referring to
   - A brief description of your suggestion

Overview

The 9030B CPU card (see Figure 1) is installed in slots 8 and 10 of shelf 2 on Model 50 and 70 systems.

The P connector designations for the 9030B CPU card are as follows:

- P1 - CCC motherboard connection
- P2 - CCC motherboard connection
- P3 - Standard umbilical cord connector
- P4 - Not used
- P5 - Not used

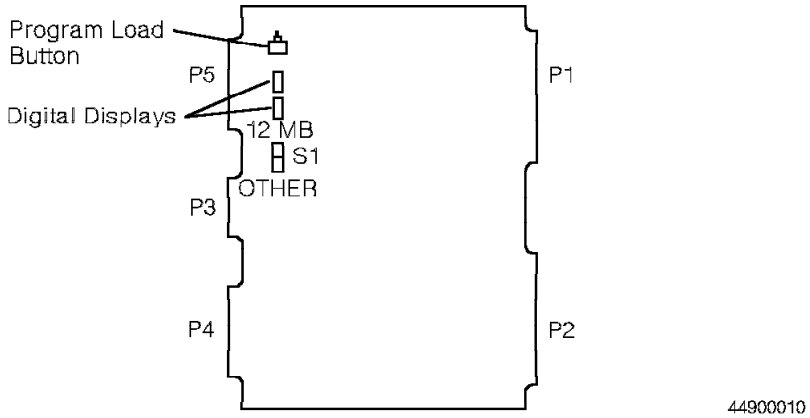

Figure 1. 9030B CPU Card

Model and Part Numbers

The following are the model and part numbers of the 9030B CPU card.

Description	Model Number	Part Number
12/16 MB 9030B CPU card	91300G	51D0592
32 MB 9030B CPU card	91303	51D0594

The 12/16 MB 9030B CPU card replaces the 12 MB 9030A CPU card.

Switch Settings for the 9030B CPU Card

If one side has 12 MB, set the S1 switch to 12 MB and use it with or without a 9030A memory expansion card. Both sides *must* have the same size memory. Otherwise, a warning message appears.

To use the 9030B CPU card in the 16 MB mode, set the S1 switch to OTHER. Both sides *must* have the same size memory. Otherwise, a warning message appears.

Note: Do *not* use the 9030B in the 16 MB mode with a 9030A memory expansion card. New systems are shipped in the 16 MB mode.

To use the 9030B CPU card in the 24 MB mode, set the S1 switch to 12 MB and use it with the 9030A memory expansion card (model number 91320, part number 98D1807).

To use the 9030B CPU card in the 32 MB mode, set the S1 switch to OTHER. When replacing a 9030A CPU or 9030A expanded memory card with a 32 MB 9030B CPU card, you must replace *all* 9030A cards and install new cards on both sides. CPU cards on both sides must be set to the same 32 MB mode.

Upgrading to the 9030B CPU Card

Follow electrostatic discharge (ESD) prevention procedures when you upgrade to the 9030B CPU card.

Install the 9030B CPU card as follows:

1. Set the S1 switch to match the memory size of the active side.
2. Using the umbilical cord on the P3 connector of the 9030B CPU card, slide the 9030B CPU card into the standby side (slot 8 for CPU A and slot 10 for CPU B) on shelf 2.
3. Close the card lock levers.
4. Enter the following command:

   ```
   LOAD STBY 9005.X.XX
   ```

   Note: X is the bind number.

   The system responds with the following message:

   ```
   NO RESPONSE FROM STANDBY ON NODE <n>
   ```

5. Remove the umbilical cord from the card. Standby load begins. The system responds:

   ```
   STANDBY LOAD STARTED - SLOAD INITIATED FROM NODE <n>

   STANDBY LOAD SUCCEEDED NODE <n>.
   WARNING:  DO NOT SWITCHOVER UNTIL STANDBY
   SIDES¢S SYSTEM_STATUS IS NORMAL.
   ```

6. Enter the following command to list the system status of the standby processor:

   ```
   LIST SYSTEM STATUS <n> S
   ```

7. When the SYSTEM STATUS=NORMAL appears on the CURRENT SYSTEM STATISTICS TABLE, enter the following command to start the watchdog timer on the standby side:

   ```
   START WDT <n> S
   ```

8.

   CUSTOMER IMPACT

   This type of switchover causes the loss of *all* calls in progress. Use it only during periods of low traffic.

   Enter the following command:

   ```
   SWITCHOVER UNCONDITIONAL MAJOR
   ```

9. Check the system banner and verify that the memory size is correct.

   Note: If the new system banner does not indicate the correct memory size, contact your next level of support.

10. Following ESD prevention procedures, install the second 9030B CPU card.

11. Use the umbilical cord on the P3 connector of the 9030B card and then slide the card into the standby side on shelf 2.

12. Close the card lock levers.

13. Remove the umbilical cord from the card. Standby load begins automatically. The following message appears:

    ```
    STANDBY LOAD STARTED - SLOAD INITIATED FROM NODE <n>

    STANDBY LOAD SUCCEEDED NODE <n>.
    ```

14. When the standby load completes, enter the following command to log on to the standby side:

    ```
    LOGON NODE <n> S
    ```

15. Check the system banner and verify that the memory size is correct.

    Note: If the new system banner does not indicate the correct memory size, contact your next level of support.

Removing the 9030B CPU Card

Follow ESD prevention procedures when you remove and replace the 9030B CPU card.

Remove the 9030B CPU card as follows:

1. Put the umbilical cord on the P3 connector of the standby 9030B CPU card.
2. Open the card lock levers.
3. Handling the card by its edges only, slide it out of the shelf.
4. Immediately place the card in a static shielding bag or static-free box.

Replacing the 9030B CPU Card

Replace the 9030B CPU card as follows:

1. Handling the card by its edges, remove the replacement card from its static shielding bag or static-free box.
2. Set the S1 switch to the correct memory size on the 9030B CPU card.
3. Using the umbilical cord on the P3 connector of the replacement card, slide the card into the appropriate slot and then seat the card into the motherboard.
4. Close the card lock levers.
5. Remove the umbilical cord from the card's P3 connector.

Verifying the Procedure

You correctly replaced the 9030B CPU card if the system banner on the maintenance terminal shows the correct memory size.

SIEMENS

Field Service Note
FNCX5642

9751 CBX

Release 9005/9006m

Correction to System Service Manual

July 18, 1997

Purpose

This field service note (FSN) contains information that was inadvertantly deleted from the CD version of the *9751 CBX, Release 9005/9006m, System Service Manual, Models 10, 40, and 50*, G281-0209-01. This includes the rest of Appendix B, all of Appendix C, Appendix D, Appendix E, the Glossary, and the Index. This will be included in the next release of the Support Documentation CD.

Manuals

This FSN corrects the *9751 CBX, Release 9005/9006m, System Service Manual, Models 10, 40, and 50*, G281-0209-01.