

Lucent Technologies
Bell Labs Innovations



Data Networking Products Multipurpose Concentrator Reference

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Contents

Preface	ix
Document Organization	ix
Related Documentation	x
BNS-2000 MPC Overview	1-1
BNS-2000 MPC Physical Description	1-3
BNS-2000 MPC Environments	1-5
BNS-2000 MPC Features	1-7
BNS-2000 MPC Installation	2-1
BNS-2000 MPC Configurations	2-3
Installation Preparation	2-5
Installation	2-6
BNS-2000 MPC Administration	3-1
<i>StarKeeper II</i> NMS Administration	3-3
Command Set	3-3
MPC Parameter Considerations	3-4
MPC Administrative Procedures	3-7
MPC Reports	3-10
MPC Troubleshooting	4-1
Problem Indicators	4-3
Problem Areas	4-5
Procedures	4-7
BNS-2000 MPC Commands	5-1
Appendix A. BNS-2000 MPC Compliances and Power Options	A-1
Power Options	A-2

Appendix B.**MPC Link Interface Module Considerations****B-1**

Magic

B-1

SWT Jumper Settings

B-5

SWT Data Rate and Cable Length Restrictions

B-6**Appendix C. MPC Database Entry Forms****C-1**

Figures

1-1.	BNS-2000 MPC Slot Allocation	1-4
2-1.	Base Power Unit Floor Brackets	2-9
2-2.	BNS-2000 MPC Shelves With Base Power Unit: Stacked and Secured	2-11
2-3.	Base Power Unit Wiring for an MPC Stack	2-12
2-4.	Terminal Block and Grounding Connections	2-13
2-5.	Inserting the Power Entry Module	2-15
2-6.	Wiring the Power Entry Module	2-16
2-7.	MPC Slot Allocation and Magic-capable Slots	2-19
2-8.	ASP1 I/O Board	2-21
2-9.	CO Frame (Rear View)	2-25
2-10.	CO Frame Dollies	2-26
2-11.	CO Frame Anchors	2-28
2-12.	Moving the CO Frame	2-29
2-13.	Securing the CO Frame	2-30
2-14.	Attaching Shelf Brackets	2-31
2-15.	CO Frame Covers	2-32
2-16.	Power Wiring in the CO Frame	2-34
4-1.	Voltage Check Points (Rear Cabinet View)	4-10
4-2.	Terminal Pin Assignments for Module Slots	4-11
4-3.	Normal Fuse and Blown Fuse	4-13
B-1.	SWT Jumper Locations	B-5

Tables

2-1.	BNS-2000 MPC Configurations	2-3
2-2.	BNS-2000 MPC Installation Checklist	2-4
2-3.	ASP1 I/O Board Switch Settings	2-20
3-1.	MPC Command Set	3-4
3-2.	MPC Module Address (Slot) Designations	3-5
3-3.	Available Reports for Concentrators	3-10
4-1.	Command Output	4-4
4-2.	Problems Checklist	4-5
4-3.	Measurement Points and Voltage Range	4-9
A-1.	BNS-2000 MPC Power, Electromagnetic, and Safety Compliances	A-1
A-2.	AC Power with Alternating Current Distribution (ACD) Base Power Unit	A-2
A-3.	DC Power in the Central Office	A-2
B-1.	AWJ3 I/O Board Default Switch Settings	B-2
B-2.	AWJ9 I/O Board Default Switch Settings	B-3
B-3.	AWJ10 I/O Board Default Switch Settings	B-4
B-4.	AWJ11 I/O Board Default Switch Settings	B-4
B-5.	SWT Jumper Settings	B-6
B-6.	SWT Data Rates and Cable Length Restrictions	B-6

Procedures

2-1. Preparing for MPC Installation	2-5
2-2. Unpacking the MPC	2-7
2-3. Unpacking the Base Power Unit	2-8
2-4. Anchoring the Base Power Unit	2-8
2-5. Assembling a Single MPC with a Base Power Unit	2-10
2-6. Assembling Multiple MPCs with a Base Power Unit	2-10
2-7. Checking and Setting Input Voltages on Base Power Units	2-13
2-8. Grounding the Base Power Unit	2-13
2-9. Grounding the Branch Circuit	2-14
2-10. Installing the Power Entry Module	2-14
2-11. Wiring the Power Entry Module With a Base Power Unit	2-16
2-12. Securing the Right-Angle Connectors	2-17
2-13. Inserting and Removing Power Supplies	2-17
2-14. Inserting Critical Modules	2-19
2-15. Connecting the Clock Module (ASP1) to Internal Components	2-21
2-16. Inserting the Link Interface Module (SFT/SWT)	2-22
2-17. Inserting Interface Modules (Services)	2-22
2-18. Labeling	2-23
2-19. Installing Dollies to Move the CO Frame	2-26
2-20. Anchoring the CO Frame	2-27
2-21. Installing the CO Frame	2-28
2-22. Installing Covers and Kickplates on a CO Frame	2-31
2-23. Installing and Removing the Power Entry Module	2-33
2-24. Making CO Frame Power Connections	2-33
3-1. Entering Concentrator Information in the Database	3-7
3-2. Making Minor Concentrator Database Changes	3-7
3-3. Moving Concentrator Information	3-8
3-4. Copying Concentrator Information to Another Module Address	3-9
3-5. Switching to a Cold Standby Link Interface Module	3-9
4-1. Testing Power	4-8
4-2. Checking Voltage	4-8
4-3. Solving Power Problems	4-12
4-4. Solving Fan Problems	4-12
4-5. Checking and Changing Fuses	4-12
4-6. Solving Suspended Service State Problems	4-13
4-7. Solving Problems when Administering Resident Modules	4-14

4-8. Checking Concentrators that Cannot Make Calls	4-14
4-9. Running the Concentrator Remote Test	4-15
4-10. Starting Off-line Loopback Tests	4-15
4-11. Running the Link Local Test	4-15
4-12. Running the Link External Test	4-16
4-13. Running the Link Remote Test	4-16
4-14. Running the DSU Local Test	4-16
4-15. Running the DSU Remote Test	4-17
4-16. Completing Off-line Loopback Tests	4-17

Preface

The *Data Networking Products Multipurpose Concentrator Reference* provides the information needed to install, configure, and administer a BNS-2000 Multipurpose Concentrator (MPC) in a *Datakit® II VCS*, BNS-1000, BNS-2000 VCS, or BNS-2000 node. Procedures for routine operations, maintenance, and troubleshooting are also included.

Document Organization

The *Multipurpose Concentrator Reference* explains all aspects of module hardware, software, and troubleshooting in the following five chapters:

MPC Overview	includes a physical description of the BNS-2000 MPC and an overview of MPC features.
MPC Installation	explains the different configurations of MPC hardware, how to assemble and install each key component of the configuration, and how to insert modules.
MPC Administration	discusses the implications of choosing certain options and provides procedures for initial and routine administration.
MPC Troubleshooting	provides the information and procedures needed to troubleshoot MPC problems and to run diagnostics.
MPC Commands	provides a detailed reference of the commands needed to administer, control, and maintain the MPC. Included are command syntax sections, explanations of parameter options, input/output examples, report field definitions, and system responses.

In addition, three appendixes furnish industry compliance and power option information, link interface module considerations, and database entry forms. Tables of contents and an index help to locate information quickly.

Related Documentation

The following documents will be useful companions to the *Multipurpose Concentrator Reference*:

- *Data Networking Products Planning Guide*
- *BNS-2000 Node Reference*
- *Data Networking Products Messages Reference*
- *Data Networking Products Terminal User Guide*

Publications describes the complete documentation set available for the product line; see inside front cover for ordering information.

Data Networking Products Terminology lists and defines many technical terms found within this document. In addition, documents for interface and trunk modules supported by your system are available; vendor documents might be necessary for end devices connected to this and other modules.

BNS-2000 MPC Overview

BNS-2000 MPC Physical Description	1-3
Power Supplies	1-4
Switch Module	1-4
Clock Module	1-5
Link Interface Modules and Optional Cold Standby	1-5
Interface Modules	1-5
BNS-2000 MPC Environments	1-5
BNS-2000 MPC Equipment Structure	1-5
BNS-2000 MPC Power Configurations	1-6
BNS-2000 MPC Features	1-7
Autorestore	1-7
Cold Standby Link	1-7
Configurable Options	1-7

BNS-2000 MPC Overview

The BNS-2000 Multipurpose Concentrator (MPC) distributes connections to devices grouped in remote locations in a geographically dispersed network. The BNS-2000 Multipurpose Concentrator has 15 slots that can support up to 12 interface modules.

MPC selection is based on the distance between the MPC and node, user services required, and the number and type of connections required.

User services are provided by interface modules installed in the MPC; user connections to the MPC are through ports on these interface modules. The MPC multiplexes user data from these interface modules over a fiber or wire link to the home node. At the node, the Control Computer recognizes the individual channels and sets up calls as if the multiplexed endpoints were connected directly to interface modules in the node. As such, the MPC—along with its resident interface modules—extends the distribution limit of network interfaces and services beyond conventional connection distances. This alternative to a direct connection increases node capacity, saves existing capacity for other components, and reduces cabling.

Node-to-MPC communication is achieved through paired Standard Fiber Trunk (SFT) or Standard Wire Trunk (SWT) modules. The SFT and SWT are called *link interface modules* or *links* to distinguish them from the same modules, called *trunks*, which are used for communication between nodes. Although MPCs physically connect to the node via these links, they are not an extension of the node backplane. Except through their home nodes, MPCs cannot network with other nodes and concentrators.

The BNS-2000 MPC can be configured for a customer premises (CP) or a central office (CO) environment.

BNS-2000 MPC Physical Description

A single BNS-2000 MPC is a stackable, Series M1 Shelf that is 30 inches wide, 17 inches high, and 28 inches deep. The BNS-2000 MPC contains 16 numbered slots (0 to 15) that house the following components (Figure 1-1):

- three power supplies (in one numbered slot)
- a Switch module
- a Clock module
- a link interface module (SWT or SFT)

- an optional cold standby link interface module
- as many as 12 interface modules

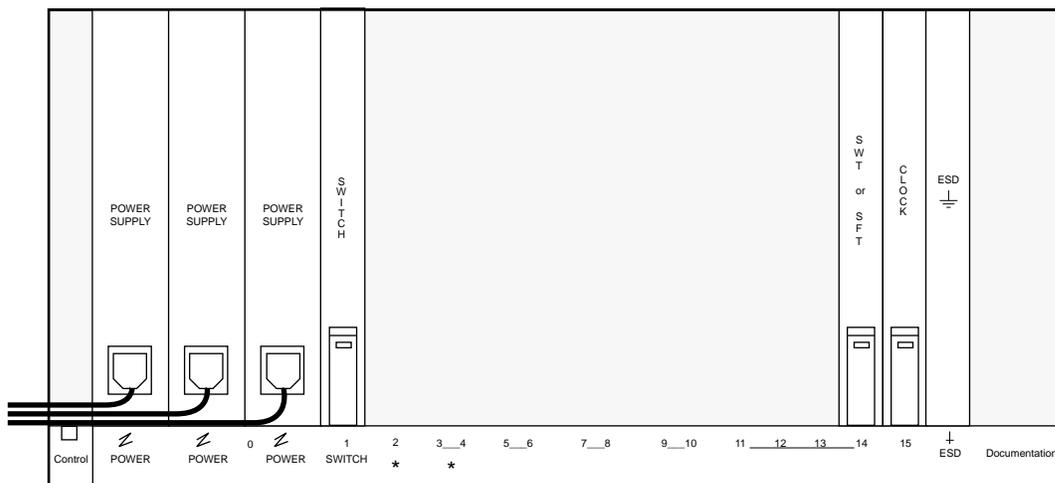


FIGURE 1-1. BNS-2000 MPC Slot Allocation

Power Supplies

Each BNS-2000 MPC houses three power supplies. These three power supplies minimize downtime; two power supplies can carry the load while the third is being replaced. The choice of power supply depends on input power:

- **611C or ACX582** power supply is used for all CP installations with alternating current (AC) input power.
- **DCX1836** power supply is used for CO installations with direct current (DC) input power (-48 V).

Refer to **Appendix A** for compliances and power options.

Switch Module

One Switch module, part number TN1002B, is required per BNS-2000 MPC; a redundant Switch module is not supported. The Switch module, which always occupies slot 1, does not require an I/O board.

Switch module memory contains information about all existing virtual circuits. Its memory is updated by the Control Computer when virtual circuits are connected or disconnected. The Switch module can support 3500 simultaneous virtual circuits and 7000 endpoints.

Clock Module

One Clock module, part number TN1001B, is required for each BNS-2000 MPC. Along with its Input/Output (I/O) distribution board, it must occupy slot 15.

The Clock module supplies bit and packet timing signals for the backplane bus. In addition, it periodically polls each module for status and serves as a repeater for its MPC.

Link Interface Modules and Optional Cold Standby

At least one link interface module is required to connect the BNS-2000 MPC to its home node. One of two types of link interface modules can be used in the BNS-2000 MPC:

- the **Standard Fiber Trunk (SFT)**, part number MC1P085A1
- the **Standard Wire Trunk (SWT)**, part number TN2092

The link interface module can be installed in slots 2, 3, 13, or 14 in the BNS-2000 MPC. The primary link interface module typically resides in slot 14; the remaining slots can house an optional cold standby link interface module.

The SFT and SWT are explained in detail in the system's *Trunk Module Reference*.

Interface Modules

Depending on whether a BNS-2000 MPC slot has been allocated for a cold standby link interface module, up to 12 slots remain for supported interface modules. The user services provided by the supported interface modules for the BNS-2000 MPC are explained in detail in the *System Description*.

BNS-2000 MPC Environments

The BNS-2000 MPC can be configured for a CP or a CO environment. The fundamental differences between the CO and CP environments deal with equipment structure and power.

BNS-2000 MPC Equipment Structure

In the CP environment, one to four BNS-2000 MPCs can be stacked on top of a Base Power Unit and bracketed together.

In the CO environment, BNS-2000 MPCs are mounted into a 78-inch frame that meets CO standards for shock and earthquake protection, cable racking, power distribution, and grounding. The frame consists of four uprights, a base assembly, and a top. An extension is available to raise the top of the frame to seven feet for sites requiring that height.

BNS-2000 MPC Power Configurations

The power configurations for a CP and a CO environment differ. The CP environment operates on standard AC voltage (200–240 V); the CO environment operates on DC voltage (-48 V).

The differences in power and mechanical arrangement do not affect BNS-2000 MPC operation. Data and control cabling are identical for a BNS-2000 MPC, whether it is in a CP or CO environment.

Power Entry Module

The power entry module, which connects to the cabinet wiring, distributes input power to each of the three power supplies in the BNS-2000 MPC. The BNS-2000 MPC can be configured with one of two types of power entry modules; the type used depends on the available input power cabling:

- **ED3P302-30, G5** is used for configurations with Alternating Current Distribution (ACD) Base Power Units.
- **ED3P302-30, G7** is used in CO environments. It accepts -48 VDC input power.

Power Distribution

The two configurations of power distribution are the following:

- The **Alternating Current Distribution (ACD) Base Power Unit** distributes power directly through breakers and line cords to the ED3P302-30, G5 power entry module. The ACD Base Power Unit provides 200–240 VAC input. The ACD Base Power Unit functions with the three 611C or ACX582 power supplies and line cords to distribute power to the BNS-2000 MPCs. The ACD Base Power Unit weighs 105 pounds.
- In **CO installations**, -48 VDC building power is distributed through breakers on the top of the CO frame via power wiring to the ED3P302-30, G7 power entry module of each BNS-2000 MPC. The power entry module then distributes this power to the three DCX1836 power supplies in each BNS-2000 MPC.

Refer to **Appendix A** for a summary of the valid combinations of power hardware and service for the BNS-2000 MPC.

BNS-2000 MPC Features

Depending on the interface modules supported by the BNS-2000 MPC configuration, BNS-2000 MPC services can include:

- asynchronous connections and asynchronous transport
- multiplexed host interfaces, including fiber cable interfaces, for various personal computers, hosts, and workstations from numerous vendors
- synchronous transport and synchronous fanout
- X.25 host and X.25 Public Data Network (PDN) connections
- Local Area Network (LAN) connectivity via LAN-to-LAN or LAN-to-node topography
- Systems Network Architecture (SNA) host connectivity to network routers and gateways

Refer to the *System Description* for a detailed list of services provided.

Autorestore

Concentrators typically have four states—in service, out of service, ready for service, and suspended. During status polling, if the in-service concentrator does not return status packets to the Control Computer (because of a failure at the concentrator site), the Control Computer puts the concentrator into a suspended state instead of removing it from service.

The Control Computer then attempts to restore the concentrator to service automatically after 5, 10, and 15 minutes; and then at 20-minute intervals. This feature is referred to as *autorestore*. If the problem has been corrected during one of these intervals, the restore succeeds. Otherwise, it fails, and the concentrator remains in the suspended state.

Cold Standby Link

The BNS-2000 MPC supports a redundant link through a cold standby link interface module. This cold standby link can reside in any slot allocated for use by a link module. If the primary link fails, the network administrator can manually restore the BNS-2000 MPC by establishing a link with the cold standby. An automatic facility for restoring the BNS-2000 MPC is not supported.

Configurable Options

Through the **concentrator** command set, these options can be configured in the database:

- type, speed, and number of user channels for the link interface module
- measurements collection for the link
- the elapsed seconds between the detection of a failed link and the disconnection of a call that was the result of the failed link

For wire link interface modules (SWTs) only, call-back devices can be used on the facility. These devices (modems) detect a link failure and attempt to re-establish a connection to their partner-modem. They are used with the configurable "seconds to disconnect" parameter. If the device re-establishes the link successfully before the "seconds to disconnect" time expires, calls over the link are not taken down. If the device cannot re-establish its own link, calls come down.

BNS-2000 MPC Installation

BNS-2000 MPC Configurations	2-3
Installation Preparation	2-5
Installation	2-6
Staging	2-7
Base Power Unit Wiring	2-12
Power Supply Installation	2-17
Module Insertion	2-18
Power Testing	2-23
BNS-2000 MPCs in a CO	2-23

BNS-2000 MPC Installation

This chapter explains how to install a BNS-2000 MPC. It begins with tables showing the recommended configurations for a BNS-2000 MPC and a checklist of procedures to help you organize the installation task for your particular configuration. It then furnishes installation procedures for the various configurations of BNS-2000 MPCs. Through the remainder of this chapter the BNS-2000 MPC is referred to as the MPC.

BNS-2000 MPC Configurations

The following tables illustrate the recommended configurations for an MPC in CP and CO environments. Refer to **BNS-2000 MPC Overview** to clarify MPC power configurations and **Appendix A** for compliances and power options.

TABLE 2-1. BNS-2000 MPC Configurations

Environment/ Configurations	Structural Support	Power Supplies	Power Distribution	Power Entry Module	Options
CP 1-4 MPCs Base	Base anchored to floor; stack bracketed together.	611C or ACX582 (AC); use three per MPC	ACD Base Power Unit	ED3P302-30, G5	None
CO 1-4 MPCs No Base	78-inch frame anchored to floor.	DCX1836 (DC); use three per MPC	Breakers on top of frame distribute power to power entry module.	ED3P302-30, G7	None

The following checklists have been supplied to aid in the installation of a BNS-2000 MPC and related components in CP or CO environments. The procedures in each checklist are listed in the order in which they should be done. The order can be adjusted depending on availability of components and/or the specific requirements of the installation site or configuration.

TABLE 2-2. BNS-2000 MPC Installation Checklist

√	MPCs with Base Power Units in CP Environments
_____	Procedure 2-1. Preparing for MPC Installation
_____	Procedure 2-2. Unpacking the MPC
_____	Procedure 2-3. Unpacking the Base Power Unit
_____	Procedure 2-4. Anchoring the Base Power Unit
_____	Procedure 2-5. Assembling a Single MPC with a Base Power Unit
_____	Procedure 2-6. Assembling Multiple MPCs with a Base Power Unit
_____	Procedure 2-7. Checking and Setting Input Voltages on Base Power Units
_____	Procedure 2-8. Grounding the Base Power Unit
_____	Procedure 2-9. Grounding the Branch Circuit
_____	Procedure 2-10. Installing the Power Entry Module
_____	Procedure 2-11. Wiring the Power Entry Module With a Base Power Unit
_____	Procedure 2-12. Securing the Right Angle Connectors
_____	Procedure 2-13. Inserting and Removing Power Supplies
_____	Procedure 2-14. Inserting Critical Modules
_____	Procedure 2-15. Connecting the Clock Module (ASP1) to Internal Components
_____	Procedure 2-16. Inserting the Link Interface Module (SFT/SWT)
_____	Procedure 2-17. Inserting Interface Modules (Services)
_____	Procedure 2-18. Labeling

TABLE 2-2. BNS-2000 MPC Installation Checklist (continued)

√	MPCs in CO Environments
_____	Procedure 2-1. Preparing for MPC Installation
_____	Procedure 2-2. Unpacking the MPC
_____	Procedure 2-19. Installing Dollies to Move the CO Frame
_____	Procedure 2-20. Anchoring the CO Frame
_____	Procedure 2-21. Installing the CO Frame
_____	Procedure 2-22. Installing Cables and Kickplates as a CO Frame
_____	Procedure 2-23. Installing and Removing the Power Entry Module
_____	Procedure 2-24. Making CO Frame Power Connections
_____	Procedure 2-10. Installing the Power Entry Module
_____	Procedure 2-11. Wiring the Power Entry Module With a Base Power Unit
_____	Procedure 2-13. Installing and Removing Power Supplies
_____	Procedure 2-14. Inserting Critical Modules
_____	Procedure 2-15. Connecting the Clock Module (ASP1) to Internal Components
_____	Procedure 2-16. Inserting the Link Interface Module (SFT/SWT)
_____	Procedure 2-17. Inserting Interface Modules (Services)
_____	Procedure 2-18. Labeling

Installation Preparation

To prepare the site for MPC installation, consult your system's *Planning Guide* for recommendations and requirements.

To prepare for the actual installation of the MPC, follow the standard procedures and precautions furnished in **Procedure 2-1. Preparing for MPC Installation.**

PROCEDURE 2-1. Preparing for MPC Installation

1. Before accepting delivery of the MPC, check the shipping package for external physical damage. Shipping damage is typically the carrier's responsibility.
2. To keep the installation site clean, do not unpack the equipment in the room in which it is to be installed.
3. Have the following tools on hand for installing the equipment:
 - screwdrivers

PROCEDURE 2-1. Preparing for MPC Installation (continued)

- 3-inch and 12-inch flat blade
- 14-inch "quick-wedge" or equivalent small screw starting tool
- large and small Phillips®-head

- wrenches
 - 6- or 8-inch adjustable wrench
 - 7/16-inch box wrench
 - 1/4-inch and 7/16-inch nut drivers
 - 1/4-inch drive socket set

- volt-ohmmeter

When equipment must be secured for earthquake protection, electric drills, drill bits, and anchor hardware are also required.

4. Since electronic equipment is easily damaged by electrostatic discharge, wear an electrostatic discharge (ESD) wrist strap when handling modules. For the MPC, grounding jacks for the wrist strap are located on the divider next to slot 15 in the front of the shelf, and near the power entry module on the right end of the slot area in the back.
5. Ensure protection from electromagnetic interference (EMI, see inside front cover).
6. Since the equipment is heavy, schedule someone to help you unpack the equipment.
MPCs and Base Power Units can be moved on a dolly or with a mechanical lift. Mounting a stack of MPCs without the aid of a mechanical lift might require several people. Follow your company's rules for handling heavy equipment.
7. Ensure that the correct node slot has been designated for the concentrator's link interface module. See your system's *Planning Guide* and *Node Reference* for module placement in the node.

Installation

Installing an MPC involves the following major steps:

- unpacking equipment and staging it for installation
- securing the component or the frame that houses the component
- assembling and installing power components and wiring input power to the power components
- inserting modules that are critical to MPC functioning, linking the MPC to the node, and providing end user services

The procedures supplied in these major steps depend on the MPC environment and configuration. Refer to Table 2-1.

Staging

This section contains only the necessary procedures to stage an MPC for installation. Since MPCs can be stacked, initial hardware configurations can expand, and parts occasionally do need to be replaced, optional installation procedures (called *replacement* procedures) are provided.

PROCEDURE 2-2. Unpacking the MPC

Applicability: MPCs in CP or CO environment.

1. Have someone help you unpack the equipment. Each MPC weighs about 100 pounds empty and about 150 pounds with all of the slots filled. An ACD Base Power Unit weighs 105 pounds.

MPCs and Base Power Units can be moved on a dolly or with a mechanical lift. Mounting stacks without a mechanical lift might require several people. Follow your company's rules for handling heavy equipment.

2. Remove the straps that secure the MPC to the pallet.
3. Remove the MPC from the shipping case. Remove any other packaging material.

CAUTION: Grasp only the metal housing of the MPC. The back corners of the MPC are recessed to serve as cable runs. Plastic cable covers snap over the recesses to hide the cables after installation. If these cable covers are in place, do not grab them when lifting the shelf; they will loosen under the strain.

4. Open the front door and rear panel.

The front door is hinged at the bottom and secured with two quarter-turn fasteners in the top corners. Turn the fasteners counterclockwise to open.

The rear panel hangs on two tabs at the bottom and is secured by captive screws at the top. Turn the screws counterclockwise to open.

5. Inspect the modules and I/O boards for obvious physical damage such as dents or misalignment and compare them to the shipping order.
6. Secure the front door and the rear panel by turning the screws clockwise.
7. Verify that the following items were shipped with each MPC:
 - spare fuses
 - a set of L-brackets
 - two grounding straps for the front of the MPC
 - line cords for power connections
 - two cable covers

PROCEDURE 2-3. Unpacking the Base Power Unit

Applicability: MPCs in CP environments.

Base Power Units are shipped with all equipment installed. Interconnecting line cords are included. Brackets for bolting the unit to the floor are also included, if they were ordered.

1. Remove the straps that secure the shipping case to the pallet.
2. Remove the Base Power Unit from the shipping case. Remove packaging material such as tie downs and string.
3. Inspect the housing for mechanical damage.

PROCEDURE 2-4. Anchoring the Base Power Unit

Applicability: MPCs in CP environments with Base Power Units.

To be able to move the Base Power Unit more easily, floor brackets are installed before any MPCs are stacked on the base. Two brackets secure the Base Power Unit to the floor. The L-type bracket is the rear bracket; the short leg goes on the floor. The U-type bracket is the front bracket; the long leg goes on the floor.

NOTE: A minimum of three feet of free space, front and rear, is needed for convenient access to the MPC.

Refer to Figure 2-1 during this procedure.

1. Move the Base Power Unit into its final position.
2. Partially insert the three bolts on the underside of the front of the Base Power Unit. Slide the front U-type bracket in from the side and pull it forward onto the bolts. Mark the floor hole positions and temporarily remove the bracket.
3. Set the rear L-type bracket in place; mark the floor hole positions and temporarily remove the bracket.
4. Drill holes in the floor. Set anchors or through-bolts, if necessary. Shift the cabinet slightly to get it out of the way, if necessary.
5. Move the cabinet back into its final position and reinstall the front U-type bracket loosely as before. Install the floor bolts and tighten both the cabinet and floor bolts on the front bracket.
6. Install the floor and cabinet bolts on the rear L-type bracket.

CAUTION: These brackets are required; they provide the stack with structural rigidity. If they are not installed, Lucent Technologies is not liable for any injury caused by cabinet tilting.

Although MPCs can be stacked in any environment, these configurations are typically *not* used in COs where MPCs are mounted in cabinets. For CO Installations, see "MPCs in a CO" later in this chapter.

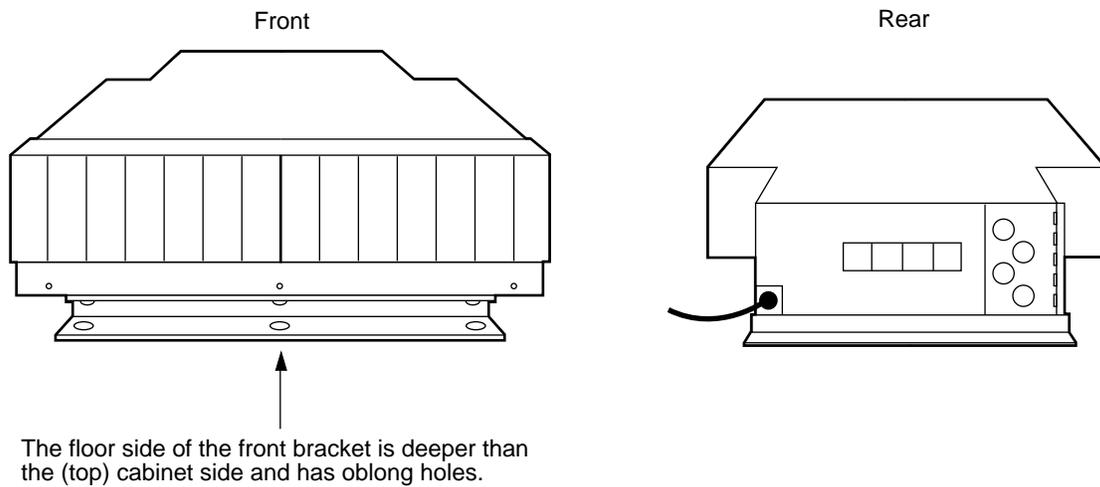


FIGURE 2-1. Base Power Unit Floor Brackets

PROCEDURE 2-5. Assembling a Single MPC with a Base Power Unit

Applicability: One MPC with a Base Power Unit that has been moved to its final site and is secured to the floor; CP environment.

Refer to Figure 2-2 during this procedure.

1. Set the MPC on the Base Power Unit, aligning the sides.
2. Install the special L-brackets (included with the Base Power Unit) to secure the MPC to the Base Power Unit. The screws for the brackets are in their holes. Remove them, position the bracket, and replace and tighten the screws.

NOTE: A set of L-brackets is included with each MPC. Because these brackets are not used with a Base Power Unit, one set of brackets remains.

3. Install the grounding straps on the front of the cabinet.

PROCEDURE 2-6. Assembling Multiple MPCs with a Base Power Unit

Applicability: Two, three, or four MPCs stacked on top of a Base Power Unit that has been moved to its final site and is secured to the floor; CP environment.

Refer to Figure 2-2 during this procedure.

1. Set the MPC on the Base Power Unit, aligning the sides.
2. Install the special L-brackets (included with the Base Power Unit) to secure the MPC cabinet to the Base Power Unit. The screws for the brackets are in their holes. Remove them, position the bracket, and replace and tighten the screws.

NOTE: A set of L-brackets is included with each MPC. Because these brackets are not used with a Base Power Unit, one set of brackets remains.

3. Install the grounding straps on the front of the cabinet.
4. Repeat Steps 2 and 3 for each additional MPC until the stack is completed.

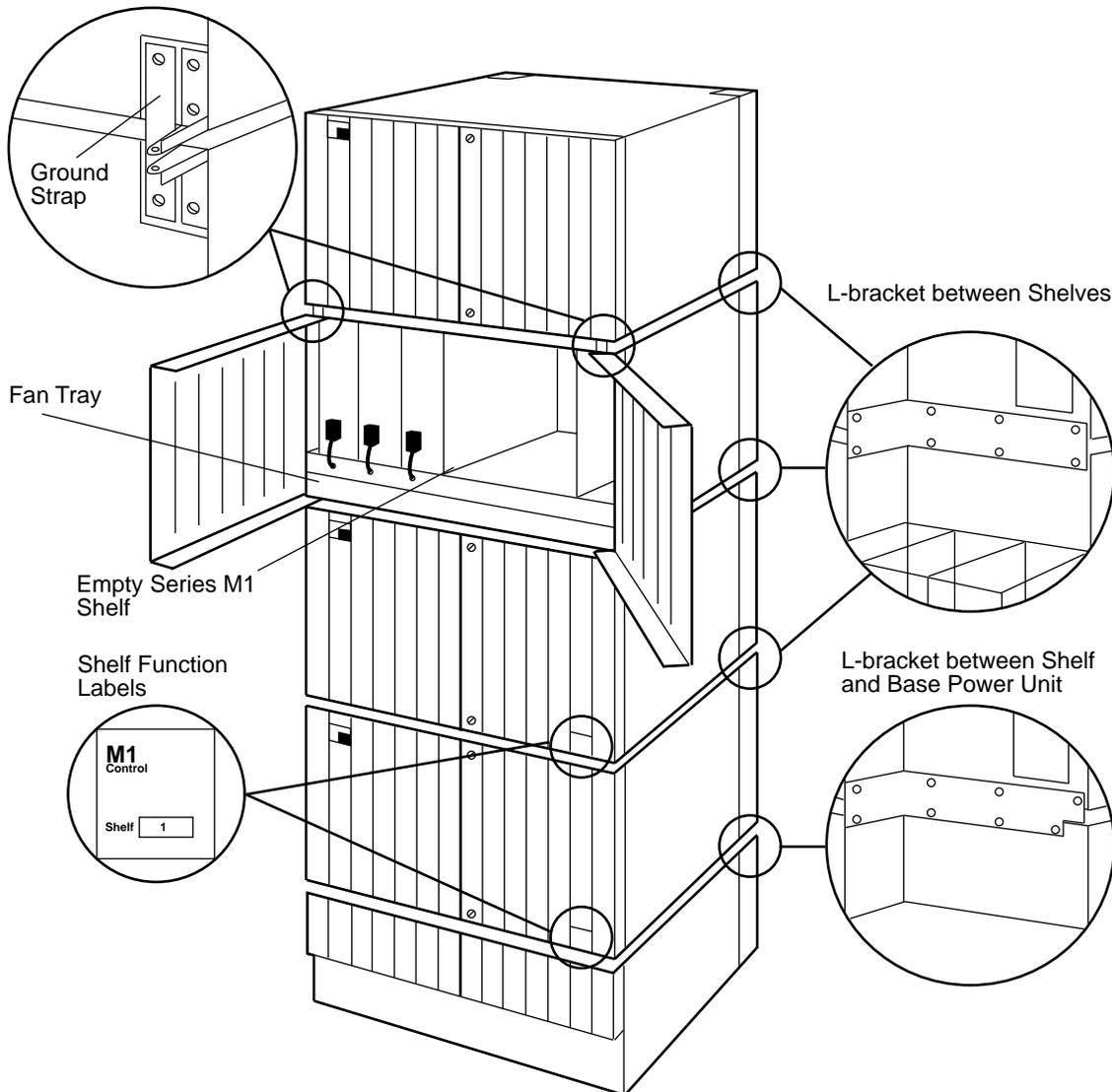


FIGURE 2-2. BNS-2000 MPC Shelves With Base Power Unit: Stacked and Secured

Base Power Unit Wiring

The input power can be connected by conduit or line cord. The input opening on the back panel of the Base Power Unit is 1-inch trade size (1.375 inches) to accommodate 8- or 10-gauge SO three-conductor line cord or 1-inch conduit as shown in Figure 2-3.

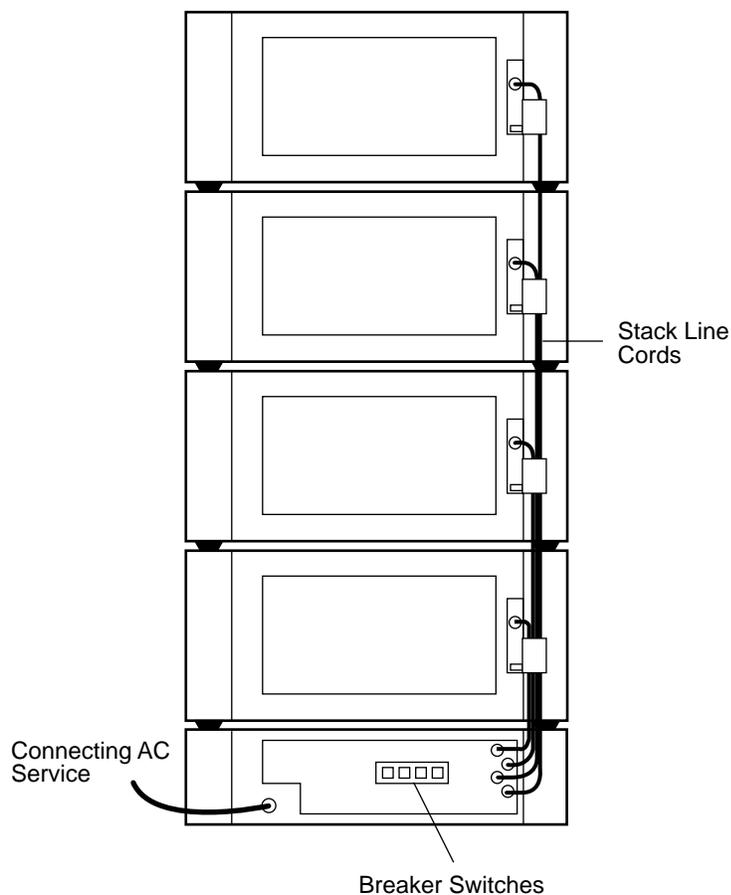


FIGURE 2-3. Base Power Unit Wiring for an MPC Stack

The following line cords are available for USA installations where permitted by code:

- *208 VAC - 30 A rating, NEMA L21-30P, Hubbell p/n 2811.* This line cord is used with the NEMA receptacle L21-30R, Hubbell p/n 2810 for the ACD Base Power Unit only.
- *240 VAC - 30 A rating, NEMA L14-30P, Hubbell p/n 2711.* This line cord is used with the NEMA receptacle L14-30R, and Hubbell p/n 2710 for the ACD Base Power Unit only.

Use conduit where required by local codes.

NOTE: With 208 VAC 3-phase, the entire system load is on a single phase.

PROCEDURE 2-7. Checking and Setting Input Voltages on Base Power Units

Applicability: MPCs in CP environments.

1. The ACD Base Power Unit runs on 200–240 VAC. The back door of the unit is equipped and clearly labeled for this voltage range.

PROCEDURE 2-8. Grounding the Base Power Unit

Applicability: MPCs in CP environments.

Grounding terminals are located in the rear of the unit; they provide a single-point ground connection. The terminals are 1/4-20-thread and positioned 3/4 inches apart.

Refer to Figure 2-4 during this procedure.

1. For applications requiring a single ground point, use 6-gauge wire. The ground wire exits from the cabinet in the cable management area near the hinge of the back door. Figure 2-4 shows the terminal block and ground connection, to the left inside the back door.
2. Connect the green (ground) wire of the line cord to the **GND** terminal. Connect the black or brown (live) wire to **L(L1)**. Connect the white or blue (neutral) wire to **N(L2)**.

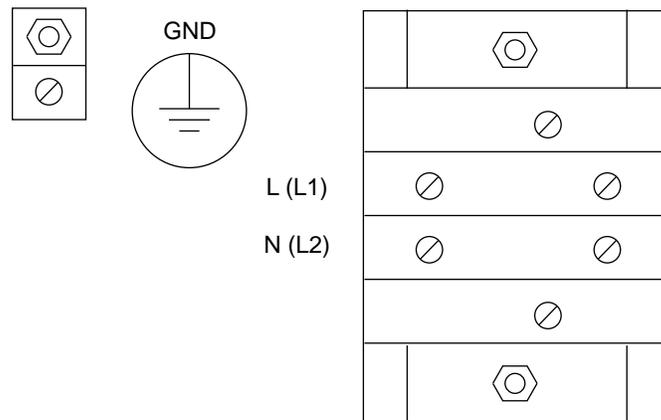


FIGURE 2-4. Terminal Block and Grounding Connections

PROCEDURE 2-9. Grounding the Branch Circuit

Applicability: Any stack of one or more MPCs in a CP environment in which the current to earth ground exceeds 5 mA.

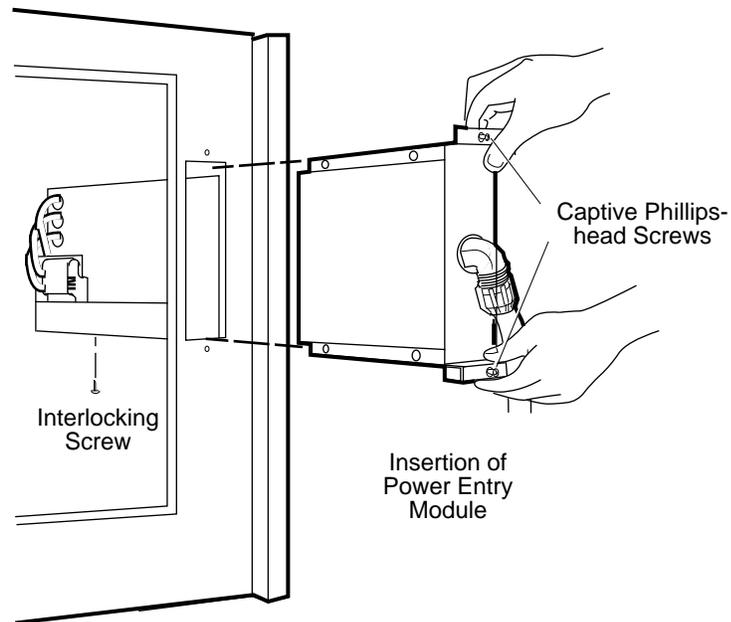
1. Install an insulated grounding conductor as part of the branch circuit that supplies the node. This conductor is identical in size, insulation material, and thickness to the grounded and ungrounded branch-circuit conductors, except it is green or green with yellow stripes.
2. Ground the grounding conductor to earth at the service equipment ground or other acceptable building earth ground.
3. The attachment-plug receptacles near the node must be a grounding type. Connect the grounding conductors serving those receptacles to earth ground at the service equipment ground or other acceptable building earth ground.

PROCEDURE 2-10. Installing the Power Entry Module

Application: All MPC stacks.

Requirements: Series M1 shelves use the ED3P302-30,G5 (for AC).

Install the power entry module before plugging in the line cord. Always power down the shelf before removing its power module.

PROCEDURE 2-10. Installing the Power Entry Module (continued)**FIGURE 2-5. Inserting the Power Entry Module**

1. Remove the interlocking screw from the bottom of the housing.
2. Slide the module into its recess until the connector seats.
3. Tighten the two captive Phillips-head screws on the back of the module.
4. Install the interlocking screw through the hole in the slide and tighten it.
5. Removal is done in the reverse order.

PROCEDURE 2-11. Wiring the Power Entry Module With a Base Power Unit

Application: MPC Stacks with a Base Power Unit.

Requirements: Series M1 shelves use the ED3P302-30,G5 power entry module.

1. Remove the power entry modules from each shelf. (Keep track of the shelf type from which the power entry module was removed.)
2. Connect the appropriate length of line cord (ED2P324-30,G25 through G28) to each power entry module.
 - a. Connect the green wire to the grounding lug near the opening of the power entry module.

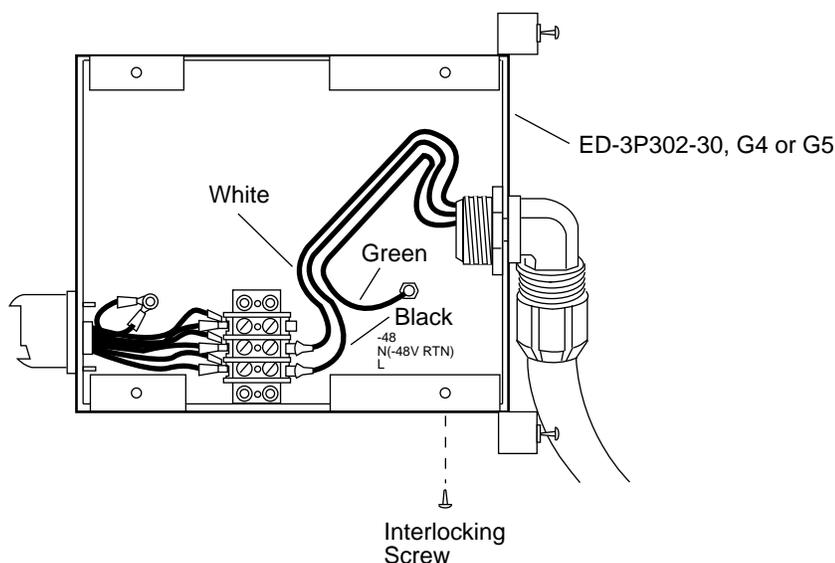


FIGURE 2-6. Wiring the Power Entry Module

- b. Connect the white wire to the neutral, N(-48V RTN), terminal.
 - c. Connect the black wire to the live, L, terminal.
3. Re-install the power entry modules in the shelves.
4. Install cord retainer brackets on all shelves except the topmost shelf:
 - a. Hold the bracket with the two grooved tabs to the left, so the cord retainer is to the lower right of the bracket.
 - b. Unscrew the two captive Phillips-head screws on the rear of the power entry module. Pull the screws out toward you, but do not remove them from their captive nut.

PROCEDURE 2-11. Wiring the Power Entry Module With a Base Power Unit
(continued)

- c. Insert the two tabs of the bracket under the screws; then tighten the screws.
5. Insert the line cords into the cord retainer brackets. Insert the longest cord first; work from top to bottom and feed the cords down toward the Base Power Unit.
6. Insert the line cords through the appropriate holes on the rear door of the Base Power Unit. (The holes are marked with shelf numbers.)
7. Open the rear door of the Base Power Unit and plug the line cords into the appropriate connectors.
8. Close the rear door of the Base Power Unit.
9. To complete the installation of shelves and power wiring for the MPC stack, go to the procedure for Inserting and Removing Power Supplies.

PROCEDURE 2-12. Securing the Right-Angle Connectors

Applicability: MPCs in CP environments.

Refer to the bottom portion of Figure 2-3 during this procedure.

1. Unscrew the large nut on the inside of the module, but leave it on the wire.
2. Insert the plug through the hole in the Base Power Unit or power entry module.
3. Slide the nut at an angle through the wide rectangular part of the hole.
4. Insert the threaded part of the right-angle connector into the hole.
5. Turn the nut firmly onto the threads.
6. Connect the plug to the wiring.

Power Supply Installation

The two power supplies used in MPC configurations are the 611C or ACX582 power supply (for all CP installations with AC input power) and the DCX1836 power supply (used only for CO installations with DC input power [-48V]).

PROCEDURE 2-13. Inserting and Removing Power Supplies

Application: All MPC stacks.

1. Loosen the screws on the power cord cover.
2. Fold down the power cord cover so that it does not block the slot for the power supply unit.

PROCEDURE 2-13. Inserting and Removing Power Supplies (continued)

3. Slide the interlock tab over the power receptacle and pull the latch down.
4. Slide the unit into the card guide until it seats on the pin field. If it does not seat easily, remove it and check for bent pins or other obstructions.
5. When the unit is seated, push the latch up and move the interlock tab over the latch.
6. Plug a power cord from the power entry module into the receptacle on the power supply.
7. Fold up the power cord cover and tighten the screws.
8. Reverse the process to remove the power supply.

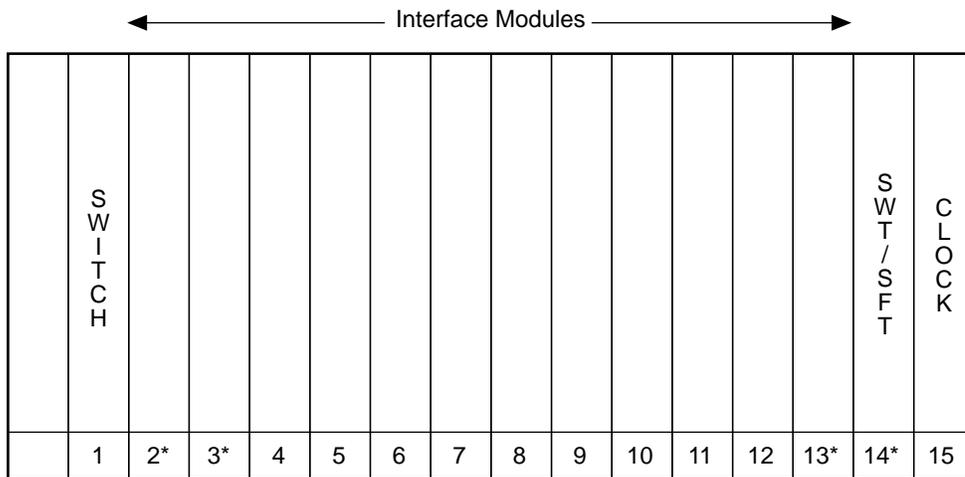
Module Insertion

The last steps that need to be followed when installing an MPC in a CP or CO environment include setting switches and inserting modules into their appropriate slots. These modules include the following:

- critical modules such as the Clock module, its ASP1 I/O board, and the Switch module
- link interface module(s) and their respective I/O board(s) (these modules connect the concentrator to the node)
- interface module(s) and their respective I/O board(s) (these modules provide user services to the remote site)

NOTE: On the MPC, the backplane bus terminating resistor (ED5P056-30, G2) is factory-installed on backplane pins 213 through 224 and pins 313 through 324 behind physical slot 0.

Figure 2-7 shows the slot allocation of an MPC.



* Magic-capable slot

FIGURE 2-7. MPC Slot Allocation and Magic-capable Slots

Slots 2 to 13 are available for supported interface modules. See your *System Description* for the modules supported in your configuration.

PROCEDURE 2-14. Inserting Critical Modules

Applicability: MPCs in CP and CO environments.

The critical modules are the Clock module, its ASP1 I/O board, and the Switch module.

Refer to Figures 2-7 and 2-8 and Table 2-3 during this procedure. In addition, a detailed explanation of how to install an I/O board and its module board is furnished in **Procedure 2-17.**

Inserting Interface Modules (Services).

1. Select the appropriate switch settings for the ASP1 I/O board from Table 2-3. (Some boards appear functional with incorrectly set switches. Always verify that the switches are set correctly.)

The positions shown in Table 2-3 apply when you hold the board with the backplane connector to your left, the interface connectors to your right, and the switches facing you. A slide switch is moved in the specified direction. A rocker switch is pushed in on the specified side.

Switch 1 on the ASP1 I/O board identifies the cabinet as an MPC; switch 2 and switch 3 identify the unit as Cabinet 0 in a single-cabinet installation.

PROCEDURE 2-14. Inserting Critical Modules (continued)**TABLE 2-3. ASP1 I/O Board Switch Settings**

Switch 1 Positions	MPC	Switch 2 Positions	MPC	Switch 3 Positions	MPC
1	ON	1	ON	1	ON
2	ON	2	ON	2	ON
3	ON	3	ON	3	ON
4	ON	4	ON	4	N/A
5	ON	5	ON		
6	OFF	6	ON		
7	ON	7	OFF		
8	N/A	8	N/A		

2. Install the ASP1 I/O board (before the Clock module) in slot 15. Secure it and connect the cables.
3. Install the Clock module in slot 15. (Make sure Steps 1 and 2 have been completed before the Clock module is installed.)
4. Install the Switch module in slot 1. (The Switch module does not have a corresponding I/O board.)

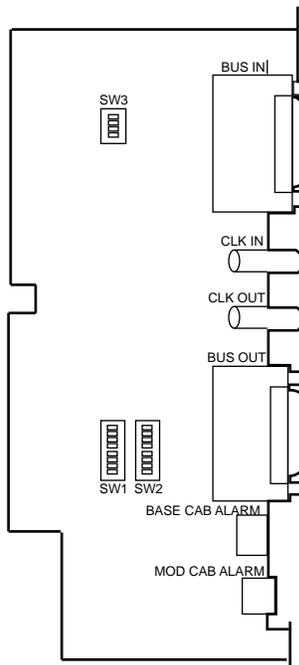


FIGURE 2-8. ASP1 I/O Board

PROCEDURE 2-15. Connecting the Clock Module (ASP1) to Internal Components

Applicability: All MPCs in CP and CO environments. The critical modules have been inserted.

Refer to Figure 2-8 for the location of the connectors on the ASP1 I/O board. In addition, a detailed explanation of how to install an I/O board and its module board is furnished in

Procedure 2-17. Inserting Interface Modules (Services).

1. Remove the Clock module from its slot.
2. Plug the MPC fan power cable into the MOD CAB ALARM receptacle on the ASP1 I/O board in each MPC.

CAUTION: If this cable is not connected, alarms are sent to the network administrator's console. In addition, continued operation with the fan power cable disconnected can result in cabinet overheating and circuit pack failure.

3. Reinsert the Clock module into its slot.

PROCEDURE 2-16. Inserting the Link Interface Module (SFT/SWT)

Applicability: MPCs in CP and CO environments with or without an optional cold spare link interface module. The critical modules have been inserted; the ASP1 I/O board has been connected to the fan.

The primary link interface module, which can be an SFT or SWT, is typically installed in slot 14 for communication with the node. Slots 2, 3, and 13 can be used for a cold spare.

The link interface module that communicates with the node must have *magic* enabled for its slot. When enabled, magic allows the SFT or SWT to appear as a controller.

Refer to **Appendix B** and Figure 2-7 during this procedure.

1. Consult **Appendix B** for the correct switch settings to enable magic on the particular link interface module I/O board being used in your configuration.
2. Enable magic for the slot.
3. Insert the I/O board into the proper slot.
4. Insert the SFT/SWT module board into the proper slot.
5. If the configuration requires a cold spare, repeat the preceding steps and install the cold spare in the proper slot.

PROCEDURE 2-17. Inserting Interface Modules (Services)

Applicability: MPCs in CP and CO environments that have critical and link interface modules inserted.

Consult your *System Description* for the user services available for your configuration; consult the particular module reference for I/O board switch settings.

Refer to Figure 2-7 during this procedure.

1. Verify that the slot in which the module and its I/O board are to be installed is free.
2. Consulting the particular module reference associated with the service being provided, set any switches on the I/O board being used.
3. Align the I/O board backplane connector with the backplane pin field at the rear of the shelf. Insert the board so that the backplane connector slips onto the pins. The board should seat easily. If seating is difficult, the board might be canted or some pins might be bent.
Insert the screws and tighten them securely.
4. Set the mode switch on the module faceplate to DISABLE.
5. With the module latch extended, carefully push the module all the way into the slot. The backplane pins will slip into the module receptacle.
6. Close the latch to lock the module into position.

PROCEDURE 2-17. Inserting Interface Modules (Services) (continued)

7. Move the mode switch on the module faceplate to ENABLE.

PROCEDURE 2-18. Labeling

Applicability: MPCs in CP and CO environments.

The labels for a single MPC are distributed on a sheet. Instructions for positioning and applying the labels are illustrated on the sheet.

Put the **cabinet front** label on the vertical strip of metal inside the front door below the module slots. Put the **cabinet rear** label on a vertical part of the inner frame, just below the lower tabs of the I/O boards. Each strip takes up the entire length of the mounting space.

1. Keep labels flat until used, and modify them as needed.
2. For cabinet address labels, type or print the following information:
 - the name of the node to which the MPC is linked
 - the node slot number in which the link interface module that provides connectivity to the MPC is located

As shown on the sheet, the cabinet address labels slip into a holder on the door.

3. After completing the information on the labels, slide the labels into the label holder on the door.

Power Testing

Once the MPC is assembled, power cabling has been completed, and the critical modules (and optionally, the link interface modules and interface modules that provide end user services) have been inserted, the power components must be tested.

Power supplies are tested by measuring input voltage during the initial power-up. Minimally, the Clock module must be installed. Base Power Units are also tested. Refer to **BNS-2000 MPC Troubleshooting** for the appropriate power testing procedures.

BNS-2000 MPCs in a CO

In a CO environment, MPCs are installed in a CO frame. The CO frame consists of four uprights, a base assembly, and a top. An extension is available to raise the top of the frame to seven feet for sites requiring this height. The CO frame accommodates R-3407A (5ESS®) switch dollies so it can be moved.

Occasionally, MPCs can already be mounted in the CO frame when shipped. Therefore, there are two ways to approach an installation:

- Install the dollies on the CO frame, install the MPCs, move the frame to its final installation site, then anchor the CO frame to the floor.

—*or*—

- Install the dollies on the CO frame, move the frame to its final installation site, anchor the frame to the floor, then install the MPCs.

CAUTION: If the CO frame was shipped with the MPCs already mounted, remove the MPCs from the frame before attempting to move the frame off the skid if you do not have a hoist. See **Procedure 2-26. Installing the CO Frame** to remove and replace the MPCs.

The exposed sides of the frame are masked with white side panels; see Figure 2-9.

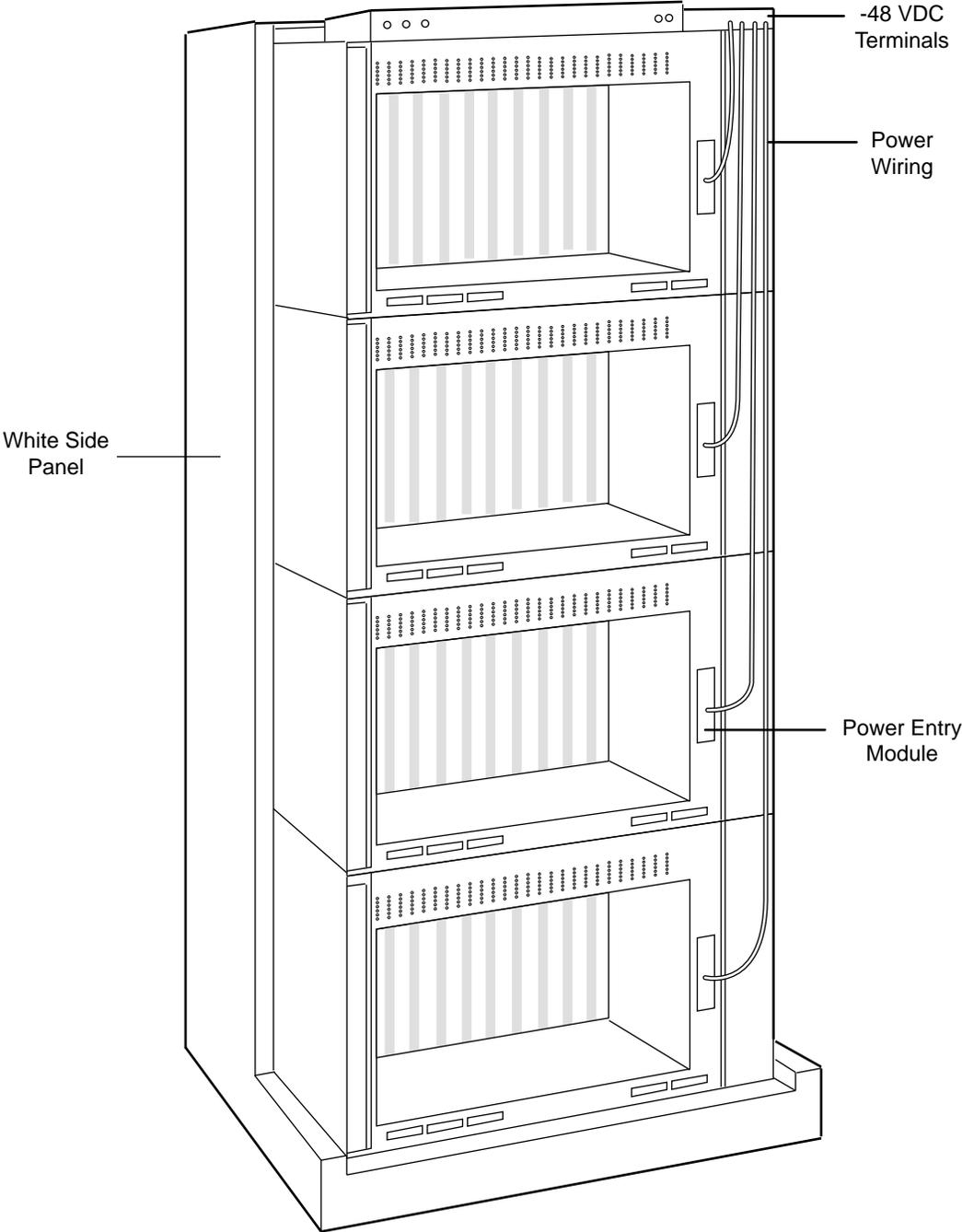


FIGURE 2-9. CO Frame (Rear View)

PROCEDURE 2-19. Installing Dollies to Move the CO Frame

Applicability: CO frames that must be moved to final installation site. With one R-3407A dolly on each corner, you can safely move a fully loaded frame.

Refer to Figure 2-10 during this procedure.

1. Pull the latch back and slip pins into the frame.
2. Turn the thumbwheel to clamp the dolly tightly.
3. Extend the casters in turn so the frame stays close to vertical.
4. Reverse Steps 1 to 3 to remove the dolly.

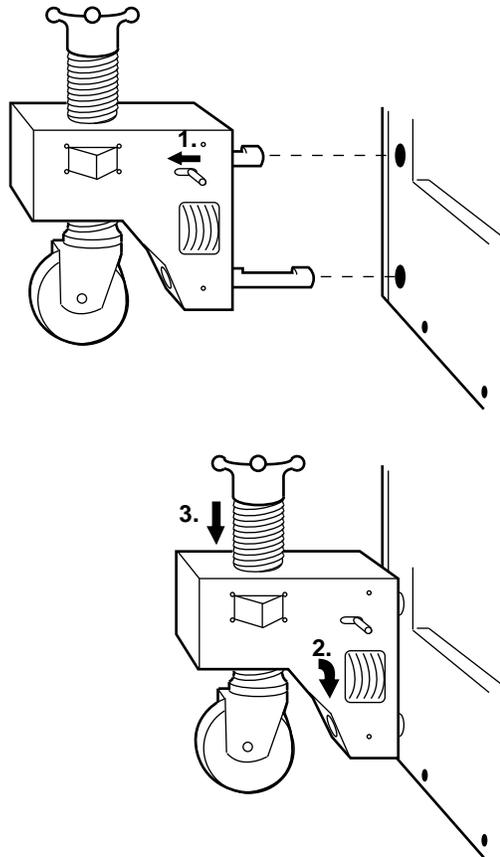


FIGURE 2-10. CO Frame Dollies

PROCEDURE 2-20. Anchoring the CO Frame

Applicability: MPCs in a CO environment.

For two adjacent frames, the two holes near the top and bottom of the frame can be used to bolt the frames together. The frames can then be anchored to the floor.

NOTE: Four bolt positions are in each corner of the base, but only one bolt is needed in each corner.

Refer to Figures 2-11 and 2-12 during this procedure.

1. Using the dollies, move the frame to its final position and lower it to the floor. Remove the dollies.
2. Each corner of the base has four drilling positions for holes. If you are installing the frame on a reinforced concrete floor, mark all four positions in each corner on the floor. On other floors, mark only the position designated **1** in the figure.
3. Using the dollies, move the frame away from the marks so you can drill the holes.
4. Drill position **1** first. If you hit an obstruction, try holes **2**, **3**, and **4**, in that order, until you can drill a hole deep enough for an anchor.
5. Install the anchors.
6. Using the dollies, move the frame to its final position and lower it to the floor. Remove the dollies. Anchor the frame. The hold down and insulator arrangement is shown in Figure 2-11.

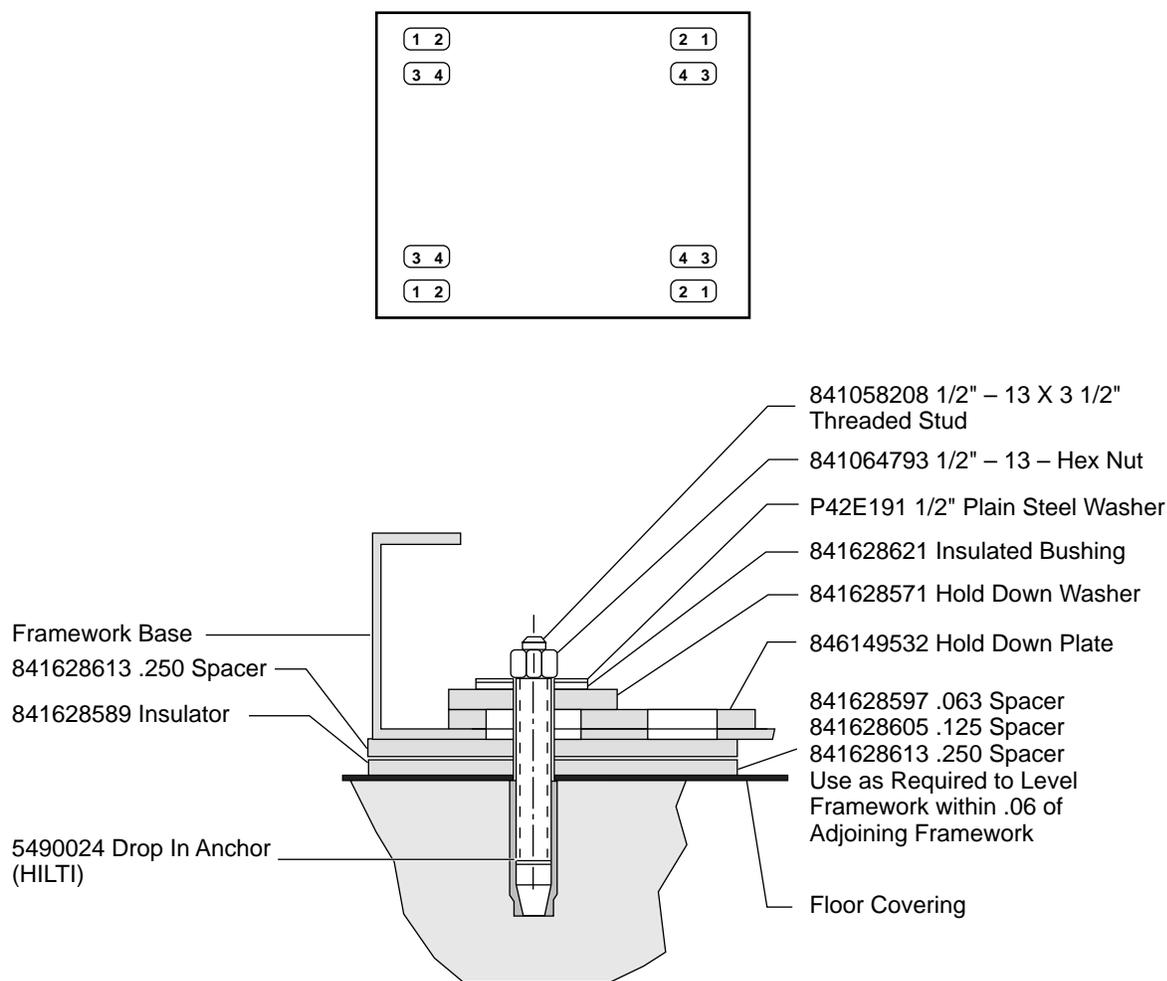


FIGURE 2-11. CO Frame Anchors

PROCEDURE 2-21. Installing the CO Frame

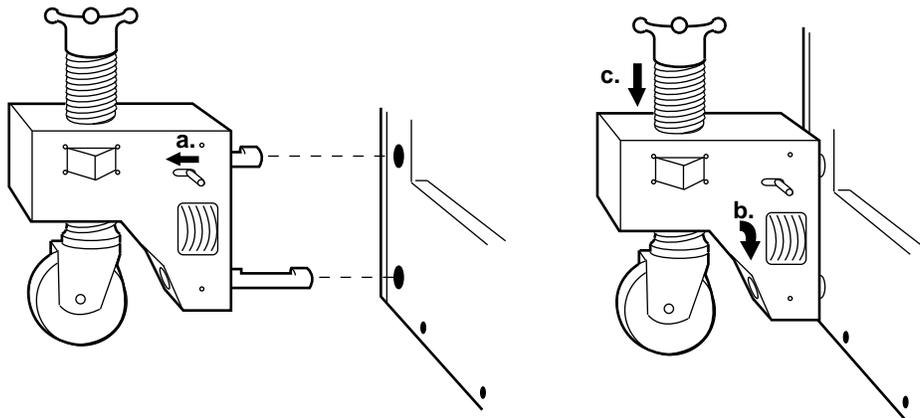
Application: MPCs in a CO environment.

NOTE: If a hoist is unavailable, remove the shelves from the frame before attempting to move the frame off the skid.

1. Remove the front and rear kickplates from the frame to expose the access holes in the base of the frame.

PROCEDURE 2-21. Installing the CO Frame (continued)

2. Unbolt the frame from the packing skid.
3. Using dollies, move the frame to its final position and lower it to the floor. Install one R-3407A dolly on each corner as follows:
 - a. Pull the latch back and slip the pins into the holes on the frame base; see the following figure.
 - b. Turn the thumbwheel to clamp the dolly tightly against the frame.
 - c. Extend the casters, gradually, in each corner to keep the frame near vertical.
 - d. Reverse this sequence to remove the dolly.

**FIGURE 2-12. Moving the CO Frame**

4. There are four bolt positions in each corner of the base, but only one bolt is needed in each corner. The other three positions are for alternative use in case an obstruction is hit. If the frame is being installed on a reinforced concrete floor, mark all four positions in each corner; see the following figure. On other floors, mark only the position designated 1.
5. Move the frame away from the marks to drill the holes.
6. Drill position 1 first. If an obstruction is hit, try positions 2, 3, or 4.
7. Install the anchors (provided with the frame) into the drilled holes.
8. Move the frame into position over the holes and bolt the frame to the floor using the hold down, insulator, and spacers provided; see the following figure.

PROCEDURE 2-21. Installing the CO Frame (continued)

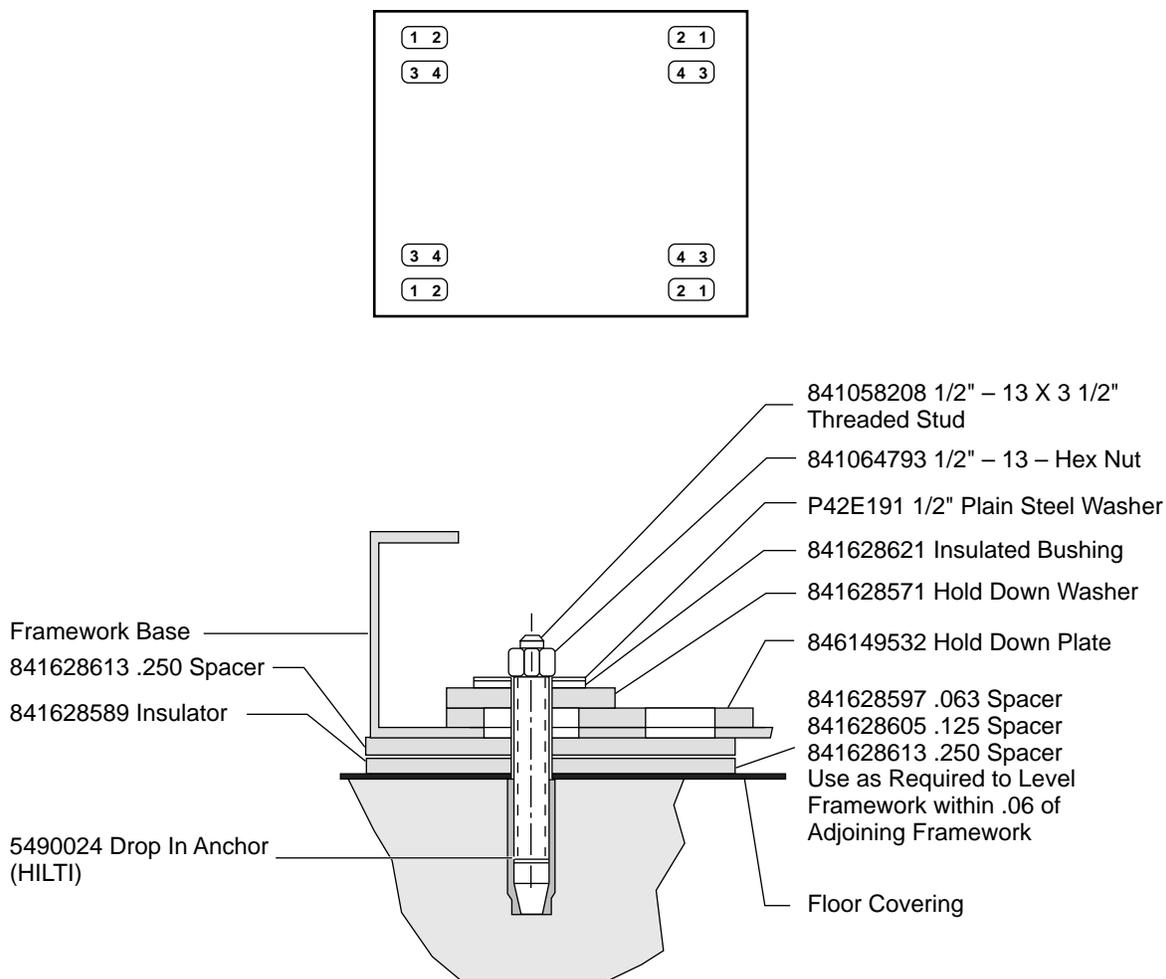


FIGURE 2-13. Securing the CO Frame

9. When two or more adjacent frames are installed, the frames must be bolted to each other as well as to the floor. When bolting the frames together, remove the side covers on the adjacent sides of the frames.
10. There are four holes on the sides of the frame, two near the top and two near the bottom. Bolt the right frame to the left frame using the hex bolts and lock washers provided with the frame.
11. Re-install the front and rear kickplates and the shelves (if required).
12. *If a frame extension is required*, bolt the extension bracket to the top of the frame using the hex bolts, lock washers and flat washers provided with the frame.

PROCEDURE 2-21. Installing the CO Frame (continued)

Snap the front cover for the extension bracket to the front of the extension bracket.

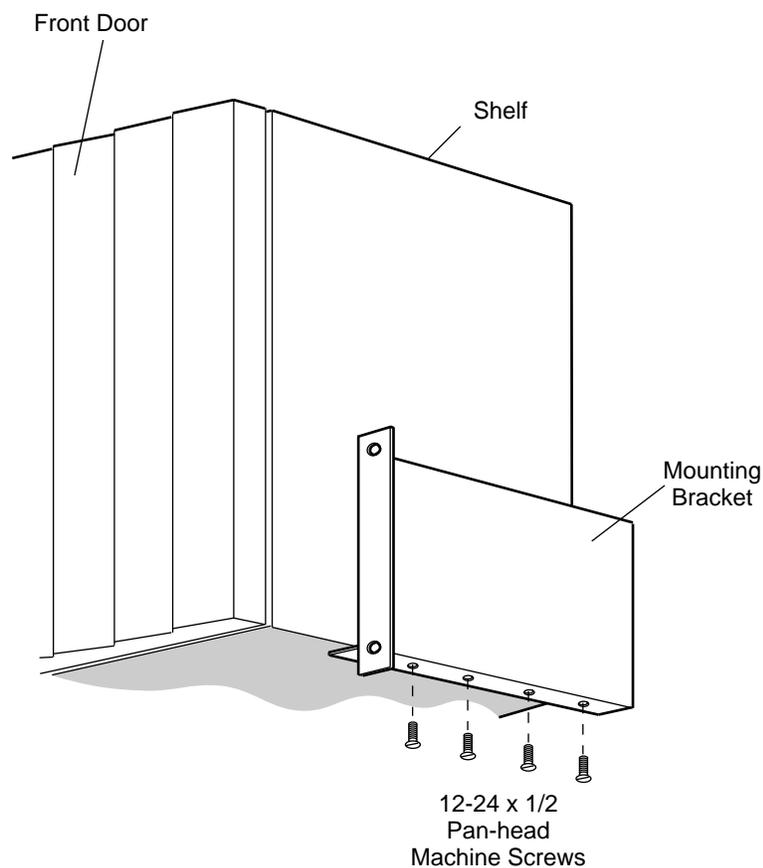


FIGURE 2-14. Attaching Shelf Brackets

PROCEDURE 2-22. Installing Covers and Kickplates on a CO Frame

Application: MPC stack installed in CO frame.

1. Two identical, rectangular covers are used for each frame. Place five thread-cutting screws (provided with covers) in each upright and one on the top to hold the covers in place.

On a two-frame node, where the frames are in contact or very near each other, install side covers only on the outside of the frame.

PROCEDURE 2-22. Installing Covers and Kickplates on a CO Frame (continued)

2. The stiles are held in place with clips. To install a stile, press it against the upright with the bottom about an inch above the floor and slide it down until the clips catch.
3. Slide the kickplates horizontally into place and use the two screws provided to attach the rails to the frame. The front rail is shorter; it fits between the uprights.

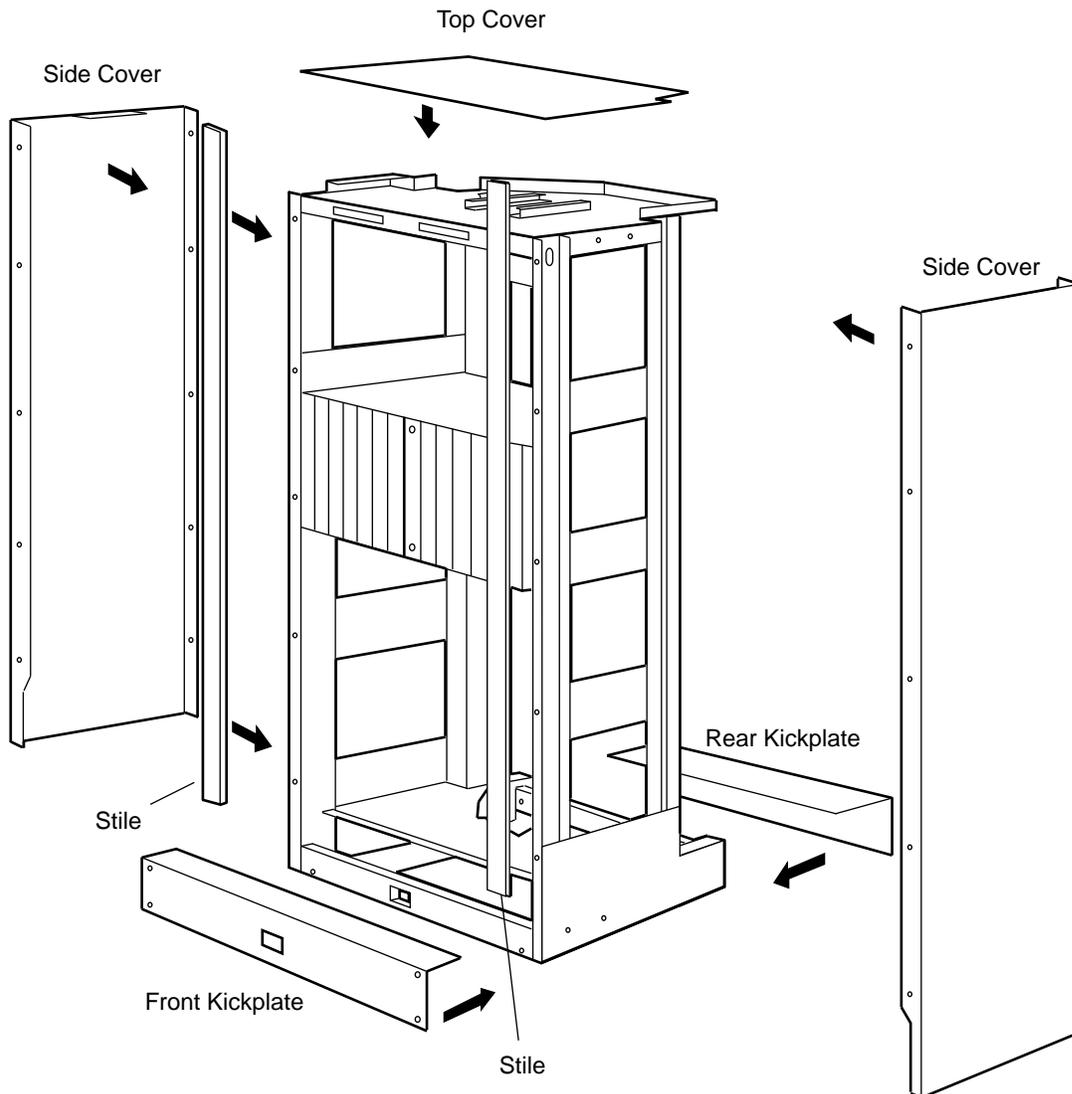


FIGURE 2-15. CO Frame Covers

CO Frame Power Connections

The DC building power (-48V) is fed to a terminal strip on the back panel at the top of the CO frame, with a separate connection for each installed cabinet. From the terminal strip, wires lead to individual breakers on the front panel and back to the bottom of the terminal strip, from which wires lead to the cabinet. Wiring and ground connections are shown in Figure 2-16.

NOTE: Do not install wiring for vacant cabinet positions.

The ED3P302-30, G7 power entry module accepts -48 VDC input power.

PROCEDURE 2-23. Installing and Removing the Power Entry Module

Applicability: ED3P302-30, G7 power entry modules installed in MPCs in CO environments.

Refer to the following figures during this procedure.

1. Remove the interlocking screw from the bottom of the housing. (The location of the interlocking screw is shown in Figure 2-5.)
2. Slide the module into its recess until the connector seats.
3. Tighten the two captive Phillips-head screws on the back of the module.
4. Install the interlocking screw through the hole in the slide and tighten it.
5. Removal is done in the reverse order.

PROCEDURE 2-24. Making CO Frame Power Connections

Application: CO nodes.

Requirements: Use #6 AWG conductors for the grounding connections.

Always wire all four feeds, A through D, regardless of the number of shelves in the frame. Each feed must be provided with approved overcurrent protection not to exceed 60 amps.

1. The ED3P302-30, G7 power entry modules accept the -48/-60 VDC input power for CO installations. Make the wiring and ground connections shown in the following figure.
2. Ground the CO frame at a single point. Grounding points are available on both sides of the top. In two-frame installations, the frames are connected by a ground conductor, and the node as a whole is grounded to the building ground from a single point only.

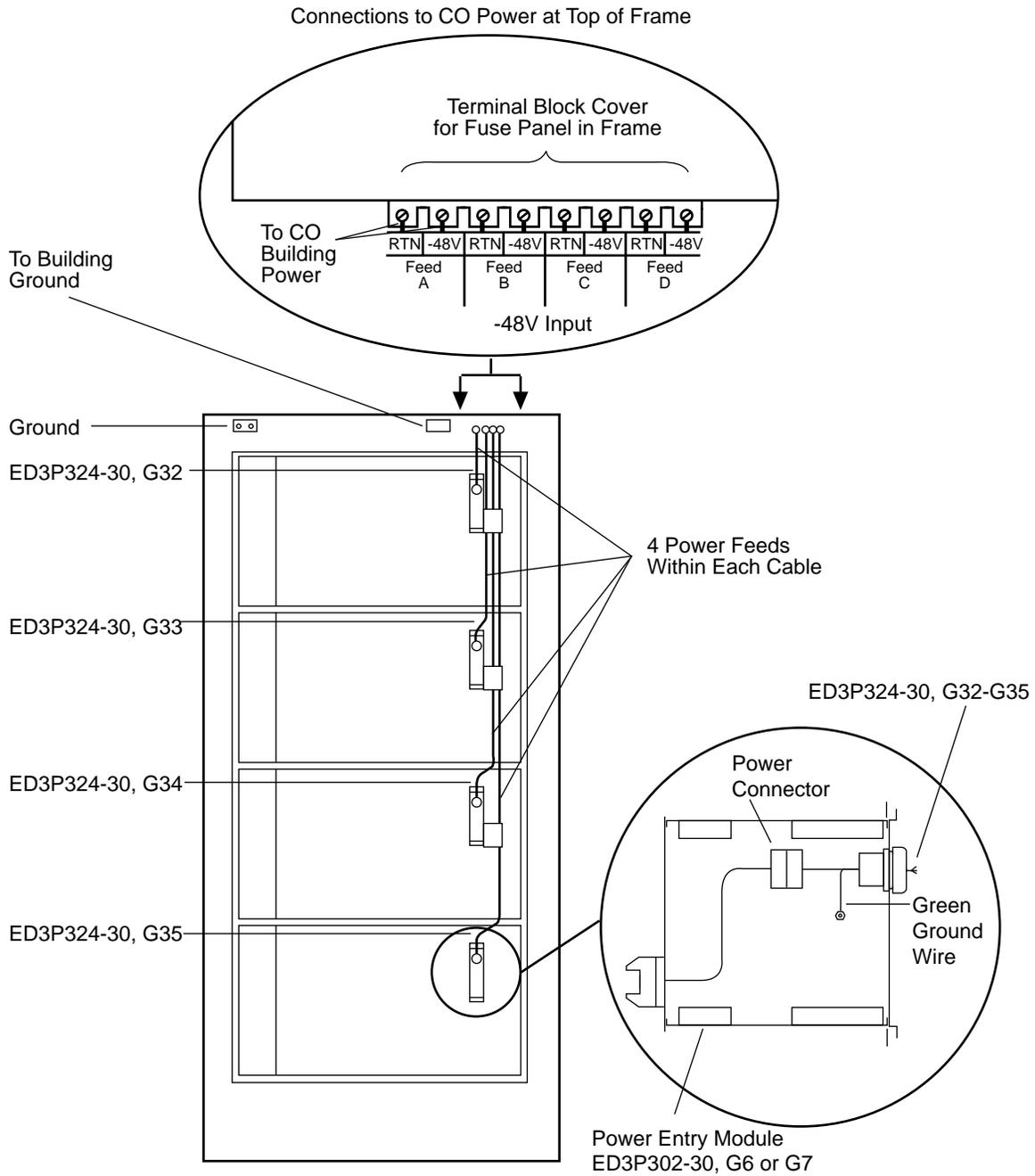


FIGURE 2-16. Power Wiring in the CO Frame

BNS-2000 MPC Administration

<i>StarKeeper II</i> NMS Administration	3-3
Command Set	3-3
MPC Parameter Considerations	3-4
Module Address	3-5
Concentrator Type	3-6
Link Type	3-6
MPC Administrative Procedures	3-7
MPC Reports	3-10

BNS-2000 MPC Administration

Before BNS-2000 MPC administration can begin, the home node to which the MPC is linked must be entered into the database. For BNS-2000, shelf administration must also be done. Refer to the *Node Reference* for information on the **node** (and, for BNS-2000, **shelf**) commands and for available module addresses (slot numbers).

MPCs are physically connected to the node through two trunk modules, one residing in the node and one residing in the concentrator. Unlike other trunk modules, which are administered with the **enter trunk** command, MPC trunk modules (called *link interface modules [LIMs]* or *links* in this context) are administered with the **enter concentrator** command. These LIMs are the Standard Fiber Trunk (SFT) and the Standard Wire Trunk (SWT).

Unlike most hardware components, the MPC does not have to be associated with a group. It is simply an intermediary device to the node, and only the ports of its resident modules must be associated with groups.

StarKeeper II NMS Administration

MPC administration via *StarKeeper*® II NMS is accomplished by using the pass-through feature and **configure** commands of *StarKeeper* II NMS. Concentrator commands are entered and executed almost as they would be entered and executed on the direct console connection. *StarKeeper* II NMS does not allow all of the same abbreviations nor does it validate input information. Refer to the appropriate *StarKeeper* II NMS documentation for information on accessing the pass-through feature for your node.

Command Set

Information on the MPC and its associated link interface module is added to the database, and thereafter manipulated and checked, with the **enter concentrator**, **change concentrator**, **delete concentrator**, and **verify concentrator** commands. The parameter prompts of the **enter** and **change** commands enable configurable options to be specified in the database. Once specified, these options can be checked with the **verify** command and removed from the database with the **delete** command.

The **restore concentrator** and **remove concentrator** commands control the service state of the concentrator; these commands, which also affect call processing, are often used with administration and maintenance procedures. When modules are resident in the MPC, the execution of **remove concentrator** and **restore concentrator** automatically affects the service state of the resident module. Refer to the description of these commands in **MPC Commands**.

In addition, the **remove** and **restore** commands can be used with **verify oosmods**, which lists all out-of-service concentrators and modules.

The **diagnose concentrator** command is used for concentrator maintenance and troubleshooting, along with other status and maintenance-related commands, such as **dstat concentrator** and **dmeas concentrator**.

TABLE 3-1. MPC Command Set

Administration	Operation	Maintenance	Related Objects
change concentrator delete concentrator enter concentrator verify concentrator	remove concentrator restore concentrator	diagnose concentrator dmeas concentrator dstat concentrator	comment measurements module node* oosmods schedule shelf*
* This object must be entered before configuring a concentrator in the database.			

MPC Parameter Considerations

Some parameter specifications that are made during an iteration of **enter concentrator** or **change concentrator** do not affect other parameters or database elements entered, or the general performance of the network or node. Other parameters require special consideration because of the nature of the hardware configuration or the application being supported. These parameters are explained in this section.

The syntax of **enter concentrator** described in **MPC Commands** and the database entry forms provided in **Appendix C** give the correct prompting sequence for the concentrator type being entered. In addition, the parameter definitions provided in **enter concentrator** supplement the following sections.

Module Address

The **MODULE ADDRESS** parameter is used to identify the location, or address, of the concentrator module. The address of the concentrator module depends on the physical placement of its link interface module (its SFT or SWT) in the node. Its address is represented as:

<module>

Where: *module* represents the number of the node slot that the concentrator's link interface module (SFT or SWT) occupies.

If an interface module is installed into the concentrator, its address is represented as:

<concentrator/module>

Where: *concentrator* is the number indicating the node slot number that the concentrator's link interface module (SFT or SWT) occupies; and *module* is the number indicating the concentrator slot number that the module occupies.

Range of Administrable Module Addresses

The range of administrable module addresses for the node slot that the concentrator's link interface module (SFT or SWT) occupies is explained in the *Node Reference*.

The range of administrable module addresses for the modules that reside in an MPC is 1 to 15. Within this range, only certain module types can be installed and subsequently administered in certain module addresses. Refer to the following table.

TABLE 3-2. MPC Module Address (Slot) Designations

Module Address (Slot Number)	MPC
0	(Redundant) Power Supply or Diagnostic Board
1	Switch
2	Free, or LIM or Spare
3	Free, or LIM or Spare
4	Free
5	Free
6–12	Free
13	Free, or LIM or Spare
14	Free, or LIM or Spare
15	Clock

The "free" slots can be used for interface modules that provide user services.

Module Address Conventions

Depending on the particular command, module addresses can be identified with a *single address entry* or with *multiple address entries*. If a single address entry is allowed, only one module address can be specified. For example:

diagnose concentrator 27

A slight variation of this addressing method is demonstrated with the **verify** command, which allows you to specify either *one* concentrator address or, with the word **all**, *every* concentrator address. For example:

verify concentrator all

Multiple address entries can be specified if the modules are linked to the same node.

For multiple, but not all, address entries you can enter the module address as a range of numbers (x-y), a series of numbers (x,y,z), or a combination of both (x-y,z). Some examples are:

restore concentrator 27-30 (module address for four concentrators linked to the same node)

restore concentrator 27,29 (module address for two concentrators linked to the same node)

restore concentrator 17,28-30 (module address for four concentrators linked to the same node)

Concentrator Type

The type of concentrator being administered in the database is specified at the **CONCENTRATOR TYPE** prompt of the **enter concentrator** command:

- MPCs are designated in the software as *frs*

Link Type

The **LINK TYPE** prompt enables you to specify which link interface module (LIM) is being used to physically connect the concentrator to the node. The link type that can be used is the Standard Fiber Trunk, which is administered in the software as an *sft*, or the Standard Wire Trunk, which is administered in the software as an *swt*.

MPC Administrative Procedures

The initial administration of a concentrator (**Procedure 3-1**) is not hardware dependent—that is, the concentrator does not have to be physically installed before its information is entered in the database. However, for routine administration and operations procedures, such as removing and restoring the concentrator to service or displaying the status of the hardware, concentrator installation is required.

PROCEDURE 3-1. Entering Concentrator Information in the Database

Applicability: Administering an MPC for the first time in the database.

1. Use **enter concentrator** to administer the concentrator. Have your completed database entry forms handy and remember that default values can be specified by pressing or , as shown in the prompted entry examples in **MPC Commands**.
2. Use **verify concentrator** to check your entries.
3. If you made any errors or have to change parameter specifications, use **change concentrator**. If you need to start over, use **delete concentrator** to eliminate all entries made; then begin again with **enter concentrator**.
4. If the concentrator is installed, use **restore concentrator** to bring the concentrator into service.

PROCEDURE 3-2. Making Minor Concentrator Database Changes

Applicability: A minor database change constitutes a change to a few parameter options. The concentrator has already been administered in the database.

1. Remove the concentrator from the in service or suspended state with **remove concentrator**.
(If the concentrator is not removed from service, the only parameter that can be changed is **ENABLE LINK MEASUREMENTS FOR THIS LINK**. See the **change concentrator** command.)
2. Make modifications with **change concentrator**.
If you are specifying a **NEW MODULE ADDRESS**, all information on the concentrator is transferred to the new module address automatically.
3. Check changes with **verify concentrator**.
4. Return the concentrator to service with **restore concentrator**.

PROCEDURE 3-3. Moving Concentrator Information

Applicability: Information pertaining to a concentrator can be moved to another module address (slot) with the **move** command or with a combination of **delete** and **enter**.

Method 1:

1. Remove the concentrator from service with **remove concentrator**.
2. Use **verify module** to ensure that a database entry has not been made for the new module address. (If a database address does exist for the specified module address, the command fails.)
3. Use **move module** to transfer database information from one module address to another.
4. Physically move the hardware.
5. Using the new module address, put the concentrator back into service with **restore concentrator**.

All information on the concentrator, including the interface modules residing in the concentrator, is transferred to the new module address automatically.

Method 2:

1. If **move module** is not appropriate for the situation, use **verify concentrator** to get a report of the configuration data.
2. Remove the concentrator from service with **remove concentrator**.
3. Delete the information on all modules residing in the concentrator with iterations of the appropriate **delete <module>** commands.
4. Use **delete concentrator** to eliminate all information at the existing module address.
5. Use **enter concentrator** to add the information to the new address.
6. Use **enter <module>** to add the new module addresses and the remaining information on all modules residing in the concentrator.
7. Check information entered at the new address with **verify concentrator**.
8. Physically move the hardware.
9. Return the concentrator to service with **restore concentrator**.

PROCEDURE 3-4. Copying Concentrator Information to Another Module Address

Applicability: If an additional concentrator must be installed that requires the same or similar parameter specifications as a currently installed and administered concentrator, database information can be duplicated from one module address to another module address with the **copy** command or with a combination of **verify** and **enter**. (Remember that the **copy module** command does not duplicate any endpoint numbers or ranges.)

Method 1:

1. Remove the concentrator from service with **remove concentrator**.
2. Use **verify module** to ensure that a database entry has not been made for the new module address. (If a database entry does exist for the specified module address, the command fails.)
3. Use **copy module** to duplicate the database information from one module address to another.
4. Return the concentrator to service with **restore concentrator**.

All information on the concentrator, its associated link interface module, and any resident interface modules is automatically duplicated in the new module address.

Method 2:

1. If **copy module** is not appropriate for the situation, use **verify concentrator** to get a report of the existing parameter options specified. Complete the database entry forms furnished in **Appendix C**.
2. Re-enter the information with **enter concentrator**.
3. Check information entered with **verify concentrator**.

PROCEDURE 3-5. Switching to a Cold Standby Link Interface Module

Applicability: MPCs with SFT or SWT link interface modules.

1. Use **remove concentrator** to take the suspended concentrator out of service.
2. Use **change concentrator** to change the addresses of the link interface modules to those of the cold spare.
3. Use **restore concentrator** to bring the cold standby link interface module into service.

NOTE: When modules reside in the concentrator that either specify physical addresses as a PDD destination, or are identified by endpoint numbers or ranges, the **change concentrator** command will not make the necessary modifications to these parameters.

MPC Reports

The following table explains the reports available to assist with analysis of concentrator/network performance, system expansion, troubleshooting, and other routine tasks. In addition, refer to the reports available for the concentrator's resident modules.

TABLE 3-3. Available Reports for Concentrators

Report Topic	Command	Description
comment information	verify comment	Shows the comment information entered into the database for the concentrator and resident modules.
connection/traffic data	display connections	Lists established connections for modules, groups, or hosts. Group names are included.
	display traffic	For BNS-2000, lists established connections for modules, groups, or hosts. Segment counts are included. See your <i>Node Reference</i> .
database size	dbaudit	Shows where database space expenditures occur. If dbresize is used, the database tables are readjusted automatically. See your <i>Node Reference</i> .
measurements	dmeas concentrator	Provides information on the amount of data the link is carrying relative to its capacity, and the number of packets transported in both directions on the link. Overflow, parity, transmission, and synchronization errors are also reported for both sides of the link.
	verify schedule	Verifies the printing schedule for measurement data. Reports must be scheduled through <i>StarKeeper II NMS</i> ; output goes to the BNS-2000 console and to <i>StarKeeper II NMS</i> .
module hardware status	dstat concentrator	Enables you to determine the hardware status of the concentrator and the service state of its link interface module.

TABLE 3-3. Available Reports for Concentrators (continued)

Report Topic	Command	Description
module/port data	verify concentrator	Lists hardware/software data as it currently appears in the configuration database. The concentrator does not have to be installed.
out-of-service modules	verify oosmods	Lists all configured concentrators and modules that are currently out of service.

MPC Troubleshooting

Problem Indicators	4-3
Problem Areas	4-5
Procedures	4-7
MPC Diagnostics	4-14

MPC Troubleshooting

For information about a general, systematic approach to troubleshooting, refer to the *Node Reference*. Using the method outlined there, you can diagnose problems affecting the entire node and isolate localized problems to a concentrator or to one of its resident modules.

Once the problem is isolated to the concentrator, this chapter can help identify and further isolate the problem. It provides problem indicators that are MPC-specific, a checklist of problem areas, and detailed procedures or further references to remedy the problem. This chapter does not explain problem indicators, such as module faceplate light-emitting diodes (LEDs), that are common to all modules; these are explained in the *Node Reference*.

In addition, this chapter does not give problem isolation techniques or procedures for end users or their connected end devices, nor for the user services provided by resident interface modules. Refer to the *Node Reference* and/or to the appropriate module reference.

Problem Indicators

The faceplate indicators for the critical modules residing in the concentrator (the Switch module and Clock module) and the link interface modules (the SFT and SWT) often indicate problems specific to the MPC. In addition, the output of certain alarms can also indicate MPC problems.

Module Faceplate Indicators. The lights associated with the faceplate of the critical modules and the link interface modules are green, yellow, and red. They indicate on-line, off-line, and fault states. When the red light (fault light) is lit, the module circuitry and the database are inconsistent.

When pressed, the reset push button clears the module buffers and registers, and restarts the module application program. The concentrator is taken out of service and connections are terminated.

Command Output. The output of operations commands—such as **diagnose concentrator** and the others listed in Table 4-1—can indicate an existing or potential problem.

Alarms. Alarm output indicates the nature of the problem and often gives a recommended action. For a complete list of alarms and recommended actions, see the *Data Networking Products Messages Reference*.

TABLE 4-1. Command Output

Command	Description	Further Reference
diagnose concentrator	Enables execution of several loopback tests. Test patterns can be looped from the Control Computer to the concentrator and back.	See concentrator diagnostic procedures in this chapter. See diagnose concentrator in MPC Commands .
display connections	Shows established connections for modules, groups, or hosts. Group names are included.	See the <i>Commands Reference</i> .
display traffic	For BNS-2000, shows established connections for modules, groups, or hosts. Segment counts are included.	See the <i>Commands Reference</i> .
dstat concentrator	Enables you to determine the hardware status of the concentrator and the service state of its link interface module. Report output can be compared to that of dstat module , verify concentrator , and faceplate indicators. The report output also provides serial numbers of the link interface module, which can be useful in tracking intermittent hardware failures that occur when a module is moved from configuration to configuration.	See the <i>Commands Reference</i> .
dmeas concentrator	Enables you to receive on-demand measurements for the node and the remote link interface module connected to the concentrator. Reports can also be scheduled. The dmeas report provides information on the amount of data the link is carrying relative to its capacity, and the number of packets transported in both directions on the link. Overflow, parity, transmission, and synchronization errors are also reported for both sides of the link. This data relates primarily to link re-engineering, but also contains information relating to facilities status and hardware failures.	See MPC Commands .
verify shelf	Lists data for the specified shelf and the modules housed in the shelf.	See the <i>Commands Reference</i> .
verify concentrator	Shows all parameter options configured for the concentrator.	See MPC Commands .

Problem Areas

Some problems that arise during system operation can be quickly identified and solved. Other problems are more complex, perhaps involving the inter-relationship of several elements. Whatever the problem, a good start toward a solution is to identify the severity of the problem, what capabilities are affected, the symptoms displayed by the problem, and who is affected.

This chapter is organized to suggest a general approach to troubleshooting; to help you take a first cut at a problem, as common indicators are observed; to identify the problem areas associated with certain indicators; and to further narrow the focus to a particular component. Procedures for correcting the problem are then given.

TABLE 4-2. Problems Checklist

√ Symptoms/Indicators	Possible Causes	Actions
<p>___ End users unable to connect to node. (They report no DESTINATION: prompt.)</p> <p>___ BUSY received when call is attempted to an endpoint on a module residing in the concentrator.</p> <p>___ No connections can be made over the link; call processing is interrupted.</p> <p>___ Concentrator information cannot be deleted. The delete concentrator command fails.</p> <p>___ Database changes made with change concentrator have not taken effect.</p> <p>___ Attempts to add and/or restore interface modules in the concentrator failed.</p> <p>___ Alarm output: Cannot auto-restore concentrator. Not enough switch memory allocated.</p>	<p>Concentrator is in the suspended-service state. (The concentrator's autorestore attempts may have failed.)</p> <p>Concentrator is in the out-of-service state.</p> <p>Faulty end device.</p>	<p>Use restore concentrator to put the concentrator back into service.</p> <p>Follow Procedure 4-6. Solving Suspended Service State Problems.</p> <p>Follow Procedure 4-7. Solving Problems when Administering Resident Modules.</p> <p>Follow the procedures for running MPC diagnostics at the end of this chapter.</p> <p>See the <i>Node Reference</i> for procedures regarding end user/device problems (modem pool).</p> <p>See appropriate vendor documentation for connected end device.</p>

TABLE 4-2. Problems Checklist (continued)

✓ Symptoms/Indicators	Possible Causes	Actions
<p>___ Output of diagnose concentrator indicates problems.</p>	<p>Faulty connection. Faulty module. Problem with connected end device.</p>	<p>Secure all connections. Replace faulty module. See the <i>Node Reference</i> for procedures regarding end user/device problems (modem pool). See appropriate vendor documentation for connected end device.</p>
<p>___ No calls in progress or cannot make calls. ___ Console reports (display connections) or alarms indicate no calls in progress. ___ Concentrator, link, or modules out of service. ___ Red LED lit on LIM to concentrator. ___ End users on concentrator report data loss or error.</p>	<p>Bad cabling connection. Link module fuse blown. Facilities outage. Facilities interface (for example, Data Service Unit [DSU] or modem) failure. Link module to concentrator failure. Link at capacity (dmeas concentrator report). Power problem at concentrator. Concentrator common equipment failure.</p>	<p>Run total set of concentrator diagnostics to isolate the problem. See MPC Diagnostics later in this chapter.</p>
<p>___ Unable to restore concentrator. ___ Red LED lit on Switch module in concentrator.</p>	<p>Faulty Switch module in concentrator.</p>	<p>Replace Switch module.</p>
<p>___ Power failure at concentrator site. ___ Green LED not lit on power supply. ___ Connected module problems indicated by hardware errors or out-of-service status on network reports.</p>	<p>Power supply not receiving power. Concentrator unplugged.</p>	<p>Plug in the concentrator and make sure the power switch is on. Replace the power supply.</p>

TABLE 4-2. Problems Checklist (continued)

√ Symptoms/Indicators	Possible Causes	Actions
<p>___ Green LED not lit on local/remote link.</p> <p>___ End users on the connected modules cannot get DESTINATION prompt; experiencing lost or garbled data.</p>	<p>Link-level errors.</p> <p>Channel allocation insufficient.</p>	<p>Run total set of concentrator diagnostics to isolate the problem. See MPC Diagnostics later in this chapter.</p> <p>Verify the number of user channels allocated; increase allocation if insufficient.</p>
<p>___ Green LEDs on power supplies are not lit and fans are not running.</p> <p>___ Green LEDs on power supply are lit, but fans are not running.</p> <p>___ Mixed green and red LEDs are lit on power supplies.</p>	<p>Power problem.</p> <p>Power problem; fan tray faulty; or ASP1 faulty.</p> <p>Power problem.</p>	<p>See Procedure 4-3. Solving Power Problems.</p> <p>See Procedure 4-4. Solving Fan Problems.</p> <p>Swap in known good power supplies.</p>

Procedures

This section explains the considerations to take into account and the procedures to follow when troubleshooting concentrator problems.

- **Procedure 4-1. Testing Power**
- **Procedure 4-2. Checking Voltage**
- **Procedure 4-3. Solving Power Problems**
- **Procedure 4-4. Solving Fan Problems**
- **Procedure 4-5. Checking and Changing Fuses**
- **Procedure 4-6. Solving Suspended Service State Problems**
- **Procedure 4-7. Solving Problems when Administering Resident Modules**
- **Procedure 4-8. Checking Concentrators that Cannot Make Calls**
- **Procedure 4-9. Running the Concentrator Remote Test**
- **Procedure 4-10. Starting Off-line Loopback Tests**
- **Procedure 4-11. Running the Link Local Test**
- **Procedure 4-12. Running the Link External Test**

- **Procedure 4-13. Running the Link Remote Test**
 - **Procedure 4-14. Running the DSU Local Test**
 - **Procedure 4-15. Running the DSU Remote Test**
 - **Procedure 4-16. Completing Off-line Loopback Tests**
-

PROCEDURE 4-1. Testing Power

Power supplies should be tested during the initial power-up of a new installation. To test MPC power supply operation, the Clock module and its ASP1 I/O board must be installed. Data cables are not required.

1. Make sure the switch settings on the ASP1 I/O board are correctly set. See Table 2-7.
Install the ASP1 I/O board followed by the Clock module in slot 15.
Set module faceplate switches to DISABLE.
 2. Verify that the fan cable is connected to the ASP1 I/O board.
 3. Verify that the building supply circuit is ON.
 4. Verify that all fuses on the two fuse modules are functioning. Because power is required for the bus terminating resistor, slot F0 must be correctly fused. (Backplane signals are affected if the fuse in slot 0 of an MPC is missing or blown.) Refer to **Procedure 4-5. Checking and Changing Fuses**.
 5. Verify that the Base Power Units' power switch is ON.
 6. Determine if all the fans are running.
 7. If the green LEDs on the power supplies are lit, the power supplies are working properly.
-

PROCEDURE 4-2. Checking Voltage

Requirements: Slots should be empty when slot voltages are measured.

MPC voltage levels must be measured using a voltmeter. Measurement points are located behind the third power supply slot. Position 056 is on the rear of the backplane (to the left of the fuse modules).

The following table shows appropriate voltage ranges and measurement points; Figure 4-1 illustrates pin locations.

1. Using a voltmeter to check the voltage and the mounting rails for the I/O boards as the common probe point, check the voltage level coming out of the MPC backplane.

PROCEDURE 4-2. Checking Voltage (continued)**TABLE 4-3. Measurement Points and Voltage Range**

Position 056	
Pin Number	Voltage Range
056	5.15 to 5.35 VDC
032	0 V (GRD)
024	11.4 to 12.6 VDC
021	-10.8 to -13.2 VDC

2. If the measurements do not show a voltage level within the range, call the Customer Assistance Center (CAC).

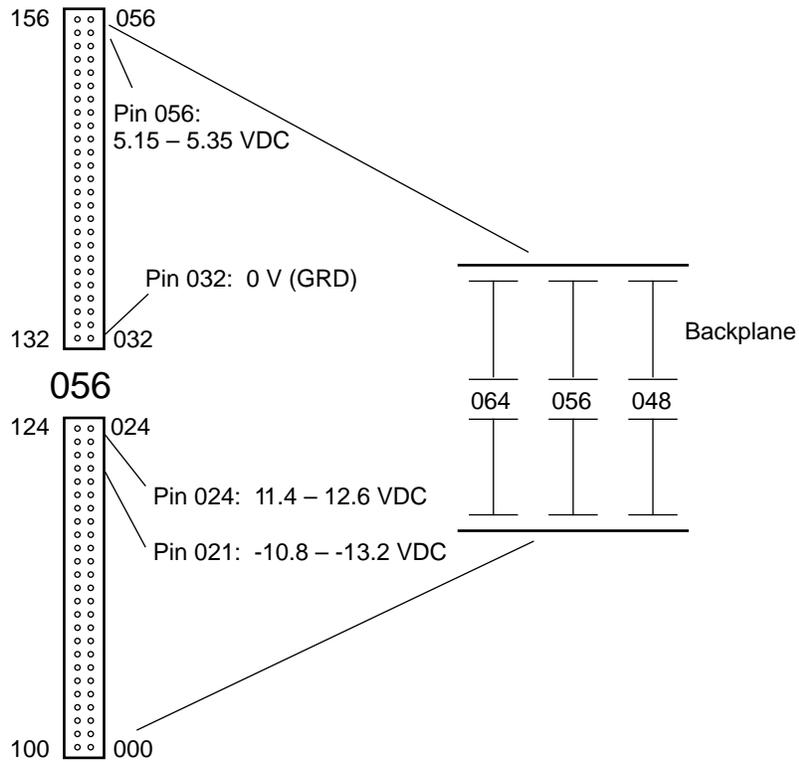


FIGURE 4-1. Voltage Check Points (Rear Cabinet View)

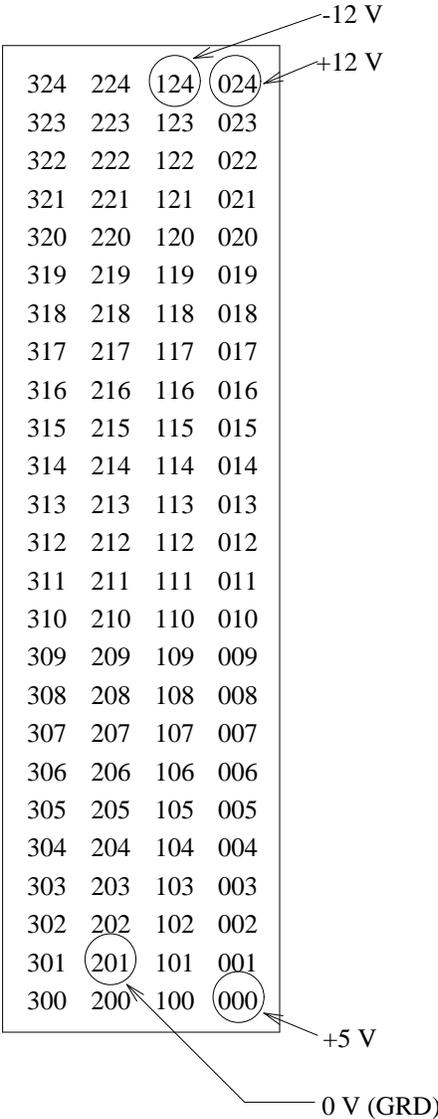


FIGURE 4-2. Terminal Pin Assignments for Module Slots

PROCEDURE 4-3. Solving Power Problems

1. Make sure the power supplies are properly seated and their input line cords are securely connected.
2. For MPCs with Base Power Units, make sure the circuit breaker on the base is turned on.
For MPCs in COs, make sure the cabinet circuit breaker on the top of the frame is turned on.
3. Check the power connection to the Base Power Unit.
4. Check the connections to the power entry module.

PROCEDURE 4-4. Solving Fan Problems

1. Make sure that the fan cable is plugged into the ASP1 I/O board.
2. Swap in a working fan tray.
3. Swap in a working ASP1 I/O board.

PROCEDURE 4-5. Checking and Changing Fuses

Each MPC contains two fuse modules (ASP2) located on the wiring side of the backplane between power supplies 0 and 1. Each fuse module contains nine fuses, for a total of 18 per MPC. Each module slot has one fuse; position E3 and position E5 have two additional fuses.

When a fuse is blown, a wire breaks and a flag, which is visible through the clear plastic top, pops up. In addition, the output of **dstat concentrator** indicates whether a fuse has blown.

Refer to Figure 4-2 during this procedure.

NOTE: Check the fuse for the backplane terminators in slot 0. Because bus terminating resistors require power, slot F0 must be correctly fused. (Backplane signals are affected when the fuse in slot 0 of an MPC is missing or blown.)

1. Look for the flag at the top of the fuse. If a flag is not visible, the fuse has not blown. If a flag is visible, the fuse has blown. Or, run **dstat concentrator** and check the **5-VOLT FUSE** report field to determine whether a fuse has blown.
2. To change a blown fuse, use pliers to grasp and remove the fuse. Discard the blown fuse and insert a new one.
3. Isolate and correct the condition causing the blown fuse. First, remove the module, insert a new fuse, and then reinsert the module. If the fuse blows again, replace the module. If the fuse blows after the module has been replaced, replace the I/O board.

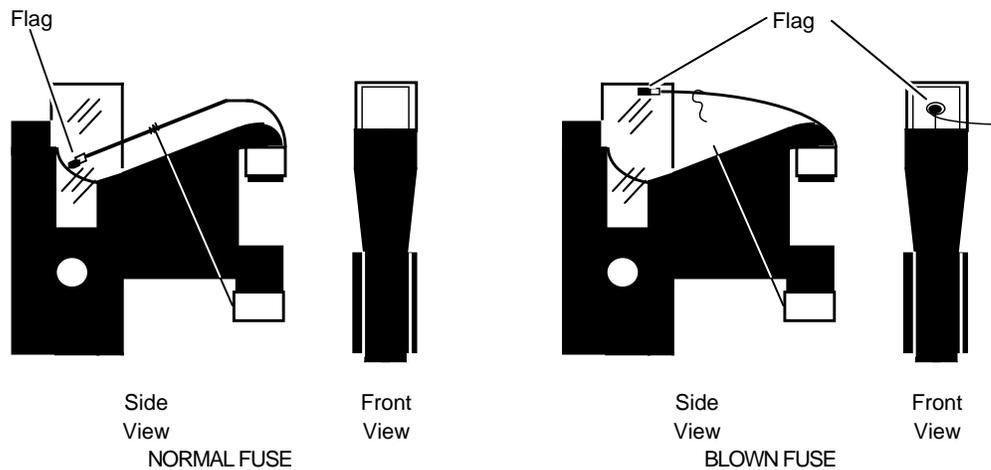


FIGURE 4-3. Normal Fuse and Blown Fuse

PROCEDURE 4-6. Solving Suspended Service State Problems

Concentrators normally have four service states—in service, out-of-service, ready-for-service, and suspended. During status polling, if the concentrator does not return status packets to the Control Computer (because of a failure at the concentrator site), the Control Computer puts the concentrator into a suspended state instead of removing it from service. The Control Computer then attempts to restore the concentrator to service after 5, 10, and 15 minutes; and then at 20-minute intervals. If the problem has been corrected during one of these intervals, the restore succeeds. Otherwise, it fails, and the concentrator remains in the suspended state.

NOTE: If a power failure occurs or the system reboots for another reason, the concentrator is marked suspended and is restored automatically. If you want the concentrator removed from service, you must remove it manually. Alarms and command responses indicate the correct state.

1. Use **verify concentrator** to determine if the concentrator is in the suspended service state and if any resident modules are in the ready for service (*rfc*) state.
2. Use **remove concentrator** to remove the concentrator from service.
3. Use **restore concentrator** to put the concentrator back into service.

PROCEDURE 4-6. Solving Suspended Service State Problems (continued)

4. Use **verify concentrator** to determine if the concentrator and any resident modules are back in service.
5. If the concentrator fails to restore, run concentrator diagnostics. See **MPC Diagnostics** later in this chapter.

PROCEDURE 4-7. Solving Problems when Administering Resident Modules

Alarms have indicated that the total channel or contiguous channel allocation is insufficient to support a new resident module.

1. If the total channel allocation is insufficient, use **remove concentrator** to take the concentrator out of service; use **change concentrator** to change the channel allocation; and use **restore concentrator** to put the concentrator back into service.
2. If the contiguous channel allocation is insufficient, use **remove concentrator** to take the concentrator out of service and **restore concentrator** to put the concentrator back into service. This remove/restore process consolidates available channels.

PROCEDURE 4-8. Checking Concentrators that Cannot Make Calls

1. Run the **dstat concentrator** and **display connections** commands and review the output.
2. Run the full set of concentrator diagnostics. See **MPC Diagnostics**, which follows.

MPC Diagnostics

The following procedures explain how to begin running concentrator diagnostics, and the cables, connectors, and jumper settings needed for some tests.

If a link problem is suspected or indicated, the link can be in service, suspended, or out-of-service. For an in-service link that is a suspected problem, the *conc_remote* test should be run first. Only the *conc_remote* test can be run while the link is in service.

If the link is in the suspended or out-of-service state (see Table 4-2 for symptoms/indicators) and diagnostics must be run, follow **Procedure 4-10. Starting Off-line Loopback Tests**. The five available tests are *link_local*, *link_external*, *link_remote*, *dsu_local*, and *dsu_remote*. These tests should be run in the order stated here and indicated in the procedures. The procedures start testing the link interface module in the node (*link_local*) and progress outward to the remote link interface module (*link_remote*).

In addition, the diagnostics extend to the local, then remote, data service units (*dsu_local* then *dsu_remote*). This test expansion method is useful if more than one problem exists. Complete *all* the tests listed to isolate and determine the extent of the problem.

This section is supplemented by information contained in **diagnose concentrator** (in the **MPC**

Commands chapter) which explains the nature of each test, the diagnostic prompting sequence, and the meaning of each parameter option.

Some general testing guidelines include:

- If end user problems occur after database configuration changes have been made or after an end user has changed terminal options, verify module/port options with **verify <module>** before running **diagnose concentrator**.
- When installing or changing a concentrator, run **diagnose concentrator**.
- After making any type of configuration database changes, run **diagnose concentrator**.
- Whenever concentrator integrity is in question, run **diagnose concentrator**.

PROCEDURE 4-9. Running the Concentrator Remote Test

Applicability: In-service MPCs with SFT or SWT link interface modules.

1. Enter **diagnose concentrator <mod addr> conc_remote**.
2. If the test passes, a temporary problem probably occurred with the link. Use **dstat concentrator** and **dmeas concentrator** to get an indication of the nature of the problem. Note the problem with a description in the system record log.
3. If the test fails, check each piece of equipment and the link between the node and the concentrator.

PROCEDURE 4-10. Starting Off-line Loopback Tests

Applicability: MPCs with SFT or SWT link interface modules.

1. Remove the concentrator to be tested from service: **remove concentrator <mod addr>**.
2. Verify that concentrator information has been entered into the database and the concentrator has been taken out of service: **verify concentrator <mod addr>**.
3. Put devices in loopback mode or attach the appropriate loopback connectors and cables as required.

NOTE: Improperly installed connectors and cables can produce diagnostic errors.

4. Begin by running *link_local* and follow the testing order explained in the following procedures.

PROCEDURE 4-11. Running the Link Local Test

Applicability: Out-of-service MPCs with SFT or SWT link interface modules.

PROCEDURE 4-11. Running the Link Local Test (continued)

1. Enter **diagnose concentrator <mod addr> link_local**.
2. If the test passes, run *link_external*.
3. If the test fails, replace the LIM and repeat the test.

PROCEDURE 4-12. Running the Link External Test

Applicability: Out-of-service MPCs with SFT or SWT link interface modules.

This test requires a loopback connector external to the link interface module I/O board. For the correct loopback connections, refer to your system's *Trunk Module Reference*.

1. Set the SWT timing to internal by setting the jumpers on the timing straps in the upper left-hand corner of the module to the following: internal clock, IN for J3, and OUT (no jumper) for J4. (Refer to **Appendix B** for more information on SWT jumper settings.)
2. Enter **diagnose concentrator <mod addr> link_external**.
3. If the test passes, run *link_remote* on a fiber link, or *dsu_local* on a wire link, depending on the configuration.
4. If the test fails, check the I/O board switch settings or replace the I/O board and repeat the test.
5. When the test is completed, remove the loopback connector and reinstall the normal cable.

PROCEDURE 4-13. Running the Link Remote Test

Applicability: Out-of-service MPCs with SFT link interface modules.

1. Enter **diagnose concentrator <mod addr> link_remote**.
2. If the test passes, rerun *conc_remote*.
3. If the test fails, the fiber link might be faulty. Check the link for components that may be lossy. Replace the suspected faulty component and repeat the test. If the test fails again, replace the link interface module and I/O board in the concentrator and repeat the test.

PROCEDURE 4-14. Running the DSU Local Test

Applicability: Out-of-service MPCs with SWT link interface modules.

This test requires the local DSU to be put in loopback mode so data is looped back to the node. Refer to the appropriate DSU documentation.

1. Enter **diagnose concentrator <mod addr> dsu_local**.

PROCEDURE 4-14. Running the DSU Local Test (continued)

2. If the test passes, run *dsu_remote*.
3. If the test fails, the cabling or the local DSU is probably faulty. Replace the suspected faulty component and repeat the test.
4. When the test is completed, put the DSU back into nonloopback mode.

PROCEDURE 4-15. Running the DSU Remote Test

Applicability: Out-of-service MPCs with SWT link interface modules.

This test requires the remote DSU to be put into loopback mode so data is looped back to the node. Refer to the appropriate DSU documentation.

1. Enter **diagnose concentrator <mod addr> dsu_remote**.
2. If the test passes, rerun *conc_remote*.
3. If the test fails, the link or the remote DSU might be faulty. Replace the suspected faulty component and repeat the test.
4. When the test is completed, put the DSU back into nonloopback mode.

PROCEDURE 4-16. Completing Off-line Loopback Tests

Applicability: Out-of-service MPCs with SFT or SWT link interface modules.

1. Remove any loopback connectors that are still attached and reconnect the cabling.
2. Restore the concentrator to service: **restore concentrator <mod addr>**.
3. Verify that the concentrator has been restored to service: **verify concentrator <mod addr>**.

BNS-2000 MPC Commands

change concentrator	5-4
delete concentrator	5-6
diagnose concentrator	5-7
dmeas concentrator	5-10
dstat concentrator	5-14
enter concentrator	5-23
remove concentrator	5-26
restore concentrator	5-27
verify concentrator	5-28
System Responses	5-30

BNS-2000 MPC Commands

This chapter describes the commands related to the administration, operation, and maintenance of a concentrator. Commands that include the object **concentrator** appear in alphabetical order by verb. System responses for all **concentrator** commands conclude this chapter.

The **enter concentrator** command shows the full prompting sequence and contains a list of parameter definitions. Additional information on the parameters used in the prompting sequence of **enter concentrator** and **change concentrator** is in **MPC Administration**. In addition, the database entry forms in **Appendix C** follow the prompting sequence for each concentrator type entered. Procedures for running diagnostics are in **MPC Troubleshooting**.

change concentrator

The **change concentrator** command enables you to modify existing concentrator information in the database. The **change concentrator** command does not allow you to change the **CONCENTRATOR TYPE** or reduce the **NUMBER OF USER CHANNELS** below the minimum required to support the modules residing in a concentrator.

When the concentrator is out of service, however, **change concentrator** does enable you to specify a **NEW MODULE ADDRESS**, which is useful to put the cold standby link interface module in service if the primary link goes down. By specifying a **NEW MODULE ADDRESS** and a new LIM address (**REMOTE LINK MODULE ADDRESS**), both portions of the LIM address (at the node and at the LIM), can be transferred. All information on the concentrator is transferred to the new module address; nothing associated with the old module address remains in the database. When you change the concentrator address, the addresses for modules residing in the concentrator are changed automatically.

If you use **change concentrator** for an in-service concentrator, you can change the **ENABLE LINK MEASUREMENTS FOR THIS LINK** parameter only. The system queries you with the prompt **ENABLE LINK MEASUREMENTS FOR THIS LINK**. Any change designated takes effect immediately. However, if you input this same change for a suspended or out-of-service concentrator, the change does not take effect until the concentrator is first restored to service.

Syntax

You can input **change concentrator** in prompted entry only. The syntax for **enter concentrator** and **change concentrator** is similar. When the concentrator is out of service, the **change concentrator** command prompts you for a **NEW MODULE ADDRESS** parameter, but does not prompt you for the **CONCENTRATOR TYPE**.

The defaults for **change concentrator** are those values, conditions, or states that currently exist in the database. They are displayed within parentheses in the parameter prompt. If the default value of the **NUMBER OF USER CHANNELS** is greater than 504 when an MPC (*frs*) is changed from **LINK TYPE sft** to **LINK TYPE swt**, the system sets the default of **NUMBER OF USER CHANNELS** to 504.

Parameters

This section contains explanations of parameters used in the **change concentrator** prompting sequence that differ from those used in **enter concentrator**. Refer to **Syntax** for the prompting sequence, system defaults, and parameter options.

NEW MODULE ADDRESS

Specifies the new module address for the LIM (in the node) providing concentrator connectivity. The default is the *current entry*; meaning, the current **MODULE ADDRESS**.

Prompted Entry: Changing MPC (*frs*) Information

```
CC0> change
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
NEW MODULE ADDRESS [(+17)]: +
COMMENT [up to 60 chars double quoted, or "none":
+"In 2S-D45"]]:
+
LINK TYPE [sft, swt: +(sft)]: +
REMOTE LINK MODULE ADDRESS [2, 3, 13, 14: +(14)]: +
NUMBER OF USER CHANNELS [1-2040: +(100)]: 500
ENABLE LINK MEASUREMENTS FOR THIS LINK [yes, no: +(yes)]: +
MODULE ADDRESS: 
CC0>
```

delete concentrator

The **delete concentrator** command enables you to eliminate concentrator information from the database. Before any information can be deleted, the concentrator must be taken out of service with **remove concentrator**. All modules residing in the concentrator must be removed from service and their information deleted from the database before concentrator information can be deleted.

In addition, a concentrator in the suspended service state is treated as if it were in service; hence, **remove** must be executed before **delete** can be entered successfully.

Syntax

You can input **delete concentrator** in prompted or one-line entry.

```
CC0> delete
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
```

Parameters

Refer to the parameter definitions supplied in **enter concentrator**.

Prompted Entry: Deleting MPC (*frs*) Information

```
CC0> delete
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
CC0>
```

One-line Entry: Deleting MPC (*frs*) Information

```
CC0> delete concentrator 17
```

diagnose concentrator

The **diagnose concentrator** command enables you to run any one of several loopback* tests for a concentrator. These loopback tests are used to check the concentrator and link interface modules (LIMs). During each test, data is sent from the Control Computer to the loopback point and back to the Control Computer as follows:

- For all tests, except *conc_remote*, 1 KB of data is transmitted. The data consists of all ones (1s), hexadecimal 55 and AAs, walking ones, and a serial count from 1 to FF. All packet sizes (1 to 16 packets) are used. Error checking is accomplished by a bit-by-bit comparison of transmitted and looped-back data.
- For *conc_remote*, 1000 transmissions of the ASCII lowercase alphabet and the digits 0 to 9, and then 0 are transmitted and looped back. The looped-back data is checked for errors.

Any defective module residing in the concentrator or any transmission path problems, such as an improper connection to an I/O board, can be located and isolated.

All tests, except the concentrator remote (*conc_remote*), require the concentrator to be out of service. Refer to **MPC Troubleshooting** for diagnostic procedures.

Syntax

You can input **diagnose concentrator** in prompted or one-line entry.

```
CC0> diagnose
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
If CONCENTRATOR TYPE is "frs" or "rrs" and if LINK TYPE is "swt":
  TEST TYPE [link_local, link_external, dsu_local, dsu_remote, conc_remote:
    +(link_local)]:
If CONCENTRATOR TYPE is "frs" or "rrs" and if LINK TYPE is "sft":
  TEST TYPE [link_local, link_external, link_remote, conc_remote: +(link_local)]:
  REPETITIONS [1-1000; "c" for continuous: +(1)]:
Command loops to TEST TYPE prompt.
```

* These tests are referred to as *LOOP-AROUND* in the software and system responses.

Parameters

This section contains explanations of parameters used in the **diagnose concentrator** prompting sequence that differ from those used in **enter concentrator**. Refer to **Syntax** for the prompting sequence, system defaults, and parameter options.

REPETITIONS

Specifies whether a particular loopback test is to be run *1* to *1000* times or if continuous testing (*c*) should occur. You can stop testing by pressing .

TEST TYPE

Specifies the particular loopback diagnostic to be executed:

- *conc_remote*
For the MPC (*frs*), this test extends to the Switch module in the MPC. This test indicates the severity of the link impairment.
- *dsu_local*
For an SWT, this test extends through the local link interface module to the local data service unit (DSU) or to the facility's interface device (modem or multiplexer).
- *dsu_remote*
For an SWT, this test extends through the local link interface module, the local DSU, and then the remote DSU.
- *link_external*
For an SFT or SWT, this test extends through the local link interface module to a loopback connector external to the I/O board.

SWT jumpers must be set to provide internal timing for this test. (Refer to **MPC Troubleshooting** and/or **Appendix B** for more information on SWT jumper settings.)
- *link_local*
For an SFT or SWT, this test checks the data path from the backplane to the link interface module in the node. It also checks link option settings. These link option settings are specified during an iteration of **enter concentrator**. (Not all prompts that appear in **enter concentrator** set hardware options.)
- *link_remote*
For an SFT, this test extends through the local link interface module to the remote link interface module.

For the remaining parameter, refer to the definition supplied in **enter concentrator**.

Prompted Entry: Running MPC (*frs*) Link Remote Diagnostics

```
CC0> diagnose
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
TEST TYPE [link_local, link_external,
  link_remote, conc_remote, +(link_local)]: link_remote
REPETITIONS [1-1000; "c" for continuous: +(1)]: 3
  93-12-31 09:44:07 NODE=Redqueen
M diagnose concentrator 17 link_remote 3
LOOP-AROUND DIAGNOSTIC SUCCEEDED ON ALL TESTED CHANNELS
  93-12-31 09:44:10 NODE=Redqueen
M diagnose concentrator 17 link_remote 3
LOOP-AROUND DIAGNOSTIC SUCCEEDED ON ALL TESTED CHANNELS
  93-12-31 09:44:13 NODE=Redqueen
M diagnose concentrator 17 link_remote 3
LOOP-AROUND DIAGNOSTIC SUCCEEDED ON ALL TESTED CHANNELS
TEST TYPE [link_local, link_external, link_remote,
  conc_remote, +(link_local)]: 
CC0>
```

dmeas concentrator

The **dmeas concentrator** enables you to receive on-demand measurements for the node and remote link interface module (SFT or SWT) connected to the concentrator. Measurements for each module residing in the concentrator are not included, but can be obtained with **dmeas <module>**.

Syntax

You can input **dmeas concentrator** in prompted or one-line entry.

```
CC0> dmeas
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
```

Parameters

Refer to the parameter definition supplied in **enter concentrator**.

Prompted Entry: Displaying MPC (*frs*) Measurements

```
CC0> dmeas
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
<report output>
```

One-line Entry/Output: Displaying MPC (*frs*) Measurements for BNS-2000

```
CC0> dmeas concentrator 87
93-07-15 14:14:25 NODE=Mitty
M dmeas concentrator 87
CONCENTRATOR MEASUREMENTS - FULL REMOTE SHELF (SFT LINK)
93-07-15 14:00 ---> 93-07-15 14:10
MODULE ADDRESS: 87          SPEED: 8.0 Mb/s
----- PEAK DATA -----
FM NODE    FM NODE    FM NODE PEAK    TO NODE    TO NODE    TO NODE PEAK
SEGMENTS  UTIL      START - STOP  SEGMENTS  UTIL      START - STOP
8906      0%        14:00 - 14:05  28894     0%        14:00 - 14:05
----- TOTALS -----
FM NODE    FM NODE          TO NODE    TO NODE
SEGMENTS  UTIL            SEGMENTS  UTIL
17758     0%              57615     0%
--- No node link error measurements ---
--- No concentrator link error measurements ---
-----
CC0>
```

Report Fields

CHANNEL OVERFLOW

For an SWT, the number of times the per-channel counter, for a channel on the low priority queue, recorded an overflow.

CMOD BAD PKT

The number of times bad packets were received from the concentrator module.

FIBER BAD PKT

The number of times bad packets were received from the fiber concentrator.

FM BUS OVERFLOW

For an SFT and SWT, the number of overflow errors sent from the node.

FM NODE OVERFLOW

The number of overflow errors sent from the node.

FM NODE PEAK START - STOP

The time in which the concentrator/link utilization reporting started and stopped for the peak interval in the from-node direction.

FM NODE SEGMENTS

The number of segments received, in a 10-minute interval, from the node; or the total number of segments sent to the facility.

FM NODE UTIL

The overall percentage of concentrator/link utilization of total traffic data from the node as compared to the maximum link capacity.

LOCAL SYNC

For an SFT, the number of times the local fiber receiver lost synchronization with the remote fiber transmitter.

LOST CARRIER

The number of times the fiber carrier was lost.

MODULE ADDRESS

A number identifying the node slot that the link interface module, which provides connectivity to the concentrator, occupies.

PACKETS FM NODE

The number of packets received, in a 10-minute interval, from the node; or the total number of packets sent to the facility.

PACKETS FROM BUS

The number of packets received, in a 10-minute interval, from the node; or the total number of packets sent to the facility.

Report Fields (continued)

PACKETS TO BUS

The number of packets sent, in a 10-minute interval, to the node; or the total number of packets received from the facility.

PACKETS TO NODE

The total number of packets sent, in a 10-minute interval, to the node; or the total number of packets received from the facility.

PARITY ERROR

For an SFT and SWT, the number of parity errors that occurred on the link.

PCT UTIL

The overall percentage of concentrator/link utilization of total traffic data from the node as compared to the maximum trunk capacity.

PEAK INTERVAL START - STOP

When the concentrator/link utilization reporting started and stopped for the packet interval.

QUEUE CONGESTED

For an SWT, the number of times a segment from the bus was discarded because the SWT low priority queue was congested.

REMOTE SYNC

For an SFT, the number of times the remote fiber receiver lost synchronization with the local fiber transmitter.

SPEED

The concentrator-link bit rate.

SYNC LOSS

The number of times synchronization was lost with the first in, first out (FIFO) queue.

TO BUS OVERFLOW

For an SFT and SWT, the number of overflow errors sent to the node.

TO NODE OVERFLOW

The number of overflow errors sent to the node.

TO NODE PEAK START - STOP

When the concentrator/link utilization reporting started and stopped for the peak interval in the to-node direction.

TO NODE SEGMENTS

The number of segments sent, in a 10-minute interval, to the node; or the total number of segments received from the facility.

Report Fields (continued)

TO NODE UTIL

The overall percentage of concentrator/link utilization of total traffic data to the node as compared to the maximum link capacity.

TRANSMSN ERROR

For an SFT and SWT, the number of transmission errors that occurred on the link interface module.

dstat concentrator

The output of the **dstat concentrator** command shows you the hardware status of the concentrator and its associated LIMs. To display information on only the modules residing in a concentrator, use **dstat module** or **dstat <module name>**.

Syntax

You can input **dstat concentrator** in prompted or one-line entry.

```
CC0> dstat
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
DETAIL [low, high: (+low)]:
```

Parameters

This section contains explanations of parameters used in the **dstat concentrator** prompting sequence that differ from those used in **enter concentrator**. Refer to **Syntax** for the prompting sequence, system defaults, and parameter options.

DETAIL

Specifies if the output is to show a limited amount of information (*low* detail) or more information (*high* detail). With *high* detail, information for link interface modules residing in the node and in the concentrator is furnished.

Prompted Entry: Displaying Low-Detail MPC (*frs*) Status

```
CC0> dstat
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
DETAIL [low, high: (+low)]: +
<report output>
```

One-line Entry/Output: Displaying High-Detail MPC/SFT Link Status for BNS-2000

```
CC0> dsystat conc 96 hi
 93-07-15 14:31:20 NODE=Mitty
M dstat concentrator 96 hi
***** MODULE 96 *****
CONCENTRATOR TYPE  LINK TYPE
full remote shelf  swt
***** STATUS OF CONCENTRATOR *****
COOLING AMBIENT POWER  5-VOLT
FANS    TEMP    SUPPLY  FUSES
failure good    good    good
LAST ALARM
Fan failure 93-07-15 13:52
```

One-line Entry/Output (continued)

```

NODE LINK STATUS:
-----
MODULE TYPE      SERVICE STATE  HARDWARE ERROR COUNT  SERIAL NUMBER
swt              in service    0                      105
LAST HARDWARE ALARM
none
ONLINE  ENABLED  AVAIL
yes     yes     yes
----- HIGH DETAIL -----
OPERATE LOOPBAK LPQ      HPQ      LPQ      HPQ
STATE  MODE  OCCUPIED OCCUPIED EMPTY  EMPTY
active no   0/8      0/8      no     yes
MODULE FIFO  FM NODE FM NODE TO NODE RCV  PER CHNL LPQ
RESET  RESET  PARITY  OVERFLO OVERFLO ERROR OVERFLO CONGEST
0      0      0       0       0     0      0      1
TTIMING LPQ  HPQ
SOURCE  LENGTH  LENGTH
ground  256     64
EXPECT  FULL  EMPTY  WRONG  TRANS
TYPE    PACKETS PACKETS PORT  ENAB
swt     37319  0      0      yes
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
1       0       300    340    1       0       0       0
RANGE   BAD
ERRORS  SEGMENTS
0       0
          93-07-15 14:31:20 NODE=Mitty
M dstat concentrator 96 hi

```

One-line Entry/Output: Displaying High Detail MPC/SWT Link Status

```

CC0> dstat concentrator 72 high
    93-12-31 09:48:27 NODE=Redqueen
M dstat concentrator 72 high
***** MODULE 72 *****
CONCENTRATOR TYPE   LINK TYPE
full remote shelf  swt
***** STATUS OF CONCENTRATOR *****
COOLING AMBIENT POWER 5-VOLT
FANS   TEMP   SUPPLY FUSES
failure good   good   good
LAST ALARM
none
NODE LINK STATUS:
-----
MODULE TYPE      SERVICE STATE  HARDWARE ERROR COUNT  SERIAL NUMBER
swt              in service    0                      66
LAST HARDWARE ALARM
none
ONLINE  ENABLED  AVAIL
yes     yes     yes
----- HIGH DETAIL -----
OPERATE LOOPBAK LPQ   HPQ   LPQ   HPQ
STATE  MODE  OCCUPIED OCCUPIED EMPTY  EMPTY
active no   0/8     0/8   yes   yes
MODULE FIFO  FM NODE FM NODE TO NODE RCV   PER CHNL LPQ
RESET  RESET  PARITY OVERFLO OVERFLO ERROR  OVERFLO CONGEST
0      0     0      0      0      0      0      0
TTIMING LPQ   HPQ
SOURCE  LENGTH LENGTH
ground  256   64
EXPECT  FULL   EMPTY  WRONG  TRANS
TYPE    PACKETS PACKETS PORT   ENAB
swt     32491  0      0      yes
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1  STAT2  STAT3  STAT4  STAT1  STAT2  STAT3  STAT4
1      0      300   300   1      0      0      0
RANGE  BAD
ERRORS SEGMENTS
0      0
    93-12-31 09:48:27 NODE=Redqueen
M dstat concentrator 72 high
CONCENTRATOR LINK STATUS:
-----
MODULE TYPE      SERVICE STATE  HARDWARE ERROR COUNT  SERIAL NUMBER
swt              in service    0                      118
LAST HARDWARE ALARM
none
ONLINE  ENABLED  AVAIL
yes     yes     yes

```

One-line Entry/Output (continued)

```

----- HIGH DETAIL -----
OPERATE LOOPBAK LPQ      HPQ      LPQ      HPQ
STATE  MODE    OCCUPIED OCCUPIED EMPTY   EMPTY
active no      0/8      0/8      yes     yes

MODULE FIFO    FM NODE  FM NODE  TO NODE  RCV     PER CHNL LPQ
RESET  RESET   PARITY   OVERFLO OVERFLO  ERROR   OVERFLO  CONGEST
0      0      0        0        0       0       0        0

TTIMING LPQ      HPQ
SOURCE  LENGTH  LENGTH
ground  256     64

EXPECT  FULL    EMPTY   WRONG   TRANS
TYPE    PACKETS PACKETS PORT     ENAB
swt     32489  0       0       yes

ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
1       0       300    340    1       0       0       0

RANGE   BAD
ERRORS  SEGMENTS
0       0

CC0>

```

Report Fields**ACTUAL STAT1**

The actual value of the first hardware status byte in the most recently received status packet.

ACTUAL STAT2

The actual value of the second hardware status byte in the most recently received status packet.

ACTUAL STAT3

The actual value of the third hardware status byte in the most recently received status packet.

ACTUAL STAT4

The actual value of the fourth hardware status byte in the most recently received status packet for the SWT.

AMBIENT TEMP

The ambient temperature status; if a problem exists, it reads *unknown*.

AVAIL

For SFTs and SWTs, indicates whether (*yes* or *no*) the module is available; meaning, it is on-line and administered; the link is properly cabled, and the protocol is established.

Report Fields (continued)

BAD SEGMENTS

The count of segments with envelope parity errors transmitted by the module and detected by the Eswitch.

CHNL OVERFLO

The SWT status packet count received which indicates that a per-channel counter, for a channel on the SWT low priority queue, overflowed since the last status packet response.

CNTRLER LESS MD

Indicates whether (*yes* or *no*) the controllerless mode features are enabled. When enabled, the SFT operates with enhanced fiber protocol and supports the extended address mode.

CONCENTRATOR TYPE

The type of concentrator for which the report output is shown can be a *full remote shelf* (MPC).

CONT STRAP

The hardware contention strap, used with the group contention strap, is (*in*) or is not (*out*) installed. When installed and the group contention option is *on*, the SFT contends for the backplane 100% of the time, transmitting 8 MB of data per second. When the contention strap is not installed, the concentrator is out of service (*oos*); this capability is not supported.

COOLING FANS

Reports the status of the cooling fans as *good* or *failure*.

DIAGNOS_MODE

Indicates if diagnostics are *in progress* or *inactive* on the SFT.

EMPTY PACKETS

For an SFT, the number of empty packets received since the last status packet response.

ENABLED

Indicates if the module is (*yes*) or is not (*no*) enabled by the mode switch on the module faceplate.

ENHANCED PROTOCOL

Indicates whether (*yes* or *no*) enhanced protocol has been enabled.

EXPECT STAT1

The expected value of the module's first hardware status byte.

EXPECT STAT2

The expected value of the module's second hardware status byte.

EXPECT STAT3

The expected value of the module's third hardware status byte.

EXPECT STAT4

The expected value of the SWT's fourth hardware status byte.

Report Fields (continued)**EXPECT TYPE**

The expected type for the link module.

FIFO RESET

For an SFT, the number of times the hardware failed to send a packet due to an invalid address or invalid packet format.

FLOCTRL REQUEST

The SFT status packet count received. This number indicates that at least one transmitter flow control request occurred since the last status packet response.

FM NODE OVERFLO

For an SFT, the number of packet overflows received from the node.

FM NODE PARITY

For an SFT, the number of parity errors received from the node.

FR CMOD BAD PKT

The SWT status packet count received. This number indicates that a maximum of 15 bad packets were received from the concentrator modules since the last status packet response.

FULL PACKETS

For an SFT, the number of full packets received since the last status packet response.

GROUP CONT

Indicates if the SFT group contention arbitration option is set to *on* or *off*.

HARDWARE ERROR COUNT

An approximate sum of module errors detected since its last reboot. Counts of 3 or 4 can be typical for a given module; higher counts probably indicate some problem.

HPQ EMPTY

Indicates whether (*yes* or *no*) the SWT high priority queue was empty during the status polling cycle.

HPQ LENGTH

Indicates if the frame termination length setting on the SWT high priority queue is *16* or *64* bytes.

HPQ OCCUPIED

Indicates, within 1/8 granularity, if the amount of data in the high priority queue on the SWT is *0* to *7/8*.

LAST ALARM

The last alarm generated and recorded for the concentrator.

LAST HARDWARE ALARM

The last alarm for the given link interface module, based on status packet data. This information is not stored between system reboots.

Report Fields (continued)

LINK PRIORITY

For an SWT, indicates if the high water mark for the link priority scheme is enabled.

LINK TYPE

Indicates if the type of link interface module is an *sft* or *swt*.

LOCAL SYNC ER

The SFT status packet count received. This number indicates that the local fiber receiver lost synchronization with the remote transmitter at least once since the last status packet response.

LOOPBAK MODE

When in the diagnostic mode, indicates if the SFT or SWT loopback test should be directed to the local or remote link. When not in the diagnostic mode, this field reads *no*.

LPQ CONGEST

The SWT status packet count received. This number indicates a packet coming from the bus was discarded because of congestion on the SWT low-priority queue.

LPQ EMPTY

Indicates whether (*yes* or *no*) the SWT low-priority queue was empty during the status polling cycle.

LPQ LENGTH

Indicates if the frame termination length setting on the SWT low-priority queue is set to *16*, *64*, or *256* bytes.

LPQ OCCUPIED

Indicates, within 1/8 granularity, if the amount of data in the low-priority queue on the SWT is *0* to *7/8*.

MODULE RESET

For an SFT, the number of times a module reset occurred.

MODULE TYPE

Indicates whether the link interface module is an *sft* or *swt*.

ONLINE

Indicates if the module (as reported by the hardware in the status response packet) is *on-line* or has been taken *off-line*.

OPERATE STATE

Indicates if the current operational state of the SFT or SWT is *active*, *reboot*, *disconn*, or *restart*.

PER CHNL OVERFLO

The SWT status packet count received which indicates that a per-channel counter, for a channel on the SWT low-priority queue, overflowed since the last status packet response.

Report Fields (continued)**POWER SUPPLY**

The status of the power supply is *good* or *failure*.

PROTOCOL MISMATCH

The SFT status packet count received. This number indicates that at least one protocol compatibility error occurred since the last status packet response. This field could also indicate that a cable is not properly connected.

RANGE ERRORS

The count of segments transmitted by the module on a channel that is beyond the limit for which the module is configured.

RCV ERROR

For an SWT, the status packet count received. This number indicates receipt of at least one error from the link since the last status packet response.

REMOTE SYNC ER

The SFT status packet count received. This number indicates that the remote fiber receiver lost synchronization with the local fiber transmitter at least once since the last status packet response.

SELFTST

For SFTs, indicates if on-board hardware diagnostics have *passed* or *failed* their self-test when the module is enabled or rebooted. This field reads *waiting* when the on-board diagnostics are running, but have not yet reported their results.

SERIAL NUMBER

The factory-encoded unique number that appears on all modules that access the backplane—that is, have a switch and an LED. Maintaining records with these numbers can help track vintages of circuit packs.

SERVICE STATE

Shows the current module service state (as reported by the software) to be: *in service* (via **restore**), *oos*, *manual* (out of service via **remove**), *oos*, *fault*, *auto* (out of service via the alarm system), *rfs* (ready for service), or *suspended*.

SHELF NUMBER

For an MPC (*frs*), the number of the shelf which is always 0.

TO NODE OVERFLO

For an SFT, the number of packet overflows sent to the node.

TRNSMSN ERROR

The SFT or SWT status packet count received. This number indicates that the Universal Synchronous/Asynchronous Receiver/Transmitter (USART) detected at least one transmission error (receiver overrun, framing error, cyclic redundancy check [CRC] error, or frame abort message) since the last status packet response.

Report Fields (continued)

TTIMING SOURCE

For an SWT, the selected source for the terminal timing signal is the data communications equipment (DCE) transmit clock (*dce trn*), the DCE receive clock (*dce rec*), the data terminal equipment (DTE) 500-kHz clock (*dte*), or *ground*.

5-VOLT FUSES

Shows a status of *good* or *bad* to indicate whether a fuse has blown.

enter concentrator

The **enter concentrator** command enables you to add information regarding a particular type of concentrator into the database.

Syntax

You can input **enter concentrator** in prompted entry only. The sequence of prompts depends on your response to the **CONCENTRATOR TYPE** prompt. The defaults are shown in parentheses.

```

CC0> enter
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
COMMENT [up to 60 chars double quoted]:

If BNS-2000 VCS, Datakit II VCS, or BNS-1000:
  CONCENTRATOR TYPE [frs, rrs, isn]:
If BNS-2000:
  CONCENTRATOR TYPE [frs, rrs]:
  LINK TYPE [sft, swt: +(swt)]:

If CONCENTRATOR TYPE is "frs":
  REMOTE LINK MODULE ADDRESS [2, 3, 13, 14: +(14)]:
If CONCENTRATOR TYPE is "rrs":
  REMOTE LINK MODULE ADDRESS [2, 3, 14: +(14)]:

If CONCENTRATOR TYPE is "frs" or "rrs" and if LINK TYPE is "swt":
  NUMBER OF USER CHANNELS [1-504: +(504)]:
If CONCENTRATOR TYPE is "frs" or "rrs" and if LINK TYPE is "sft":
  NUMBER OF USER CHANNELS [1-2040: +(504)]:

If CONCENTRATOR TYPE is "frs" or "rrs" and if LINK TYPE is "swt":
  FRAME TERMINATION LENGTH
  HPQ/LPQ [16/16, 16/64, 64/64, 64/256: +(64/256)]:
If LINK TYPE is "swt":
  LINK SPEED [2400, 4800, 9600, 19200, 48k, 56k, 64k, 128k, 192k, 256k, 320k,
  384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1.024M, 1.088M,
  1.152M, 1.216M, 1.280M, 1.344M, 1.408M, 1.472M, 1.536M, 1.544M, 2.048M:
  +(56K)]:

If CONCENTRATOR TYPE is "frs" "rrs" or "isn" regardless of LINK TYPE:
  ENABLE LINK MEASUREMENTS FOR THIS LINK [yes, no: +(no)]:

If LINK TYPE is "swt":
  SECONDS BEFORE CALL DISCONNECT DUE TO LINK FAILURE
  [10 second intervals, 20-420: +(50)]:

Command loops to MODULE ADDRESS prompt.

```

enter concentrator

Parameters

This section contains explanations of parameters used in the **enter concentrator** prompting sequence. Refer to **Syntax** for the prompting sequence, system defaults, and parameter options.

COMMENT

An optional string of 1 to 60 characters, enclosed in double quotation marks, that specifies useful administrative information.

CONCENTRATOR TYPE

Specifies whether the concentrator is an *frs* (MPC), *rrs*, or *isn*.

ENABLE LINK MEASUREMENTS FOR THIS LINK

Specifies whether the link traffic and error measurement collection for a link servicing the concentrator should be enabled (*yes*) or disabled (*no*). Also, measurements must be scheduled with **schedule measurements** to obtain a report.

FRAME TERMINATION LENGTH HPQ/LPQ

If **CONCENTRATOR TYPE** is *frs* or *rrs* and **LINK TYPE** is *swt*, specifies whether the maximum frame size for the high-priority transmit queue (HPQ) and the low-priority transmit queue (LPQ) is *16/16*, *16/64*, *64/64*, or *64/256* bytes.

LINK SPEED

If **LINK TYPE** is *swt*, specifies the speed in which the link module can be configured. See **Syntax** for the speeds.

LINK TYPE

Specifies if the LIM (in the node) providing connectivity to the concentrator is an *sft* or *swt*.

MODULE ADDRESS

A number identifying the node slot that the LIM, which provides connectivity to the concentrator, occupies in the node.

NUMBER OF USER CHANNELS

If **CONCENTRATOR TYPE** is *frs* or *rrs*, specifies the number of link-supported channels available for user circuits. (Overhead channels are not included.) SWTs have 1 to 504 channels; SFTs have 1 to 2040 channels.

REMOTE LINK MODULE ADDRESS

If **CONCENTRATOR TYPE** is *frs* or *rrs*, specifies the location of the LIM on a remote MPC to be 2, 3, 13, or 14 for an *frs*; or 2, 3, or 14 for an *rrs*.

SECONDS BEFORE CALL DISCONNECT DUE TO LINK FAILURE

If **LINK TYPE** is *swt*, specifies the number of seconds, in 10-second intervals from 20 to 420, that are to elapse between the detection of a failed link and the disconnection of a call that was a result of the failed link. Specification of this parameter provides call-back devices time to attempt alternate paths around a failed link.

Prompted Entry: Entering MPC (*frs*) Information for BNS-2000

```
CC0> enter
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
COMMENT [up to 60 chars double quoted]:
  "ln 2S-D45"
CONCENTRATOR TYPE [frs, rrs]: frs
LINK TYPE [sft, swt: +(swt)]: sft
REMOTE LINK MODULE ADDRESS [2, 3, 13, 14: +(14)]: +
NUMBER OF USER CHANNELS [1-2040: +(504)]: 100
ENABLE LINK MEASUREMENTS FOR THIS LINK [yes, no: +(no)]: yes
MODULE ADDRESS: 
CC0>
```

remove concentrator

The **remove concentrator** command enables you to take a concentrator out of service (oos). Once taken out of service, the concentrator can no longer process calls, and in-service modules residing in the concentrator are put in the ready-for-service (rfs) state.

In addition, a concentrator in the suspended service state is treated as if it were in service by all operations commands; hence, the **remove** command must be executed before the **delete** and the **restore** commands can be entered successfully.

Syntax

You can input **remove concentrator** in prompted or one-line entry.

```
CC0> remove
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
```

Parameters

Refer to the parameter definitions supplied in **enter concentrator**.

Prompted Entry: Removing an MPC (*frs*) from Service

```
CC0> remove
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
CC0>
```

One-line Entry: Removing an MPC (*frs*) from Service

```
CC0> remove concentrator 17
```

restore concentrator

The **restore concentrator** command brings a concentrator into service for the first time; or it returns the concentrator to service following a manual or automatic removal from service. When a concentrator is restored to service, all modules residing in the concentrator are automatically restored if they are in the ready-for-service (rfs) state.

A concentrator in the suspended service state is treated as if it were in service; hence, **remove** must be executed before **restore** can be entered successfully. (If a network fault caused the automatic removal of a concentrator, refer to **MPC Troubleshooting**.)

Syntax

You can input **restore concentrator** in prompted or one-line entry. To have the restoration process execute in the background, press after the process has started. Pressing during the prompting sequence terminates the command process.

```
CC0> restore
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS:
```

Parameters

Refer to the parameter definitions supplied in **enter concentrator**.

Prompted Entry: Restoring an MPC (*frs*) to Service

```
CC0> restore
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS: 17
<system output>
```

One-line Entry/Output: Restoring an MPC (*frs*) to Service

```
CC0> restore concentrator 17
Local concentrator equipment restore completed.
Modules on the concentrator being restored.
Hit <DEL> to put process in the background.
Restore of modules on the concentrator proceeding. > 
CC0>
```

verify concentrator

The output of the **verify concentrator** command enables you to check the database for information regarding a specified concentrator. The **verify concentrator** command also displays the service state of the concentrator and its resident modules. The data output reflects information currently entered in the database.

Syntax

You can input **verify concentrator** in prompted or one-line entry.

```
CC0> verify
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS [(all)]:
```

Parameters

Except for being able to specify the word *all*, meaning every concentrator, the **MODULE ADDRESS** parameter definition for **verify concentrator** is the same as that for **enter concentrator**.

Prompted Entry: Verifying Concentrator Information

```
CC0> verify
OBJECTS [...concentrator...]: concentrator
MODULE ADDRESS [(all)]: all
<report output>
```

One-line Entry/Output: Verifying Concentrator Information

```
CC0> verify concentrator all
93-12-31 13:54:11 NODE=Redqueen
M verify concentrator all
MODULE ADDRESS: 17
CONCENTRATOR TYPE: frs           NCHLS: 500
SERVICE STATE: out (manual)
LINK TYPE: sft
ENABLE LINK MEASUREMENT: yes
COMMENT: In 2S-D45

MODULE  TYPE      SRVC
  1      switch    rfs
  14     sft       rfs
  15     clock     rfs
CC0>
```

Report Fields

This table correlates each report field heading shown in the output of **verify concentrator** to the parameter for which you are prompted in **enter concentrator** or **change concentrator**. The information beneath each report field heading reflects the parameter option specified in either command. An *N/A* indicates that the parameter is *not applicable* or *not used*.

Report Field Name	Corresponding Parameter Name
CONCENTRATOR TYPE	CONCENTRATOR TYPE
COMMENT	COMMENT
ENABLE LINK MEASUREMENT	ENABLE LINK MEASUREMENTS FOR THIS LINK
FRAME TERMINATION LENGTH	FRAME TERMINATION LENGTH HPQ/LPQ
LINE SPEED	LINK SPEED
LINK TYPE	LINK TYPE
MODULE	None: slot number of the module residing in the concentrator, including the remote link, Switch, and Clock.
MODULE ADDRESS	MODULE ADDRESS
NCHLS	NUMBER OF USER CHANNELS
SECS BEFORE DISCONNECT	SECONDS BEFORE CALL DISCONNECT DUE TO LINK FAILURE
SERVICE STATE	None: service state of the concentrator
SRVC	None: service state of the module
TYPE	None: type of module residing in the concentrator; the remote link is indicated by SFT or SWT

System Responses

The following sections contain applicable system responses for the **concentrator** commands. This section is organized by the key phrase that prefaces each response.

COMMAND FAILED:

Command manually terminated.

The key was pressed while the command processor attempted to execute the command. Retry the command.

Measurements are not being collected for concentrator <addr>.

Measurements are not being collected for the specified concentrator. Use the **verify schedule** command to see if the reports have been scheduled.

Module Is Not A Concentrator.

The specified module is not a concentrator module.

Module is not in service.

The report cannot be generated because the concentrator is out of service.

No concentrator modules are entered.

Report output cannot be generated for the requested module address because no concentrators have been configured.

No measurement report displayed for concentrator <addr>

A measurement report will not be output for the specified concentrator.

Requested measurement report timed-out.

The report requested timed-out.

Scheduled report is being processed. Try again later after it is generated.

The **dmeas concentrator** command cannot be executed while the scheduled report is being compiled.

Unexpected message type received -- <mess type>

Contact your support group.

INPUT ERROR:

Cannot <change/delete> concentrator <addr> while in service.

Information about the indicated concentrator cannot be deleted while the concentrator is in service. Use **remove** to take the concentrator out of service. Then retry the command.

Cannot inform REPMEAS to turn meas <on/off> for concentrator <addr>.

The command processor cannot inform the measurements process to turn the link traffic measurements *on* or *off*. Later, retry the process by turning measurements off with **schedule measurements**.

INPUT ERROR:

Cannot reduce number of channels below number required to support provisioned modules (<num>).

The number specified is less than the total number of channels currently administered for the module. The minimum number of administered modules residing in the concentrator is (*num*).

Concentrator cannot reside in the remote shelf.

A concentrator can only reside in the node.

Concentrator Does Not Exist: <addr>

The concentrator at the specified address does not exist in the database.

Concentrator <addr> is already <in/out of> service.

The specified concentrator is in the designated service state.

Concentrator <addr> is not currently defined in the database.

The concentrator is not entered in the database at the address specified.

Concentrator <addr> is not entered.

The specified concentrator has not been configured.

Concentrator <addr> must be out of service to diagnose.

The concentrator must be taken out of service in order to run diagnostics.

Connected components must be deleted before deleting concentrator <addr>.

Use **remove** to take connected modules out of service; then use **delete** to delete module information from the database. Component information must be deleted in reverse hierarchical order (the lowest component is the first, then the next highest) before concentrator information can be deleted.

Invalid Concentrator Address: <addr>

The address specified for the concentrator is not a valid concentrator address.

Invalid Number: <input>

The number input is not valid (too many digits, wrong format, out of range).

Link module does not exist.

The link interface module for an MPC (*frs*) is not an SWT or SFT, or the link interface module has not been administered in the database.

List not allowed: <input>

The list of numbers specified is not an allowed input string.

Module address <addr> contains module type <atype> <module/link> - <concentrator/concentrator link> expected.

The module or link module that exists at the specified address is *atype*. A concentrator or link interface module should be physically present.

INPUT ERROR:

Module Already Exists

The module at the specified address is already administered in the database.

Module Does Not Exist: <addr>

The module at the specified address has not been administered in the database.

Module In Service

The attempted operation is not allowed while the module is in service. Use **remove** to take the module out of service and retry the command.

Module <addr> is a <type> type module, concentrator expected.

The module at the specified address is not a concentrator. A concentrator or link interface module should be physically present.

Module <addr> is already configured.

The specified module address is already administered.

Module <addr> is already entered.

The specified module has already been administered.

Module <addr> is not a concentrator.

The module at the specified address is not a concentrator.

Not An Allowed Value.

The value specified is not allowed; check the list of parameter options and retry the command.

Number Expected: <input>

The string input was alphabetic or alphanumeric; input a numeric string.

Parameter out of Range

The value specified is not within the allowed range.

Programmer Error

Contact your support group.

Range not allowed: <input>

The range of numbers specified is not allowed.

Range Specification Error

The specified range is incorrect; enter the correct range and retry the command.

Slot is reserved: <addr>

The specified slot number is reserved for another module type.

The module specified is <atype>, however the module in the database for the specified slot is a concentrator.

Enter the correct module address and retry the command.

REMOVE/RESTORE FAILED:

restore concentrator module <addr> failed.

Cannot assign ports for module <addr>.

Not enough memory. Increase remote shelf channel allocation.

An attempt was made to put more channels into service than were configured (allocated). Increase the number of channels for the concentrator and retry **restore**.

Common equipment failure for concentrator <addr>. Check link equipment: LIM, remote switch, remote clock, etc. The concentrator is in the suspended state.

The restore process failed due to the reasons cited.

DIAGNOSTICS:

Common equipment failure. Check link equipment: LIM, remote switch, remote clock, etc.

The **diagnose concentrator** command was input without having first checked common link equipment.

Diagnose completed:

loop-around data comparison passed.

0 errors in <reps> transmission.

More than one loopback repetition (<rep>) was requested and no errors occurred.

Loop-around data comparison failed.

<lerr> errors in <reps> transmissions (<lpcnt>%).

<cerr> mismatched characters; <ctot> characters transmitted (<cpcnt>%).

One or more errors occurred during loopback testing. <lerr> is the number of loopbacks in which the returned text did not match the transmitted text; <reps> is the total number of loopbacks completed; <lpcnt> is the percentage of mismatched loopbacks (100x(<lerr>/<reps>)); <cerr> is the total of mismatched characters found in all repetitions; <ctot> is the total of characters transmitted across all repetitions; <cpcnt> is the percentage of mismatched characters found in all repetitions (100x(<cerr>/<ctot>)).

Diagnose not completed:

Another diagnostic process is running.

Error during communication with control computer process (error code: <num>).

System too busy to process command. Try again later.

Timeout on link facility occurred.

The diagnostic did not complete because of one of the reasons listed.

DIAGNOSTIC REQUIRES MODULE TO BE IN SERVICE.

USE THE **restore** COMMAND TO PUT THE MODULE BACK IN SERVICE THEN BEGIN THIS COMMAND AGAIN.

To put the concentrator in service use **restore concentrator**.

DIAGNOSTIC REQUIRES SERVICE INTERRUPTION TO MODULE.

**USE THE `remove` COMMAND TO TAKE THE MODULE OUT OF SERVICE.
THEN BEGIN THIS COMMAND AGAIN.**

Use **`remove concentrator`** before running the diagnostic.

NO KEY PHRASE:

Concentrator <addr> is not in service, status is not available

The specified concentrator is out of service; hence, its status is unknown.

Concentrator <addr> is suspended.

The concentrator is currently in the suspended state.

DATABASE BEING MODIFIED - TRY AGAIN LATER

The command process cannot continue because the database is being changed. Wait a while and retry the command.

SERIOUS DATABASE TRANSACTION PROBLEM - UPDATE NOT ACCEPTED

The command process cannot continue because of a critical problem in the database. (Possibly, a file could have been removed from the disk.) Contact your local support group.

Appendix A.

BNS-2000 MPC

Compliances and Power Options

TABLE A-1. BNS-2000 MPC Power, Electromagnetic, and Safety Compliances

Input Power			
48 VDC CO		240 VAC International	
Yes		Yes	
Electromagnetic Compatibility (EMC) Standards			
FCC A Domestic	DOC A Canada	VDE A International	CISRP22 A International
Yes	Yes	Yes	Yes
Safety Standards			
UL Domestic	CSA Canada	IEC International	
Yes	Yes	Yes	

Power Options

The following tables summarize the valid combinations of power hardware and service for the MCP.

TABLE A-2. AC Power with Alternating Current Distribution (ACD) Base Power Unit

Base Power Unit	Power Entry Module/ Connection Method	AC Voltage (50/60 Hz)	Country
200-240 VAC	ED3P302-30, G5 Line cord from power entry module to Base Power Unit	200 *	Hong Kong, Japan, South Korea
		208	USA
		220 *	Taiwan, Thailand, France, Italy, Spain, West Germany, Netherlands, Argentina
		230 *	Singapore
		240	USA, Canada, Australia, United Kingdom, Venezuela

* These units are intended for conduit connections to the main only.

TABLE A-3. DC Power in the Central Office

Power Entry Module/ Connection Method	DC Voltage	Country
ED3P302-30, G7 Wiring harness to breakers on frame; 20A per cabinet.	-41 to -60	USA, Canada

Appendix B.

MPC Link Interface Module Considerations

Magic

Magic is a property that, when enabled, allows the MPC link interface modules (SFT and SWT) to function as a controller. Magic settings for the MPC are found on the I/O board.

MPC Magic Settings

For the MPC, the I/O boards used with the SFT and SWT must have switch-selectable magic capability. Through switch settings made directly on these I/O boards, magic is *enabled* on the I/O board of the link interface module housed in the concentrator and *disabled* on the I/O board of the link interface module housed in the node. In addition, the slots in which these I/O boards are placed must be magic-capable slots. The magic-capable slots in an MPC are slots 2, 3, 13, and 14.

MPC Magic Settings for an SFT Link (AWJ3)

When an MPC uses an SFT link interface module with an AWJ3 I/O board, the following guidelines apply.

- Switch 1/position 1 is not used.
- When the AWJ3 is used with an MPC, magic must be **enabled** by setting switch 1/position 2 and switch 1/position 3 in the **up** position.

MPC Default Settings for an SFT Link (AWJ3)

Use the settings shown in the following table only to determine if the initial default settings on the I/O board switches have been altered.

TABLE B-1. AWJ3 I/O Board Default Switch Settings

Switch/ Position	Function	Up	Down	Comments
S1.1				Not used
S1.2	PERENA (permanently enabled)		•	U: Connects Pin 205 to ground (magic enabled) D: Open circuit (magic disabled)
S1.3	BRESET (backplane reset)		•	U: Connects Pin 106 to Pin 105 (magic enabled) D: Open circuit (magic disabled)

Default settings are indicated with a •.

MPC Magic Settings for an SWT Link (AWJ9, AWJ10, AWJ11)

When an MPC uses an SWT link interface module with an AWJ9, AWJ10, or AWJ11 I/O board, the following guidelines apply.

- When the AWJ9 I/O board is used with an MPC, magic is **enabled** by setting switch 1/position 2 and switch 1/position 3 to the **left**.

- When the AWJ10 I/O board is used with an MPC, magic is **enabled** by setting switch 1/position 2 and switch 1/position 3 to the **right**.
- When the AWJ11 I/O board is used with MPC, magic is **enabled** by setting switch 1/position 2 and switch 1/position 3 to the **left**.

MPC Default Settings for an SWT Link (AWJ9, AWJ10, AWJ11)

Use the settings shown in the following tables only to determine if the initial default settings on the I/O board switches have been altered.

TABLE B-2. AWJ9 I/O Board Default Switch Settings

Switch/ Position	Function	Left	Right	Comments
S1.1	NRZI		•	L: Enabled R: Disabled
S1.2	PERENA (permanently enabled)		•	L: Connects Pin 205 to ground (magic enabled) R: Open circuit (magic disabled)
S1.3	BRESET (backplane reset)		•	L: Connects Pin 106 to Pin 105 (magic enabled) R: Open circuit (magic disabled)

Default settings are indicated with a •.

TABLE B-3. AWJ10 I/O Board Default Switch Settings

Switch/ Position	Function	Left	Right	Comments
S1.1	NRZI	•		L: Disabled R: Enabled
S1.2	PERENA (permanently enabled)	•		L: Open circuit (magic disabled) R: Connects Pin 205 to ground (magic enabled)
S1.3	BRESET (backplane reset)	•		L: Open circuit (magic disabled) R: Connects Pin 106 to Pin 105 (magic enabled)

Default settings are indicated with a •.

TABLE B-4. AWJ11 I/O Board Default Switch Settings

Switch/ Position	Function	Left	Right	Comments
S1.1	NRZI		•	L: Enabled R: Disabled
S1.2	PERENA (permanently enabled)		•	L: Connects Pin 205 to ground (magic enabled) R: Open circuit (magic disabled)
S1.3	BRESET (backplane reset)		•	L: Connects Pin 106 to Pin 105 (magic enabled) R: Open circuit (magic disabled)

Default settings are indicated with a •.

SWT Jumper Settings

The SWT module has three jumpers to control various module functions; see Figure B-1.

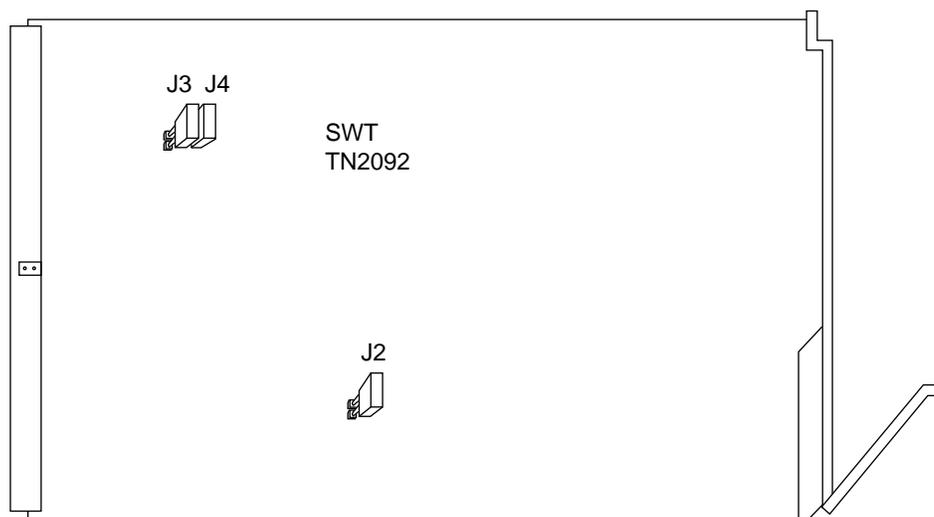


FIGURE B-1. SWT Jumper Locations

Jumper J2

Jumper J2 controls queuing. For normal operation, the jumper is installed (In) to enable both low- and high-priority queues. Removing the jumper (Out) limits service to the low-priority queue.

Jumpers J3 and J4

Jumpers J3 and J4 control the source of the terminal timing signal on the RS-449/422 or V.35 interface, and terminal timing for the SWT.

Use terminal timing whenever the cable length between the SWT link and its modem exceeds the distances shown in Table B-8. If you enable terminal timing on the SWT, you must also enable it on the connected modem. For loopback testing with no modem connected, set the timing type to the internal clock (11 kHz).

The J3 and J4 terminal timing settings shown in Table B-7 allow increased cable length between the SWT and its modem; see Table B-8. If the cable length is *less* than that given for a data rate, terminal timing is not required and both jumpers J3 and J4 should be removed (Out Out).

TABLE B-5. SWT Jumper Settings

J2	J3	J4	Timing Source	Use
In				Normal position is In. Uses both low- and high-priority queues.
Out				Uses only low-priority queue.
	Out	Out	No terminal timing	Normal setting; both jumpers removed.
	In	Out	Internal clock	Used when loopback connector is installed.
	Out	In	DCE transmit clock	Used for terminal timing if modem provides this signal in terminal timing mode.
	In	In	DCE receive clock	Used for terminal timing if modem does not provide the DCE-to-clock signal in terminal timing mode.

SWT Data Rate and Cable Length Restrictions

The maximum cable length that can be used to connect an SWT to a modem or data service unit (DSU) is determined by the device. Table 2-8 shows the maximum cable lengths for connecting an SWT if terminal timing is not enabled.

TABLE B-6. SWT Data Rates and Cable Length Restrictions

Interface Standard	Data Rate	Maximum Cable Length (ft)*
RS-232-C	<=19.2 Kbps	50
RS-449/422 or V.35	2.0 Mbps	20
	1.5 Mbps	40
	1.0 Mbps	60
	500 Kbps	140
	100 Kbps	800
	<=56 Kbps	1600

* Terminal timing is not enabled.

Appendix C. MPC Database Entry Forms

This appendix contains a sample database entry form (Form C-1, Entering a BNS-2000 MPC) that should be used when initially entering an MPC into the database or when making any extensive changes. The form should be used with similar forms completed for interface modules that provide user services. These forms are provided in the appropriate module references.

The form lists prompts that appear when the **enter** command is used and the possible values (or range of values) that can be entered in response to the prompts. Default values are shown in *italics*. The information contained in this appendix is supplemented by explanations in **MPC Administration** and **MPC Commands**.

FORM C-1. Entering a BNS-2000 MPC

MODULE ADDRESS				
COMMENT [up to 60 chars double-quoted, <i>none</i>]				
CONCENTRATOR TYPE* [frs, rrs]	frs	frs	frs	frs
LINK TYPE [sft, <i>swt</i>]				
REMOTE LINK MODULE ADDRESS [2, 3, 13, <i>14</i>]				
If LINK TYPE is <i>swt</i> : NUMBER OF USER CHANNELS [1-504]				
If LINK TYPE is <i>sft</i> : NUMBER OF USER CHANNELS [1-2040, 504]				
If LINK TYPE is <i>swt</i> : FRAME TERMINATION LENGTH HPQ/LPQ [16/16, 16/64, 64/64, 64/256]				
If LINK TYPE is <i>swt</i> : LINK SPEED [2400, 4800, 9600, 19200, 48k, 56k, 64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1.024M, 1.088M, 1.152M, 1.216M, 1.280M, 1.344M, 1.408M, 1.472M, 1.536M, 1.544M, 2.048M]				
ENABLE LINK MEASUREMENTS FOR THIS LINK [yes, <i>no</i>]				
If LINK TYPE is <i>swt</i> : SECONDS BEFORE CALL DISCONNECT DUE TO LINK FAILURE [20-420 (10 second intervals), 50]				

* *frs* indicates the BNS-2000 MPC.

Index

A

AC. *See* Alternating current (AC)

ACD Base Power Unit. *See* Alternating Current Distribution (ACD) Base Power Unit

ACX582 power supply, 2-18

Address(es),
 module address conventions, 3-6
 module address/slot number, 2-6, 2-19, 2-22, 3-5–3-6, 5-24

Alarms, 2-21, 4-3, 4-5, 4-6, 4-13, 5-19, 5-21

Alternating current (AC), 2-14
 customer premises (CP) environment, 1-6

Alternating Current Distribution (ACD) Base Power Unit,
 anchoring, 2-8–2-9
 breakers, 4-12
 grounding, 2-13
 hardware configurations, 2-3
 input voltage check, 2-13
 power connection, 4-12
 power entry module, 1-6
 power supplies, 1-6
 right angle connectors, 2-17
 unpacking, 2-8
 weight, 1-6, 2-7
 wiring, 2-12–2-17

Anchoring brackets. *See* Brackets

Anchors for CO frame, **2-29**

ASPI input/output (I/O) board, 2-18, 2-19, 2-21, 4-8
 fan cable connection, 4-8, 4-12
 internal component connections, 2-21–2-22
 switch settings, 2-19, 4-8

Asynchronous connections/transport, 1-7

Autorestore, 1-7, 4-5

AWJ input/output (I/O) board(s) switch settings,
 AWJ10 default, B-3–B-4
 AWJ10 magic, B-2–B-3
 AWJ11 default, B-3–B-4
 AWJ11 magic, B-2–B-3
 AWJ3 default, B-1–B-2

AWJ3 magic, B-1
AWJ9 default, B-3–B-4
AWJ9 magic, B-2–B-3
AWJ10 board, B-4

B

Base power unit. *See* Alternating Current Distribution (ACD) Base Power Unit; Power Factor Correction (PFC) Base Power Unit

Base Power Unit,
 unpacking, 2-8
 wiring, 2-12–2-17

BNS-2000 MPC. *See* Multipurpose Concentrator (BNS-2000 MPC)

Brackets,
 for anchoring Base Power Units, 2-8, 2-8–2-9
 L-type for stacking Multipurpose Concentrators (MPCs), 2-7, 2-9, 2-10, 2-11
 on shelf, 2-16
 special L-type for Base Power Units, 2-10, 2-11

Bracket(s) on shelf, **2-31**

Branch circuit grounding, 2-14

Bus terminating resistor, 2-18, 4-8, 4-12

C

Cable length restrictions for Standard Wire Trunk (SWT), B-6

Cable support bracket. *See* Brackets

Call back devices, 1-8, 5-24

Central office (CO),
 circuit breaker, 4-12
 direct current (DC) distribution, 1-6, A-2
 dolly installation on frame, 2-26
 environment, 1-3, 1-5, 2-9
 frame, 2-23–2-26, 2-29, 2-30
 anchors, 2-29
 covers, 2-33
 frame anchoring, 2-27–2-28
 frame covers, **2-33**

- installing, 2-34
 - power, **2-33**
 - power configurations, 1-6, A-2
 - power connections to frame, 2-33
 - power entry module, 1-6, 2-33
 - power supplies, 1-6
 - structural specifications of frame, 1-5
 - change concentrator** (operations command), 3-3, 3-4, 3-6, 3-7, 4-5, 4-14, 5-3, 5-4-5-5
 - Clock module, 1-3, 1-5, 2-18, 2-21, 3-6, 4-3, 4-8
 - ASPI input/output (I/O) board, 2-20, 2-21
 - insertion, 2-19, 2-20
 - internal component connections, 2-21
 - CO. *See* Central office (CO)
 - Cold spare. *See* Link Interface Modules (LIMs)
 - Command set, 1-7, 3-3-3-4, 5-3-5-29. *See Also*
 - Database, operations commands
 - Conductor (#6 AWG), 2-33
 - Configurations of hardware, 2-3
 - Connection data, 3-10, 4-4, 4-6, 4-14
 - Connectors,
 - right angle, 2-17
 - Console pin assignments (for slots), **4-11**
 - copy module** (operations command), 3-9
 - CP. *See* Customer premises (CP)
 - Critical module(s). *See* Clock module; Switch module
 - Customer premises (CP),
 - alternating current (AC), 1-6
 - BNS-2000 MPC equipment configurations, 1-5
 - environment, 1-3, 1-5, 2-9
 - grounding, 2-14
 - power configurations, 1-6, A-1
 - Customer premises (CP) node, 2-17
- D**
- Data rate restrictions for Standard Wire Trunk (SWT),
 - B-6
 - Data Service Unit (DSU). *See Also* Diagnostic(s)
 - faulty cabling, 4-17
 - faulty unit, 4-17
 - tests, 5-8
 - Database,
 - administrative procedures, 3-7
 - entry forms, C-1-C-2
 - operations commands,
 - change concentrator**, 3-3, 3-4, 3-6, 3-7, 4-5, 4-14, 5-3, 5-4-5-5
 - copy module**, 3-9
 - delete concentrator**, 3-3, 3-4, 3-7, 3-8, 4-5, 5-6
 - enter concentrator**, 3-3, 3-4, 3-6, 3-7, 3-8, 3-9, 5-3, 5-23-5-25
 - move module**, 3-8
 - verify concentrator**, 3-3, 3-4, 3-6, 3-7, 3-8, 3-9, 3-11, 4-4, 4-13, 4-14, 4-15, 4-16, 4-17, 5-28-5-29
 - verify module**, 3-8
 - verify shelf**, 4-4
 - parameter considerations, 3-4-3-6
 - procedure,
 - changing existing information, 3-7
 - copying information to another module address, 3-9
 - initial concentrator administration, 3-7
 - moving information to another module address, 3-8
 - sizing report, 3-10
 - utilization report, 3-10
 - verification of information, 3-11
 - dbaudit** (utility command), 3-10
 - dbresize** (utility command), 3-10
 - DC. *See* Direct current (DC)
 - DCX1836 power supply, 2-18
 - delete concentrator** (operations command), 3-3, 3-4, 3-7, 3-8, 4-5, 5-6
 - diagnose concentrator** (operations command), 3-4, 3-6, 4-3, 4-4, 4-6, 4-15, 4-16, 4-17, 5-7-5-9
 - Diagnostic(s). *See Also* Problem(s)
 - command used to run, 3-4, 3-6, 4-3, 4-4, 4-6, 4-15, 4-16, 4-17, 5-7-5-9
 - concentrator remote test, 4-14, 4-15, 4-16, 4-17, 5-7, 5-8
 - DSU local test, 4-14, 4-16, 5-8
 - DSU remote test, 4-14, 4-17, 5-8
 - general information, 4-14-4-15
 - link external test, 4-14, 4-16, 5-8
 - link local test, 4-14, 4-15, 5-8
 - link remote test, 4-14, 4-16, 5-8
 - loopback cables/connectors, 4-15, 4-16, 4-17, B-6
 - loopback mode, 4-16
 - SWT jumper settings, 4-16, B-5-B-6
 - test completion, 4-17

Direct current (DC),
 central office (CO) environment, 1-6, A-2
 power connections to central office (CO) frame, 2-33
display connections (operations command), 3-10, 4-4,
 4-6, 4-14
display traffic (operations command), 3-10, 4-4
dmeas concentrator (operations command), 3-4, 3-6,
 3-11, 4-4, 4-6, 4-15, 5-10–5-13
 Dollies, 2-23–2-24, 2-26, 2-27, 2-29
dstat concentrator (operations command), 3-4, 3-11,
 4-4, 4-12, 4-14, 4-15, 5-14–5-22
dstat module (operations command), 3-11
 DSU. *See* Data Service Unit (DSU)

E

ED2P324-30,
 G25 line cord, 2-16
 G26 line cord, 2-16
 G27 line cord, 2-16
 G28 line cord, 2-16
 ED3P302-30,
 G4 power entry module, 2-14
 G5 power entry module, 2-14, 2-16
 G6 power entry module, 2-33
 G7 power entry module, 2-33
 G1 power entry module. *See* Power entry module
 G2 power entry module. *See* Power entry module
 Electromagnetic compliances for the Multipurpose
 Concentrator (MPC), A-1
 Electromagnetic interference (EMI), 2-6
 Electrostatic discharge (ESD), 2-6
 EMI. *See* Electromagnetic interference (EMI)
 End user problems, 4-5, 4-6, 4-7
enter concentrator (operations command), 3-3, 3-4,
 3-6, 3-7, 3-8, 3-9, 5-3, 5-23–5-25
 ESD. *See* Electrostatic discharge (ESD)

F

Faceplate indicators, 4-3, 4-4, 4-8
 Fan(s),
 cable, 2-21
 connected to ASP1 input/output (I/O) board, 2-22
 problems, 4-7, 4-8, 4-12, 5-18
 tray cover and labeling, 2-23

Frame size, 5-24
frs. *See* Multipurpose Concentrator (BNS-2000 MPC)
 Fuse(s),
 blown, 4-6, 4-12, 4-13
 changing, 4-12
 check, 4-12, 5-14, 5-16, 5-22
 normal, 4-13
 required for bus terminating resistor, 4-8
 shipped, 2-7

G

Grounding,
 Alternating Current Distribution (ACD) Base Power
 Unit, 2-13
 branch circuit, 2-14
 CO frame, 2-33
 conductors, 2-33
 grounding conductor, 2-14
 jacks for Multipurpose Concentrator (MPC), 2-6
 power entry module, 2-16
 straps for Multipurpose Concentrator (MPC), 2-10,
 2-11
 terminal location, 2-13

H

Hardware configurations,
 Multipurpose Concentrator (MPC), 2-3
 High-priority transmit queue (HPQ), 5-24

I

In service (in). *See* Service state(s)
 Installation,
 central office (CO), 2-34
 customer premises (CP), 2-17
 power supply(ies), 2-18
 Interface module(s),
 for user services, 1-3
 insertion, 2-18, 2-22–2-23
 module address/slot number, 1-3, 1-4, 1-5, 2-19
 user services, 1-5, 3-6

J

Jumper settings for Standard Wire Trunk (SWT), 4-14, 4-16, B-5–B-6

K

Kickplate(s), 2-28, 2-30

L

Labels, 2-23

LIMs. *See* Link Interface Modules

Line cord bracket. *See* Brackets

Line cord(s), 2-16, 2-17

for Base Power Unit wiring, 2-12–2-13

Link,

measurements collection, 5-24

speed, 5-24

type, 5-24

Link Interface Modules (LIMs), 1-3. *See Also* Standard Fiber Trunk (SFT); Standard Wire Trunk (SWT)

administration, 3-3

as a configurable option, 3-6

cold spare, 1-5, 1-7

diagnostics, 5-7

faceplate indicators, 4-3

failed link, 5-24

insertion, 2-18, 2-22

magic settings, B-1–B-5

module address/slot number, 1-5, 2-22, 3-5, 3-6

number of user channels, 5-24

number required, 1-5

re-engineering, 4-4

remote link module address, 5-24

speed, 5-24

switching to a cold standby, 3-9

SWT call disconnect timer, 5-24

types, 1-5, 3-3, 5-24

Links. *See* Link Interface Modules (LIMs)

Local area network (LAN) connectivity, 1-7

Loopback cables/connectors/tests. *See* Diagnostic(s)

Low-priority transmit queue (LPQ), 5-24

L-type bracket. *See* Brackets

M

Magic, 2-19, 2-22, B-1–B-5

Measurements data, 1-7, 3-4, 3-6, 3-11, 4-4, 4-6, 4-15, 5-10–5-13, 5-24

Modems. *See* Call back devices

Module(s). *See Also* Clock module; Interface modules; Link Interface Modules (LIMs); Switch module

faceplate indicators, 4-3

for user services, 1-3

hardware status display, 3-4, 3-11, 4-4, 4-12, 4-14, 4-15, 5-14–5-22

input/output (I/O) boards, 4-3

mode switch, 2-22, 2-23

module address/slot number, 2-6, 2-19, 2-22, 3-5–3-6

module (operations command object), 3-4

providing user services, 1-5, 4-3

resident, 1-5, 4-3

user services, 3-6

move module (operations command), 3-8

Multiplexed host interfaces, 1-7

Multipurpose Concentrator (BNS-2000 MPC),

central office (CO) equipment structure, 1-5

Clock module, 1-3, 1-5

customer premises (CP) equipment structure, 1-5

module address/slot number, 1-3, 1-4

physical description, 1-3, 1-4

power configurations, 1-6

power supplies, 1-4

Switch module, 1-3, 1-4

Multipurpose Concentrator (MPC),

administration, 3-6

anchoring base power units, 2-8–2-9

assembly with Base Power Unit, 2-10–2-11

Clock module, 3-6, 4-3, 4-8

configurations, 2-3

electromagnetic compliances, A-1

equipment shipped, 2-7,

faceplate indicators, 4-3, 4-4, 4-8

fans, 4-7, 4-8, 4-12

fuses, 4-6, 4-8, 4-12

grounding Base Power Units, 2-13

grounding straps, 2-10, 2-11

installation checklist, 2-4–2-5

labels, 2-23

- L-brackets, 2-10
 - magic settings, B-1, B-5
 - module address/slot number, 2-19
 - module insertion, 2-18–2-23
 - power compliances, A-1
 - power problem solutions, 4-12
 - power testing, 2-23
 - right angle connectors, 2-17
 - safety compliances, A-1
 - Switch module, 3-6, 4-3
 - unpacking, 2-7–2-8
 - voltage checks, 4-8
 - weight, 2-7
 - Multipurpose Concentrator (MPC15),
 - diagnostics, 5-7–5-9

 - N**
 - Node(s),
 - administration, 3-3
 - distance from, 1-3
 - distinction between trunks and links, 1-3
 - extending capabilities, 1-3
 - internodal communications, 1-3
 - links required, 1-5
 - local area network (LAN) connectivity, 1-7
 - module address/slot number, 2-6, 2-19, 2-22, 3-5–3-6
 - node** (operations command object), 3-4

 - O**
 - Out of service (oos). *See* Service state(s)

 - P**
 - PDN. *See* X.25 host/public data network (PDN)
 - connectivity
 - PFC Base Power Unit. *See* Power Factor Correction (PFC) Base Power Unit
 - Power, 2-18, 2-33
 - central office (CO), 2-18, 2-33
 - tests, 4-11
 - Power compliances for the Multipurpose Concentrator (MPC), A-1
 - Power configuration(s),
 - Multipurpose Concentrator (MPC) in central office (CO), A-2
 - Power entry module, 1-6, **2-14**, **2-16**, **2-17**
 - ED3P302-30,
 - G5,
 - hardware configurations, 2-3
 - G7,
 - hardware configurations, 2-3
 - installation, 2-14–2-17, 2-33
 - removal, 2-33
 - G1, 1-6
 - G2, 1-6
 - ED-3P302-30G7,
 - power testing, 4-8
 - connections, 4-12
 - Power Factor Correction (PFC) Base Power Unit,
 - breakers, 4-12
 - power connection, 4-12
 - power entry module, 1-6
 - Power supply(ies),
 - installation, 2-17
- Powering down the system, 2-14
- Problem(s). *See Also* Diagnostic(s)
 - alarms, 4-3, 4-5, 4-6
 - blown fuse, 4-6
 - board failure, 2-21
 - cabinet overheating, 2-21
 - call BUSY received, 4-5
 - cannot make calls, 4-6
 - change concentrator** fails, 4-5
 - circuit pack failure, 2-21
 - Data Service Unit (DSU), 4-17
 - delete concentrator** fails, 4-5
 - end user, 4-5, 4-6, 4-7
 - faceplate indicators, 4-3, 4-4, 4-8
 - fan, 4-7, 4-8, 4-12, 5-18
 - faulty cabling, 4-6
 - faulty connection, 4-6
 - faulty module, 4-6
 - faulty Switch module, 4-6
 - lost/garbled data, 4-7
 - no calls in progress, 4-6
 - no connection over link, 4-5
 - no **DESTINATION** prompt, 4-5, 4-7
 - overflow errors, 4-4, 5-11, 5-12
 - parity errors, 4-4, 5-12, 5-19
 - power failure, 4-13

- remove concentrator** fails, 4-5
 - restore concentrator** fails, 4-5
 - synchronization errors, 4-4, 5-11, 5-12, 5-20, 5-21
 - system reboot, 4-13
 - transmission errors, 4-4
- ## R
- Ready for service (rfs) service state. *See* Service State(s)
 - Remote link modules address, 5-24
 - remove concentrator** (operations command), 3-3, 3-4, 3-7, 3-8, 3-9, 4-14, 4-15, 5-6, 5-26
 - Report generation,
 - comment data, 3-4, 3-10
 - connection data, 3-10, 4-4, 4-6, 4-14
 - database audit, 3-10
 - database information verification, 3-3, 3-4, 3-6, 3-7, 3-8, 3-9, 3-11, 4-4, 4-13, 4-14, 4-15, 4-16, 4-17, 5-28–5-29
 - database sizing, 3-10
 - database verification, 4-4
 - measurements data, 3-4, 3-6, 3-11, 4-4, 4-6, 4-15, 5-10–5-13
 - module hardware status, 3-4, 3-11, 4-4, 4-12, 4-14, 4-15, 5-14–5-22
 - out-of-service module verification, 3-4, 3-11
 - traffic data, 3-10, 4-4
 - Reset push button, 4-3
 - Resistor,
 - bus terminating, 4-8
 - restore concentrator** (operations command), 3-3, 3-4, 3-7, 3-8, 3-9, 4-5, 4-13, 4-14, 4-17, 5-27
 - Right angle connectors, 2-17
- ## S
- Safety compliances for the Multipurpose Concentrator (MPC), A-1
 - Series M1 shelf, 2-14, 2-16
 - Service state(s),
 - and database parameters, 5-4, 5-6
 - and running diagnostics, 5-7
 - commands used to alter, 3-3, 3-4, 3-7, 3-8, 3-9, 4-5, 4-13, 4-14, 4-15, 4-17, 5-26–5-27
 - in service (in), 1-7, 4-13, 4-14
 - out of service (oos), 1-7, 4-5, 4-13, 4-14
 - problems with, 4-6
 - ready for service (rfs), 1-7, 4-13
 - suspended, 1-7, 4-5, 4-13, 4-14
 - types, 5-26, 5-27
 - SFT. *See* Standard Fiber Trunk (SFT)
 - Slot allocation/numbering, 1-3, 1-4, 1-5, 1-7, 2-6, 2-19, 2-22, 3-3, 3-5–3-6, 4-8. *See Also* Module(s); Node(s)
 - Slot(s) for modules,
 - terminal pin assignments, **4-11**
 - SNA. *See* Systems Network Architecture (SNA)
 - Standard Fiber Trunk (SFT), 1-3
 - as a configurable option, 3-6
 - AWJ3 I/O board default settings, B-1–B-2
 - AWJ3 I/O board magic settings, B-1
 - BNS-2000 MPC module address/slot number, 1-5
 - diagnostics, 5-7
 - faceplate indicators, 4-3
 - insertion, 2-18, 2-22
 - module address/slot number, 2-22, 3-5
 - number of user channels, 5-24
 - part number, 1-5
 - re-engineering, 4-4
 - remote link module address, 5-24
 - Standard Wire Trunk (SWT), 1-3
 - as a configurable option, 3-6
 - AWJ10 I/O board default settings, B-3–B-4
 - AWJ10 I/O board magic settings, B-2–B-3
 - AWJ11 I/O board default settings, B-3–B-4
 - AWJ11 I/O board magic settings, B-2–B-3
 - AWJ9 I/O board default settings, B-3–B-4
 - AWJ9 I/O board magic settings, B-2–B-3
 - BNS-2000 MPC module address/slot number, 1-5
 - cable length restrictions, B-6
 - call back modems, 1-8
 - call disconnect timer, 5-24
 - data rate restrictions, B-6
 - diagnostics, 5-7
 - faceplate indicators, 4-3
 - failed link, 5-24
 - insertion, 2-18, 2-22
 - jumper settings, 4-16, B-5–B-6
 - module address/slot number, 2-22, 3-5
 - MPC module address/slot number, 3-6

number of user channels, 5-24
part number, 1-5
re-engineering, 4-4
remote link module address, 5-24
speed, 5-24
StarKeeper II NMS,
 concentrator administration, 3-3
Suspended service state. *See* Service State(s)
Switch module, 1-3, 1-4, 2-18, 3-6, 4-3, 4-6
 insertion, 2-19, 2-20
SWT. *See* Standard Wire Trunk (SWT)
Synchronous transport/fanout, 1-7
System responses, 5-30–5-34
Systems Network Architecture (SNA) connectivity, 1-7

T

Terminal timing, B-6
Test(s), *See* Diagnostic(s)
Tools needed for installation, 2-5–2-6
Traffic data, 3-10, 4-4
Troubleshooting. *See* Diagnostic(s); Problem(s)
Trunks. *See* Link Interface Modules (LIMs)

U

User channels,
 number of, 5-24
User services, 1-3, 1-5, 4-5, 4-6, 4-7

V

verify comment (operations command), 3-10
verify concentrator (operations command), 3-3, 3-4,
 3-6, 3-7, 3-8, 3-9, 3-11, 4-4, 4-13, 4-14, 4-15,
 4-16, 4-17, 5-28–5-29
verify module (operations command), 3-8
verify oosmods (operations command), 3-4, 3-11
verify schedule (operations command), 3-4
verify shelf (operations command), 4-4
Voltage,
 Series M1 shelf, 4-11

W

Wiring,
 Base Power Unit, 2-17
 central office (CO), 2-33–2-34

X

X.25 host/public data network (PDN) connectivity, 1-7