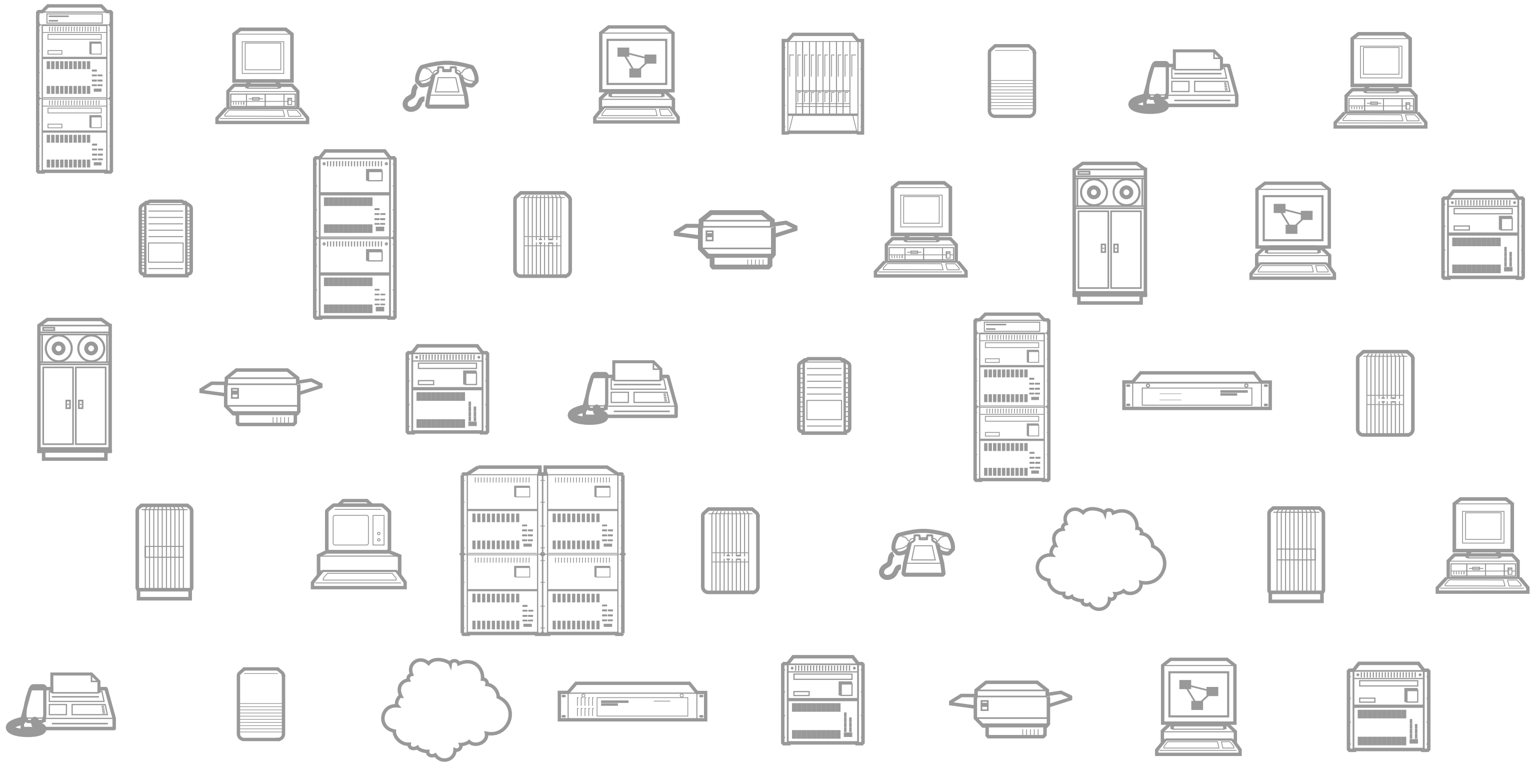

3624 MainStreet

Intelligent T1 Channel Bank

Technical Practices

Release 12 Generic 620C

NEWBRIDGE

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Notice

This manual contains information on the redundant power supply and the T1 IHTU module. At the time the documentation was published, these features were not available. Please contact your Newbridge representative for information on availability.

Foreword

This document describes the *3624 MainStreet* Intelligent T1 Channel Bank, release 12, software generic 620C. It contains:

- **Installation** – installing and connecting system equipment
- **Configuration** – configuring all node and module parameters
- **Maintenance** – troubleshooting and system maintenance
- **Ordering Information** – available Newbridge parts and accessories
- **Acronyms**
- **Index**

Not all systems include all components or features described in this document.

Mandatory Regulations

The following sections outline the mandatory regulations governing the installation and operation of the *3624 MainStreet* unit. Adherence to these instructions is necessary to ensure that regulatory compliance requirements are met.

Before connecting this equipment, users should read and understand all instructions. Follow all warnings and instructions marked on the product.

Caution

In order to prevent accidental shorting of modules, the modules must be correctly aligned between the card guides before insertion.

Danger

There is a danger of explosion if the battery used in this device is replaced incorrectly. Do not attempt battery replacement. Return this equipment to Newbridge for servicing where battery fault is suspected to be the cause of equipment failure. Where the law prohibits, do not discard the battery, or the equipment with battery, but return it to Newbridge for proper disposal.

Danger

The lithium battery used in this device may present a fire or chemical burn hazard if mishandled. Do not recharge, disassemble, heat above 100°C (212°F) or incinerate.

Warning

High Leakage Current. This equipment must be connected to earth before the power supply is connected. Refer to the grounding instructions in *Installation*, chapter B2.

Disclaimer

Newbridge products are intended for standard commercial uses. Without the appropriate network design engineering, they must not be sold, licensed or otherwise distributed for use in any hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life-support machines, or weapons systems, in which the failure of products could lead directly to death, personal injury, or severe physical or environmental damage. The distributor hereby agrees that the use, sale, licence or other distribution of the products for any such application, without the prior written consent of Newbridge, shall be at the distributor's sole risk. The distributor hereby agrees to defend and hold Newbridge harmless from any claims for loss, cost, damage, expense or liability that may arise out of or in connection with the use, sale, licence or other distribution of the products in such applications.

Canada

Industry Canada

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

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

The standard connecting arrangement code for the *3624 MainStreet* unit is CA81A.

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

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

Caution

Users should not attempt to make electrical ground connections themselves, but should contact the appropriate electric inspection authority, or electrician.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

Safety approval for dc systems

The dc source for the *3624 MainStreet* unit must meet the requirements of a SELV (Safety Extra Low Voltage) source in accordance with CSA C22.2 No. 950. The system is intended for use with a SELV secondary source which is electrically isolated from the ac source, and which is reliably connected to earth.

United States

Federal Communications Commission

This equipment has been approved by the Federal Communications Commission (FCC) Part 68 Rules, as not being harmful to the telephone network when connected directly to the telephone lines. Customers shall, upon request from the telephone company, provide the information specified in Table 1.

Table 1: Federal Communications Commission Information

FCC Registration Numbers	GQ64GN-17621-DD-N
	GQ64GN-19493-XD-N
Universal Service Order Code (USOC)	RJ48C
Facility Interface Codes (FIC)	04DU9-B, 04DU9-C
Service Order Code	6.0P
Ringer Equivalent Number (REN)	N/A

The FCC registration numbers can be found on the product label located on the side of the equipment door panel.

If any of your telephone equipment causes harm to the telephone network, the telephone company may temporarily discontinue service to your line. If possible and practical, the company will notify you in advance. If not, the company will notify you as soon as possible. With the notification you will be advised of your right to file a complaint with the FCC.

The telephone company may make changes to its facilities, equipment, operations and procedures which could affect the operation of your equipment. Before these changes are made, the company will provide advance notice that communications service will be interrupted.

FCC regulations prohibit the connection of customer-provided equipment to coin service (central office implemented systems). Connection to party lines is subject to tariffs; contact your state public service commission for information.

In the event that repairs are needed to this equipment, contact:

Newbridge Networks Inc.
810 Commerce Park Drive
Ogdensburg, NY 13669
(315) 393-9981

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

Safety approval for dc systems

The dc source for the *3624 MainStreet* unit must meet the requirements of a SELV source in accordance with UL1950. The system is intended for use with a SELV secondary source which is electrically isolated from the ac source, and which is reliably connected to earth.

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A1. Introduction

The *3624 MainStreet* Intelligent T1 Channel Bank multiplexes up to 24 voice or 96 data circuits onto one T1 (1.544 Mb / s) link, for access to private or public switched networks or for point-to-point configurations. The system supports a wide variety of interfaces for the high-speed transmission of multiple combinations of voice and data traffic.

This chapter describes the components of the *3624 MainStreet* unit, and outlines the installation requirements and procedures.

A1.1 Chassis

The *3624 MainStreet* unit is available as a wall-mount chassis or a rack-mount drawer that is installed in a shelf assembly. The wall-mount unit can also be installed in a rack. The units are available with an ac, redundant ac (wall-mount only) or dc power supply.

The chassis contains the power supply, Control card and Universal card.

Wall-mount unit

The wall-mount unit has a lockable front cover and side door. The front cover provides access to the Control card and the Universal card. The side door provides access to the power switch, power plug, fuse holder, and grounding and antistatic strap stud, and to the connectors and LED indicators on the edge of the Control card and Universal card.

The physical specifications for the wall-mount chassis are:

❑ dimensions: 43.2 cm (h) x 30.5 cm (w) x 10.2 cm (d) (17 in. x 12 in. x 4 in.)
❑ weight: 7 kg (15.4 lb)

Figures A1-1 and A1-2 show the exterior and interior views of the wall-mount unit.

Figure A1-1: *3624 MainStreet* Wall-mount Unit

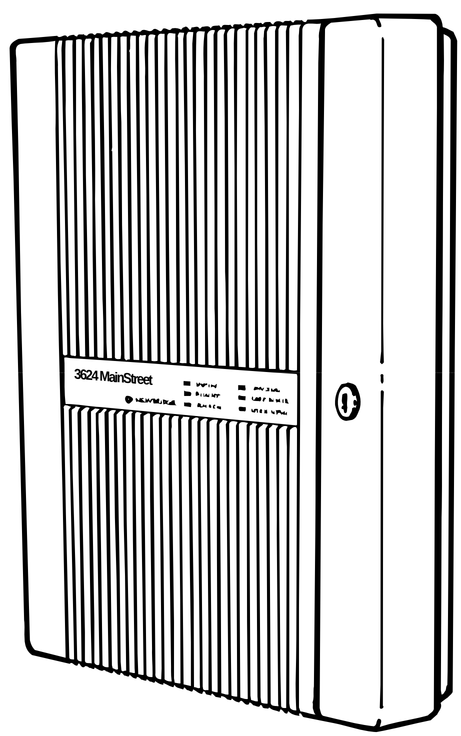
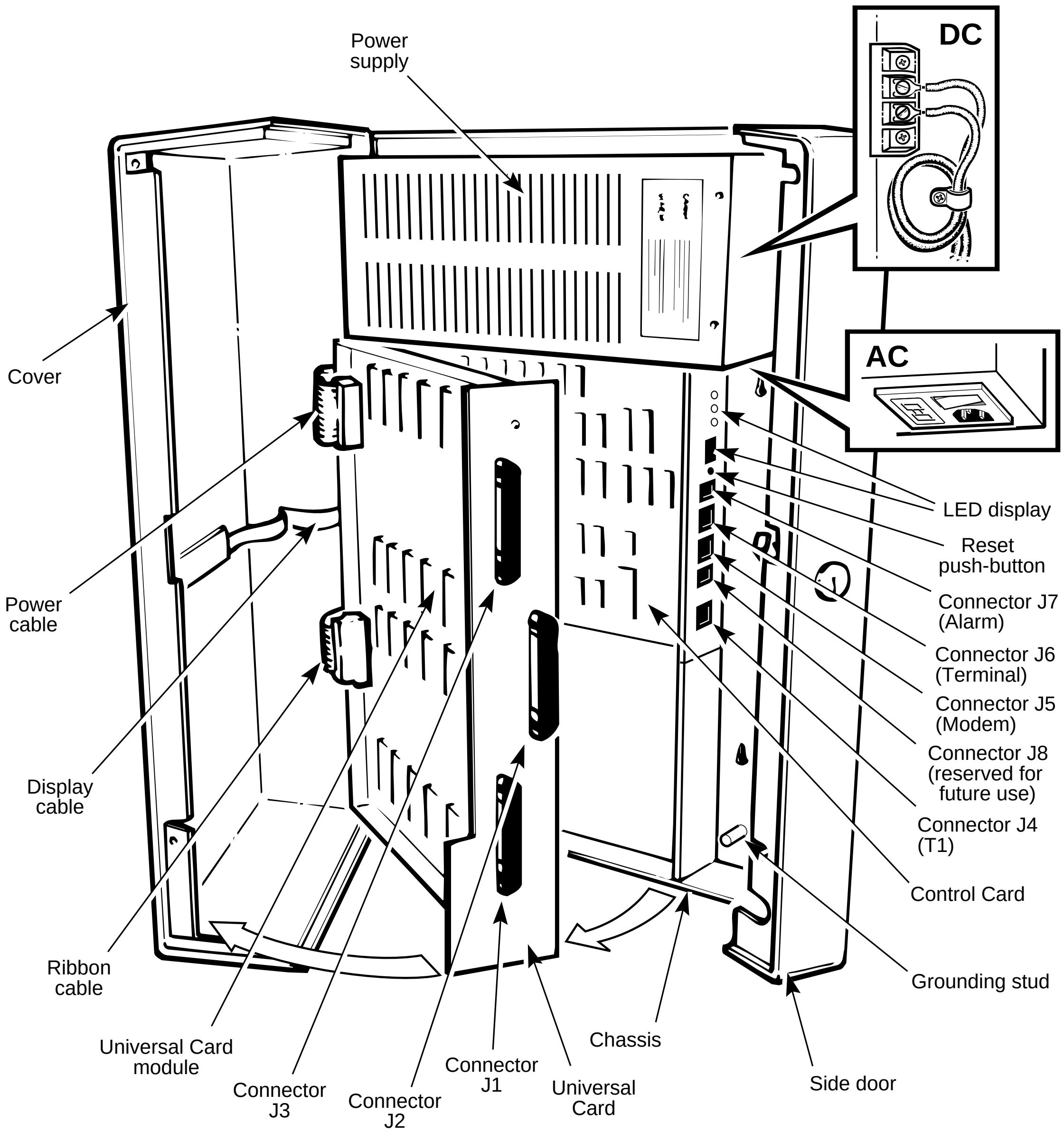


Figure A1-2: Wall-mount Unit (Interior)



Wall-mount unit with redundant power supply

The wall-mount unit with redundant power supply is similar to the wall-mount chassis, with the addition of an external case at the top of the unit that holds the second power supply. The unit also contains a power supply selector card that provides redundant system operation.

The physical specifications for the wall-mount unit (redundant power supply) are:

❏ dimensions: 58.4 cm (h) x 30.5 cm (w) x 10.2 cm (d) (23 in. x 12 in. x 4 in.)
❏ weight: 9.1 kg (20 lb)

Figures A1-3 and A1-4 show the exterior and interior views of the wall-mount unit with redundant power supply. For simplicity, only the ac unit is shown.

Figure A1-3: *3624 MainStreet* Wall-mount Unit with Redundant Power Supply

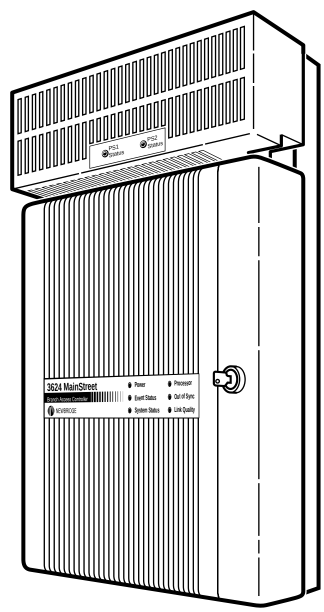


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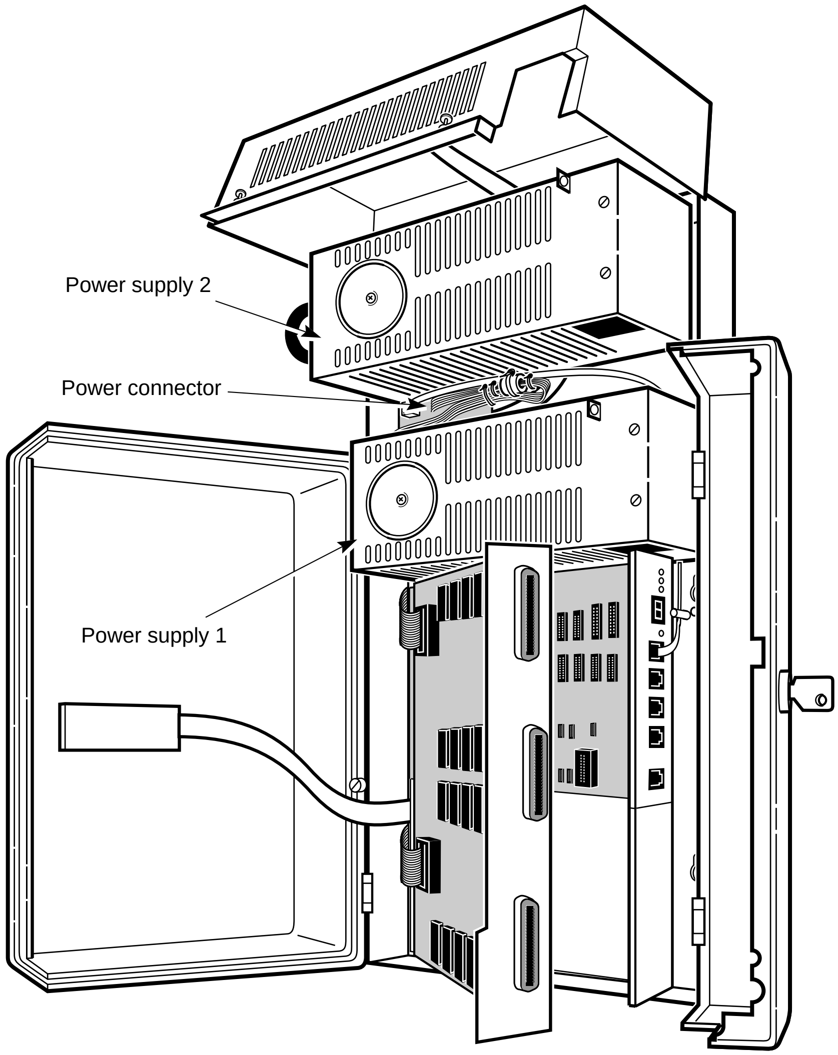
Figure A1-4: Wall-mount Unit with Redundant Power Supply (Interior)



Rack-mount drawer

The rack-mount shelf provides a ground stud and an antistatic strap connection point for the rack-mount drawer unit.

The physical specifications for the rack-mount drawer are:

❏ dimensions: 66.6 cm (h) x 10.8 cm (w) x 30.5 cm (d) (26 in. x 4 in. x 12 in.)
❏ weight: 9.7 kg (26 lb)

The physical specifications for the rack-mount shelf are:

❏ dimensions for 19-inch shelf: 66.6 cm (h) x 48.3 cm (w) x 31 cm (d) (26 in. x 19 in. x 12 in.)
❏ dimensions for 23-inch shelf: 66.6 cm (h) x 58.4 cm (w) x 31 cm (d) (26 in. x 23 in. x 12 in.)
❏ weight: 12 kg (32 lb)

Figures A1-5 and A1-6 show the front and rear views of the rack-mount drawer unit.

Figure A1-5: *3624 MainStreet* Rack-mount Drawer Unit (Interior, Front View)

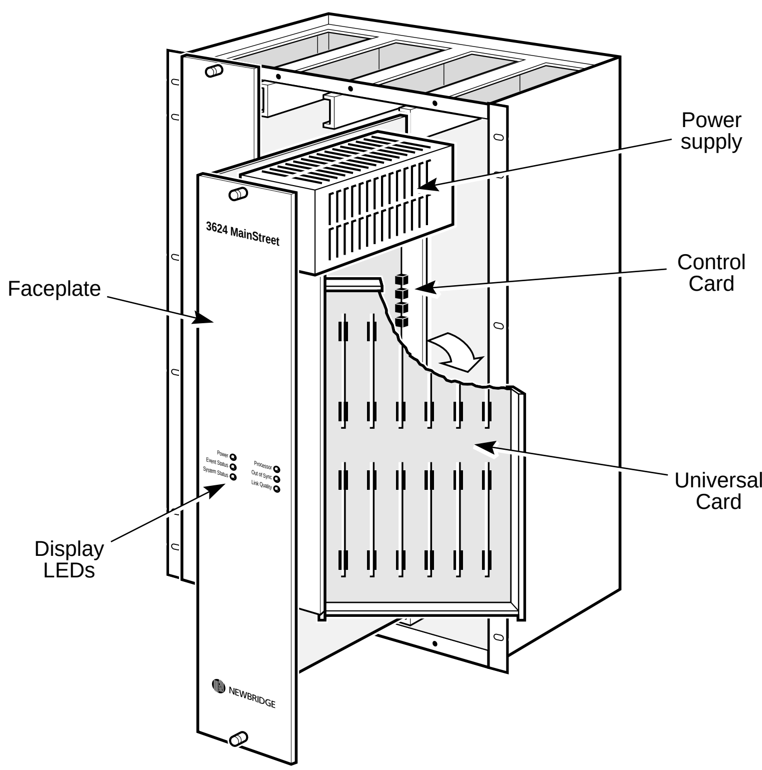
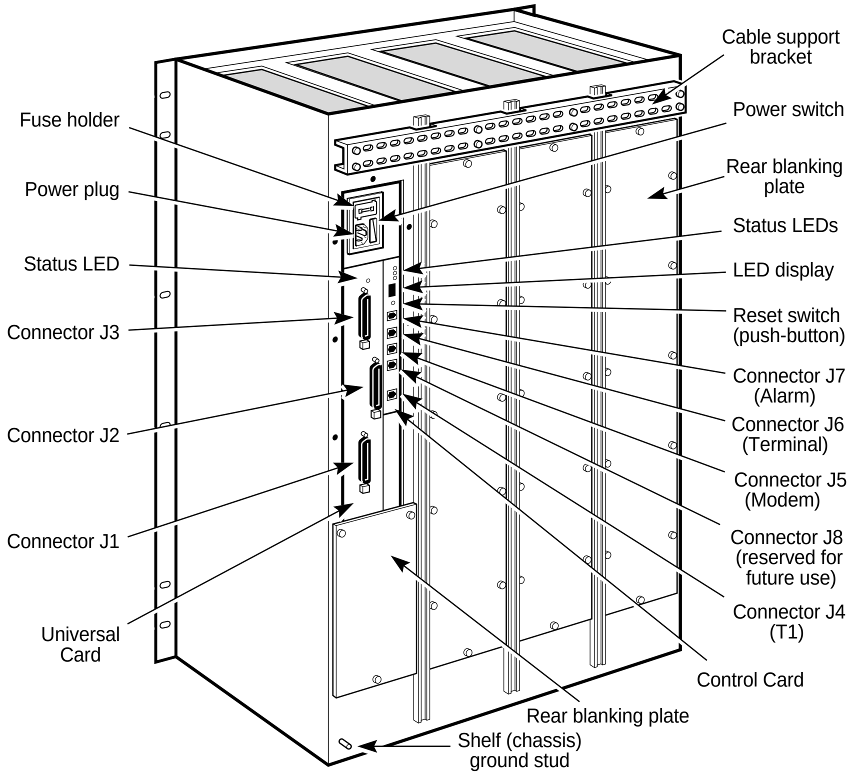


Figure A1-6: Rack-mount Drawer Unit (Rear View)



A1.2 Power Supply

The power supply is a self-contained unit at the top of the chassis. It contains an ac-to-dc or dc-to-dc converter, a ringing generator, and either a power switch and fuse module (ac power) or a terminal block and circuit breaker (dc power).

The ac-to-dc power supply accepts a 100 V / 60 Hz or 120 V / 60 Hz ac source, and the dc-to-dc power supply accepts a +24 V (wall-mount units only), –24 V or –48 V dc source.

Redundant power supply (120 V ac power only)

The *3624 MainStreet* wall-mount unit can contain two 120 V ac power supplies for redundant power. One power supply is located inside the unit, and the other is contained in the external case at the top of the chassis.

The power supplies are connected to a power supply selector card that is installed in the chassis and connected to the Control card. The power supply selector card provides power to the system from one or both of the supplies. For more information, see *Installation*, chapter D1.

A1.3 Control Card

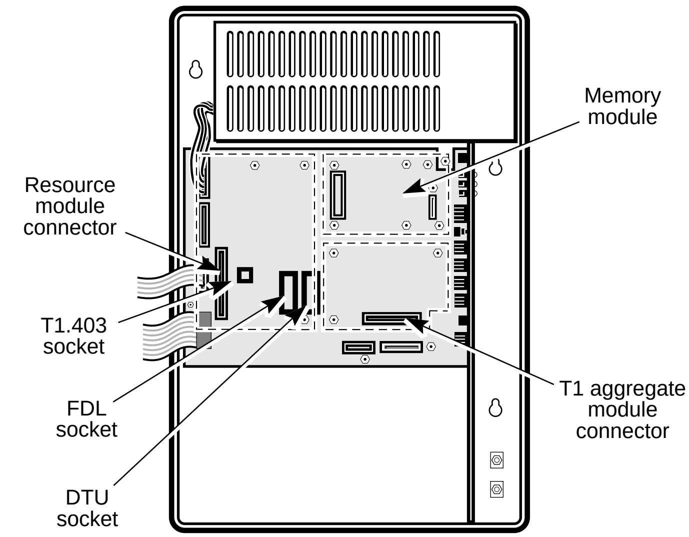
The Control card is a printed circuit board located at the rear of the chassis, behind the Universal card. It contains the CPU, the system memory and a real-time clock. The card provides the circuitry required to cross-connect calls onto circuits on the T1 link.

The Control card holds:

- T1 aggregate module
- resource modules (optional)
- memory module
- DTU module (optional)
- T1.403 module (optional)
- network and device connectors
- status LEDs and reset button

The Control card module positions are shown in Figure A1-7.

Figure A1-7: Location of Control Card Modules



T1 aggregate modules

The *3624 MainStreet* unit supports three types of T1 aggregate modules. One of these must be installed on the Control card.

LIM

The LIM provides a DSX-1 T1 interface for connecting T1 equipment on the customer site or for connecting to the DSX-1 side of an external CSU. An external CSU is required if you are connecting to an external T1 link.

The LIM provides standard T1 cross-connections and facilitates loopbacks for the T1 link. It supports line buffering, impedance matching, isolation and line protection.

CSU-2

The CSU-2 module provides a DS-1 T1 interface for use in off-site T1 applications. It permits connection of the T1 interface directly to an external T1 line.

The module provides standard T1 cross-connections and facilitates loopbacks for the T1 link. It also provides lightning surge protection on the line.

The CSU-2 module complies with AT&T Pub 62411 (December 1990).

IHTU

The IHTU module provides the same functionality as the CSU-2 module, but uses HDSL technology to allow long distance transmission over two-pair, unconditioned copper wire, without the use of repeaters.

Loop length is 3620 m (12 000 ft) on 24 AWG (0.5 mm nominal diameter) wire, and 2700 m (9000 ft) on 26 AWG (0.4 mm nominal diameter) wire.

Resource modules

The resource modules are optional modules used for digital signal processing. Any one of the modules can be installed, but two cannot be installed at the same time.

Tone

The Tone module generates a ringback tone. The ringback tone is used by LGS modules operating in PLAR, LS_EM or GS_EM mode, and may be required for MegaCom800 applications.

DDS and DDS 2

The DDS and DDS 2 modules generate the ringback tone and provide DDS compatibility on data interfaces.

The modules translate Newbridge's proprietary HCM framing format to industry-standard DDS format, and translate DDS data into HCM format.

The DDS 2 module also provides 2713 Hz loopback tone detection for 2WTO and 4WTO modules, and error correction for 2.4, 4.8 and 9.6 kb/s DDS data speeds.

Memory module

Two variants of memory modules are available: Flash and PROM. The Flash memory module supports downloading of software upgrades across the network. The PROM memory module does not support software downloading – software is upgraded by physically replacing the PROMs.

DTU module

The optional DTU module allows communication with the *46XX MainStreet* series network manager software over the T1 aggregate link.

If installed in the DTU socket on the Control card, the module controls the D channels of any connected DTUs. If installed in the FDL socket, the DTU module allows communication with the network manager through the FDL channel, and supports AT&T 54016 performance monitoring on the T1 link.

A DTU module is required in the DTU socket if a DNIC module is installed.

T1.403 module

The T1.403 module provides T1 performance monitoring as outlined in the ANSI T1.403 specifications. A DTU module must also be installed in the FDL socket to support this feature.

Network and device connectors

The Control card holds the connectors listed in Table A1-1.

Table A1-1: Control Card Connectors

Connector	Type	Connection
J4	RJ48C	T1 line
J5	RJ45	Modem – RS-232 compatible, DTE
J6	RJ45	Terminal – RS-232 compatible, DCE
J7	RJ11	External alarm and device monitoring, power supply status monitoring
J8	RJ11	Reserved for future use

Status LEDs and reset button

The Control card contains a status LED, two loopback LEDs and a seven-segment LED display. The LEDs provide card and module status information. On the wall-mount unit, the LEDs are visible when the side door of the chassis is open. On the rack-mount drawer, they are visible from the rear of the shelf assembly.

The Control card also contains a reset button. When the reset button is pressed, the unit goes out of service and then powers up again. (See *Installation*, chapter D6 for the power-up sequence.)

A1.4 Universal Card

The Universal card is a printed circuit board that holds up to 12 modules. It is located at the front of the chassis, and is hinged on the left side to provide access to the Control card. It contains:

- ❑ voice interface modules
- ❑ data interface modules
- ❑ Tributary T1 modules

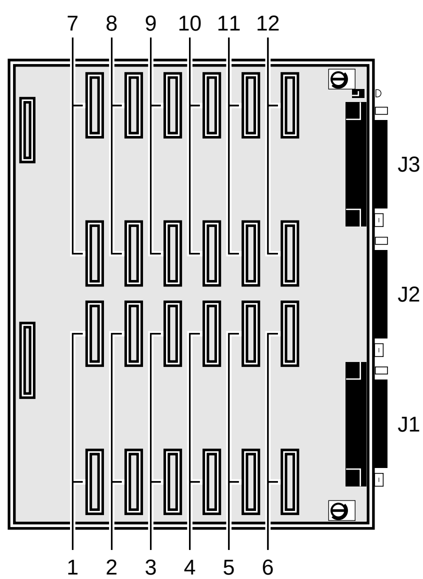
The Universal card has a single card status LED. On the wall-mount unit, the LED is visible when the chassis side door is open. On the rack-mount drawer, the LED is visible from the rear of the shelf assembly.

Power and ringing voltage are provided to the Universal card through ribbon cables connected to the Control card.

Universal cards have three 50-pin connectors for connections to external voice and data circuits, as shown in Figure A1-8. On wall-mount units, these connectors are located inside the side door, on the Universal card front panel. On rack-mount drawers, they are located at the rear of the shelf assembly.

The Universal card is available in two variants: the Universal card and the Universal (48 V) card. Both variants support all module types.

Figure A1-8: Location of Universal Card Modules and Connectors



**Universal and
Universal (48V) Card**

Voice interface modules

The *3624 MainStreet* unit supports the following voice modules.

LGS

The LGS module provides an interface to subscriber equipment such as PBXs, key system ports or single telephones. It is functionally equivalent to the FXS circuit.

The module transmits signals from the customer site onto a T1 aggregate link, over two 2-wire analog circuits.

The latest revision of the LGS module (manufacturing code C) features on-hook transmission capability, enabling the module to support the CLASS series of services such as call trace, call screen, call name identity and calling party identity on call waiting.

LGE

The LGE module provides an interface to subscriber trunks and PBX extension ports. It is functionally equivalent to the FXO circuit.

The module transmits signals from the customer site onto a T1 aggregate link, over two LGE 2-wire analog circuits.

E&M

The E&M module formats voice signals from customer premise equipment, such as a PBX, for transmission onto the T1 aggregate link.

It provides two E&M interfaces (2-wire or 4-wire).

MRD

The MRD module provides an interface to a specialized telephone or a key system for manual ringdown circuits.

The module transmits signals over two circuits, each providing configurable TLP settings.

Data interface modules

The following data modules are supported.

DNIC

The DNIC module enables data equipment to be connected to T1 aggregate digital networks. It connects to the data devices through *26XX MainStreet* series DTUs.

The module provides terminations for basic rate 2B+D data transmission over a single twisted pair of wires.

It supports transparent and HCM subrate multiplexing and multidrop data bridging.

RS-232 DCM

The RS-232 module provides two synchronous/asynchronous network interfaces to V.24 data equipment.

X.21 DCM, V.35 DCM

The X.21 and V.35 DCMs are single-circuit modules that provide a synchronous/asynchronous network interface to X.21 and V.35 data equipment. They support super-rate data connections for speeds up to 1.536 Mb/s.

OCU

The OCU module is a dual-circuit DDS module that is available in two variants.

❏ OCU 2 – provides an interface between the user's local loop and the DDS network through the T1 link. It supports switched 56 data service on the T1 link. This module is not recommended for new installations.

❏ OCU 3 – similar to the OCU 2, but also provides 19.2 and 64 kb/s data rates, secondary channel support and latching channel loopback capability. This module is recommended for new installations.

2WTO, 4WTO

These modules are used primarily to pass analog modem data over a permanent (nailed up) 2- and 4-wire local loop; however, they can also pass analog voice traffic. Signalling information is not passed.

The modules have two circuits that provide individually configurable transmission level settings and line impedance (600 or 900 ohms).

If a DDS 2 module is also installed, a 2713 Hz network-invoked loopback tone detection feature can be enabled.

Tributary T1 module

The Tributary T1 module provides an interface between customer equipment such as PBXs, routers and video codecs, and the T1 interfaces to the *3624 MainStreet* unit. Remaining bandwidth on the T1 aggregate can be used for traditional voice and data applications. Super-rate data connections up to 1.536 Mb/s are supported.

The module also provides framing conversion between the tributary link and the aggregate.

Distribution panels

Distribution panels provide indirect connections to the external voice and data devices. The following panels are available:

❏ Universal Distribution Panel – provides low-cost and flexible external connections for all voice and data interfaces on the *3624 MainStreet* unit. The panel can be configured with any combination of voice and data personality modules to match the voice and data interface modules on the node. The personality modules transfer the signals between the node and their respective external equipment terminations. For more information, refer to the Universal Distribution Panel User Guide, supplied with the panel.

❏ RS-232 Distribution Panel – a 19-inch rack-mount panel with eight DB25 connectors for RS-232 connections

❏ V.35 Distribution Panel (DB25/M34) – a wall-mountable panel assembly that provides access to six V.35 data circuits through six DB25 or M34 female connectors. Two custom cables are provided to connect between the *3624 MainStreet* unit and the panel. Each cable carries three data circuits to the panel. This panel should be used with the Universal card (part number 90-0154-05) only. For more information, refer to the *36SM MainStreet* V.35 Distribution Panel – Notice to Users, supplied with the panel.

A1.5 Site Requirements

The *3624 MainStreet* unit must be installed in an area that meets the following requirements:

- ❑ power source: unswitched, separate circuit providing one of the following voltages:
  - ❑ 104 V ac to 127 V ac (120 V ac –13% / +6%)
  - ❑ 90 V ac to 110 V ac (100 V ac ±10%)
  - ❑ –48 V dc
  - ❑ +24 V dc
  - ❑ –24 V dc
- ❑ temperature:
  - ❑ operating: 0° to 40°C (32° to 104°F)
  - ❑ shipping and storage: –40° to 66°C (–40° to 150°F)
- ❑ humidity: 5% to 95% relative humidity, non-condensing (maximum 32 g of water per cubic metre of air, or 0.024 lb of water per pound of air)
- ❑ altitude: between 60 m (200 ft) below and 4000 m (13 000 ft) above sea level
- ❑ grounding: cables used for ground (earth) connections must be a minimum of 65 / 34 stranded (16 AWG [1.5 mm nominal diameter]), and must comply with local requirements
- ❑ distance from sources of electromagnetic radiation: although this unit has been designed and tested to all relevant standards of conducted and radiated electromagnetic interference, it may be affected by strong sources of electromagnetic radiation in the near field, such as elevators, air conditioners, photocopiers and facsimile machines

Space requirements

The unit must be installed where it can easily be connected to the T1 line, voice and data terminations, and to a power source.

- ❑ Wall-mount units

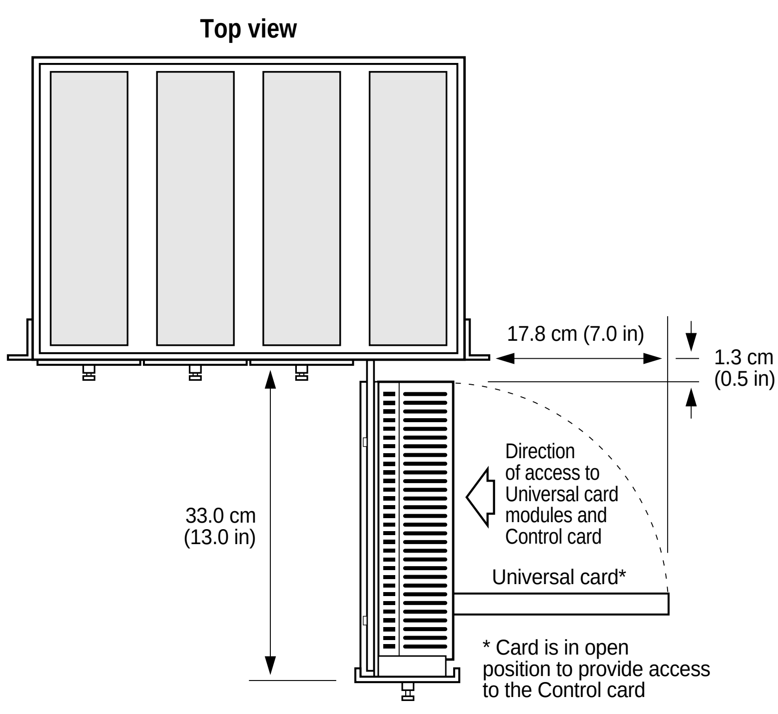
  The wall-mount unit and redundant unit should be installed on a plywood panel, or in a rack using rack-mount brackets. Leave 30 cm (1 ft) on either side and in front of the unit, to ensure that all covers can be opened fully. Locate the unit at a height that allows service personnel to provide maintenance without having to remove the unit from the wall.

- ❑ Rack-mount drawer units

  The rack-mount drawer unit should be installed in a shelf assembly in either a 19-inch or 23-inch rack. Ensure that the rack is properly installed and stable (for example, bolted securely to the floor). Leave a minimum of 1 m (3 ft) clearance in front, 0.5 m (1.5 ft) behind and 18 cm (7 in.) to the right of the shelf, to allow access to the Control card and Universal card.
  See Figure A1-9.

  The rack-mount dc unit must be installed in a restricted access area.

Figure A1-9: Recommended Clearances for Rack-mount Drawer



A1.6 Installation Summary

The table below outlines the installation procedure and points to where information on each step is located.

Table A1-2: Installation Procedures

Step	Reference chapter
Unpack and inspect the components.	A2
Install the unit.	B1
Ground the unit.	B2
Install the Control card modules, Universal card and Universal card modules.	C1, C2 and C3
Connect to power and conduct the power-up test.	D1
Connect the external voice and data circuits.	D2
Connect the T1 link.	D3
Connect the node management terminal.	D4
Connect the external alarm devices.	D5
Switch on the power.	D6

A2. Unpacking the Unit

To prevent damage to the components, unpack the unit on a flat, clean surface at the installation site. If you must unpack the components at another location, ensure that you carefully repack them in the original container before moving them to the installation site.

Warning

Electronic circuits are easily damaged by static discharge. Take the following precautions when unpacking and assembling the unit:

❑ Wear an antistatic wrist strap that is attached to a building ground point.
❑ Before handling any electronic component, touch a grounded metal surface to discharge static from your body.
❑ Handle all cards and modules by the edges only. Do not touch any connectors.

A2.1 System Components

All system components should be checked carefully to ensure that the correct parts have been received and that there is no damage.

To inspect system components

1. Check each package for any signs of outer damage.

2. Unpack and check the contents of each package against your order form and packing slip to ensure that all components have been received. Record the part number, manufacturing code and serial number for each component in Tables A2-1 and A2-2, below.

   Some basic units may include modules that were installed on the Control card or Universal card before shipment.

Table A2-1: Basic System Components

Component	Part Number and Manufacturing Code	Serial Number
Basic system		
Ringing generator (installed)		——
Control card (installed)		
Warranty cards and keys	——	——
Documentation		——
AC power cord (ac-powered units only)		——
Rear blanking plate with screws (rack-mount units only)		——

Table A2-2: Optional Components

Component	Part Number and Manufacturing Code	Serial Number
LIM, CSU-2 or IHTU module		
Tone, DDS, DDS 2 module		
Universal card or Universal (48V) card		
Voice, data and/or Tributary T1 modules: position 1		
Voice, data and/or Tributary T1 modules: position 2		
Voice, data and/or Tributary T1 modules: position 3		
Voice, data and/or Tributary T1 modules: position 4		
Voice, data and/or Tributary T1 modules: position 5		
Voice, data and/or Tributary T1 modules: position 6		
Voice, data and/or Tributary T1 modules: position 7		
Voice, data and/or Tributary T1 modules: position 8		
Voice, data and/or Tributary T1 modules: position 9		
Voice, data and/or Tributary T1 modules: position 10		
Voice, data and/or Tributary T1 modules: position 11		
Voice, data and/or Tributary T1 modules: position 12		
DTU module		——
T1.403 module		——
Memory module 620C or Flash memory module 620C		
Wall-mount kit		——
36SM rack shelf assembly kit		——

3. Inspect all components for signs of shipping damage.

4. Report any missing or damaged components to your Newbridge sales representative.

A2.2 Repacking the Unit

Store the packing material in a clean, dry area for future use.

When moving the unit, ensure that all electronic components are protected from movement and static discharge. If the original packing material is not available, place the components in antistatic bags and wrap them in several layers of air-cushion material. Place them in a suitable container and surround them with paper or similar non-static packing material.

B1. Installing the *3624 MainStreet* Unit

This chapter describes the procedures for installing the *3624 MainStreet* wall-mount and rack-mount drawer units.

The wall-mount unit can be installed on a wall or in a 19-inch or 23-inch rack.

Danger

Before installing any rack-mount assembly, secure the rack to the floor to ensure that it does not tip over.

B1.1 Installing the Wall-mount Unit on a Wall

Tools required:

- ❏ #2 Phillips screwdriver
- ❏ three #10 x 3/4-inch round-head wood screws or suitable equivalent

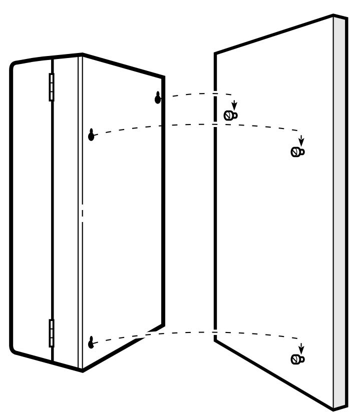
Warning

The unit is designed to be mounted vertically on a flat plywood panel. Ensure that the panel is at least 19 mm (3/4 in.) thick. Do not mount the unit on an uneven surface such as a concrete wall, as this might damage the chassis.

To install the wall-mount unit on a wall

1. Open the chassis cover by unlocking the side door and loosening the top and bottom captive screws.
2. Position the unit on the wall and mark the location of the three screw holes. Remove the unit.
3. Fasten the screws directly into the panel, leaving them sitting out about 3 mm (1/8 in.).
4. Hold the back of the unit against the wall and align the mounting keyholes in the chassis with the screw heads, as shown in Figure B1-1. Lower the unit onto the screws.

Figure B1-1: Installing the Wall-mount Unit



5. Tighten the screws to secure the unit.

B1.2 Installing the Wall-mount Unit in a Rack

The wall-mount unit can be mounted vertically in a 19-inch or 23-inch rack.

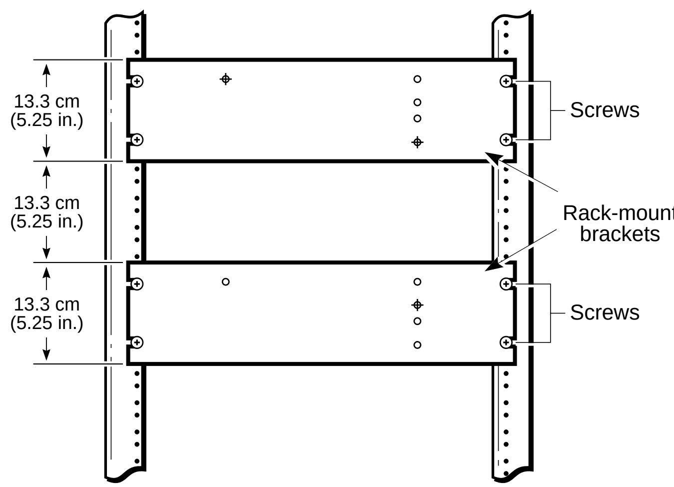
Tools required:

- ❏ #2 Phillips screwdriver
- ❏ one rack-mount kit, available from Newbridge

To install the wall-mount unit in a rack

1. Attach the two rack-mount brackets to the rack with eight panhead screws (supplied), as shown in Figure B1-2.

Figure B1-2: Position of Rack-mount Brackets



2. Partially thread the three mounting screws into the holes shown by the + symbol on the figure. Leave them sitting out about 3 mm (1/8 in.).
3. Open the chassis cover by unlocking the side door and loosening the top and bottom captive screws.
4. Hold the back of the unit against the brackets and align the mounting keyholes in the chassis with the screw heads, then lower the unit onto the screws.
5. Tighten the screws to secure the unit.

B1.3 Installing the Rack-mount Shelf Assembly

The shelf assembly provides mechanical support, grounding and dc power distribution (with the addition of a Rack DC Connector Kit) for four dc-powered drawers. The assembly can be mounted in either a 19-inch or 23-inch rack. Two shelf assemblies can be installed in a standard 7 ft. rack.

Shelf assembly kit

The 36SM Rack Shelf Assembly Kit includes:

- ❏ shelf assembly for 19-inch rack
- ❏ cable support bracket
- ❏ twelve #10-32 x 1/4-inch Phillips panhead screws
- ❏ antistatic wrist strap

Rack adapter kit

The Rack Mount 23-inch Adapter Kit enables the shelf assembly to be installed in a 23-inch rack. It includes:

- ❏ two 23-inch rack-mounting brackets
- ❏ twelve #10-32 x 1/4-inch Phillips panhead screws

Note

Two people are required to install the shelf assembly.

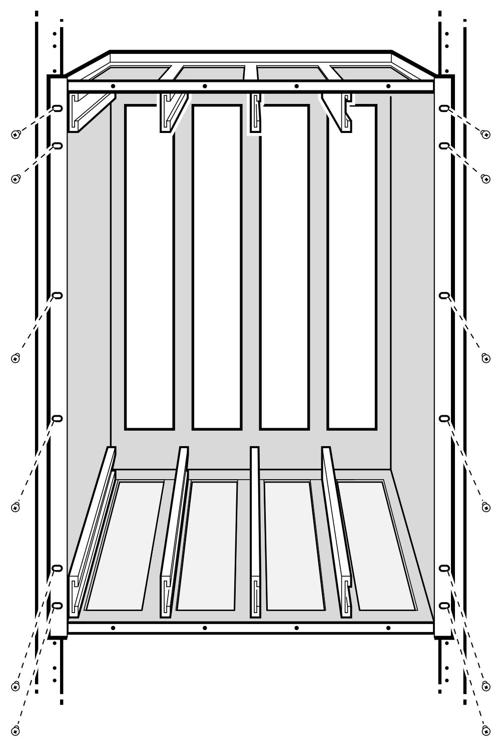
To install the assembly in a 19-inch rack

Tools required:

- ❑ #1 Phillips screwdriver
- ❑ #2 Phillips screwdriver

1. Remove all packing material from the shelf.
2. Ensure that the rack is securely bolted to the floor.
3. Have one person hold the shelf in position against the rack while the second person loosely fastens the mounting screws to the rack. Refer to Figure B1-3.

Figure B1-3: Shelf Installed in 19-inch Rack



4. Tighten the mounting screws to secure the shelf to the rack.

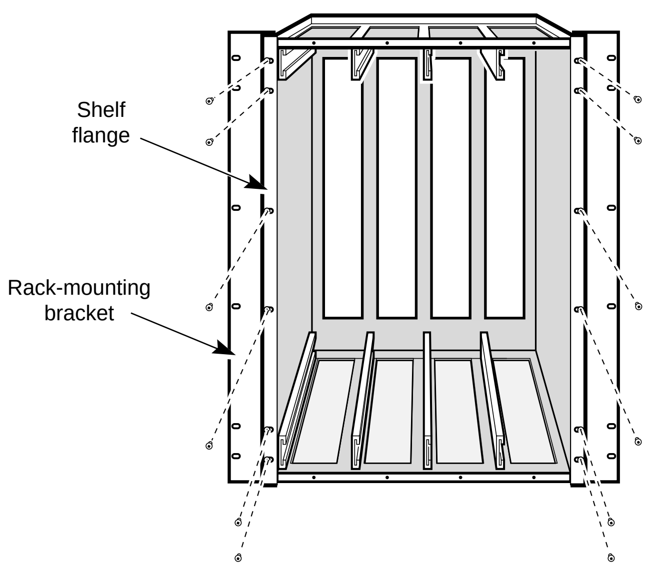
To install the assembly in a 23-inch rack

Tools required:

- ❑ #1 Phillips screwdriver
- ❑ #2 Phillips screwdriver
- ❑ Rack-mount 23-inch Adapter Kit

1. Remove all packing material from the shelf and set it on a firm, flat surface.
2. Position a rack-mounting bracket behind a shelf flange, and align the holes on the rack-mounting bracket with the holes on the shelf flange. Refer to Figure B1-4.
3. Secure the bracket to the shelf flange with the screws included with the kit.
4. Repeat steps 2 and 3 for the other side of the shelf.

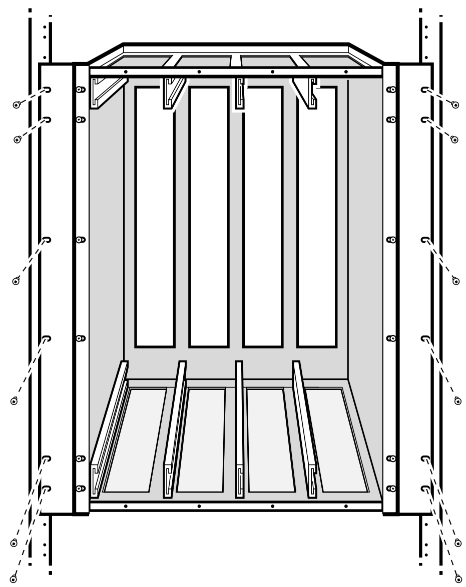
Figure B1-4: Brackets Installed on 23-inch Rack



5. Ensure that the rack is securely bolted to the floor.

6. Have one person hold the shelf in position against the rack while the second person loosely fastens the mounting screws to the rack. Refer to Figure B1-5.

Figure B1-5: Shelf Installed in 23-inch Rack



7. Tighten the mounting screws to secure the shelf to the rack.

B1.4 Installing the Rack-mount Drawer

Each rack-mount shelf is shipped with eight slides installed (one slide on the top and one on the bottom for each of the four drawer positions).

Each slide is made up of a shelf member and a removable drawer member as shown in Figure B1-6. Initially, the drawer members are installed in the shelf members. You must remove the drawer members and attach them to the rack-mount drawers, then install the drawers in the shelf assembly.

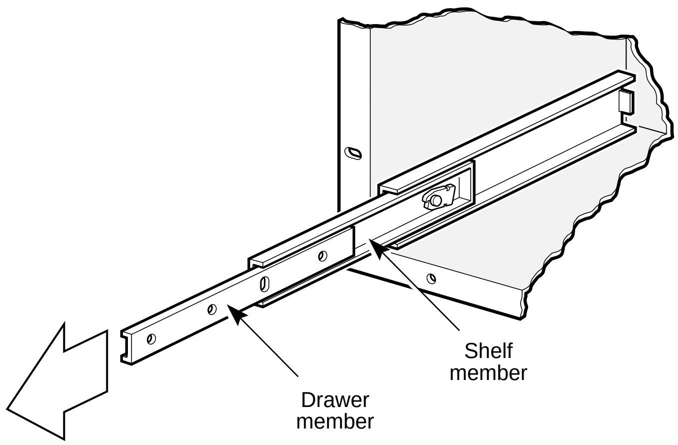
Tools required:

- ❏ #1 Phillips screwdriver
- ❏ #2 Phillips screwdriver

To install the rack-mount drawer

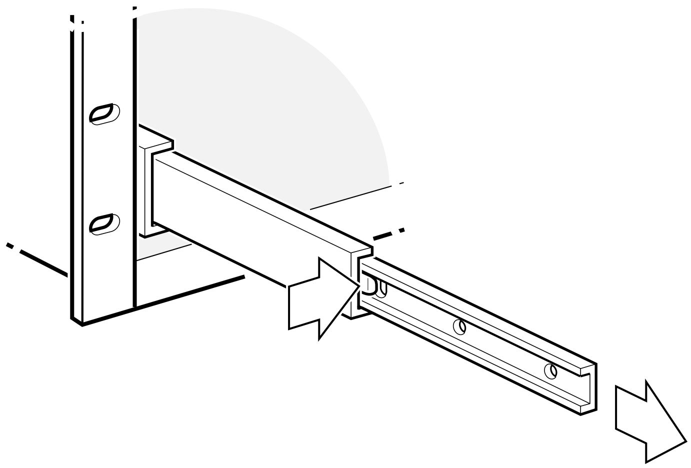
1. Pull the shelf and drawer members out until they lock into position.

Figure B1-6: Drawer and Shelf Members



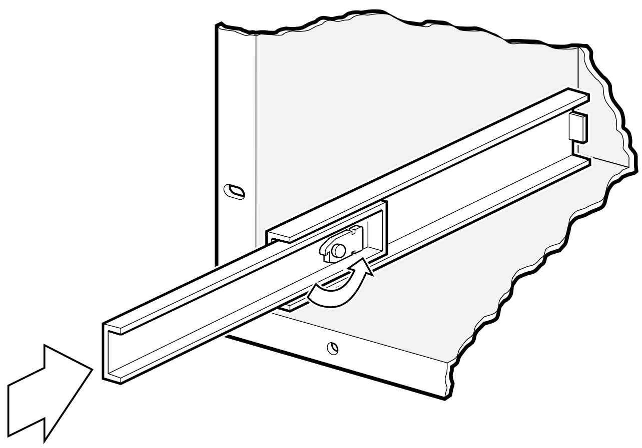
2. Depress the tab on each drawer member while pulling it free of the shelf member. See Figure B1-7.

Figure B1-7: Releasing Drawer Member from Shelf Member



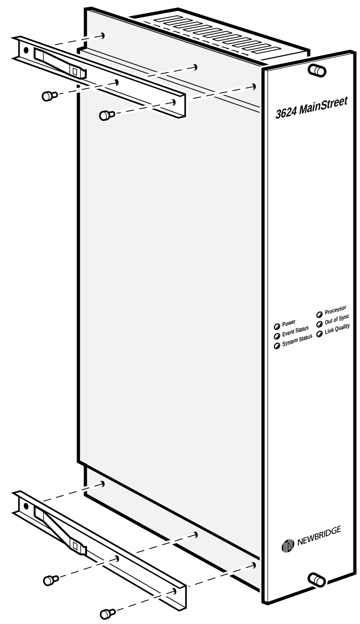
3. If a shelf member is interfering with the installation, centre the shelf member latch while pushing it back into the shelf. See Figure B1-8.

Figure B1-8: Shelf Member Latch



4. Attach the drawer members to the drawer with the supplied 6-32 x 1/4-inch screws, as shown in Figure B1-9.

Figure B1-9: Drawer Members Installed on Drawer



Note

For optimum fit, keep the same match of drawer and shelf member pairs as originally shipped.

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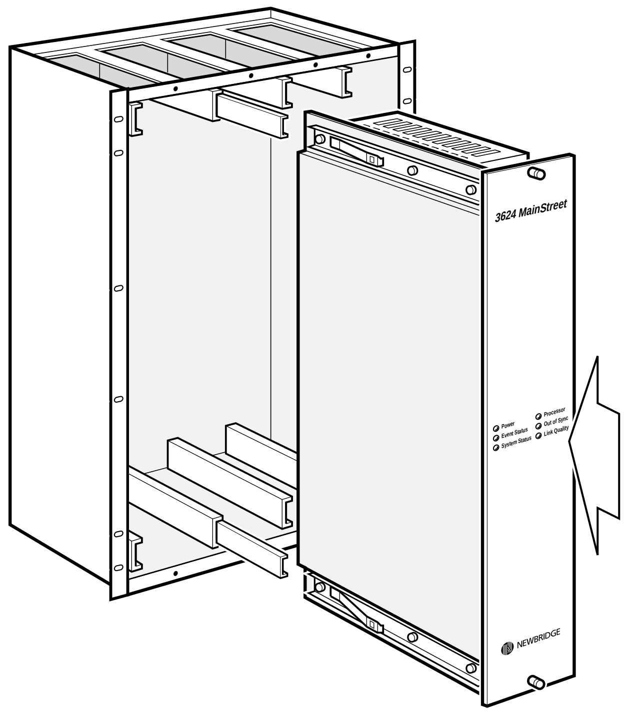
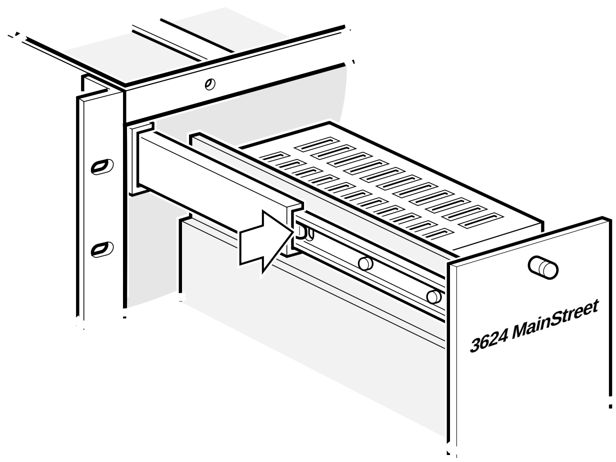
5. Extend the shelf members fully and align the drawer members with the shelf members as shown in Figure B1-10. Push the drawer in until the drawer members lock into position.

Figure B1-10: Drawer Members Aligned with Shelf Members



6. Depress the tabs on the top and bottom drawer members while pushing the drawer all the way into the shelf.

Figure B1-11: Installing Drawer in Shelf



7. Secure the drawer to the shelf with the captive screws.

Note

The drawer may offer some resistance the first time it is inserted into the shelf.

B1.5 Installing the Blanking Plates

To protect against the effects of electromagnetic interference, blanking plates should be installed over all empty drawer positions. The 36SM Rack Blanking Plate Kit includes:

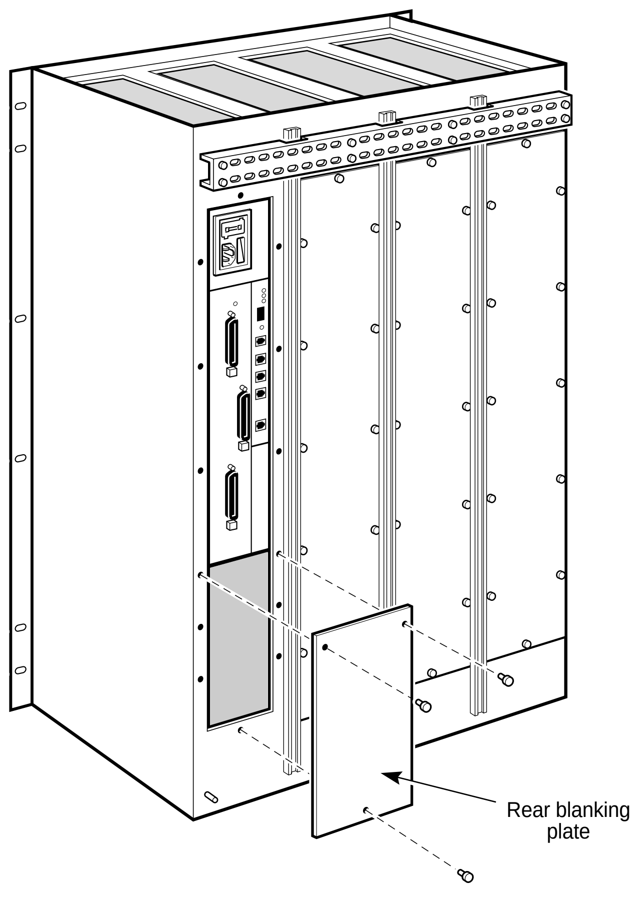
- ❑ front blanking plate
- ❑ rear blanking plate
- ❑ #6 x 1/4-inch Phillips sheet metal screws (12)

When the drawers are in place, attach the small rear blanking plate to the shelf assembly, and install front and rear blanking plates for all empty drawers.

To install the small blanking plate

1. Align the holes in the small blanking plate with the holes on the back of the shelf, as shown in Figure B1-12.

Figure B1-12: Installing the Small Blanking Plate



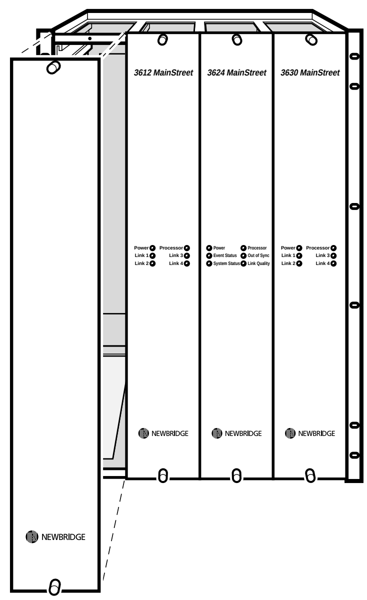
2. Secure the blanking plate to the back of the shelf with the screws provided.

To install the front and rear blanking plates

1. Align the captive screws on the front blanking plate with the holes on the front of the shelf. Refer to Figure B1-13.

2. Secure the front blanking plate to the shelf with the captive screws.

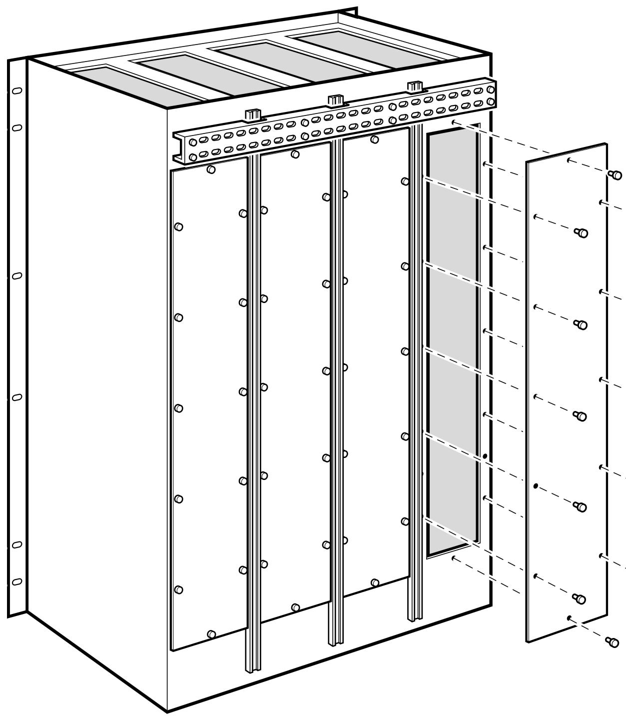
Figure B1-13: Installing the Front Blanking Plate



3. Align the holes in the rear blanking plate with the holes on the rear of the shelf.

4. Secure the rear blanking plate to the shelf with the screws provided. Refer to Figure B1-14.

Figure B1-14: Installing the Rear Blanking Plate



B1.6 Installing the DC Power Distribution Assembly

The dc power distribution assembly provides dc power distribution for four dc-powered drawers.

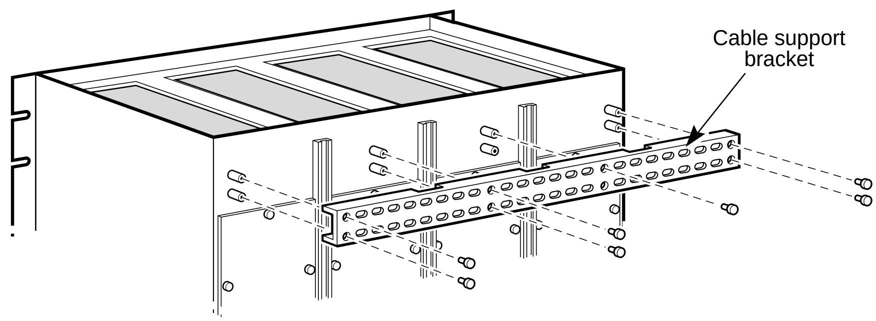
Tools required:

- ❑ #2 Phillips screwdriver
- ❑ Rack DC Connector Kit

To install the distribution assembly

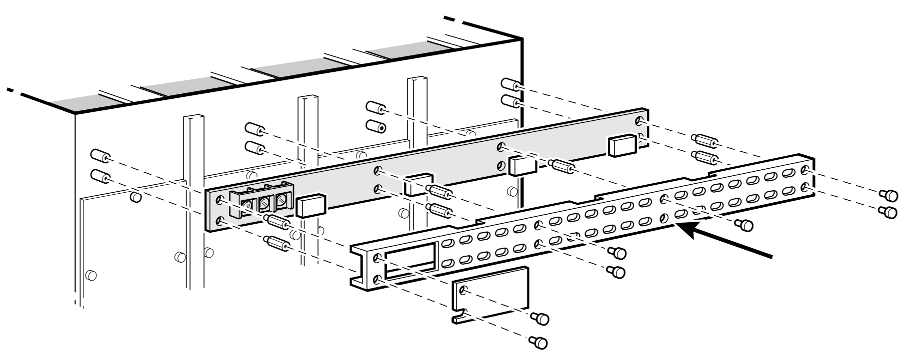
1. Remove the existing cable support bracket from the rear of the shelf as shown in Figure B1-15. Keep the screws.

Figure B1-15: Removing the Cable Support Bracket



2. Align the dc power distribution circuit board with the tapped standoffs on the shelf and secure the circuit board to the shelf with the hex spacers provided. Refer to Figure B1-16.

Figure B1-16: Installing the DC Power Distribution Assembly



Warning

Do not insert a screw in the position indicated by the arrow in Figure B1-16, as it might cause a system short.

3. Align the dc power distribution cable support bracket with the hex spacers and secure the bracket with the screws removed in step 1.

B2. Ground Connections

The unit must be grounded during all installation procedures. The signal and chassis grounds must be connected to separate grounding wires, which are connected to a building ground point.

To meet Class A EMC requirements, the supplied ferrite beads must be installed on the chassis ground wires (wall-mount units only) and the signal ground wires.

This chapter describes the grounding procedures for the *3624 MainStreet* wall-mount and rack-mount units.

For proper grounding of the unit, ensure that the following conditions are met.

❑ An equipment grounding conductor that is not smaller in size than the ungrounded branch-circuit supply conductors is to be installed as part of the circuit that supplies the product or system. Bare, covered or insulated grounding conductors are acceptable. Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green, or green with one or more yellow stripes. The equipment grounding conductor is to be connected to ground at the service equipment.

❑ The attachment-plug receptacles in the vicinity of the product or system are all to be of a grounding type, and the equipment grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.

Warning

Electronic circuitry is easily damaged by static discharge. Take the following precautions when unpacking and assembling the unit:

❑ Wear an antistatic wrist strap that is attached to a building ground point.

❑ Before handling any electronic component, touch a grounded metal surface to discharge static from your body.

❑ Handle all cards and modules by the edges only. Do not touch any connectors.

B2.1 Grounding the Wall-mount Unit

Tools required:

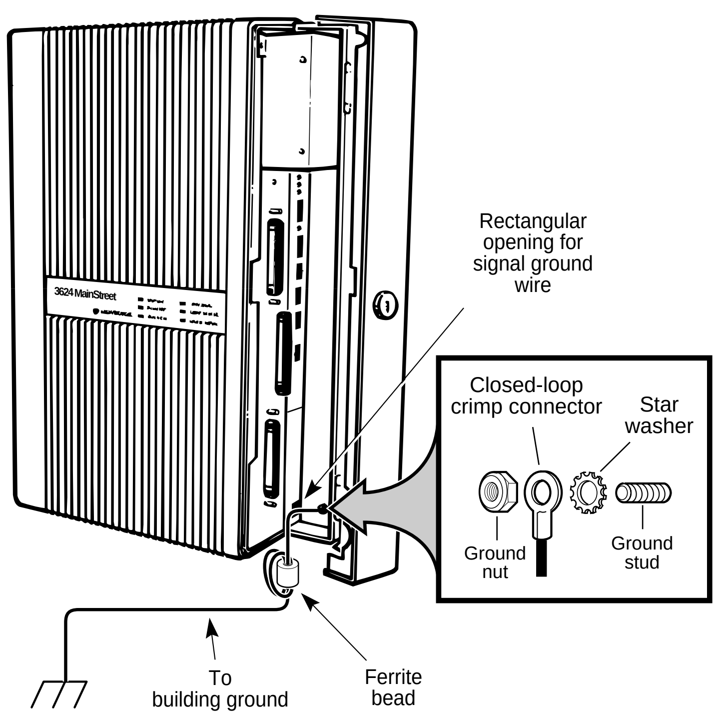
- ❑ wire stripper
- ❑ crimp tool
- ❑ 5/16-in. nut driver (or suitable equivalent)
- ❑ closed-loop crimp connector (UL-listed). Connectors are supplied with the unit – ensure that the connector type is suitable for the wire gauge used.
- ❑ 16 AWG (minimum) ground wire, 10 or 12 AWG recommended (1.5 mm stranded nominal diameter, 2.4 or 2.9 mm stranded nominal diameter recommended). The ground wire must be long enough to connect to the ground point without splicing.
- ❑ ferrite beads (supplied)
- ❑ cable ties (supplied)

To ground the wall-mount unit

1. Run a single length of wire from the building ground point to the chassis ground stud, according to local wiring practices. Run a second length of wire from the building ground point to the grounding terminals (signal ground and EDG) on the Control card. The chassis ground stud is located behind the side door of the chassis, and the grounding terminals are located inside the main door, under the power supply. See Figures B2-1 and B2-2.

2. Slide a ferrite bead over the end of the chassis ground wire and loop the wire through twice.

Figure B2-1: Chassis Ground Connections (Wall-mount Unit)



3. Remove the closed-loop crimp connector from the chassis ground stud and crimp it to the chassis ground wire.

4. Place the connector back on the stud, replace the ground nut and tighten securely.

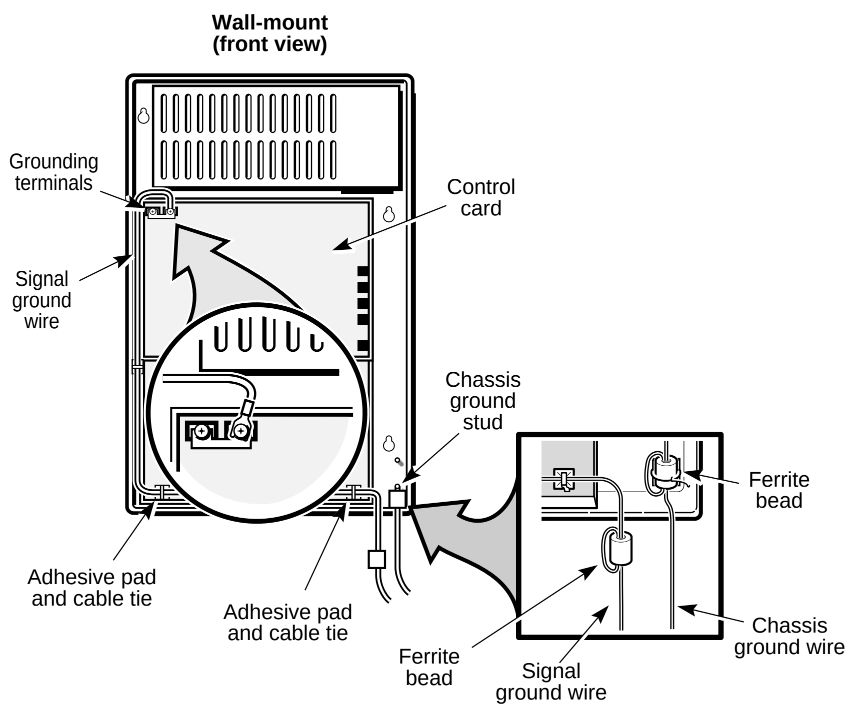
5. Place a cable tie on the adhesive pad located under the ground stud. Slide the ferrite bead up the wire and place it on top of the pad. Secure the bead tightly with the cable tie, as shown in Figure B2-2. The cable tie can be wrapped around the bead only, or wrapped around both the bead and the wire loop. Either method is acceptable as long as the ferrite bead is securely fastened.

6. Slide a ferrite bead over the end of the signal ground wire and push it back down the wire approximately 1.5 m (5 ft.). Loop the wire twice through the ferrite bead, keeping the loops large enough to allow the bead to slide freely up and down the wire.

   The signal ground wire must be routed through an opening in the bottom of the chassis and attached to the grounding terminal shown in Figure B2-2. Ensure that you leave enough excess wire from the bead to the end of the wire to allow for this.

7. Feed the signal ground wire through the hole in the bottom of the chassis (see Figure B2-1 for the location of the hole) and route it between the Control card and the rear of the chassis, up to the grounding terminals.

Figure B2-2: Signal Ground Connections (Wall-mount Unit)



8. Remove the connector from the grounding terminal and crimp it to the signal ground wire.
9. Attach the wire to the grounding terminal and tighten.
10. Secure the wire to the unit using the adhesive pads and attached cable ties at the bottom of the chassis.
11. Slide the ferrite bead up the wire and place it as close as possible to the exit point of the unit, as shown in Figure B2-2.
12. Ground the far ends of the wires to the building ground point.

Note

For dc units, connect the 0 V return to battery ground. In North America, this point is typically referenced to earth.

B2.2 Grounding the Rack-mount Unit

Tools required:

- ❑ wire stripper
- ❑ Phillips screwdriver
- ❑ crimp tool
- ❑ 5/16-in. nut driver (or suitable equivalent)
- ❑ closed-loop crimp connector (UL-listed). Connectors are supplied with the unit – ensure that the connector type is suitable for the wire gauge used.
- ❑ 14 or 16 AWG (minimum) ground wire, 10 or 12 AWG recommended (1.9 or 1.5 mm stranded nominal diameter, 2.4 or 2.9 mm stranded nominal diameter recommended). The ground wire must be long enough to connect to the ground point without splicing.
- ❑ ferrite beads (supplied)

Note

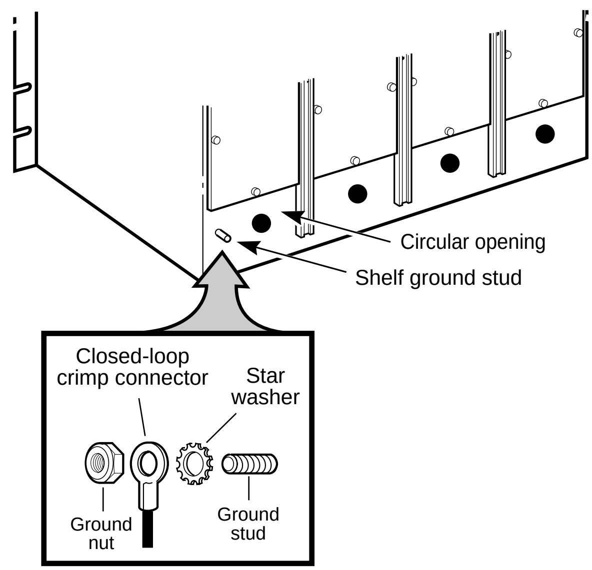
Chassis ground connections are made by connecting the ground stud on the rear of the shelf assembly to the building ground point. Each rack-mount drawer is grounded by its connection to the shelf assembly.

Separate signal ground connections must be made for each drawer in the assembly.

To ground the rack-mount unit

1. Run a single length of wire from the building ground point to the ground stud on the rear of the shelf assembly. See Figure B2-3 for the location of the ground stud.

Figure B2-3: Chassis Ground Connections (Rack-mount Unit)

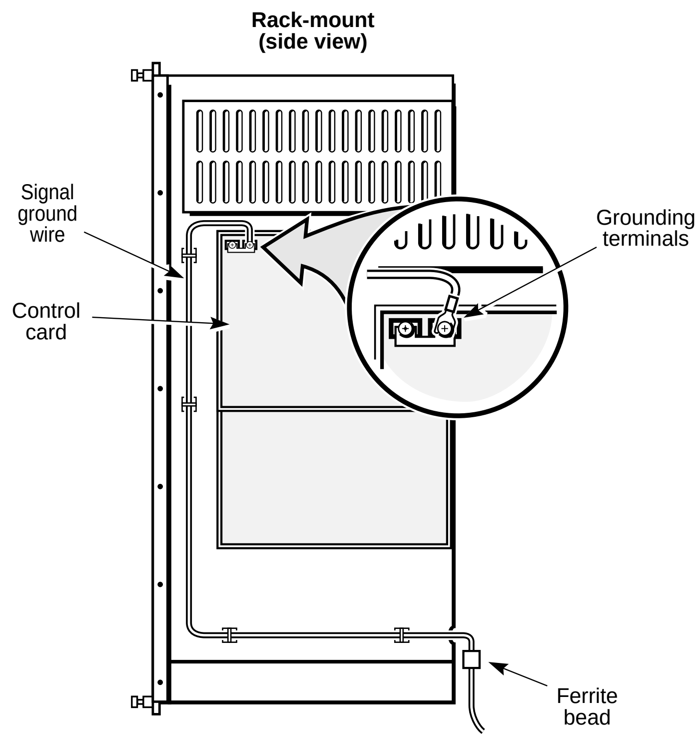


2. Remove the closed-loop crimp connector from the ground stud and crimp it to the chassis ground wire.

3. Slide the connector over the stud, replace the ground nut and tighten securely.

4. For each rack-mount drawer unit, run a length of wire from the building ground point to the grounding terminals on the Control card. The grounding terminals are located under the power supply as shown in Figure B2-4.

Figure B2-4: Signal Ground Connections (Rack-mount Unit)



5. Slide a ferrite bead over the end of the signal ground wire and push it back down the wire. Loop the wire twice through the ferrite bead, keeping the loops large enough to allow the bead to slide freely up and down the wire.

   The signal ground wire must be routed through an opening at the back of the shelf assembly and attached to the grounding terminal shown in Figure B2-4. Ensure that you leave enough excess wire from the bead to the end of the wire to allow for this.

6. Feed the signal ground wire through the hole in the back of the shelf assembly (see Figure B2-3 for the location of the hole) and route it between the Control card and the edge of the rack-mount drawer, up to the grounding terminals. See Figure B2-4.

7. Remove the connector from the grounding terminal and crimp it to the signal ground wire.

8. Attach the wire to the grounding terminal and tighten.

9. Secure the wire to the unit using the adhesive pads and attached cable ties. Leave enough of a service loop so that the drawer can be opened fully.

10. Slide the ferrite bead up to the shelf assembly, placing it as close as possible to the opening in the assembly.

11. Repeat steps 5 to 10 for each rack-mount drawer in the assembly.

12. Ground the far ends of the wires to the building ground point.

Note

For dc units, connect the 0 V return to battery ground. In North America, this point is typically referenced to earth.

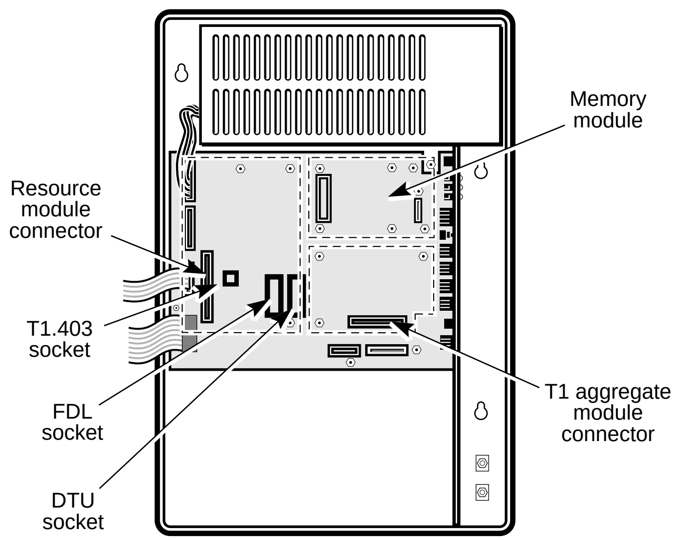
C1. Installing the Control Card Modules

This chapter provides instructions on installing and removing the Control card modules. The Control card is attached at the rear of the chassis, under the Universal card, in both the wall-mount and rack-mount designs.

The DTU and T1.403 modules should be installed first, as they are located under the memory, T1 and resource modules.

Refer to Figure C1-1 for the location of the modules. For simplicity, only the wall-mount unit is shown.

Figure C1-1: Control Card Module Connectors



Warning

Wear an antistatic wrist strap when handling any electronic component.

Ensure that the system power is off before installing or removing the modules.

C1.1 Module Part Number

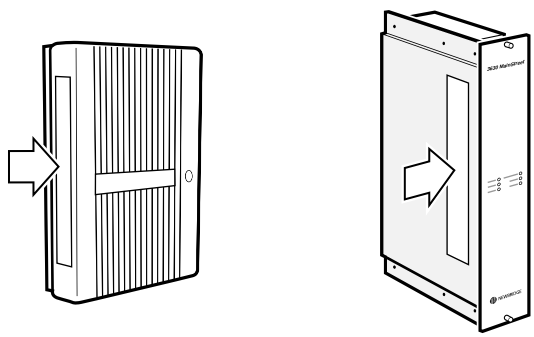
The module package includes a label with the module part number and alphabetic manufacturing code. This number should match the part number located on the module.

To record the part number

1. Verify that the part number on the label matches the number on the module. If it does not, contact your Newbridge service representative.

2. Attach the label to the appropriate position on the system configuration panel, located on the left hand side of the chassis cover or faceplate. Refer to Figure C1-2.

Figure C1-2: System Configuration Panel



Wall-mount **Rack-mount**

3. If you remove or replace a module, remove its label from the system configuration panel and take the part number off the inventory form (see *Installation*, section A2.1).

C1.2 Installing and Removing the DTU and T1.403 Modules

Install the DTU module in the DTU socket:

- ❑ to communicate with a *46XX MainStreet* series network manager through a 64 kb/s channel on the T1 link
- ❑ if DNIC modules are installed

Install the DTU module in the FDL socket:

- ❑ to communicate with a *46XX MainStreet* series network manager through the FDL channel on the T1 link
- ❑ to support AT&T 54016 performance monitoring on the T1 link
- ❑ to support ANSI T1.403 performance monitoring on the T1 link (also requires installation of a T1.403 module)

You may have to remove a Control card module to access the DTU or FDL socket. Refer to section C1.3.

The module installation procedure is the same for both wall-mount and rack-mount units.

Warning

Ensure that the module is inserted correctly; otherwise it will be damaged when the unit is powered up. Follow the installation procedure carefully.

To install the DTU module

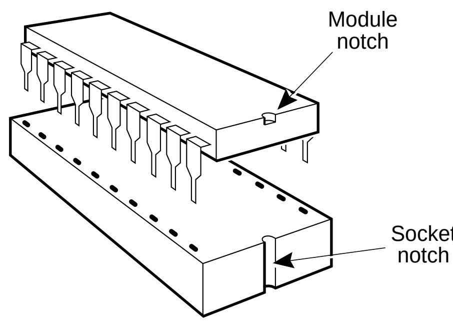
Tools required:

❑ IC insertion tool

1. Pick up the module with the IC insertion tool and align the module pins with the socket holes.

   The notch on the module must face towards the notch on the socket, as shown in Figure C1-3.

Figure C1-3: Installing a DTU Module



2. Set the pins gently into the proper holes in the socket.

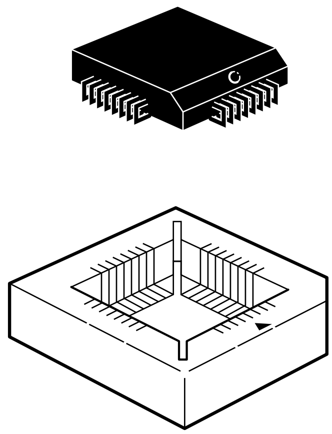
3. Push down on the knob on top of the IC insertion tool until the module pins snap into the socket. Do not force the module, as this might bend the pins.

To install the T1.403 module

1. Pick up the module and align the module pins with the socket holes.

   The pin 1 mark on the module must line up with the mark on the socket, as shown in Figure C1-4.

Figure C1-4: Installing a T1.403 Module



2. Set the pins gently into the proper holes in the socket and push down on the module until the pins snap into the socket. Do not force the module, as this might bend the pins.

To remove the DTU or T1.403 module

Tools required:

- ❑ IC extraction tool

1. Grasp the module firmly with the IC extraction tool.
2. Gently ease it out of the socket by pulling up on one end of the module at a time.

C1.3 Installing and Removing the Memory, T1 and Resource Modules

The memory module must be installed before the T1 or resource modules, as it is located under the other modules.

The module installation procedure is the same for both wall-mount and rack-mount units.

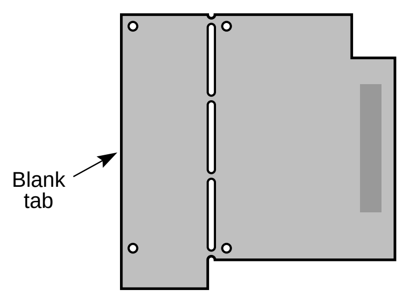
To install memory, T1 and resource modules

Tools required:

- ❑ #1 Phillips screwdriver
- ❑ small slot screwdriver
- ❑ vice (for IHTU modules only)

1. For IHTU modules and LIM modules (some revisions): Remove the blank tab on the module by clamping it in a vice as close to the perforations as possible, and carefully applying pressure to snap the tab off along the perforations. Discard the blank tab. See Figure C1-5 for the location of the tab.

Figure C1-5: IHTU or LIM Module



2. Remove and retain the screws from the mounting posts on the Control card.

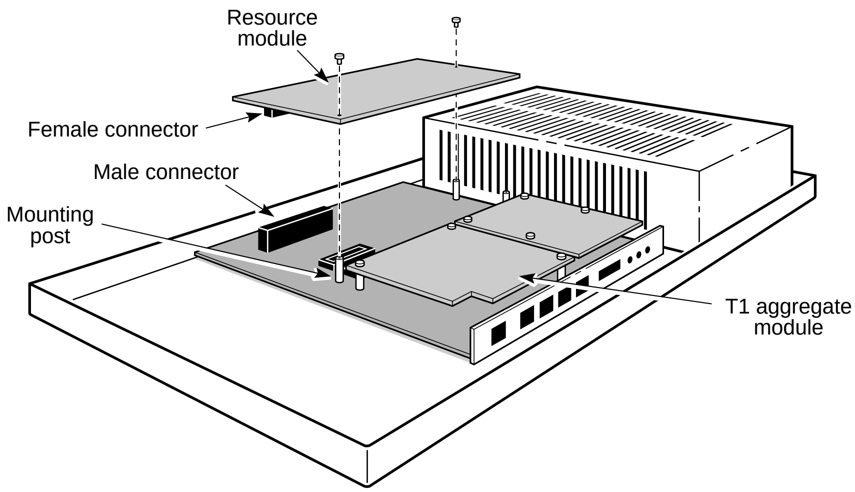
3. Hold the module by the edges with the female connector facing down.

4. Align the module connector and mounting holes with the appropriate connector and mounting posts on the Control card. Refer to Figure C1-6.

   Ensure that the mounting holes in the module line up with the mounting posts. If they do not, you are installing the wrong module on that connector.

5. Push down on the edge of the module nearest the female connector. Do not force the module, as this might bend the pins.

Figure C1-6: Installing a Resource Module



6. Use the screws from step 2 to secure the module to the mounting posts.

To remove memory, T1 and resource modules

1. Remove the mounting post screws that hold the module in place.

2. Hold the module by the edges close to the connector and carefully pull the module off the Control card.

3. Re-insert the screws into the mounting posts.

C2. Universal Card

This chapter describes how to install the Universal card in the chassis or drawer unit.

The Universal card is located at the front of the chassis or drawer unit, above the Control card.

C2.1 Installing the Universal Card

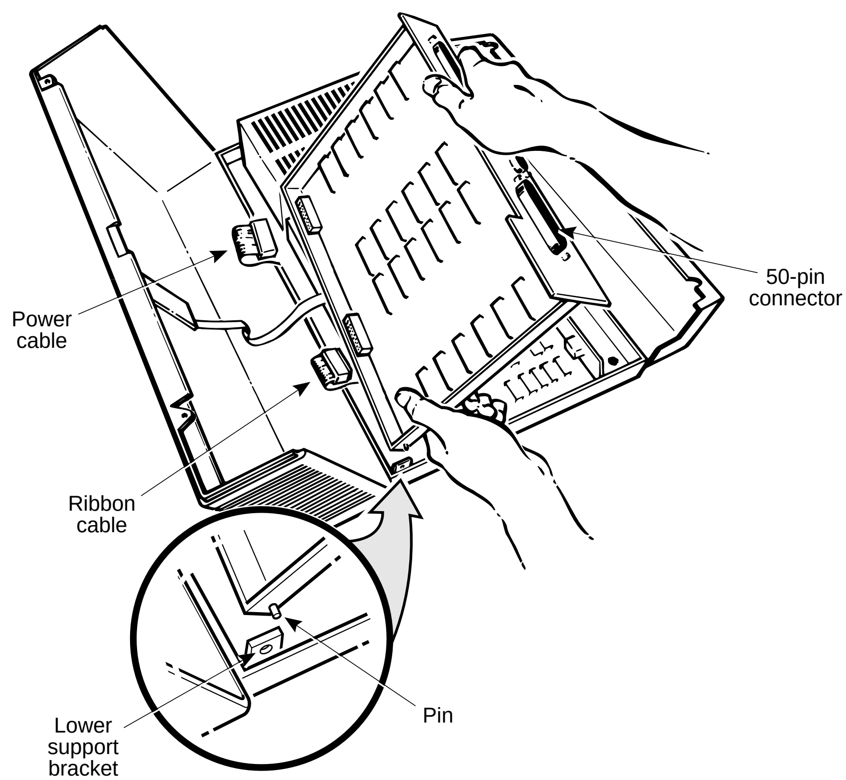
The installation procedure is the same for both the Universal card and the Universal (48 V) card, and applies to both the wall-mount and rack-mount units. For simplicity, the illustrations show the wall-mount unit only.

To install the card

1. Move the unattached ends of the Control card power cable and ribbon cable to the side of the chassis, as shown in Figure C2-1.

2. Hold the Universal card as shown in the figure, with the four rows of male connectors facing upwards.

Figure C2-1: Installing the Universal Card



3. Insert the pin on the lower left corner of the Universal card into the hole in the lower support bracket on the chassis.

4. With your left hand, carefully lift the upper support bracket on the chassis (below the power supply) and insert the pin on the upper left corner of the Universal card into the hole in the bracket.

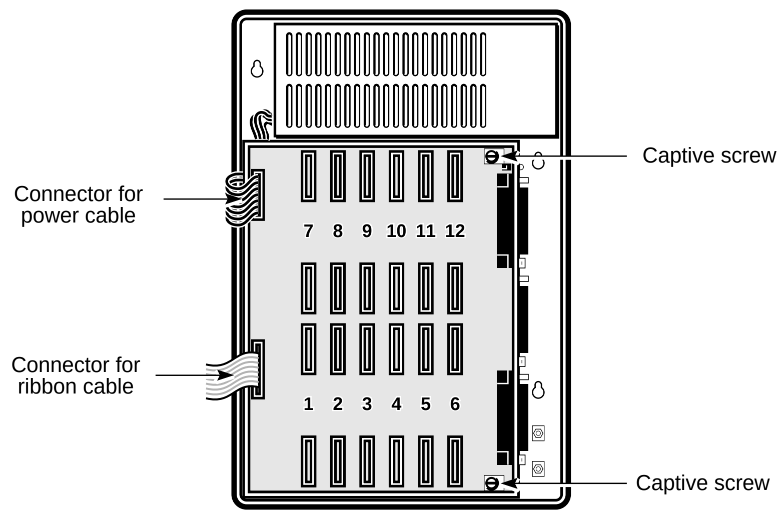
   The Universal card should swing easily on the supports.

5. Screw the Universal card to the posts on the chassis with the captive screws, as shown in Figure C2-2.

6. Plug the Control card power cable into the Universal card. Do not twist the cable.

7. Plug the Control card ribbon cable into the Universal card and push down until the tabs on the connector snap on. Do not twist the cable.

Figure C2-2: Location of Cable Connectors and Captive Screws



C3. Installing the Universal Card Modules

This chapter describes how to install the Universal card modules. The modules can be installed or removed while the system power is on.

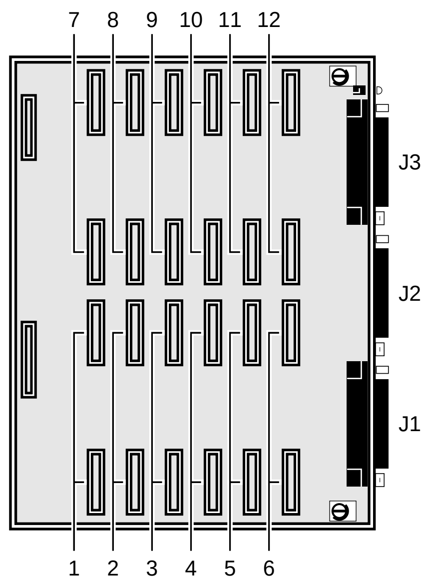
Warning

Wear a properly attached antistatic wrist strap before handling the modules.

C3.1 Location of Universal Card Modules

The Universal card and Universal card (48 V) can hold up to 12 interface modules. Each position consists of two male connectors. Refer to Figure C3-1 for the location of the modules.

Figure C3-1: Location of Universal Card Modules



Any module can be installed in any position; however, when Tributary T1 modules or X.21 and V.35 DCMs are configured for super-rate interface speeds, some of the positions adjacent to them must be left empty. See *Configuration*, chapter C3, for more information on super-rate circuits.

The Tributary T1 module occupies three slots on the Universal card. All other modules occupy one slot each.

C3.2 Module Part Number

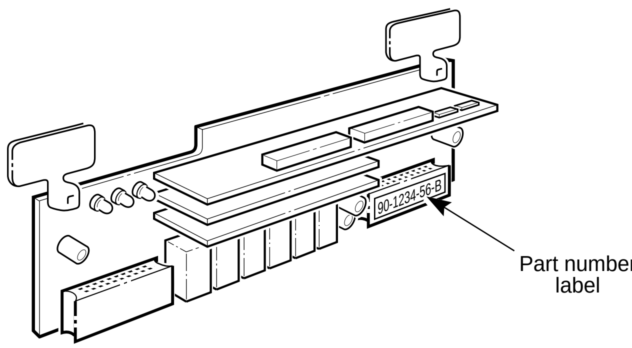
The module package includes a label with the part number and alphabetic manufacturing code. This number should match the part number located on the module.

To record the part number

1. Verify that the part number on the label matches the number on the module. If it does not, contact your Newbridge service representative.

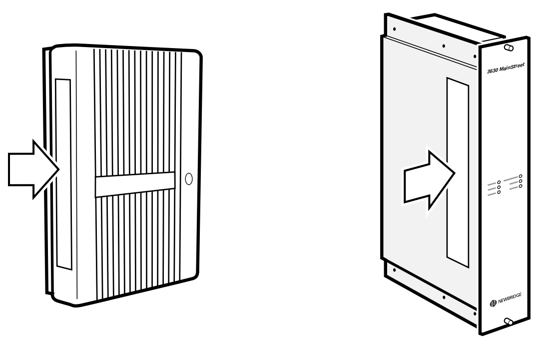
   Figure C3-2 shows the location of the module part number.

Figure C3-2: Location of Part Number on Voice Module



2. Attach the label to the appropriate position on the system configuration panel, located on the left hand side of the chassis cover or faceplate. Refer to Figure C3-3.

Figure C3-3: System Configuration Panel



Wall-mount **Rack-mount**

3. If you remove or replace a module, remove its label from the system configuration panel and take the part number off the inventory form (see *Installation*, section A2.1).

C3.3 Installing and Removing Universal Card Modules

The module installation procedure is the same for both the wall-mount and rack-mount units.

Tools required:

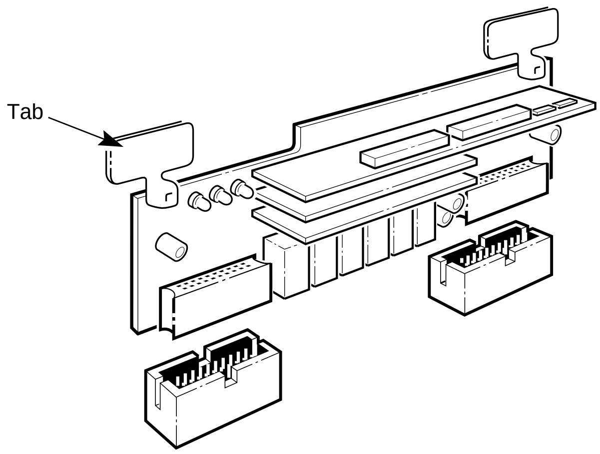
- ❑ #1 Phillips screwdriver
- ❑ slot screwdriver

To install a Universal card module

1. Hold the module by the plastic tabs with the two female connectors pointing towards the Universal card and the soldered side facing towards the chassis cover.

2. Align the two female connectors on the module with the two male connectors on the Universal card, as shown in Figure C3-4.

Figure C3-4: Installing a Universal Card Module



3. Carefully push the female connectors part way onto the male connectors, and check that each pin is in the proper position.

4. Push on the upper corners of the module until it is firmly in place. Do not force the module, as this might bend the pins.

Note

If any LEDs on the installed module illuminate before it has been configured, the module is not properly inserted. Remove the module and re-install it on the Universal card.

To remove a Universal Card Module

Hold the module by the plastic tabs and pull evenly to gently remove the module from the connectors. Check the connectors to ensure that no pins are bent.

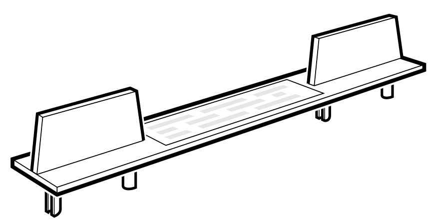
Pull the handle on the Tributary T1 module with the forefinger and thumb of both hands to prevent connector pins from being bent.

C3.4 Installing and Removing Blank Modules

A blank module is a plastic module that is installed in a module position on the Universal card when super-rate circuits on V.35, X.21 DCMs or Tributary T1 modules are cross-connected to T1 circuits. A blank module is shown in Figure C3-5.

The blank module prevents the installation of another interface module type into a position that is being used in a super-rate connection. See *Configuration*, chapter C3, for more information on super-rate circuits and connections.

Figure C3-5: Blank Module

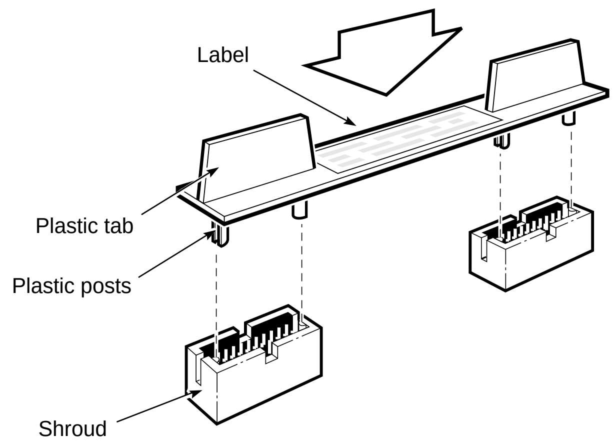


To install blank modules

1. Hold the module by the plastic tabs with the two plastic posts facing downward and the surface with the yellow caution label facing upward, as shown in Figure C3-6.

2. Align the plastic posts on the blank module with the two male connectors on the Universal card.

Figure C3-6: Inserting the Blank Module



3. Gently push the plastic posts part way onto the male connectors.

4. Push on the upper corners of the module until it is installed. Do not force the module, as this might break the posts.

To remove blank modules

Grasp the two plastic tabs on the modules and pull the blank module out.

D1. Preliminary Testing

The *3624 MainStreet* unit should be powered up and tested once all modules have been installed, and before any external connections are made. When you have verified that the unit is operational, turn the power off and make the external connections as described in *Installation*, chapters D2 to D5.

The unit is shipped with a 100 V / 60 Hz or 120 V / 60 Hz ac power supply, or a +24 V, –24 V or –48 V dc supply. The maximum power consumption is 65 W, depending on the number and type of modules installed.

Connect the unit to an unswitched, dedicated power source. Newbridge recommends that you also install external surge protectors, as the unit is not equipped with power surge protection.

For ac systems in North America, use a UL-listed or CSA-certified power cord with grounding connection, with a rating that corresponds to the desired operating voltage of the unit.

Warning

The unit must be powered down before it is unplugged, to avoid damage to the power supply or the cards.

Do not connect external circuits while testing the system. Do not power up a system that has been connected to the network until all external circuit connections have been made.

This chapter describes the ac and dc wall- and rack-mount power connections and the startup diagnostics.

D1.1 AC Wall-mount Power Connections

Tools required:

❑ cable ties

To connect an ac wall-mount unit to power

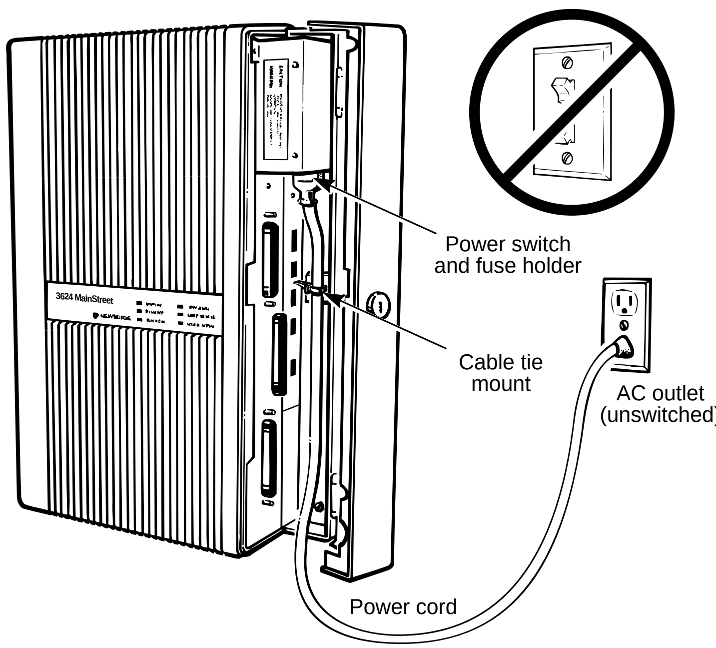
1. Ensure that the power switch on the *3624 MainStreet* unit is in the Off (O) position. See Figure D1-1 for the location of the power switch.

2. Connect the power cord to the power plug.

3. Fasten the power cord to the cable tie mount with a cable tie.

4. Plug the power cord into an unswitched, dedicated power source. Leave the cord loose – do not fasten it to any building surface.

Figure D1-1: AC Wall-mount Unit Connected to Power



5. Set the power switch to the On (|) position.

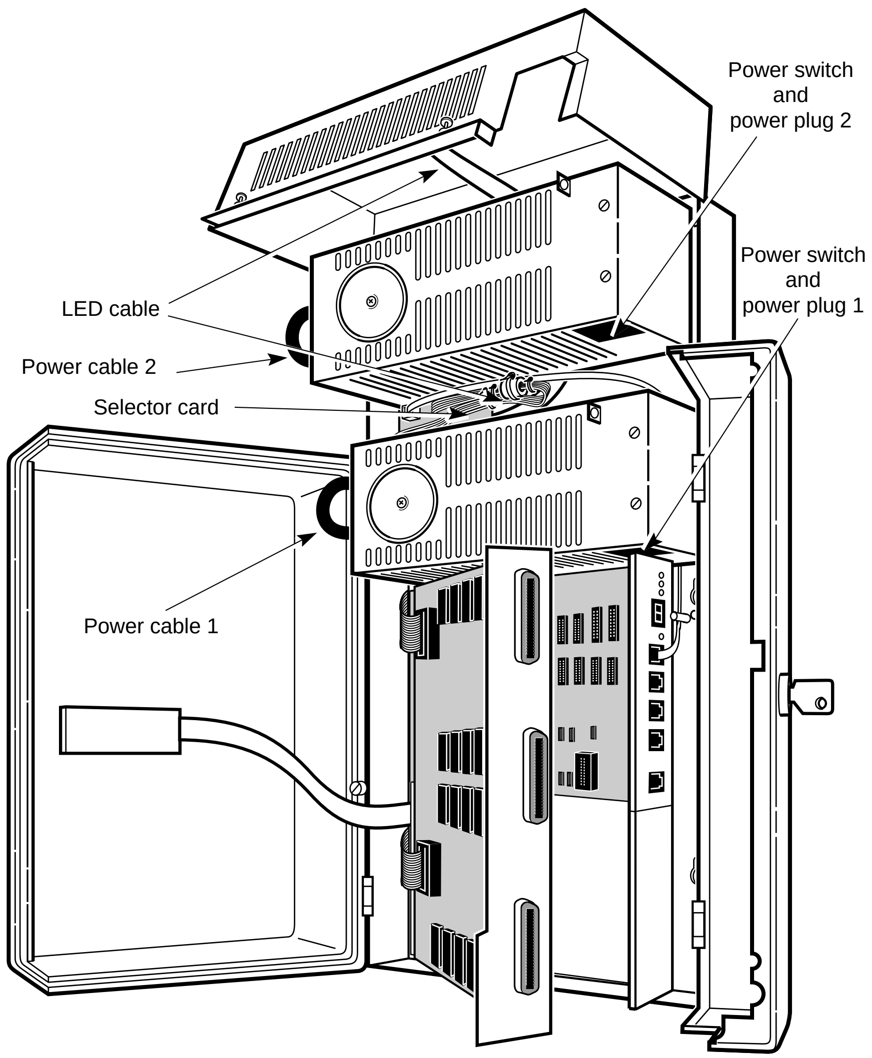
   The unit automatically runs through its diagnostic tests, as described in section D1.6.

6. Set the power switch to the Off position when the diagnostic tests are complete. Diagnostics are complete when the power LED on the cover or faceplate is on (steady), and the status lights on the Control card and Universal card are on (steady).

D1.2 Redundant AC Power Connections

In redundant ac units, two power supplies are connected to a power supply selector card, and the power supply selector card is connected to the power connector on the Control card. The card provides power to the system from one or both of the supplies. See Figure D1-2 for the location of the power supplies and selector card.

Figure D1-2: Redundant AC Power Supplies



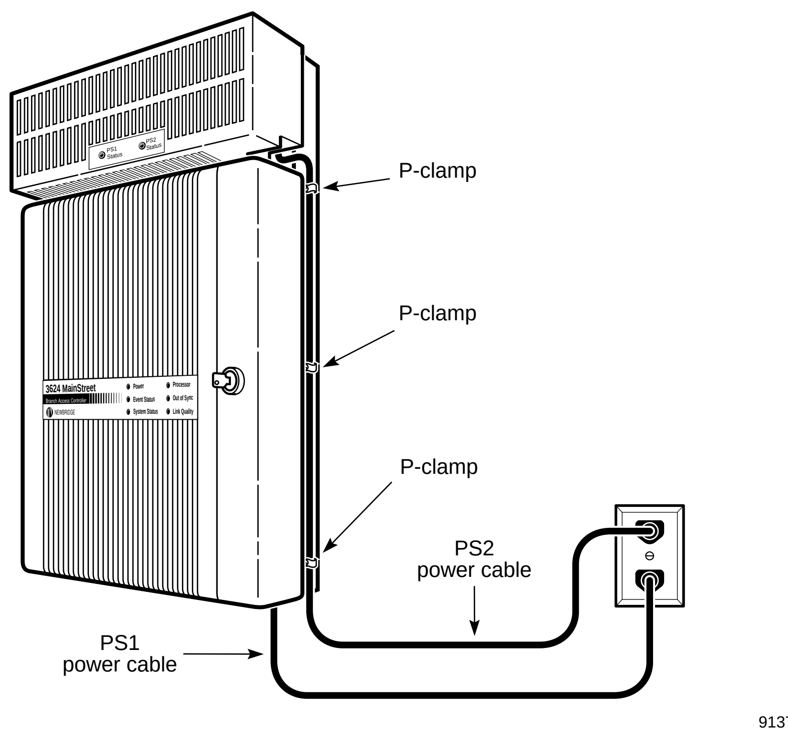
To connect a redundant ac unit to power

1. Ensure that the power switch is in the Off position.

2. Connect the ac power cord to the power plug on the internal power supply (power supply 1), and route it along the inside of the chassis as shown in Figure D1-1. Fasten the power cord with a cable tie to the bottom of the Control card.

3. Connect the ac power cord to the power plug on the external power supply (power supply 2), and route it along the outside of the chassis as shown in Figure D1-3. Fasten it to the side of the chassis with P-clamps.

Figure D1-3: Connecting the Power Cord to the External Power Supply



4. Plug the other ends of the power cords into an unswitched, dedicated power source. Leave the cords loose – do not fasten them to any building surface.

5. Set the power switch to the On position.

   The unit automatically runs through its diagnostic tests, as described in section D1-6.

6. Set the power switch to the Off position after the diagnostic tests are complete. Diagnostics are complete when the power LED on the cover and the status LEDs on the Control card and Universal card are on steady.

When the unit powers up, power is drawn from both supplies for 500 ms, then the system defaults to the main power supply (power supply 1).

For the redundant function to work, the selector card must be connected to the external alarm port on the Control card, and the port must be configured to raise an alarm when the circuit opens. The redundant unit is shipped with the card already connected; however, if it needs to be reconnected for any reason, see *Installation*, chapter D5, for information. See *Maintenance*, section A2.5 for information on configuring the external alarm port.

D1.3 AC Rack-mount Power Connections

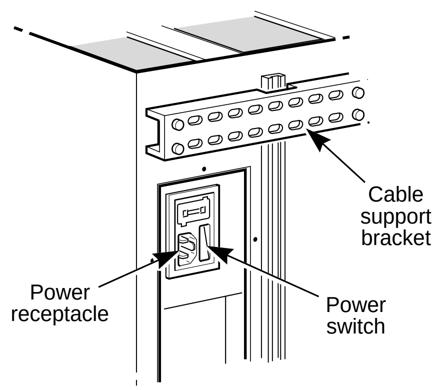
Tools required:

- ❑ cable ties

To connect an ac rack-mount unit to power

1. Ensure that the power switch on the *3624 MainStreet* unit is in the Off (O) position. See Figure D1-4 for the location of the power switch.

Figure D1-4: AC Power Switch and Plug (Rack-mount Unit)



2. Connect the power cord to the power receptacle.
3. Secure the power cord to the cable support bracket with a cable tie. Leave a service loop long enough to allow the drawer to fully open and close.
4. Plug the power cord into an unswitched, dedicated power source.
5. Set the power switch to the On (|) position.

   The unit automatically runs through its diagnostic tests, as described in section D1.6.
6. Turn the power switch to the Off position after the diagnostic tests are complete.

D1.4 DC Wall-mount Power Connections

Tools required:

❑ #2 Phillips and slot screwdrivers
❑ cable ties

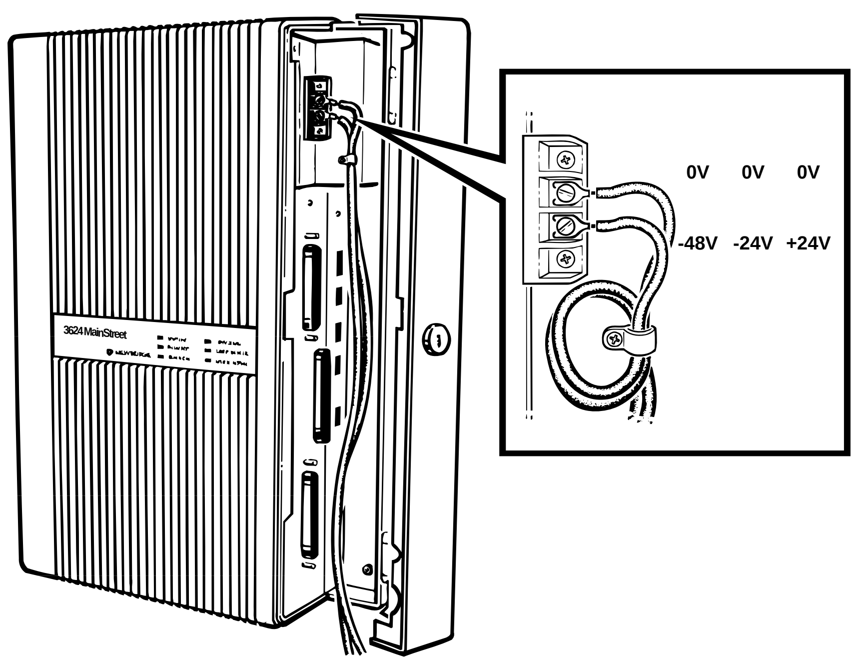
To connect a dc wall-mount unit to power

1. Set the dc circuit breaker to the Off position. The circuit breaker is located under the power supply section.

2. Loosen the screw on the cable clamp, located under the terminal block.

3. Feed the dc power wires through the clamp, looping them as shown in Figure D1-5. Tighten the screw on the clamp to secure the wires.

Figure D1-5: DC Unit Power Supply



4. Connect the dc power wires to the correct terminals, as labelled on the terminal block. Ensure that the wires are separated by at least 5 cm (2 in.) from all other communication cabling.

5. Run the dc power wires along the cable channel and secure them to the cable tie mount with a cable tie.

6. Connect the dc power wires to the battery source (match the polarity). Ensure that the wiring from the unit to the battery source is adequately routed and secured according to local wiring practices.

7. Set the dc circuit breaker to the On position.

   The unit runs through its diagnostic tests, as described in section D1.6.

8. Turn the dc circuit breaker to Off after the diagnostic tests are complete.

D1.5 DC Rack-mount Power Connections

To complete dc power connections for a rack-mount system, you must:

❏ connect the dc drawers to the dc power distribution assembly
❏ connect the dc power distribution assembly to a dc power source

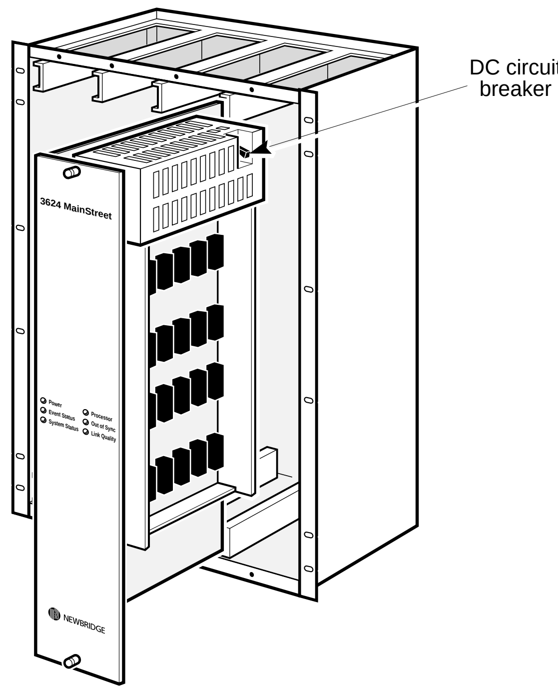
Tools required:

❏ Rack DC Connector Kit
❏ cable ties
❏ #2 Phillips and slot screwdrivers
❏ dc power interconnect cables
❏ dc input power cabling (18 gauge AWG minimum [1.2 mm stranded nominal diameter]; length as required)
❏ wire stripper or cutter
❏ crimping tool
❏ spade lugs

To connect the rack-mount drawer to the DC power distribution assembly

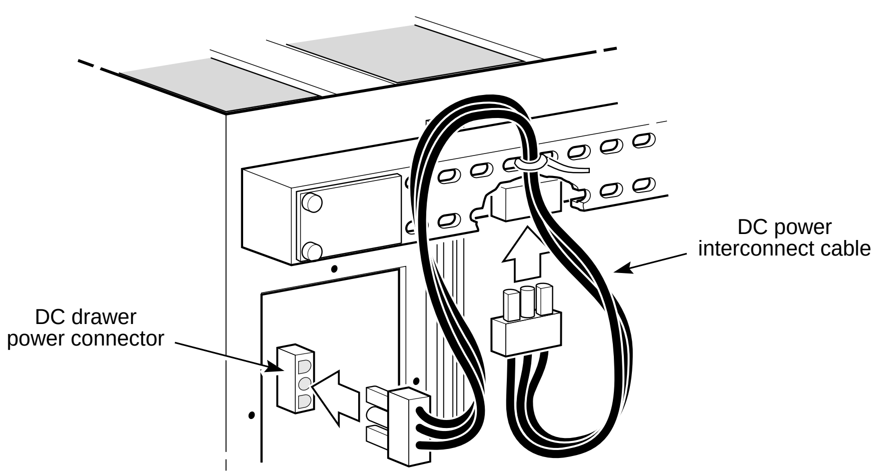
1. Ensure that the dc drawer circuit breaker is in the Off position. Refer to Figure D1-6 for the location of the circuit breaker.

Figure D1-6: DC Circuit Breaker



2. Connect a dc power interconnect cable between the power connector on the rear faceplate of the drawer and the power connector on the dc power distribution circuit board. Refer to Figure D1-7.

Figure D1-7: Attaching DC Power Interconnect Cable



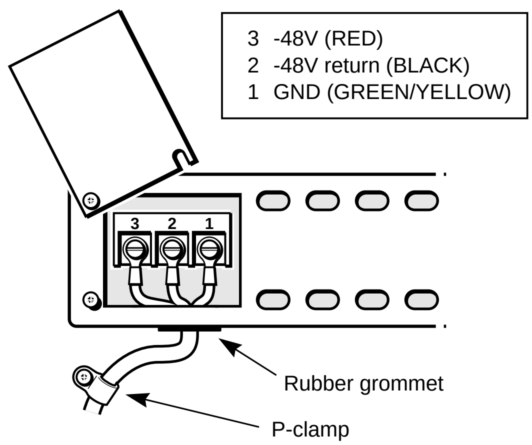
3. Secure the power interconnect cable to the power distribution assembly with a cable tie. Leave a service loop long enough to allow the drawer to fully open and close.

To connect the DC power distribution assembly to power

1. Strip 0.6 cm (1/4 in.) of insulation from the end of each of the three conductors on the dc input power cable, and crimp a spade lug onto each conductor.

2. Loosen the two screws on the dc terminal block access cover and swing the cover up to expose the dc power terminal block. Tighten the top screw to hold the cover open. Refer to Figure D1-8.

Figure D1-8: DC Power Terminal Block Connections



3. Install the rubber grommet in the opening on the under side of the cable support bracket.

4. Feed the three conductors of the dc input power cable through the grommet opening.

   Connect the conductors to the terminal block according to the pin assignment shown in Figure D1-8. The –24 and +24 V dc assignments are the same as the –48 V dc assignments; however, for simplicity only the –48 V labels are shown.

5. Close and secure the dc terminal block access cover.

6. Secure the dc input power cable to the P-clamp attached to the shelf beneath the dc terminal block access cover.

7. Connect the other end of the dc input power cable to an approved dc power supply.

   Check that all connections have been made to the proper terminals.

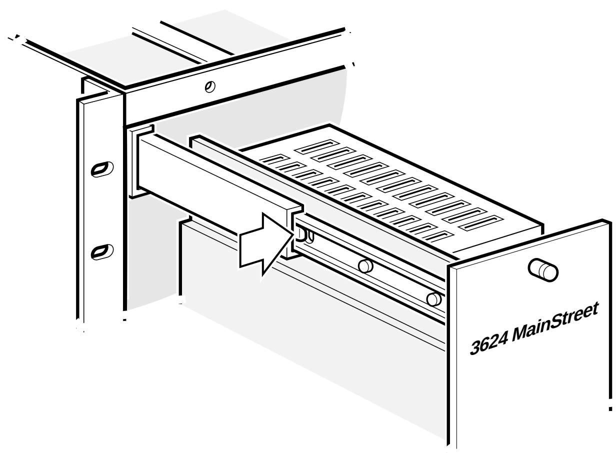
8. Turn the dc circuit breaker to the On position.

   The unit automatically runs through its diagnostic tests, as described in section D1.6.

9. Turn the unit off after the diagnostic tests are complete.

10. Close the drawer by depressing the tabs of the top and bottom drawer members while pushing the drawer all the way into the shelf. See Figure D1-9.

Figure D1-9: Drawer Member Tabs



11. Secure the drawer to the shelf with the captive screws on the drawer faceplate.

D1.6 Startup Diagnostics

When powered up, the unit performs a number of diagnostic tests. During this time, various LEDs on the Control card, Universal card and chassis cover or faceplate, light to indicate the status of the unit.

Figure D1-10 shows the location of the LEDs on the wall-mount unit.

Figure D1-10: Wall-mount Unit LEDs

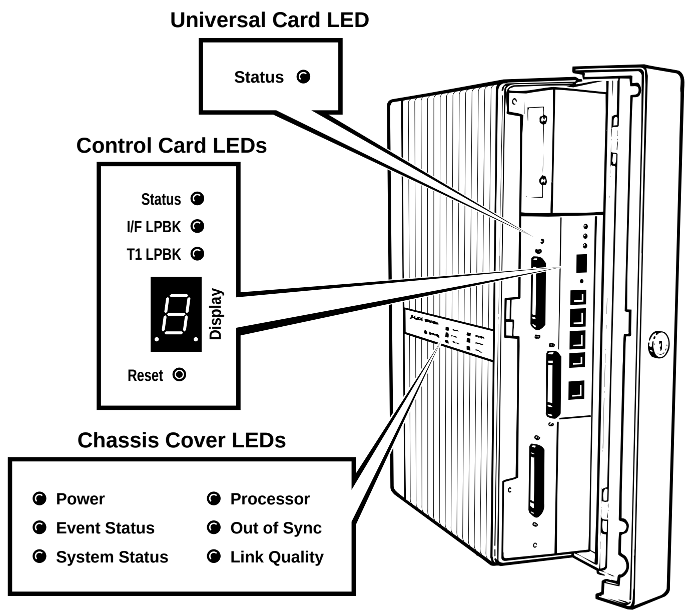
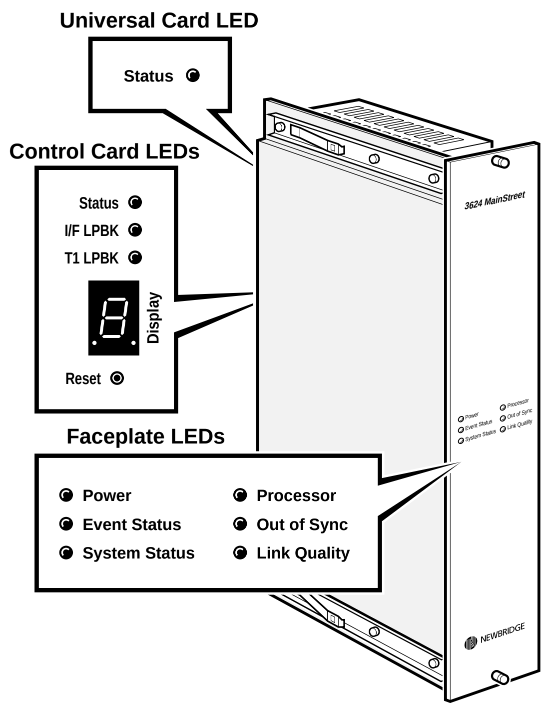


Figure D1-11 shows the location of the LEDs on the rack-mount drawer.

Figure D1-11: Rack-mount Drawer LEDs



The tests typically last less than one minute. If the LEDs do not light as described in Table D1-1, or if the diagnostics last more than one minute, see *Maintenance*, chapter A1.

Table D1-1 describes the LED displays.

Table D1-1: Startup Diagnostics

LED	Display	Meaning
Power (chassis)	On	Power is on
Processor (chassis)	Flashes 0.5 second on/0.5 second off	All alarms in the alarm queues have been acknowledged
Seven-segment display (Control card)	Power indicator dot is on	Power is on
	Each segment flashes in order – first clockwise, then counter-clockwise	Diagnostics are being performed
	Character P flashes once	Power-up diagnostics are complete
	Character D flashes (up to 30 seconds after P appears)	System software and database are initializing
	A number flashes	Power-up procedure has ended and the unit is ready for configuration. The number is the number of alarms in the major alarm queue.
Status (Control card)	On	Control card is functioning
Status (Universal card)	On	Universal card is functioning
Power supply (redundant wall-mount unit) – two LEDs	One or both on (green)	One or both power supplies are functioning

If a number from 1 to 5, or the letter F, appears on the seven-segment display before diagnostics are complete, it indicates that a problem has been discovered. Refer to Table D1-2 for the meaning of the code and the action to be taken. Wait until the startup diagnostics are complete before taking any action.

Table D1-2: Diagnostic Error Codes

Error Code	Problem	Action
1	PROM checksum error	Check that memory module PROMs are properly installed
2	RAM check failure	Switch power off, wait 30 seconds, then restart the system. If problem persists, contact your Newbridge service representative.
3	Processor viability failure	Contact your Newbridge service representative
4	DX test failure	Contact your Newbridge service representative
5	Timer check failure	Contact your Newbridge service representative
F	EDX test failure	Contact your Newbridge service representative

If the letters C, L or U appear on the seven-segment display during startup, contact your Newbridge service representative.

D2. External Voice and Data Circuit Connections

This chapter describes how to connect the external voice and data circuits to the Universal card.

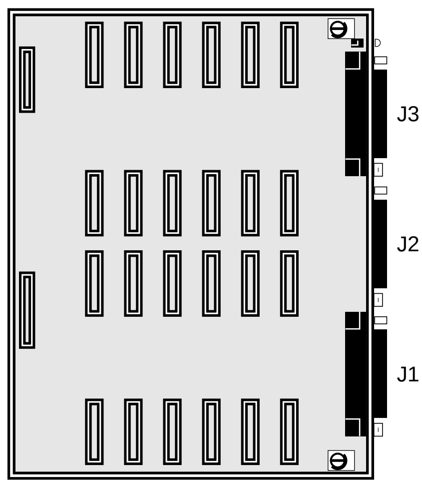
Warning

The unit must be powered down while external circuit connections are being made. Ensure that all circuits have been connected before turning the power back on.

D2.1 Universal Card Connectors

The external voice and data connectors (labelled J1, J2 and J3) are shown in Figure D2-1.

Figure D2-1: Location of the External Voice and Data Connectors



Universal and Universal (48V) Card

Table D2-1 lists the assignment of module position signals to connectors for both Universal card variants.

Table D2-1: Signal and Connector Assignments for Universal Cards

Connector	Universal Card	Universal (48 V) Card
J1	All signals for module positions 1 through 4	TR (tip return), RR (ring return), E&M signals for module positions 1 through 6
J2	All signals for module positions 5 through 8	T (tip) and R (ring) signals for all module positions
J3	All signals for module positions 9 through 12	TR, RR, E&M signals for module positions 7 through 12

D2.2 Connecting External Circuits to the Wall-mount Unit

Tools required:

❏ 25-pair cables with right-angle headshells (refer to *Ordering Information*)
Connector type: CA2GA (Canada), RJ2GX (U.S.)

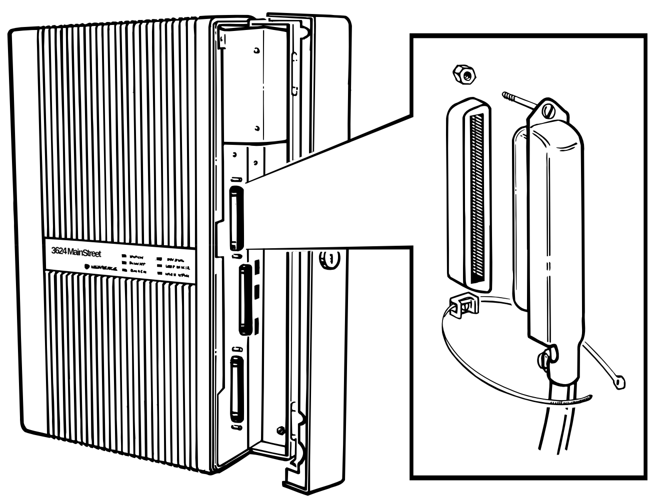
Note

Using an RS-232 interface at speeds above 38.4 kb/s is not guaranteed. If interface speeds above 38.4 kb/s are required, it is recommended that you use short, high-grade shielded cable to connect the device to the interface.

To connect circuits to the wall-mount unit

1. Connect one end of a 25-pair cable to connector J1, J2 or J3 on the Universal card, so that the cable exits from the bottom of the unit without bending. Figure D2-2 shows the proper orientation of the cable.

Figure D2-2: Orientation of Connector



2. Secure the connector with a cable tie wrap.

3. Connect the other end of the cable to the appropriate device, for example, a punch-down block or data device.

D2.3 Connecting External Circuits to the Rack-mount Drawer

All external circuit connections are made at the rear of the rack-mount drawer.

Note

For dc rack-mount drawers: ensure that you have installed the dc power distribution assembly before connecting external circuits. See *Installation*, section D1.5 for details.

Tools required:

❑ 25-pair cables with straight headshells (AMP 552003-1 or equivalent)
❑ cable tie wraps (approximately six per drawer)

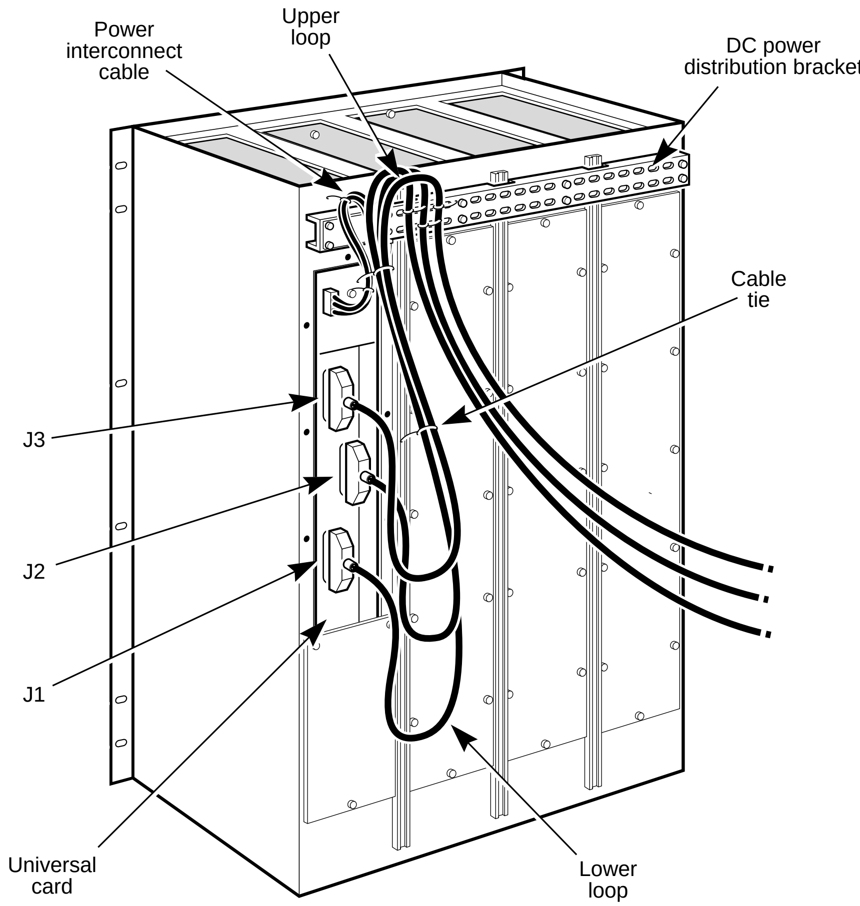
Cables must be long enough to create a service loop using the cable ties. The service loop lets the drawer slide freely when it is pulled out.

To connect external circuits to the rack-mount drawer

1. Attach one end of each 25-pair cable to connector J1, J2 or J3 on the Universal card as shown in Figure D2-3.
2. Gather all external circuit cables for a given drawer.
3. Create one or more service loops to allow the drawer to be fully opened.
4. Tie wrap the tops of the loops to the rack shelf cable support bracket, or dc power distribution bracket if it is attached.
5. Tie wrap the cables in a bundle between the upper and lower loops.

6. Attach the other end of each 25-pair cable to the appropriate device.

Figure D2-3: Connection to the Universal Card on the Rack-mount Drawer



D2.4 Pin and Signal Assignments

Table D2-2 shows the pin and signal assignments for connectors J1, J2 and J3 for the module positions and module types installed on the Universal card (part numbers 90-0154-05 and 90-0154-06).

Signals for module positions 1, 2, 3 and 4 come out on connector J1. Signals for module positions 5, 6, 7 and 8 come out on connector J2. Signals for module positions 9, 10, 11 and 12 come out on connector J3.

Table D2-3 shows the pin and signal assignments for connectors J1 and J3 for the module positions and module types installed on the Universal (48 V) card (part numbers 90-0154-02 and 90-0154-03). TR, RR and E&M signals for module positions 1 through 6 come out on connector J1. For module positions 7 through 12 the signals come out on connector J3.

Table D2-4 shows the pin and signal assignments for connector J2 on the Universal (48 V) card. Connector J2 carries the T and R signals for all 12 module positions.

If only LGS, LGE, DNIC and 2WTO Modules are installed on the Universal (48 V) card, connector J2 is used to convey the signals from the unit. Connectors J1 and J3 are not used.

The pin and signal assignments are identical for both wall-mount units and rack-mount drawers.

Note

The pair colours should be read <background colour> <tracer colour>, where the tracer can be dots or a stripe. For example, the wire listed for pin 26 is W-BL and should be read as "white with blue". The wire colours listed in the tables are used in Newbridge 25-pair cabling and are based on CAN / CSA-22.2 No. 214-M90, Appendix A, and the relevant parts of Accunet T1.5 Service Standard (62411).

Table D2-2: Pin and Signal Assignments for Connectors J1, J2 and J3 (Universal Card)

Pin	Pair Colour[1]	Module Position	Circuit Number	Module Type: Trib T1	LGS LGE MRD 2WTO	E&M	4WTO OCU 2 OCU 3	DNIC	RS-232 DCM	X.21 DCM	V.35 DCM
26	W-BL	1, 5, 9	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
1	BL-W			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
27	W-O					TR1	TR1		RXD1	R(B)	RxDB
2	O-W					RR1	RR1		XCLK1	R(A)	RxDA
28	W-G					E1			RTS1	S(A)	SCTA
3	G-W					M1			SCR1	S(B)	SCTB
29	W-BR		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
4	BR-W			RxRing	R2	R2	R2		TXD2	C(B)	CTS
30	W-S					TR2	TR2		RXD2	I(A)	SCRA
5	S-W					RR2	RR2		XCLK2	I(B)	SCRB
31	R-BL					E2			RTS2	SG	DCD
6	BL-R					M2			SCR2		SG
32	R-O	2, 6, 10	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
7	O-R			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
33	R-G					TR1	TR1		RXD1	R(B)	RxDB
8	G-R					RR1	RR1		XCLK1	R(A)	RxDA
34	R-BR					E1			RTS1	S(A)	SCTA
9	BR-R					M1			SCR1	S(B)	SCTB
35	R-S		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
10	S-R			RxRing	R2	R2	R2		TXD2	C(B)	CTS
36	BK-BL					TR2	TR2		RXD2	I(A)	SCRA
11	BL-BK					RR2	RR2		XCLK2	I(B)	SCRB
37	BK-O					E2			RTS2	SG	DCD
12	O-BK					M2			SCR2		SG
38	BK-G	3, 7, 11	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
13	G-BK			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
39	BK-BR					TR1	TR1		RXD1	R(B)	RxDB
14	BR-BK					RR1	RR1		XCLK1	R(A)	RxDA
40	BK-S					E1			RTS1	S(A)	SCTA
15	S-BK					M1			SCR1	S(B)	SCTB
41	Y-BL		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
16	BL-Y			RxRing	R2	R2	R2		TXD2	C(B)	CTS
42	Y-O					TR2	TR2		RXD2	I(A)	SCRA
17	O-Y					RR2	RR2		XCLK2	I(B)	SCRB
43	Y-G					E2			RTS2	SG	DCD
18	G-Y					M2			SCR2		SG
44	Y-BR	4, 8, 12	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
19	BR-Y			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
45	Y-S					TR1	TR1		RXD1	R(B)	RxDB
20	S-Y					RR1	RR1		XCLK1	R(A)	RxDA
46	V-BL					E1			RTS1	S(A)	SCTA
21	BL-V					M1			SCR1	S(B)	SCTB
47	V-O		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
22	O-V			RxRing	R2	R2	R2		TXD2	C(B)	CTS
48	V-G					TR2	TR2		RXD2	I(A)	SCRA
23	G-V					RR2	RR2		XCLK2	I(B)	SCRB
49	V-BR					E2			RTS2	SG	DCD
24	BR-V					M2			SCR2		SG
50	V-S			–15 V [2]			ground [3]				
25	S-V			–15 V [2]			ground [3]				

Notes

1. BK = Black, BL= Blue, BR = Brown, G = Green, O = Orange, R = Red, S = Slate, V = Violet, W = White, Y = Yellow
2. For connectors J1 and J3
3. For connector J2

Table D2-3: Pin and Signal Assignments for Connectors J1 and J3 (Universal [48 V] Card)

Pin	Pair Colour[(1)]	Module Position	Circuit Number	Module Type: Trib T1	LGS LGE MRD 2WTO	E&M	4WTO OCU 2 OCU 3	DNIC	RS-232 DCM	X.21 DCM	V.35 DCM
26	W-BL	1, 7	1			TR1	TR1		RXD1	R(B)	RxDB
1	BL-W					RR1	RR1		XCLK1	R(A)	RxDA
27	W-O					E1			RTS1	S(A)	SCTA
2	O-W					M1			SCR1	S(B)	SCTB
28	W-G		2			TR2	TR2		RXD2	I(A)	SCRA
3	G-W					RR2	RR2		XCLK2	I(B)	SCRB
29	W-BR					E2			RTS2	SG	DCD
4	BR-W					M2			SCR2		SG
30	W-S	2, 8	1			TR1	TR1		RXD1	R(B)	RxDB
5	S-W					RR1	RR1		XCLK1	R(A)	RxDA
31	R-BL					E1			RTS1	S(A)	SCTA
6	BL-R					M1			SCR1	S(B)	SCTB
32	R-O		2			TR2	TR2		RXD2	I(A)	SCRA
7	O-R					RR2	RR2		XCLK2	I(B)	SCRB
33	R-G					E2			RTS2	SG	DCD
8	G-R					M2			SCR2		SG
34	R-BR	3, 9	1			TR1	TR1		RXD1	R(B)	RxDB
9	BR-R					RR1	RR1		XCLK1	R(A)	RxDA
35	R-S					E1			RTS1	S(A)	SCTA
10	S-R					M1			SCR1	S(B)	SCTB
36	BK-BL		2			TR2	TR2		RXD2	I(A)	SCRA
11	BL-BK					RR2	RR2		XCLK2	I(B)	SCRB
37	BK-O					E2			RTS2	SG	DCD
12	O-BK					M2			SCR2		SG
38	BK-G	4, 10	1			TR1	TR1		RXD1	R(B)	RxDB
13	G-BK					RR1	RR1		XCLK1	R(A)	RxDA
39	BK-BR					E1			RTS1	S(A)	SCTA
14	BR-BK					M1			SCR1	S(B)	SCTB
40	BK-S		2			TR2	TR2		RXD2	I(A)	SCRA
15	S-BK					RR2	RR2		XCLK2	I(B)	SCRB
41	Y-BL					E2			RTS2	SG	DCD
16	BL-Y					M2			SCR2		SG
42	Y-O	5, 11	1			TR1	TR1		RXD1	R(B)	RxDB
17	O-Y					RR1	RR1		XCLK1	R(A)	RxDA
43	Y-G					E1			RTS1	S(A)	SCTA
18	G-Y					M1			SCR1	S(B)	SCTB
44	Y-BR		2			TR2	TR2		RXD2	I(A)	SCRA
19	BR-Y					RR2	RR2		XCLK2	I(B)	SCRB
45	Y-S					E2			RTS2	SG	DCD
20	S-Y					M2			SCR2		SG
46	V-BL	6, 12	1			TR1	TR1		RXD1	R(B)	RxDB
21	BL-V					RR1	RR1		XCLK1	R(A)	RxDA
47	V-O					E1			RTS1	S(A)	SCTA
22	O-V					M1			SCR1	S(B)	SCTB
48	V-G		2			TR2	TR2		RXD2	I(A)	SCRA
23	G-V					RR2	RR2		XCLK2	I(B)	SCRB
49	V-BR					E2			RTS2	SG	DCD
24	BR-V					M2			SCR2		SG
50	V-S	-15 V, 30 mA max									
25	S-V	-15 V, 30 mA max									

Notes

1. BK = Black, BL = Blue, BR = Brown, G = Green, O = Orange, R = Red, S = Slate, V = Violet, W = White, Y = Yellow

Table D2-4: Pin and Signal Assignments for Connector J2 (Universal [48 V] Card)

Pin	Pair Colour[1]	Module Position	Circuit Number	Module Type							
				Trib T1	LGS LGE MRD 2WTO	E&M	4WTO OCU 2 OCU 3	DNIC	RS-232 DCM	X.21 DCM	V.35 DCM
26	W-BL	1	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
1	BL-W			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
27	W-O		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
2	O-W			RxRing	R2	R2	R2		TXD2	C(B)	CTS
28	W-G	2	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
3	G-W			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
29	W-BR		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
4	BR-W			RxRing	R2	R2	R2		TXD2	C(B)	CTS
30	W-S	3	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
5	S-W			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
31	R-BL		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
6	BL-R			RxRing	R2	R2	R2		TXD2	C(B)	CTS
32	R-O	4	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
7	O-R			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
33	R-G		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
8	G-R			RxRing	R2	R2	R2		TXD2	C(B)	CTS
34	R-BR	5	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
9	BR-R			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
35	R-S		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
10	S-R			RxRing	R2	R2	R2		TXD2	C(B)	CTS
36	BK-BL	6	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
11	BL-BK			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
37	BK-O		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
12	O-BK			RxRing	R2	R2	R2		TXD2	C(B)	CTS
38	BK-G	7	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
13	G-BK			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
39	BK-BR		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
14	BR-BK			RxRing	R2	R2	R2		TXD2	C(B)	CTS
40	BK-S	8	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
15	S-BK			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
41	Y-BL		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
16	BL-Y			RxRing	R2	R2	R2		TXD2	C(B)	CTS
42	Y-O	9	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
17	O-Y			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
43	Y-G		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
18	G-Y			RxRing	R2	R2	R2		TXD2	C(B)	CTS
44	Y-BR	10	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
19	BR-Y			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
45	Y-S		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
20	S-Y			RxRing	R2	R2	R2		TXD2	C(B)	CTS
46	V-BL	11	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
21	BL-V			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
47	V-O		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
22	O-V			RxRing	R2	R2	R2		TXD2	C(B)	CTS
48	V-G	12	1	TxTip	T1	T1	T1	Line+	CTS1	T(B)	TxDB
23	G-V			TxRing	R1	R1	R1	Line-	TXD1	T(A)	TxDA
49	V-BR		2	RxTip	T2	T2	T2		CTS2	C(A)	RTS
24	BR-V			RxRing	R2	R2	R2		TXD2	C(B)	CTS
50	V-S	-15 V, 30 mA max									
25	S-V	-15 V, 30 mA max									

Notes

1. BK = Black, BL = Blue, BR = Brown, G = Green, O = Orange, R = Red, S = Slate, V = Violet, W = White, Y = Yellow

D3. Network Connections

This chapter describes how to connect the *3624 MainStreet* unit to the network through the T1 and T1 HDSL (IHTU) link.

D3.1 Connecting to the T1 Line

The T1 line connects to the system through the J4 connector (RJ48C) on the Control card. Figures D3-1 and D3-2 show the connector pin and signal assignments for the T1 and the T1 HDSL (IHTU) lines.

Figure D3-1: Pin and Signal Assignments for Connector J4 (T1 [LIM or CSU])

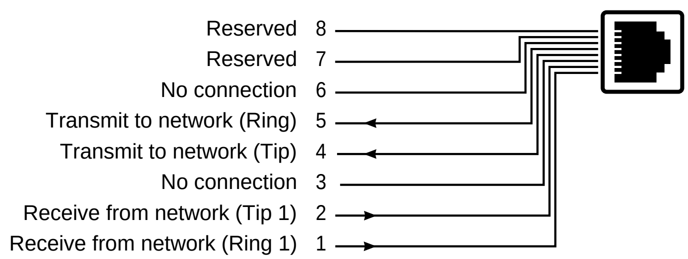
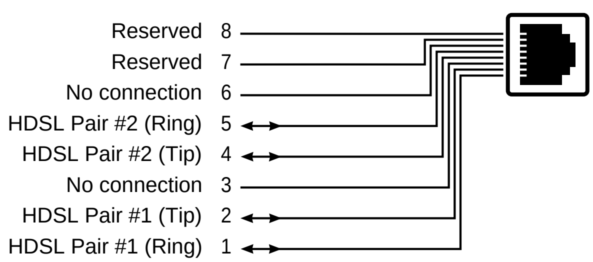


Figure D3-2: Pin and Signal Assignments for Connector J4 (T1 HDSL [IHTU])



To connect to the T1 line

Tools required:

❑ 8-wire telephone flat cable with RJ45C connectors on each end. Refer to *Ordering Information*.

1. Connect an RJ45C cable to the T1 or T1 HDSL (IHTU) line.
2. Connect the other end of the RJ45C cable to connector J4 on the Control card.

D4. Node Management Connections

Node management refers to the configuration, operation and maintenance of the *3624 MainStreet* node. The node can be managed through an NMTI program (software that resides in memory on the node), with *46XX MainStreet* series network management software, or with an SNMP manager (partial support only).

This chapter describes how to connect the node management devices to the *3624 MainStreet* unit.

See *Configuration*, chapter B2, for information on configuring the port for the connected node management device.

D4.1 Connection Requirements

The type of node management equipment required depends on the type of node management session you are running.

NMTI session

To run an NMTI session, the node must be connected to one of the following:

- ❑ a VT100 or compatible terminal (local connection)
- ❑ a PC with VT100 terminal emulation software (local connection)
- ❑ a terminal server or external router connected to a LAN (for NMTI over Telnet)
- ❑ a PC or remote workstation (remote connection via modem)
- ❑ a *46XX MainStreet* network manager (local or remote connection – for NMTI over CPSS)

If connected to a terminal server or router, the NMTI session can be accessed through a Telnet session from a network manager that supports Telnet. A Telnet session allows the host computer to interact with the *3624 MainStreet* unit as though the host was directly connected to the node. See *Configuration*, chapter A1, for information on running a Telnet session.

To support NMTI over Telnet, the node must also be configured with an IP address. See *Configuration*, chapter A2, for information on setting the IP address.

46XX MainStreet session

To run a *46XX MainStreet* session, the node should be connected to a PC or a Sun WorkStation running the network management software. Consult the appropriate *46XX MainStreet* series documentation for instructions on installing the network management equipment.

SNMP management session

To run an SNMP session, the node must be connected to the LAN through a terminal server or external router. For more information on SNMP, see *Configuration*, chapter A3. For detailed information, refer to the appropriate SNMP management documentation.

D4.2 Serial Port Connectors

The node management equipment can be connected:

- directly to the terminal connector (J6)
- indirectly to the modem connector (J5) (via a modem or null-modem)

A cable with RJ45 connectors on both ends is required to make the connection and to provide the correct interface between the device and the serial port connectors. If your equipment does not have an RJ45 connector, you must use an appropriate adapter. Adapters and cables are listed in *Ordering Information*.

Serial port default settings

The settings must be changed to accommodate the device used. The serial ports on the node are preset to:

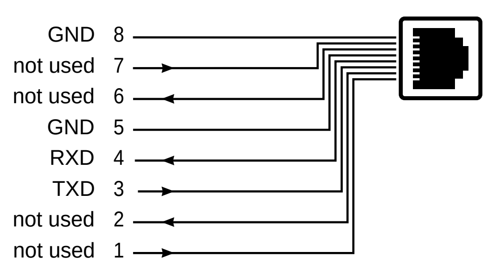
- 9600 b/s
- 8 data bits
- 1 stop bit
- no parity
- no local echo
- full duplex

Terminal connector (J6)

The terminal connector (J6) is configured as DCE. The NMTI refers to this connector as Serial Port 1.

Figure D4-1 shows the pin and signal assignment. The arrows indicate signal direction.

Figure D4-1: Pin and Signal Assignments for Terminal Connector

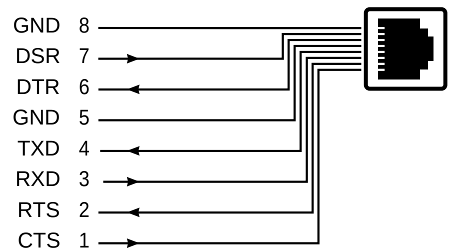


Modem connector (J5)

The modem connector (J5) is configured as DTE. The NMTI refers to this connector as Serial Port 2.

Figure D4-2 shows the pin and signal assignment. The arrows indicate signal direction.

Figure D4-2: Pin and Signal Assignments for Modem Connector



D4.3 Connecting to the Node Management Devices

1. Connect one end of the RJ45 cable to connector J6 or J5.
2. Connect the other end of the cable to the node management device.
3. Plug the node management device into an ac outlet and set the power switch to the On position.
4. Set the power switch on the *3624 MainStreet* unit to the On position.

D5. External Alarm Connections

The external alarm connector allows connection to other devices:

❏ to monitor an external circuit or piece of equipment that is part of your network (for example, an uninterruptible power source) by detecting the opening or closing of the Alarm In contacts

❏ to activate an external alarm device, such as a light or buzzer, via the Event Status or the System Status relay

The external alarm connector can also be connected to the alarm connector on the power supply selector card, to monitor the status of the power supplies.

This chapter describes how to connect to external alarm devices.

D5.1 Pin and Signal Assignments

The pin and signal assignments for the external alarm connector and the selector card alarm connector are described below.

External alarm connector

The external alarm connector (J7) is an RJ11 connector with the pin and signal assignment shown in Figure D5-1.

Figure D5-1: Pin and Signal Assignments for Alarm Connector

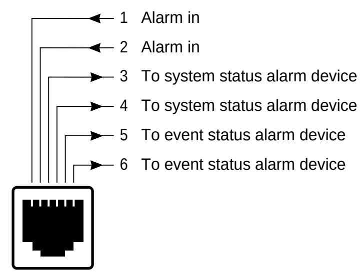
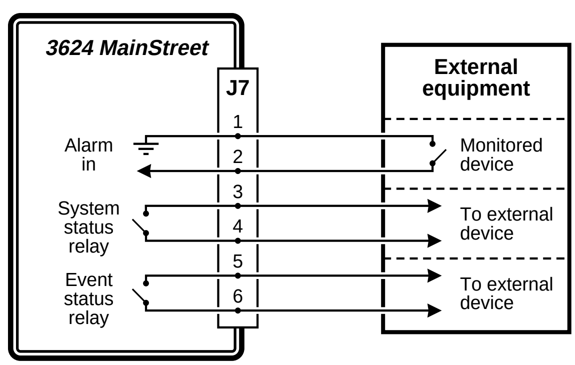


Figure D5-2 shows the alarm circuit.

Figure D5-2: External Alarm Circuit



The state of the Alarm In pins must be configured through the NMTI session to detect normally open or normally closed contacts. The opening or closing of the Alarm In pins causes the alarm "External Alarm Raised" to appear in an alarm queue.

The Event Status and System Status relays trigger the external alarm devices. When there are unacknowledged alarms in the major alarm queue, the Event Status LED illuminates and the Event Status relay closes. When a system problem occurs, the System Status LED illuminates and the System Status relay closes. For more information, see *Maintenance*, chapter A1.

Table D5-1 lists the Event Status and System Status relay contact ratings.

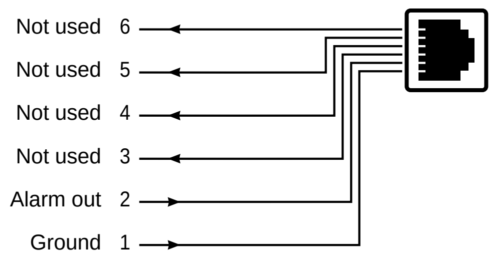
Table D5-1: Contact Ratings for External Alarm Connector

Rating	Resistive Load
Maximum Operating Voltage	60 V ac, 60 V dc
Maximum Operating Current	0.4 A

Selector card alarm connector

The selector card alarm connector is an RJ11 connector with the pin and signal assignment shown in Figure D5-3.

Figure D5-3: Pin and Signal Assignments for Selector Card Connector



An alarm is raised when a supply is out of a specified voltage range for a short period of time, or when the alarm cable from the selector card to the Control card is disconnected. This causes the selector card to switch supplies, or to draw power from both supplies, if both are out of specification.

D5.2 Connecting to External Alarm Devices

Tools required:

- ❑ one RJ11-to-spade lug cable, or
- ❑ one RJ11-to-RJ11 cable and a distribution box
- ❑ cable tie

To monitor external alarm devices

1. Attach one end of an RJ11 cable to the Alarm connector on the Control card.
2. Attach the other end of the cable.
   a. For an RJ11-to-spade lug cable, connect pin 1 (ground) and pin 2 to your device's monitoring terminals.
   b. For an RJ11-to-RJ11 cable with a distribution box, connect the RJ11 connector to the box, then connect the proper box terminals to your device's monitoring terminals.
3. Fasten the cable to the *3624 MainStreet* unit with a cable tie.

   For wall-mount units, fasten the cable to the cable tie mount. For rack-mount drawers, create a service loop to allow the drawer full movement and fasten it to the cable support bracket using cable ties.

To activate external alarm devices

1. Attach one end of an RJ11 cable to the Alarm connector on the Control card.
2. Attach the other end of the cable.
   a. For an RJ11-to-spade lug cable, connect pins 3 and 4, or pins 5 and 6, to your device's monitoring terminals.
   b. For an RJ11-to-RJ11 cable with a distribution box, connect the RJ11 connector to the box, then connect the proper box terminals to your device's monitoring terminals.
3. Fasten the cable to the *3624 MainStreet* unit with a cable tie.

   For wall-mount units, fasten the cable to the cable tie mount. For rack-mount drawers, create a service loop to allow the drawer full movement and fasten it to the cable support bracket using cable ties.

D5.3 Connecting to the Power Supply Selector Card

Tools required:

❑ one RJ11-to-RJ11 cable (supplied)

Note

The power supply selector card is connected to the Alarm connector on the Control card when the unit is shipped; therefore, this procedure should not be necessary. The information is provided here for reference purposes.

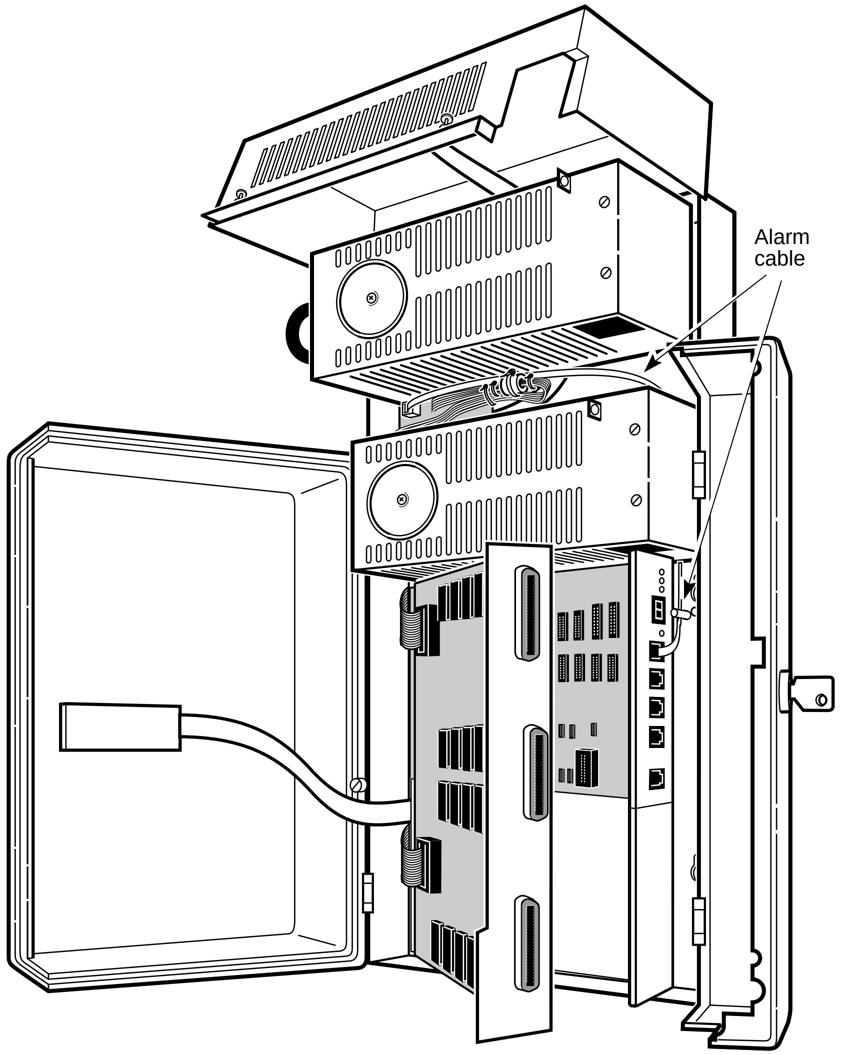
The cable cannot be used for connections between the Alarm connector and any other device.

To make connections

1. Attach one end of the RJ11 cable to the Alarm connector on the Control card.
2. Attach the other end of the cable to the alarm connector on the power supply selector card.

See Figure D5-4 for the location of the alarm connectors.

Figure D5-4: Alarm Connections for Power Supply Selector Card



D6. Powering Up

Once all connections are made, the *3624 MainStreet* unit can be powered up.

Warning

Do not power up until all external circuit connections have been made. See *Installation*, chapter D2 for information on connecting external voice and data circuits.

D6.1 Powering Up the Wall-mount Unit

1. Verify that all cables are secure.
2. Turn the power switch (for ac units) or circuit breaker (for dc units) to the On position. For redundant ac units, turn both power switches on.

   The unit runs through its diagnostic procedure, as described in *Installation*, section D1.6. If LEDs do not light up as described, or if diagnostics last more than one minute, consult *Maintenance*, chapter A1.
3. Close all covers and doors, and lock the unit.

D6.2 Powering Up the Rack-mount Unit

1. Verify that all cables are secure.
2. For ac units: turn the power switch to the On position.
3. For dc units: loosen the top and bottom captive screws on the drawer faceplate and pull out the drawer until the slides lock into position.

   Put the circuit breaker in the On position. The circuit breaker is located on the under side of the power section(s).

The unit runs through its diagnostic procedure, as described in section D1.6. If LEDs do not light up as described, or if diagnostics last more than one minute, consult *Maintenance*, chapter A1.

For dc units, close the drawer by depressing the tabs of the top and bottom drawer members while pushing the drawer all the way into the shelf.

If an error code appears during the power-up procedure (as outlined in *Installation*, Table D1-2), see *Maintenance*, chapter A2 for information on displaying the major alarm queue.

Once the unit is powered up, you must configure the system through the NMTI session. See *Configuration* for information.

A1. NMTI

The NMTI is a menu-driven software program used to configure, operate, monitor and maintain the *3624 MainStreet* node. The program is accessed through a VT100 or compatible terminal, a PC with terminal emulation software, a *46XX MainStreet* network manager over CPSS, or a Telnet session with a network manager.

The node can also be managed with *46XX MainStreet* series network management software. For information, refer to the appropriate network management documentation.

This chapter provides an overview of the NMTI.

A1.1 Logging in to the NMTI

The following steps describe the initial login procedure once the node management device has been connected as described in *Installation*, chapter D4.

Steps 1 through 6 are necessary only if this is the first login, or if the terminal is used infrequently. In a regularly used system, the login procedure starts at step 7.

Note

The NMTI uses a lockout feature that limits access to one user at a time.

To log in

1. Check that the power cables for both the *3624 MainStreet* unit and the node management terminal are plugged into a power source.

2. Check that the cable connecting the terminal to the *3624 MainStreet* unit is properly installed.

3. Set the power switch on the *3624 MainStreet* unit to the On (|) position.

   The unit performs diagnostic self-tests, as described in *Installation*, section D1.6. If these tests last more than one minute, see *Maintenance*, chapter A1.

4. Set the power switch on the node management terminal to the On position.

5. Check that the terminal is set up for:

   ❑ 8 data bits
   ❑ 1 stop bit
   ❑ no parity
   ❑ no local echo
   ❑ 9600 b / s

6. Wait until the seven-segment display on the Control card stops flashing a "D".

7. Press the <↵> (<Return> or <Enter>) key on the keyboard at approximately one-second intervals until a startup message similar to the one below appears.

   NEWBRIDGE 3624 MainStreet, Generic 620C-ab-cd
   Copyright 1988 to 1996 Newbridge Networks Corporation
   All rights reserved.

   If the message does not appear, check the connections and setup of the node management terminal.

8. At the "Enter level" prompt, type your access level number and press the <↵> key. See *Configuration*, chapter B3 for information on access levels.

   If this is the initial session, type <5> and press <↵>. Level 5 users have read and write access to all areas of the NMTI.

   If you do not enter an access level within approximately five minutes, the screen displays the message "Session idle timeout. Connection closed", and the session times out.

9. Enter your password at the password prompt and press <↵>.

   If this is the initial session, type <mainstreet>. This is the default password for all levels. The password is not case sensitive and is not displayed on the screen.

   If the password is entered incorrectly, the system responds with "Incorrect Password". Press <↵> to begin again at step 7.

   If you do not enter a password within approximately five minutes, the screen displays the message "Session idle timeout. Connection closed", and the session times out.

The system displays the NMTI top-level menu as shown in Figure A1-1.

Figure A1-1: NMTI Top-Level Menu

```
3624 MainStreet    620C-ab-cd                    Alarms:2      No Date    0:06R













  1-CONFIG         2-HOUSE          3-MAINT          4-STATS            5-ALARMS
  6-               7-               8-               9-QUIT             0-
```

To log in through Telnet

If the node has been configured as an entity in a TCP / IP local area network, a remote NMTI session can be opened by a network manager through a Telnet connection. The node must be:

- ❑ connected to the LAN through a terminal server or external router (see *Installation*, chapter D4)
- ❑ assigned a unique IP address (see *Configuration*, chapter A2)
- ❑ configured for PPP / IP traffic through the serial port (see *Configuration*, chapter B2)

When the Telnet connection has been established, the NMTI session screen is displayed and you are prompted for the level and password as described in steps 8 and 9, above.

Only one NMTI session can be active at a time. If a user attempts to log in to the NMTI through a Telnet connection when another session over Telnet is already active, a message is displayed informing them that another session is active, and the Telnet connection is dropped.

If a Telnet session is established and more than five minutes elapses before logging in to the NMTI, the Telnet connection is dropped.

If the Telnet connection fails, the NMTI session is terminated.

A1.2 NMTI Screen Display

A sample NMTI screen is shown in Figure A1-2.

Figure A1-2: NMTI Screen Display

```
3624 MainStreet     Generic Number       Node Name       Alarms     Date     Time

 Position #  Configured   Installed      Status    Name    Options
    M01       LGS          LGS            OK                0156-06










  CONFIG POSITION  1  NAME “..”

  Enter position name, maximum of 8 characters

  1-CONFIG           2-HOUSE            3-MAINT            4-STATS             5-ALARMS
  6-                 7-                 8-                 9-QUIT              0-
```

Note

The actual menu displays may differ slightly from those illustrated in this manual.

Header line

The header line is at the top of the screen. It displays:

- ❑ product name
- ❑ software generic and revision number
- ❑ node name
- ❑ number of alarms in the major alarm queue
- ❑ date and time

To assign the node name and set the date and time, see *Configuration*, chapter B1.

Data area

The data area occupies the 18 lines below the header line. It displays information associated with the current menu, for example, configuration information or statistical reports.

Command line

The command line is located directly below the data area. It displays user input – either the selected softkey or keyboard entries.

Diagnostics line

The diagnostics line is under the command line. It displays information relevant to the user input, such as:

- ❑ prompts
- ❑ warnings
- ❑ error messages
- ❑ valid ranges for numeric parameters

Softkey area

The softkey area is at the bottom of the screen. Softkeys represent the functions available for the particular menu. Functions are selected by pressing the associated function key (F1 to F10) or the number key (1-9 and 0).

A1.3 NMTI Main Menus

The top-level menu displays the main menu titles in the softkey section of the screen. To access a menu, enter the relevant softkey (either a function key or number key).

Configuration

Configuration functions include:

❏ programming the T1 aggregate link
❏ configuring the circuits on the T1 link
❏ defining the circuit cross-connections
❏ configuring the Tributary T1, voice and data modules
❏ specifying the system timing source and recovery mechanism

Housekeeping

Housekeeping functions include:

❏ setting the date and time
❏ specifying the node name
❏ configuring the serial ports
❏ assigning NMTI access levels and passwords
❏ configuring the node for SNMP management support

Maintenance

Maintenance functions include:

❏ performing system diagnostics
❏ monitoring circuit status
❏ performing loopbacks
❏ testing circuits
❏ backing up and restoring the system database
❏ upgrading the system software
❏ checking the status of the system NVM

Statistics

Statistical functions include:

❏ viewing ESF quality statistics
❏ viewing ANSI T1.403 statistics

Alarms

The NMTI continuously monitors the system for abnormal conditions and significant events, and displays alarms when they are generated. Alarm functions include:

- viewing and editing alarms
- logging alarms
- classifying alarms by priority
- configuring external alarm devices

The menu functions are described in detail in the following chapters.

A1.4 General Menu Functions

Certain functions are common to most of the system menus. These are described below.

- CANCEL (F8 or 8)

The Cancel function undoes the last command or instruction entered.

- QUIT (F9 or 9)

If you select Quit from the main menu, you are logged off the node. If you select Quit from any other menu, you are returned to the main menu.

- PROCEED (F10 or 0)

The Proceed function executes a command or instruction. The system always prompts you to proceed when required.

- <Esc>

If the system is waiting for user input and you want to enter a softkey function, press <Esc> and then the softkey. For example, to cancel or quit a function while the system is waiting for user input, enter <Esc> <8> or <Esc> <9>. If you enter only <8> or <9>, the system assumes that it is part of the user input, and will add the number to the command line.

- SHOW functions

Functions such as SHOW_ALL and SHOW_TABLE are referred to as display functions. They are used to display information while you are entering a command, without interrupting the procedure.

Erasing the buffer

Up to 100 characters can be stored in the keyboard buffer, allowing you to type in commands or other key sequences before being prompted for them. To clear the buffer, hold down the <Ctrl> key and type <X>. All unexecuted commands are cancelled when the buffer is cleared.

Refreshing the display

To refresh the terminal screen, press <Esc> <R>. Refreshing the screen is useful when:

- ❑ a database verification is in progress
- ❑ you are monitoring system alarms and want to update the information displayed
- ❑ you are examining the signalling leads
- ❑ a transmission error or some other event corrupts the displayed information

A1.5 Logging out of the NMTI

You can log out manually, or, to prevent unauthorized use of an unattended terminal, you can program the length of time after which the NMTI automatically quits if there has been no activity.

If the Telnet connection is dropped, the NMTI session is terminated automatically.

To log out manually

To log out from the main menu, select Quit (F9 or 9). To log out from any other menu, select Quit to return to the main menu, then select Quit again to log out.

To log out automatically

1. From the HOUSE menu, select:

   MORE — SESSN_TIME

2. Select an automatic logout time period.

   Automatic logouts can be set to 5, 10, 15 or 30 minutes, or None. If None is selected, the session remains connected until you log out manually. The default is 30 minutes.

A1.6 Restarting the *3624 MainStreet* Node

During the commissioning of a *3624 MainStreet* node, it may be necessary to restart the node. This does not affect configuration or maintenance records; however, all active calls are dropped.

To restart the *3624 MainStreet* node, log out of the NMTI and either push the reset button or turn the power switch off and then on. Log back into the NMTI.

A2. TCP/IP Networks

If the *3624 MainStreet* node is configured as a node in a TCP / IP local area network, it can support the following:

- management by an SNMP manager (see *Configuration*, chapter A3)
- NMTI sessions over Telnet (see *Installation*, chapter D4 and *Configuration*, section A1.1)
- software downloading using FTP (see *Maintenance*, chapter C1)

The node must be connected to the LAN through a terminal server or external router, as described in *Installation*, chapter D4, and the serial port must be configured for PPP / IP traffic, as described in *Configuration*, chapter B2.

The node must also be assigned a unique IP address for it to be recognized as an entity in the network. This chapter describes how to assign the address.

A2.1 Assigning an IP Address

Each node in an IP network must be assigned a unique IP address. The address can be assigned in the NMTI House menu, as shown below, or derived from the terminal server that the node is connected to.

Note

The IP address should be assigned before the serial port is configured for PPP/IP traffic. If you attempt to assign or change the IP address when the port is configured for PPP/IP, the new address will not take effect until you restart the system, or configure the port away from PPP/IP, then configure it back.

To assign an IP address

1. From the HOUSE menu, select:

   MORE — IP_ADDRESS

2. Enter the IP address in the form <*???.???.???.???*>.

The address menu is shown in Figure A2-1, below.

Figure A2-1: IP Address Display

```
3624 MainStreet   620C-R0-00                       Alarms:2      No Date    0:00R


      Port  Baud Rate    Port Type    Flow Control   CPSS Cost   Link State

       1       9600       VT100         NONE          N/A           N/A
       2       9600       PPP/IP        NONE          N/A           UP

 Current Port         : Serial port one
 Session Time         : 30 minutes
 IP Address           : 138.120.100.111 (programmed),  138.120.121.102 (active)
 Domain Number (CPSS) : 1
 Node Number   (CPSS) : Unassigned
 Large Packets        : Disabled
 NOC  Number          : Unassigned
 Shared CPSS Cost     : Normal
 Level Zero Access    : No


 HOUSE IP_ADDRESS "???.???.???.???"
 Enter the node IP address e.g. 192.1.2.3

  1-               2-               3-               4-               5-
  6-               7-               8-CANCEL         9-QUIT           0-
```

When a serial port is configured for PPP/IP, the node attempts to bring up a PPP connection between itself and the terminal server. The node requests the terminal server to provide an IP address, and specifies the address that has been assigned to it, if any. If the terminal server accepts the address, it uses it.

If the terminal server does not accept the address, or the address is unassigned (0.0.0.0), it provides an IP address if one is configured for it. The NMTI screen then displays both addresses as shown in the above menu – the programmed address is the one configured through NMTI, and the active address is the one provided by the terminal server and currently used.

If the terminal server does not accept the node IP address and does not have an address assigned to it, the PPP connection remains down.

A3. SNMP Management Support

SNMP is a standard protocol for the management of entities in a TCP / IP local area network. When the *3624 MainStreet* node is configured to support SNMP, it can be controlled and monitored over an IP network through an SNMP manager. The *45020 MainStreet* Node Manager is an SNMP manager that provides partial control and monitoring of the node. For information on the *45020 MainStreet* Node Manager, refer to the node manager documentation.

As an SNMP-managed node, the *3624 MainStreet* node can:

- send trap messages to the SNMP manager
- process get and set messages from the manager

The node must be connected to the LAN through a terminal server or external router, as described in *Installation*, chapter D4, and the serial port must be configured for PPP / IP traffic, as described in *Configuration*, chapter B2.

This chapter describes:

- assigning access privileges to node managers
- assigning where trap messages will be sent

A3.1 MIBs

An SNMP manager is the application that controls or monitors remote nodes by sending SNMP requests to the nodes. An SNMP agent is the process at the node that receives the requests and executes them at the node.

The SNMP agent controls access to the MIB. The MIB is a database of objects and attributes pertinent to the management of the network. The information is presented hierarchically, in logical groups, in accordance with the Internet standard Structure of Management Information for TCP / IP-based Internets (RFC 1155).

The overall MIB is made up of various subset MIBs. The subsets of the MIB that are applicable to the *3624 MainStreet* node are the standard management MIB (MIB-II) and the private enterprise MIB. MIB-II is described here. The private enterprise MIB is a Newbridge-specific MIB that provides alarm information. See *Maintenance*, section A2.6 for information on the alarm MIB.

MIB objects

The SNMP agent provides access to the applicable groups within MIB-II – System, Interfaces, IP, ICMP, TCP, UDP and SNMP. The groups contain objects such as network addresses, interface types, error counts, product name, node name and generic number. Each object is uniquely identified. Some of these are described in detail below.

sysDescr

The object provides the same information that is displayed in the header on the NMTI screen in the form:

Newbridge *ProductName* MainStreet   Generic *GenericNumber*

where
ProductName is the product name, for example 3624
GenericNumber is the software generic, for example 620C-H0-01

sysName

The object provides the same information as the NMTI node name. If the node name is assigned through NMTI, the name is copied to the *sysName* object. If the *sysName* object is updated via SNMP, the name is truncated to 12 characters and stored as the NMTI node name.

ifDescr

The object provides the following information:

Newbridge *Product* MainStreet M<slot><circuit> *CircuitType* Module ID $*NN*

where
Product is the product name, for example 3624
CircuitType is the circuit type, for example X21_DCM
NN is the module ID

For all T1 interfaces, only the slot position is returned.

ifAdminStatus

The object can be set as:

- up – unbusy the interface if it is busied out, or remove the loopback if present
- down – busy out the interface if it is not busied out
- testing – set up a loopback C where possible. For T1, set a line loopback.

If a loopback is initiated and the operational status changes from testing to down, and then to up, the loopback will not be attempted again on the transition from down to up.

ifOperStatus

The object provides the following information:

- up – the interface is in the Ready and Connected state. For T1, the interface has a cleared Red alarm.
- down – the interface is in the OutOfService, SigFault, NotAvailable, BusyOut or Failed state. For T1, the interface is in Red alarm.
- testing – the interface is not down and is set to UnderMaint. For T1, a line or equipment loopback is active on the line.
- dormant – the interface is in the Ready state
- unknown – an interface is configured but no hardware is present

A3.2 Controlling SNMP Access

To control which managers have access to the nodes, the managers and agents are paired in communities. A community is a text string that identifies an SNMP manager to an SNMP agent.

Community names are assigned through the NMTI. When an SNMP manager wants to access a node, it must enter the community name that has been assigned for it. Up to 10 communities can be assigned.

The SNMP access display is shown in Figure A3-1, below.

Figure A3-1: SNMP Access Display

```
3624 MainStreet   620C-R0-00                    Alarms:2    No Date    4:49R



 #  Community Name     Restricted Mgr IP Address     Privilege
--  ----------------   -------------------------     ---------
1   public             Unassigned                    READ
2   Newbridge          138.120.142.111               READ_WRITE
3   Newbridge          138.120.173.122               READ_WRITE
4   ---                ---                           ---
5   ---                ---                           ---
6   ---                ---                           ---
7   ---                ---                           ---
8   ---                ---                           ---
9   ---                ---                           ---
10  ---                ---                           ---



 HOUSE SNMP ACCESS


  1-ADD/EDIT       2-DELETE         3-DELETE_ALL      4-              5-
  6-               7-               8-CANCEL          9-QUIT          0-
```

To add a community name

1. From the HOUSE menu, select:

   MORE — SNMP — ACCESS — ADD / EDIT

2. Enter a number from 1 to 10 – this specifies where the community name will appear in the list.

3. Select COMMUNITY and enter a name. The community name can be 1 to 16 alphanumeric characters in length, and is case sensitive.

When a manager attempts to access the node, it must enter the community name exactly as it appears in this list.

To restrict IP addresses

The default IP address restriction is unassigned, which means that any manager entering the community name can have access. Alternatively, you can restrict access to a single manager by specifying the IP address for that manager.

1. From the HOUSE menu, select:

   MORE — SNMP — ACCESS — ADD / EDIT

2. Enter the number (from 1 to 10) that corresponds to the community name whose access you want to restrict.

   You must assign a community name before entering the address.

3. Select IP_ADDRESS and enter the manager's address in the form <*???.???.???.???*>.

If a manager attempts to access the node with that community name, the node checks the list for the name and the manager's address. If the address is not in the list and the community name does not have unassigned addresses, access is denied.

A community name can be used for several IP addresses – the maximum is 10. To assign more than one address to a community name, enter a new list item, using the same community name and a different address. Communities can not have the same name and IP address.

To change a restricted IP address back to unassigned, enter all zeros (in the format 0.0.0.0) when prompted for the address.

To assign access privileges

Each community in the list should be assigned read only or read / write access privileges. The default is none.

1. From the HOUSE menu, select:

   MORE — SNMP — ACCESS — ADD / EDIT

2. Enter the number (from 1 to 10) that corresponds to the community whose access privileges you want to restrict.

3. Select PRIVILEGE, then select NONE, READ or READ_WRITE.

A3.3 Trap Messages

An SNMP trap message is an alarm or status message that is generated by the SNMP agent for the node, and sent to the SNMP manager. For example, trap messages are sent when the link goes up or down.

The node can control which SNMP managers receive trap messages. Up to 10 managers can be assigned.

The SNMP trap destination display is shown in Figure A3-2, below.

Figure A3-2: Trap Destination Display

```
3624 MainStreet   620C-R0-00                       Alarms:2     No Date    1:43R



 #  Community Name     Destination IP Address     Trap Generation
--  ----------------   ----------------------     ---------------
1   Newbridge          138.120.142.111            ENABLED
2   public             Unassigned                 DISABLED
3   ---                ---                        ---
4   ---                ---                        ---
5   ---                ---                        ---
6   ---                ---                        ---
7   ---                ---                        ---
8   ---                ---                        ---
9   ---                ---                        ---
10  ---                ---                        ---



 HOUSE SNMP TRAPS


  1-ADD/EDIT        2-DELETE          3-DELETE_ALL       4-              5-
  6-                7-                8-CANCEL           9-QUIT          0-
```

To assign managers to receive traps

1. From the HOUSE menu, select:

   MORE — SNMP — TRAPS — ADD / EDIT

2. Enter a number from 1 to 10 – this specifies where the community name will appear in the list.

3. Enter the community name and IP address where you want trap messages to be sent. See section A3.2 for information on assigning the name and address.

4. For each community, specify whether trap generation is enabled or disabled. The default is disabled, meaning that no trap messages will be sent to the manager.

If trap generation is enabled, the SNMP trap messages are sent to the manager when they occur. As well, any alarm that has been configured as a major alarm is sent to the manager, whether or not it is an SNMP-specific alarm. See *Maintenance*, section A2.2 for information on major alarms, and section A2.6 for more information on SNMP traps.

A4. CPSS Management Support

This chapter describes how to configure a *3624 MainStreet* node for communication with a *46XX MainStreet* series network manager using CPSS protocol. This includes:

- ❑ assigning a node number
- ❑ assigning an NOC phone number
- ❑ assigning a node domain identifier
- ❑ enabling or disabling large packets
- ❑ configuring the communication path
- ❑ configuring the CPSS cost

These parameters must be set through the NMTI session. Once the node is set up for CPSS communications, a *46XX MainStreet* series network manager can perform all remaining configuration and maintenance. For more information about network management, consult the network manager documentation.

A4.1 CPSS Protocol

The CPSS protocol is a Newbridge proprietary communication protocol – a packet-switched system similar to X.25. *MainStreet* products use CPSS to exchange information with each other.

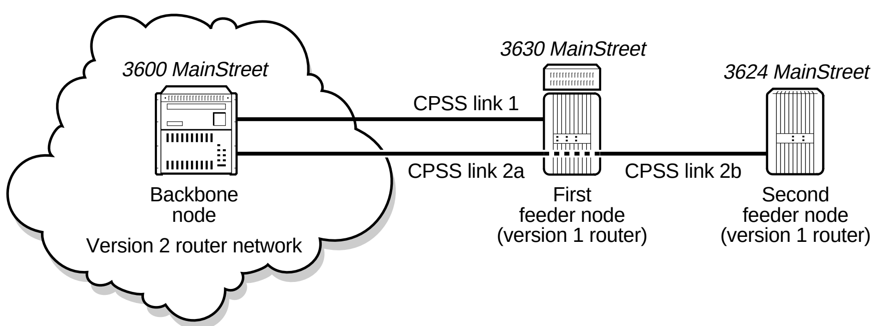
CPSS messages carry:

- status information, enabling nodes to construct routing tables
- control information, allowing *46XX MainStreet* series network managers to send commands to nodes
- alarm and maintenance information, allowing the *46XX MainStreet* series network managers to gather diagnostic information

For backbone nodes such as the *3600* and *3645 MainStreet*, CPSS provides a choice of two routers, referred to as version 1 and version 2 CPSS. Feeder nodes such as the *3624 MainStreet* node use version 1 CPSS.

A version 2 CPSS network can communicate via CPSS with version 1 CPSS feeder nodes that are one hop away. If you want that feeder node to connect CPSS messages to a second version 1 CPSS node, you must configure two CPSS links between the router 2 network and the feeder node (see Figure A4-1). One CPSS link is for the feeder node (CPSS link 1) and the other is for the second node (CPSS link 2a). You must then configure another CPSS link (CPSS link 2b) to connect the feeder node and the second node, and circuit switch CPSS through.

Figure A4-1: Feeder Node Relaying CPSS Communications



If your network is using version 1 CPSS, configure the following parameters:

- node number
- NOC number
- domain identifier

If your network is using version 2 CPSS, configure the above parameters and set large packets to enabled.

Warning

Do not change any of these parameters while the node is involved in a *4602 MainStreet*-controlled network upgrade from version 1 to version 2 CPSS. This will cause the upgrade process to fail.

A4.2 Node Number

The node number is the CPSS address used by other Newbridge products when they are communicating with the node. Each node must have a unique node number. The unit must be assigned a node number before it can be recognized by a *46XX MainStreet* series network manager. In the *46XX MainStreet* series documentation, the node number is referred to as the "CPSS node ID".

To assign a node number

1. From the HOUSE menu, select:

   MORE — CPSSv2 — NODE_NUM

2. Enter the node number. The number can be from 1 to 999, inclusive. The default is none.

For the node number to take effect, you may have to restart the system (see *Configuration*, section A1.6). The NMTI displays a warning message if this is the case. Before you restart the system, back up the configuration database. See *Maintenance*, section C1.1 for information on backing up the database.

A4.3 NOC Number

The NOC is the site where the computer running the *46XX MainStreet* series network manager software is located. The NOC number is the phone number of the modem serving that computer. If the T1 link fails, the *3624 MainStreet* node can establish communications with the NOC through the PSTN.

To assign an NOC number

1. From the HOUSE menu, select:

   MORE — CPSSv2 — NOC_NUM

2. Enter the telephone number of the NOC modem.

When entering the phone number, include any prefix digits or area code information as if you were dialling manually from a phone. The number can include the Hayes AT modem dial modifiers ("," = pause, "W" = wait for dial tone, and so on). For example, to dial a long distance number from a PBX that provides a second dial tone after the digit 9, enter "9W1-613-591-3600".

By default, the *3624 MainStreet* node instructs the modem to dial the NOC number using dial pulsing. For the modem to dial using DTMF, the characters "DT" must precede the NOC number.

A4.4 Domain Number

CPSS nodes can be organized into groups called domains. The domain parameter is used to identify the CPSS domain to which a node belongs. This allows a large CPSS network to be divided into smaller sub-networks. All sub-networks may still be under the control of the same network manager, but each node only knows the topology of its own sub-network. This reduces routing complexity and improves performance and reliability.

Up to 64 domains can be assigned. The default is 1.

To assign a domain number

1. From the HOUSE menu, select:

   MORE — CPSSv2 — DOMAIN_NUM

2. Enter a number between 1 and 64.

Note

The communication of CPSS messages from one domain to another is not currently supported; therefore, all CPSS nodes in a network must belong to the same domain.

A4.5 Large Packets

Large packets allow CPSS communication with other nodes that use the version 2 router. If your network is using version 2 CPSS, you must enable large packets.

To enable large packets

1. From the HOUSE menu, select:

   MORE — CPSSv2 — LG_PKTS

2. Select ENABLED. The NMTI displays the message, "Changing packet size may disrupt CPSS on node. PROCEED to continue."

You may have to restart the node before the change takes effect. See *Configuration*, section A1.6, for information on restarting a node.

Note

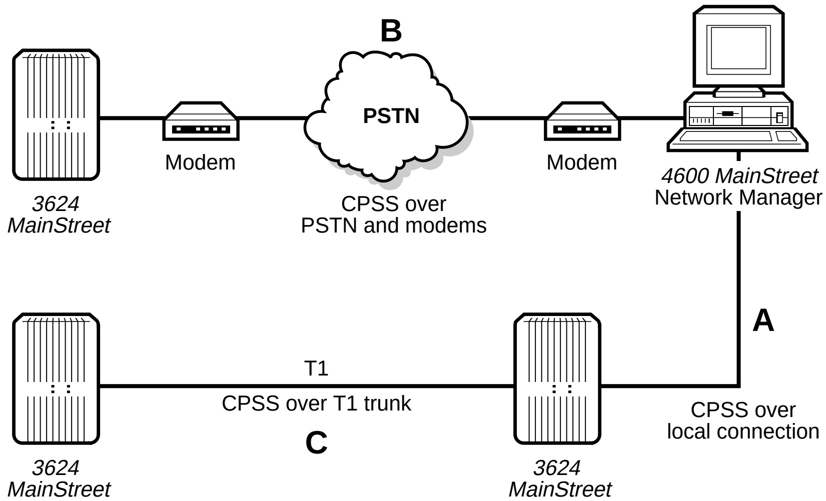
During a remote upgrade to large packets (through the *4602 MainStreet* Network Manager), the Disable and Enabled softkeys may be available temporarily. Do not select either softkey.

A4.6 Setting the Communication Path

A communication path between the *3624 MainStreet* node and a *46XX MainStreet* series network manager can be established in one of three ways, as shown in Figure A4-2:

- ❏ locally, through one of the unit's serial ports (path A)
- ❏ remotely, through modems and the PSTN (path B)
- ❏ remotely, over the T1 link (path C)

Figure A4-2: Network Management Communication Paths



For CPSS circuits set up via a serial port, you can configure CPSS cost. For shared CPSS circuits set up over the T1 link, you can configure shared CPSS cost. CPSS cost and shared cost are described in section A4.7.

To make local and modem connections

Ensure that the baud rate of the serial port matches the baud rate of the computer running the network manager software. For local connections, ensure that the port type is set to CPSS. For connections via modem, ensure that the port type is set to CPSS_MODEM. See *Configuration*, sections B2.1 and B2.2 for information on setting port types and baud rates.

To make remote connections

The connection to the T1 aggregate link provides shared CPSS communication, and can be made through:

- ❑ a T1 circuit
- ❑ the FDL

To connect to the T1 link through a T1 circuit

For the *3624 MainStreet* node to communicate with a *46XX MainStreet* series network manager over the T1 trunk, a DTU module must be installed in the DTU or FDL socket on the Control card. If the module is missing when you configure the FDL connection, the NMTI displays a warning message.

A DTU module in the DTU socket allows communication via a 4 kb/s channel on a T1 link.

1. From the CONFIG menu, select CONNECT.
2. Enter the T1 circuit number in the form T1-*cc*, where *cc* is a number from 1 to 24.
3. Select TO_CIRCUIT.
4. Enter <CPSS>.

Select the DISCONNECT softkey to disable CPSS on the circuit.

To connect to the T1 link through the FDL

A DTU module in the FDL socket allows CPSS communication via a 4 kb/s channel on a T1 link when ESF framing is used. See *Configuration*, section D1.5 for more information on ESF framing.

1. From the CONFIG menu, select POSITION.
2. Enter <T1>.
3. Select OPTIONS — FDL.
4. Select CPSS.

Select the CPSS_OFF softkey to disable CPSS over the FDL.

A4.7 Configuring CPSS Cost

The cost of a CPSS link is a user-configured weighting used by the node during CPSS link selection. The lower the cost, the more likely the link is selected.

CPSS cost can be used to bias CPSS traffic away from a certain link by increasing its cost. For example, a CPSS circuit cross-connected to a satellite link could be assigned a high cost to encourage the use of less expensive or faster connections.

CPSS cost is set at both ends of a link. Version 2 CPSS examines the cost at each end and uses the higher value when determining which link to use for CPSS message transmission. Version 1 CPSS uses the near end value to determine if the link is used. The *3624 MainStreet* node uses version 1 CPSS.

You can configure cost for CPSS links configured on:

❏ shared circuits
❏ serial ports

The cost can be set to:

❏ normal
❏ bias against
❏ bias toward

Table A4-1 lists the numeric values associated with each type of cost. The cost can be changed (for example, from normal to bias against); however, the numeric values cannot be changed.

Table A4-1: Values for CPSS Costs

CPSS Circuit	Normal	Bias Against	Bias Toward
Shared	25	50	1
Serial ports	10	200	1

All displays of CPSS information show cost in terms of normal, bias against and bias toward (except for CPSS maintenance displays which show the exact numeric value).

When the cost of a CPSS link is changed, the change takes effect immediately.

To set the cost on shared CPSS circuits

Shared CPSS circuits share the same DTU module. The module makes DS0 cross-connections.

The shared cost should be set to Normal, as there is only one T1 link available to the node.

1. From the HOUSE menu, select:

   MORE — CPSSv2 — SHARE_COST

2. Select NORMAL.

To set the cost on serial ports

You can configure the CPSS cost assigned to serial port cross-connections when the port type is configured as CPSS or CPSS_MODEM.

1. From the HOUSE menu, select either SER_PORT_1 or SER_PORT_2.

2. Select CPSS_COST, then select NORMAL, BIAS_ANST or BIAS_TOWRD.

Note

The CPSS cost should be set to Bias Against when the port type is configured as CPSS_MODEM.

B1. Node Name and System Clock

This chapter describes how to assign a name to the node and set the system date and time.

The date, time and node name appear in the NMTI screen header.

B1.1 Node Name

The *3624 MainStreet* node can be assigned a unique name that appears in the header. The name can be up to 12 alphanumeric characters in length, with no spaces.

The node name is not saved as part of a configuration database backup, and is not affected when a database is restored; that is, the node name stays as configured when a database is loaded into a node. This helps prevent two or more network nodes from having the same name.

When the unit is used in a network managed by *46XX MainStreet* series software, the node name identifies the node.

To assign a node name

1. From the HOUSE menu, select NODE_NAME.
2. Enter the name for the node. The name can be up to 12 alphanumeric characters in length, with no spaces.

To delete an existing node name, press <↵> when prompted for a name.

B1.2 Date and Time

If the date has not been set, the header line displays "No Date". If the time has not been set, the header line displays the time since the last system reset, in the form hh:mmR. For example, "4:03R" indicates that 4 hours and 3 minutes have elapsed since the last system reset.

To set the date

1. From the HOUSE menu, select DATE.
2. Enter the current date in the format <*dd-MMM-yy*>, including the hyphens. For example, enter February 7, 1996 as <07-FEB-96>.

To set the time

1. From the HOUSE menu, select TIME.
2. Enter the current time in the format <*hh:mm*A> or <*hh:mm*P>, where A indicates AM and P indicates PM. The system time appears in 12-hour format.

Note

The system uses a real-time clock; therefore, the date and time will remain current even if a system reset or power failure occurs.

B2. Serial Ports

The *3624 MainStreet* unit has two serial ports for connecting the node management devices. Each serial port must be configured for the device connected to it.

Serial port 1 (labelled J6 Terminal) is configured as a DCE device. Serial port 2 (labelled J5 Modem) is configured as a DTE device. The data format for both ports is 8 data bits, 1 stop bit and no parity.

The following port parameters can be configured:

- ❑ device type used for NMTI session
- ❑ baud rate
- ❑ flow control (software and hardware)

B2.1 Device Type

Table B2-1 shows the configuration options for the types of devices connected to the ports. The default is VT100 for serial port 1, and CPSS_MODEM for serial port 2.

Table B2-1: Port Configuration Based on Connected Device

Device	Port Configuration
VT100 or compatible terminal	VT100
PC running VT100 terminal emulation software	VT100
Terminal server or external router	PPP/IP
PC or Sun WorkStation running *46XX MainStreet* series network manager software (direct connection)	CPSS
PC or Sun WorkStation connected via modem	CPSS_MODEM
PC or Sun WorkStation connected over extended CPSS network	CPSS_LONG
Printer	PRINTER

Either serial port can be configured to carry IP traffic, but both cannot be configured for PPP/IP at the same time.

To run *46XX MainStreet* series network manager software via a direct connection to the serial port, you must configure the port for the device type and baud rate before connecting the Sun WorkStation. To do this, run an NMTI session and set the port to CPSS, baud rate 9600. You can then connect the computer to the port. See section B2.2 for information on setting the baud rate.

To configure the device type

1. From the HOUSE menu, select SER_PORT_1 or SER_PORT_2.

2. Select PORT_TYPE, then select the option that matches the type of device, as shown in Table B2-1.

If you change the device type for the serial port to which the node management terminal is connected, the display is updated, but the change does not take effect until you log out.

B2.2 Baud Rate

The baud rate is set to match the rate of the connected device. The default baud rate is 9600 b/s for both ports.

For baud rates of 2400 b/s or higher, flow control is required when backing up, verifying or restoring the configuration database to a PC running communications software. See section B2.3 and *Maintenance*, chapter C1 for more information.

To set the baud rate

1. From the HOUSE menu, select SER_PORT_1 or SER_PORT_2.
2. Select BAUD_RATE, then select the baud rate that matches the connected device.

If you change the baud rate of the serial port, the setting changes as soon as you execute the command. You must then change the baud rate of the terminal to match the new setting.

B2.3 Flow Control

Flow control is required if you are backing up, verifying or restoring the configuration database to a PC running communications software (port is configured as VT100), and the baud rate is set to 2400 b/s or higher.

Bi-directional flow control settings are:

- ❑ no flow control
- ❑ software flow control (XON/XOFF)
- ❑ hardware flow control (DTR)

Flow control is not supported by CPSS, CPSS_LONG, CPSS_MODEM or PPP/IP port types, therefore it should be set to None. For PPP/IP configurations, flow control should be disabled on the terminal server or external router as well.

Serial port 1 supports software flow control. Serial port 2 supports software and hardware flow control. The default for both ports is None.

To set flow control

1. From the HOUSE menu, select SER_PORT_1 or SER_PORT_2.
2. Select FLOW_CTRL, then select NONE, XON/XOFF or DTR.

B3. System Security

The NMTI provides security through access levels and passwords. The six access levels (0 through 5) allow different users to monitor, operate and configure specific functions of the *3624 MainStreet* node. Levels 1 to 5 can be assigned separate passwords.

To log in as a user for any level between 1 and 5, enter the level number when prompted, then enter the password for the level.

This chapter describes how to assign access levels and passwords.

Note

Only level 5 users can define and modify access level settings and passwords.

B3.1 Access Levels

Level 5 users can assign different levels of access to individual users. Level 0 provides read-only access for all menus and functions, while levels 1 to 4 can provide read-only or read / write access to specific functions.

To allow level 0 access

Level 0 does not require the user to enter a password. The default setting is no access (disabled).

1. From the HOUSE menu, select MORE.
2. Select LEVEL_0 to provide read-only access, or NO_LEVEL_0 to disable level 0 access.

If level 0 access is disabled, users must enter one of the five access level passwords in order to log in to the NMTI.

To define access for levels 1 to 4

Access to specified NMTI functions can be assigned for levels 1 through 4. The options for each function are:

❏ no access
❏ read-only access
❏ read / write access

The default is read-only access.

Note

If a softkey is assigned an access level that is more restrictive than the ones assigned to the softkeys beneath it, its access level overrides the access levels of all softkeys under it.

---

1. Select the softkey whose access level you want to set.

2. Enter <Esc> <A>.

   The screen displays the selected softkey and the current access type for each level, as shown in Figure B3-1. (If you are defining a More softkey, the word More does not appear in the top left corner. For example, if you are defining the access level for Alarms More, only the word Alarms appears.)

Figure B3-1: Access Level Display

```
3624 MainStreet    620C-ab-cd                  Alarms:1   20-JUL-96   3:40P

 CONFIG POSITION "??"

   Level         Access Type

     1           Read/Write
     2           Read/Write
     3           Read/Write
     4           Read/Write








 CHANGE_ACCESS


  1-LEVEL_1         2-LEVEL_2         3-LEVEL_3         4-LEVEL_4       5-
  6-                7-                8-CANCEL          9-QUIT          0-
```

Note

The display shows the type of access defined for the softkey. It does not indicate if it is overridden by a more restrictive access on a higher level softkey.

---

3. Select a level and assign the type of access required – READ_ONLY, READ / WRITE or NO_ACCESS.

   The display remains at the same softkey so that you can define the other levels.

4. To define the access level of another softkey, select CANCEL and repeat steps 1 to 3.

Guidelines for defining access levels

To simplify the process of defining access levels, Table B3-1 provides guidelines on the access levels and functions appropriate for various types of users. These guidelines can be used as a basis for defining your own access levels.

Table B3-1: Suggested Access Level Definitions

Level	Type of User	Main Tasks
1	network performance operator	acknowledge and clear alarms
2	network performance supervisor	manage alarms and perform maintenance functions such as diagnostic tests and circuit maintenance
3	network configuration operator	configure the network interfaces and signalling or data processing applications; manage housekeeping functions related to the serial ports, time and inactivity timeout (automatic logout time)
4	network technician	all functions except for modifying access level definitions or changing passwords

Level 5 access

Level 5 is intended for the system manager. Level 5 users have read / write access to all NMTI functions, can modify access level definitions for levels 1 to 4, and can change passwords. Level 5 cannot be redefined.

B3.2 Passwords

Access levels 1 through 5 can be assigned separate passwords. The default password is "mainstreet". It is recommended that you change all level passwords to protect the database from unauthorized users.

Note

To access the CHNG_PSSWD function, you must enter the level 5 password before proceeding.

To assign passwords

1. From the HOUSE menu, select:

   MORE — CHNG_PSSWD

   You will be prompted to enter the level 5 password.

2. Enter the password and select a level (from 1 to 5).

3. Enter the new password at the prompt. Passwords can be 8 to 12 alphanumeric characters in length with no spaces, and are not case sensitive. The password is not echoed on the screen when you enter it, and you will be prompted to enter it twice to verify.

   If you make a mistake, select CANCEL and re-enter the password.

B4. System Timing

Timing sources provide system synchronization to the network. This chapter describes how to configure the timing sources for the *3624 MainStreet* node.

B4.1 Timing Sources

Two sources of synchronization are available:

- the T1 trunk (frequency 1.544 Mb/s)
- the internal system clock (frequency 8 kHz)

When the unit is configured to its internal clock, the timing is said to be free running.

Only one timing source provides network timing at any instant in time.

To define the source of synchronization

1. From the CONFIG menu, select SYNCH.
2. Select ENABLE to make the T1 source available as a timing source.
3. Select SELECT to make the enabled T1 source the current timing source.

A timing source cannot be selected unless it has been enabled.

Figure B4-1 displays the configuration settings and status of the T1 synchronization source. If the source has not yet been configured, the default settings are shown.

Figure B4-1: Synchronization Display

```
3624 MainStreet   620C-ab-cd                      Alarms:2   07-AUG-96   1:00P
          Source    Recovery   Threshold  Status
          T1        Auto       Unlimited  Not Ready


          Current source of synchronization is Free Run







 CONFIG SYNCH T1


  1-             2-DISABLE         3-RECOVERY         4-THRESHOLD        5-
  6-             7-                8-CANCEL           9-QUIT             0-
```

Table B4-1 describes the status messages that can appear under the Status heading.

Table B4-1: Synchronization Status

Status	Meaning
Disabled	The source in manual recovery has failed. The system has unsuccessfully attempted timed recovery to the source. The source has exceeded the permissible failure rate (set under THRESHOLD). The source was disabled (by selecting DISABLE). The source is in the default state. The source was in the "Cannot Lock" state and an unsuccessful attempt to recover to the source was made.
Not Ready	The source is not available for system timing.
Ready	The source is available for system timing.
Current	The source is providing system timing.
Auto Rec	The source has failed and will be used by the system as soon as it becomes available.
Time Rec	The source has failed and the system is checking at timed intervals to see if it is available to provide system timing.
Cannot Lock	The system is unable to take timing from the source. It attempts to retake timing from the source shortly after this state is entered.

B4.2 Failure Threshold

The failure threshold is the number of times a source is allowed to fail in one hour. If the number of source failures exceeds this threshold, the source is disabled and the unit does not attempt to use it again. The source must be enabled through the NMTI, or from a *46XX MainStreet* series network manager, before it can be available again as a timing source.

Setting a failure threshold ensures that unreliable timing sources are not being used.

The threshold can be set from 0 to 30 failures per hour, or set to unlimited failures (default setting). It is recommended you enter a number higher than 1.

To set the failure threshold

1. From the CONFIG menu, select THRESHOLD.
2. Enter the number of allowable failures (from 0 to 30).

   To set the threshold to unlimited failures, press <Esc>, then select UNLIMITED.

B4.3 Failure Recovery

When a failed T1 source becomes available again (enters the Ready state), the unit attempts to recover to it. You can specify the criteria under which the unit attempts to mark a source as ready.

- ❑ Automatic recovery (default)

  A failed source becomes available to the system as soon as it recovers.

- ❑ Timed recovery

  After the specified time interval, the system checks up to four times to verify if the source has recovered. If the source has recovered when the system checks, it becomes available to the system and becomes the current source if it is enabled. If the source has not recovered by the end of the fourth check, the system places the source in the Disabled state. Recovery to the source can then only occur through selection of the Enable softkey (see section B4.1).

- ❑ Manual recovery

  The system places the failed source in the Disabled state. The source is not used as a source of synchronization until it is manually selected.

To select the recovery type

1. From the CONFIG menu, select SYNCH.
2. Select RECOVERY, then select AUTO, MANUAL or a time interval (for timed recovery).

C1. Module Positions

This chapter describes how to configure each module position on the Control card and Universal card for a particular module, and provides general information on configuring circuits.

The positions can be configured before or after the modules are physically installed. However, each position must be configured for its module type before any circuits are configured or connected.

When you configure a module position, all circuits on the module in that position are automatically configured with default settings, and can be cross-connected.

Once the module type and its options are selected, the status LED should illuminate. If it does not, ensure that the module is properly installed. If the LED is still not illuminated, you may have a faulty module, and this may cause an alarm. See *Maintenance*, chapter A1, for information on LEDs and alarms.

C1.1 Module Overview

Through the NMTI, you can display information on the modules that have been installed in the unit, and their locations on the Control card and Universal card.

To display a module position report

From the CONFIG menu, select SHOW_ALL.

The screen displays a report as shown in Figure C1-1.

Figure C1-1: Module Positions Display

```
3624 MainStreet   620C-ab-cd      ELMSTREET       Alarms:3   06-AUG-96   9:37A

#    Configured   Installed    Status        Name     Options

M01  E+M          E+M          Ok            E&M      0157-03 2-WIRE
M02  LGS          LGS          Ok            LGS      0156-06
M03  LGE          LGE          Ok            LGE      0526-01
M04  OCU          OCU          Ok            OCU      OCU_3
M05  RS232_DCM    RS232_DCM    Ok            RS-232
M06  Empty        Empty        Empty
M07  Empty        Empty        Empty
M08  Empty        Empty        Empty
M09  Empty        Empty        Empty
M10  Empty        Empty        Empty
M11  Empty        Empty        Empty
M12  Empty        Empty        Empty
T1   T1           T1           OOS           PRIME    JB7 D4 LIM
DSP  DDSII        DDSII        Ok

 CONFIG

  1-POSITION        2-CIRCUIT         3-CONNECT         4-SYNCH          5-
  6-SHOW_ALL        7-                8-CANCEL          9-QUIT           0-
```

Table C1-1 describes the report elements.

Table C1-1: Module and Card Display Information

Column	Description
#	Module position number
Configured	Module type for which the position is configured
Installed	Module type actually installed in that position
Status: Empty Status: Ok Status: Wrong Card Status: Fault On Card Status: Bad Card ID Status: OOS	No module is installed in the position Installed module matches the type configured for the position Installed module does not match the type configured for the position Module is faulty Module identification is not recognized by the software Aggregate link module is out of synchronization
Name	Name assigned to the position
Options	Options selected for the position

Module identifiers

This manual identifies modules and circuits using the formats shown in Table C1-2.

Table C1-2: Module Position and Circuit Identifiers

Module	Format	Range
T1 aggregate link	<T1-*cc*>	*cc* = 1 to 24
Tone, DDS, DDS 2	<DSP>	–
Voice and data	<*pp-c*>	*pp* = 1 to 12, *c* = 1 or 2 (A or B for DNIC modules)
Tributary T1	<*pp-cc*>	*pp* = 1, 2, 3, 4, 7, 8, 9, 10, *cc* = 1 to 24

C1.2 Resource Modules

Only one of the Tone, DDS or DDS 2 resource modules can be installed in the unit.

To configure the resource module position

1. From the CONFIG menu, select POSITION.
2. Enter <DSP>, then select TYPE.
3. Select the module type.

   If a resource module is already installed in that position, select AS_PRESENT.

   If no module is to be installed in that position, select EMPTY.

C1.3 Interface Modules

Interface modules include voice, data and Tributary T1 modules.

Since the Tributary T1 module occupies three positions on the Control card, there is not enough space for it in certain positions. Table C1-3 lists the allowable positions. Positions that are not allowed are marked "N / A".

Table C1-3: Allowable Positions for the Tributary T1 Module

Module Position	Positions Occupied
1	1, 2, 3
2	2, 3, 4
3	3, 4, 5
4	4, 5, 6
5	N/A
6	N/A
7	7, 8, 9
8	8, 9, 10
9	9, 10, 11
10	10, 11, 12
11	N/A
12	N/A

To configure the interface module position

1. From the CONFIG menu, select POSITION.

2. Enter the module position (1, 2, 3, 4, 7, 8, 9, 10 for the Tributary T1 module, and 1 to 12 for all other modules), then select TYPE.

3. Select the module type – TRIB_T1, VOICE or DATA.

   If an interface module is already installed in that position, select AS_PRESENT.

   If no module is to be installed in that position, select EMPTY.

4. If you select VOICE or DATA, select the specific module type.

   The 2WTO and 4WTO modules are under the MORE softkey in the DATA menu.

C1.4 Automatic Configuration

If the modules are already installed, the positions can be configured automatically rather than having to configure each one separately. The positions are automatically set to match the module type installed and the circuits are given default values. The positions are not affected if:

- ❑ they are already correctly configured for the module type installed
- ❑ the empty positions are already configured for a module type

To configure all module positions

1. From the CONFIG menu, select POSITION.
2. Enter <Esc> and select CONFIG_ALL.

C1.5 Module Position Names

Each module position can be assigned a unique name up to eight alphanumeric characters in length, with no spaces.

To assign a position name

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1, 2, 3, 4, 7, 8, 9, 10 for the Tributary T1 module, and 1 to 12 for all other modules), or enter <T1>.
3. Select NAME, then enter the position name.

To remove a module position name, press <↵> at the prompt.

C1.6 Circuit Names

Each T1, Tributary T1, voice and data circuit may be assigned a unique name of up to eight alphanumeric characters with no spaces.

To assign a circuit name

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position and circuit number in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select NAME and enter the circuit name.

To remove a circuit name, press <↵> at the prompt.

C1.7 Copying Circuit Configurations

Instead of configuring each circuit separately, you can copy the configuration of one circuit to another or to all unconfigured circuits on the same interface type. To do this, configure the first circuit, then use the COPY_TO command to copy its parameters (except for name and connection) to the other circuits.

For information on configuring circuits, refer to the chapters on the specific modules.

To copy configurations to one or more circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position and circuit number of the circuit you want to copy from, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select COPY_TO to copy the parameters of this circuit.
4. Enter the module position and circuit number of the circuit you want to copy to, using the same form as in step 2.

   To copy the configuration to all circuits on the same interface type, press <Esc>, then select ALL.

C2. Circuit Cross-connections

When a module position is configured, its circuits are automatically configured with default settings and can be cross-connected.

This chapter describes how to make cross-connections between circuits. Cross-connections can be made between Tributary T1, voice and data circuits, and the T1 circuits.

C2.1 Individual Cross-connections

Each circuit on a Tributary T1, voice or data module can be cross-connected to a 64 kb/s channel, or an n x 64 kb/s channel, on the T1 aggregate.

If you try to modify or cross-connect circuits on an unconfigured module, the NMTI displays the message, "Invalid circuit number".

To connect individual circuits

1. From the CONFIG menu, select CONNECT.
2. Enter the module position and circuit number, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select TO_CIRCUIT, then enter the module position and circuit number of the circuit you want to cross-connect to, using the same form as in step 2.

   If you are cross-connecting a T1 circuit to the 64 kb/s T1 channel carrying CPSS messages, enter <CPSS> as the second identifier.

If the circuits are already connected, the NMTI displays a warning message. If you proceed, the existing connection is broken and the new connection is made.

C2.2 Global Cross-connections

Instead of making individual cross-connections, you can connect all unconnected T1 circuits to unconnected voice and data circuits in a single operation.

Note

Globally connecting all circuits has no effect on circuits that have already been connected.

To connect all unconnected circuits

1. From the CONFIG menu, select CONNECT.
2. Press <Esc> and select ALL.

Unconnected circuits are cross-connected in sequence. If no circuits are currently connected, the cross-connections are made as shown in Table C2-1.

Table C2-1: Automatic Circuit Cross-connections

Circuit	Connected to Circuit
T1-1	M1-1
T1-2	M1-2
T1-3	M2-1
T1-4	M2-2
T1-5	M3-1
⋮	⋮
T1-23	M12-1
T1-24	M12-2

C2.3 Disconnecting Circuits

Circuits can be disconnected one at a time or all at once.

The Disconnect softkey appears only if at least one circuit is cross-connected to another.

To disconnect an individual circuit

1. From the CONFIG menu, select CONNECT.
2. Enter the module position and circuit number of the circuit you want to disconnect, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select DISCONNECT.

To disconnect all circuits

1. From the CONFIG menu, select CONNECT.
2. Press <Esc> and select DISCON_ALL.

C2.4 Displaying Circuit Cross-connections

Circuit cross-connections can be displayed for individual circuits or for all circuits on a module.

To display a cross-connection report

1. From the CONFIG menu, select CONNECT.
2. Enter the module position and circuit number of the circuit you want to display, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select SHOW_CCT to display a report on an individual circuit, and SHOW_GROUP to display a report on all circuits on the module.

Figure C2-1 shows a listing of T1 circuit cross-connections, where the T1 circuits are cross-connected to the circuits on the LGS module and DNIC module.

Figure C2-1: Cross-connections Display

```
3624 MainStreet   620C-ab-cd     ELMSTREET       Alarms:3   06-AUG-96  9:37A

Circuit    Name     Type            Circuit      Name     Type

T1 -01              T1_SIG           ---
T1 -02              T1_SIG           ---
T1 -03              T1_LGS_PLAR      M02-01              LGS_PLAR
T1 -04              T1_LGS_PLAR      M02-02              LGS_PLAR
T1 -05              T1_SIG           ---
T1 -06              T1_SIG           ---
T1 -07              T1_DNIC          M04-A               DNIC
T1 -08              T1_DNIC          M04-B               DNIC
T1 -09              T1_SIG           ---
T1 -10              T1_SIG           ---
T1 -11              T1_SIG           ---
T1 -12              T1_SIG           ---

  Asterisks indicate current connections.

 CONFIG CONNECT T1-1


  1-SHOW CCT        2- DISCONNECT       3-TO CIRCUIT        4-             5-
  6-                7-                  8-CANCEL            9-QUIT         0-
```

C3. Super-rate Cross-connections

Super-rate circuits provide transmission of data interface speeds up to 1536 kb/s.

The following modules support super-rate circuit connections and can cross-connect to any other circuit in the node that supports super-rate circuit connections:

- X.21 DCM
- V.35 DCM
- Tributary T1 module
- T1 aggregate module
- DNIC module

The modules support super-rate speeds only when they are configured for transparent rate adaption. See *Configuration*, chapter G2 for information on transparent rate adaption.

A T1 circuit is a single DS0 with a bandwidth of 64 kb/s. For applications requiring circuits with greater bandwidth, two or more T1 circuits can be combined into a single super-rate circuit. Up to 24 T1 circuits can be grouped, yielding a maximum bandwidth of 1536 kb/s.

The DNIC module supports super-rate speeds up to 128 kb/s (two DS0s).

This chapter describes the procedures for creating and disabling super-rate circuits on the unit. These procedures include:

- reserving module positions
- setting the interface speed
- making the cross-connections

C3.1 Reserving Module Positions

By default, one module position is required for every two T1 circuits. Since the Tributary T1 module occupies three module positions, it accesses six consecutive T1 circuits. The DNIC module and the X.21 and V.35 DCMs occupy only one position; therefore they access only two T1 circuits.

Each module position has direct access to two DS0s on the T1 interface. Since the single-circuit X.21 and V.35 modules occupy one module position, they have access to two DS0s.

If the interface speed on an X.21 or V.35 circuit requires more than two T1 circuits, successive module positions must be reserved prior to setting the interface speed.

The number of reserved module positions and T1 circuits is based on the interface speed and the transport bandwidth of the data module. The number of T1 circuits can be determined by the following formula:

$$n = \frac{\text{interface speed}}{\text{transport bandwidth}}$$

The transport bandwidth is the bandwidth used in each T1 circuit, and "n" is a whole number between 1 and 24 that represents the number of 64 kb/s channels on the T1 link.

Table C3-1 lists the valid interface speeds for a given transport bandwidth, the number of primary rate channels, and the number of module positions that must be reserved.

For example, an interface speed of 400 kb/s using the 40 kb/s transport bandwidth requires ten T1 circuits. As well, five consecutive module positions are required on the Universal card. One is required for the X.21 or V.35 DCM, and the next four are reserved.

A blank module should be installed on the Universal card for each reserved module position. This prevents the accidental insertion of another module. If you place an interface module in a reserved position, a "Wrong Module in Position" alarm is raised. The reserved module position status changes to "Wrong Module" and the circuit status of the DCM is changed to "Out of Service". This indicates that the module cannot operate as configured. When the module is removed, the status returns to "OK".

If the super-rate circuit has already been connected to a T1 circuit when the wrong module is inserted, the circuit status changes to "Out of Service", and the connection is removed by the system to prevent hardware damage. A "Super-rate conn removed: MxxMyy" alarm is raised, indicating that the circuit has been disconnected because the incorrect module was inserted. (Mxx indicates the DCM position number; Myy indicates the number of the first reserved module position.)

Table C3-1: T1 Circuits and Module Positions Based on Super-rate Speed and Transport Bandwidth

Circuit Transport Bandwidth (kb/s)									
8	**16**	**24**	**32**	**40**	**48**	**56**	**64**	**T1 Circuits Required**	**Reserved Positions Required**
16	32	48	64	80	96	112	128	2	0
24	48	72	96	120	144	168	192	3	1
32	64	96	128	160	192	224	256	4	1
40	80	120	160	200	240	280	320	5	2
48	96	144	192	240	288	336	384	6	2
56	112	168	224	280	336	392	448	7	3
64	128	192	256	320	384	448	512	8	3
72	144	216	288	360	432	504	576	9	4
80	160	240	320	400	480	560	640	10	4
88	176	264	352	440	528	616	704	11	5
96	192	288	384	480	576	672	768	12	5
104	208	312	416	520	624	728	832	13	6
112	224	336	448	560	672	784	896	14	6
120	240	360	480	600	720	840	960	15	7
128	256	384	512	640	768	896	1024	16	7
136	272	408	544	680	816	952	1088	17	8
144	288	432	576	720	864	1008	1152	18	8
152	304	456	608	760	912	1064	1216	19	9
160	320	480	640	800	960	1120	1280	20	9
168	336	504	672	840	1008	1176	1344	21	10
176	352	528	704	880	1056	1232	1408	22	10
184	368	552	736	920	1104	1288	1472	23	11
192	384	576	768	960	1152	1344	1536	24	11

To reserve bandwidth from module positions

1. From the CONFIG menu, select POSITION.

2. Enter the position of the module (from 1 to 12) that you want to reserve bandwidth for, then select OPTIONS.

3. Select NUM_RESERV and enter the number of successive module positions that you want to reserve.

   To unreserve positions, enter <0> when prompted for the number of positions.

Once the number of reserved positions is configured, the additional positions are automatically reserved as shown in Figure C3-1.

Figure C3-1: Module Positions Configured as Reserved

```
3624 MainStreet   620C-ab-cd                   Alarms: 0   12-JUL-96   1:40P

#    Configured   Installed    Status        Name    Options

M01  V35_DCM      V35_DCM      Ok
M02  RESERVED     Empty        Ok
M03  RESERVED     Empty        Ok
M04  RESERVED     Empty        Ok
M05  Empty        Empty        Empty
M06  Empty        Empty        Empty
M07  Empty        Empty        Empty
M08  Empty        Empty        Empty
M09  Empty        Empty        Empty
M10  Empty        Empty        Empty
M11  Empty        Empty        Empty
M12  Empty        Empty        Empty
T1   T1           T1           OOS                   JB7 D4 LIM
DSP  DDS          DDS          Ok

 CONFIG POSITION "??"

  1-                 2-              3-CONFIG_ALL        4-              5-
  6-SHOW_ALL         7-              8-CANCEL            9-QUIT          0-
```

If the interface speed is changed and the super-rate circuit is no longer used, the relevant entry in the "Configured" column is updated to "Empty".

If the module positions are reserved incorrectly, the NMTI displays an error message. Table C3-2 lists the possible messages.

Table C3-2: Error Messages for Reserved Module Positions

Message	Description
There are circuits connected on the card. Disconnect them first.	The number of successive module positions reserved for super-rate speeds cannot be changed while the circuit is connected.
Cannot reserve, position(s) not configured as empty.	An attempt has been made to reserve a module position that is not configured as empty.
Cannot reserve, beyond last module position.	An attempt has been made to reserve a module position beyond position 12.
Not enough reserved positions to support I/F Speed.	An attempt has been made to change the number of reserved module positions to less than what the configured circuit's interface dictates.
Cannot configure, position reserved by Mxx.	A module position configured as reserved can only be changed by changing the module position configuration (indicated by xx), that reserved the other module position.

To reserve bandwidth for the Tributary T1 Module

A Tributary T1 module occupies three module positions, which gives it access to six DS0s. If the interface speed on the module requires more than six DS0s, successive module positions must be reserved. The first reserved module position must be consecutive to the position occupied by the Tributary T1 module.

The position of the Tributary T1 on the Universal card determines the maximum number of DS0s it can use, as listed in Table C3-3. Because the Tributary T1 module occupies three positions, it cannot be installed in positions marked "N / A" in the table.

Table C3-3: Allowable Positions for the Tributary T1 Module

Module Position	Positions Occupied	Maximum Number of DS0s
1	1, 2, 3	24
2	2, 3, 4	22
3	3, 4, 5	20
4	4, 5, 6	18
5	N/A	N/A
6	N/A	N/A
7	7, 8, 9	12
8	8, 9, 10	10
9	9, 10, 11	8
10	10, 11, 12	6
11	N/A	N/A
12	N/A	N/A

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1, 2, 3, 4, 7, 8, 9, 10) and circuit (1 to 24) for the Tributary T1 module, in the form <*pp-cc*>.
3. Select OPTIONS — NUM_DS-0s, then enter the required number of DS0s (from 1 to 24).

A blank module should be installed on the Universal card for each reserved module position not actually occupied by the Tributary T1 module. This prevents the accidental insertion of another module into the reserved position.

If you attempt to configure a reserved module position, the message "Cannot configure, position is reserved by Mxx" is displayed, where xx stands for the installed Tributary T1 module position number. For example, if position M01 is configured for super-rate and you attempt to configure position M02, the message "Cannot configure, position is reserved by M01" is displayed.

If you install an interface module in a reserved position, a "Wrong Module in Position" alarm is raised. The reserved module position status changes to "Wrong Module" and the circuit status of the Tributary T1 changes to "Out of Service". This change indicates that the module cannot operate as configured. When the module is removed, the status returns to "OK".

The number of DS0s cannot be changed if there is at least one connection on the Tributary T1, or if there is a circuit on the Tributary T1 that is configured for super-rate.

C3.2 Setting the Interface Speed

The interface speed that can be configured depends on the type of module.

To configure the interface speed for X.21 and V.35 DCMs

The selected super-rate speed must be a multiple of the selected transport bandwidth. For example, if a circuit's transport bandwidth is 40 kb/s, the possible interface speeds are 80, 120 and 160, as listed in Table C3-1.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM, in the form <*pp-c*>.
3. Select FUNCTION — RATE_ADAPT — I/F-SPEED.
4. Enter the interface speed. The speed must be a multiple of the selected transport bandwidth (maximum 1536 kb/s).

If the circuit is already connected, the I/F_SPEED cannot be changed.

If the entered speed is not a multiple of the selected bandwidth or is higher than the maximum speed, an "Invalid speed" message is displayed. If there are not enough additional module positions available, the entered speed is not accepted and the message "Not enough additional positions available to support I/F_Speed" is displayed.

To configure the interface speed for the Tributary T1 module

For the Tributary T1 module, you must specify the number of circuits used to support the super-rate interface speed.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1, 2, 3, 4, 7, 8, 9, 10) and circuit (1 to 24) for the Tributary T1 module, in the form <*pp-cc*>.
3. Select FUNCTION — NUM_CIRCS.
4. Enter the number of circuits used to support the speed (from 1 to 24).

If the number of circuits is greater than the maximum number of DS0s available, the message "Not enough bandwidth" appears.

To configure the interface speed for the DNIC Module

A DNIC module connected to DTUs with super-rate functionality can support speeds of 96, 112 or 128 kb/s, depending on the revision level of the DTU.

Each module position on the *3624 MainStreet* node has sufficient bandwidth to handle the maximum interface speed; therefore, it is not necessary to reserve extra positions for the circuit.

Super-rate speeds can be configured for either DTU port A or B; however, when one port is used for a super-rate connection, the other port cannot be used.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module, in the form <*p*-A> or <*p*-B>.
3. Select FUNCTION — RATE_ADAPT — IF_SPEED.
4. Enter the interface speed. The speed must be a multiple of the transport bandwidth (maximum 128 kb/s).

If you attempt to configure a super-rate speed on a DTU that does not support super-rate speeds, an error message is displayed. If you attempt to configure the super-rate speed before the DTU is connected to the *3624 MainStreet* node, the system assumes that the DTU will not support super-rate, and the same error message is displayed.

C3.3 Circuit Cross-connections

Super-rate circuit connections can be made between the T1 primary rate link and DNIC circuits, X.21 or V.35 DCM circuits, between the link and the Tributary T1 module, and between the modules themselves.

To cross-connect super-rate circuits

1. From the CONFIG menu, select CONNECT.
2. Enter the module position and circuit for the module you are cross-connecting from, in the form:

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, A or B) for the data modules
3. Select TO_CIRCUIT.
4. Enter the module position and circuit for the module you are cross-connecting to, in the form shown in step 2, or in the form <T1-*cc*>, where *cc* is the first T1 circuit number in the consecutive group.

The successive circuit cross-connections are made automatically. For example, if four circuits are needed, starting with T1-05, enter <T1-05>. T1-05 to T1-08 inclusive are automatically connected.

Figure C3-2 shows a sample cross-connection. T1 aggregate circuits 5 to 8 are connected to a V.35 DCM in position 5 (M05-01).

Figure C3-2: Cross-connection to a V.35 DCM Circuit

```
3624 MainStreet   620C-ab-cd                       Alarms:2    13-JUL-96   9:19A

Circuit    Name     Type             Circuit    Name     Type

T1 -01              T1_RS232_DCM     *M01-01             RS232_DCM
T1 -02              T1_SIG           ---
T1 -03              T1_SIG           ---
T1 -04              T1_SIG           ---
T1 -05              T1_V35_DCM       *M05-01             V35_DCM
T1 -06              T1_V35_DCM       *M05-01             V35_DCM
T1 -07              T1_V35_DCM       *M05-01             V35_DCM
T1 -08              T1_V35_DCM       *M05-01             V35_DCM
T1 -09              T1_SIG           ---
T1 -10              T1_SIG           ---
T1 -11              T1_SIG           ---
T1 -12              T1_SIG           ---

  Asterisks indicate current connections.

 CONFIG CONNECT T1-1


  1-SHOW_CCT        2-DISCONNECT       3-TO_CIRCUIT        4-              5-
  6-                7-                 8-CANCEL            9-QUIT          0-
```

Table C3-4 lists the messages displayed when requested circuit connections cannot be made.

Table C3-4: Error Messages for Incorrect Super-rate Connections

Message	Meaning
Couldn't make connection: insufficient bandwidth.	The super-rate group extends beyond T1 circuit 24.
Cannot connect: Overlapping existing connection.	One of the T1 circuits is already connected in a subrate connection or connected as a part of a super-rate connection.
Circuit is in the middle of a super-rate group.	The entered T1 circuit is in the middle of a super-rate group.
Warning: That circuit is already connected.	The referenced source T1 circuit is the first circuit in a super-rate group.
Warning: The second circuit is connected, PROCEED will override.	The referenced destination T1 circuit is the first circuit in a super-rate group.

To disconnect super-rate circuits

Super-rate circuits are disconnected by entering the circuit number of the installed module, or by entering the first T1 circuit number of the super-rate group used to make the connection.

1. From the CONFIG menu, select CONNECT.

2. Enter the module position and circuit number of the circuit you want to disconnect, in the form:

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, A or B) for the data modules

   <T1-*cc*>, where *cc* is the first circuit number in the super-rate group

3. Select DISCONNECT to disconnect the circuit, or DISCON_ALL to remove all connections, including any super-rate connections.

If the T1 circuit number is not the first circuit in the group, the message "Circuit is in the middle of a super-rate group" is displayed.

D1. T1 and Tributary T1 Module Configuration

This chapter describes the operating parameters for the T1 aggregate and Tributary T1 modules.

The T1 aggregate connects the node to the network. Only one T1 aggregate is allowed per system. The Tributary T1 module connects to local equipment, such as a PBX. Up to four Tributary T1 modules can be installed in a system. The Tributary T1 module allows a T1 interface to connect up to 24 DS0s to the T1 aggregate and other interfaces.

The following operating parameters can be configured for the T1 aggregate and Tributary T1 modules:

- ❏ zero code suppression
- ❏ line length
- ❏ line build-out (T1 aggregate only)
- ❏ framing
- ❏ trunk conditioning

In order to provide HDSL transmission, T1 IHTU modules are required at both ends of the T1 link. The T1 IHTU-R (slave) is the remote office end, and the T1 IHTU-C (master) is the central office end. Each loop carries 12 DS0s.

D1.1 Zero Code Suppression

Zero code suppression provides sufficient pulse (ones) density to ensure that line synchronization is maintained. The output data stream must never include more than 15 consecutive zeros.

The following types of zero code suppression are available.

Transparent code suppression

With transparent code suppression, the *3624 MainStreet* node performs no zero code suppression. To avoid line synchronization problems, user data must use a protocol designed to ensure a sufficient ones density pattern.

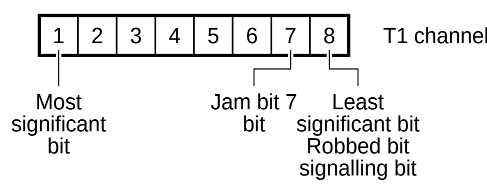
Binary 8-zero suppression

Binary 8-zero suppression replaces eight consecutive zeros with a known pattern of ones with bipolar violations to ensure a minimum one-in-eight ones density. Binary 8-zero suppression must be selected if 64 kb/s clear data channels (channels for which signalling is not passed) are required, and it must also be selected at the far end of the network.

Jam bit 7

Jam bit 7 changes bit 7 (the next-to-least significant bit) to a 1 if all eight bits are 0, and reduces the usable channel bandwidth to 56 kb/s. Jam bit 7 must also be selected at the far end of the network. Refer to Figure D1-1.

Figure D1-1: Jam Bit 7 Position



To set zero code suppression

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS — ZERO_SUPPR.
4. Select the type of zero code suppression required – either TRANSP, B8ZS or JB7. The default is B8ZS.

D1.2 T1 Aggregate Line Length and Line Build-out

For systems with a LIM installed on the Control card, the line length must be specified. The line length is the distance between the node and the external CSU or digital cross-connect point.

For systems with a CSU-2 or IHTU module, the line length function is replaced by the line build-out function.

To set line length for the T1 aggregate

1. From the CONFIG menu, select POSITION.
2. Enter <T1>, then select OPTIONS — LINE_LNGTH.
3. Select the appropriate line length range – 0_150FT, 151_450FT or 451_655FT. The default is 0_150FT.

   If the LIM is not yet installed, the line length softkeys appear as Short, Medium and Long.

To set line build-out for the T1 aggregate

1. From the CONFIG menu, select POSITION.
2. Enter <T1>, then select OPTIONS — LBO.
3. Select the appropriate line build-out – 0dB, 7.5dB or 15dB. The default is 0dB.

   If the CSU-2 or IHTU module is not yet installed, the LBO softkeys appear as Short, Medium and Long.

D1.3 Tributary T1 Module Line Length

The line length must be specified for the Tributary T1 module. The line length is the distance between the node and the external equipment.

To set line length for the Tributary T1 module

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select LINE_LNGTH, then select the appropriate line length range. The default is 0_133FT.

D1.4 T1 Framing

Two types of T1 framing are available:

❏ D4 framing (default)
❏ ESF

D4 framing

D4 is a framing pattern on a T1 link. A D4 frame consists of 193 bits: 24 timeslots each containing 8 bits, plus 1 framing bit. In D4 framing, 12 D4 frames are used to construct one D4 superframe.

ESF framing

In ESF, 24 D4 frames make up one extended superframe. Doubling the D4 superframe to an extended superframe provides two additional robbed bits for signalling. In addition, ESF provides for an FDL, which is a 4 kb/s communications path between the two ends of a T1 ESF link.

ESF must be selected if the FDL is used. If the FDL is cross-connected, the D4_FRAMING softkey does not appear.

Note

CPSS is not passed through the FDL to the Tributary T1 link.

To select a framing type

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS, then select ESF or D4_FRAMING.

D1.5 T1 Performance Monitoring

If a DTU module is installed in the FDL socket, the *3624 MainStreet* node supports T1 performance monitoring as outlined in AT&T Pub 54016. If a DTU module is installed in the FDL socket, and a T1.403 module is installed, the node supports T1 performance monitoring as outlined in the ANSI T1.403 specifications.

To configure the node for 54016 performance monitoring

A DTU module in the FDL socket supports T1 primary rate link performance as outlined in AT&T Pub 54016. When the module is connected to a network channel designated as 54016, the network can retrieve ESF link quality statistics, and reset the event counters and other interval timers involved in statistics collection. See *Maintenance*, chapter B3 for information on ESF link quality statistics.

1. From the CONFIG menu, select POSITION.
2. Enter <T1>, then select OPTIONS.
3. Select FDL — 54016.

To configure the node for ANSI T1.403 performance monitoring

The T1.403 module supports T1 link loopbacks and provides T1 performance monitoring as outlined in the ANSI T1.403 specifications. This function also requires a DTU module in the FDL socket.

When enabled, the T1.403 module detects remote requests formatted for the *3624 MainStreet* node from the far end of the network, and transfers performance reports to the far end for diagnostic purposes. See *Maintenance*, chapter B3 for information on T1.403 statistics.

1. From the CONFIG menu, select POSITION.
2. Enter <T1>, then select OPTIONS.
3. Select T1.403.

Note

CPSS over the FDL channel is disabled when the FDL is connected to the 54016 network channel, or when T1.403 is enabled. However, CPSS over a DS0 is still available.

54016 messaging and T1.403 messaging cannot be enabled at the same time.

D1.6 Trunk Conditioning

Trunk conditioning provides a method of alerting the mate circuits of a T1 or Tributary T1 circuit that a fault has occurred on the link. It defines how and when fault signals are transmitted on the information and signalling components of the line.

Trunk conditioning applies to the whole line, and can be configured as one-way or two-way. The type of signals transmitted on the conditioned line when a fault occurs is defined on an individual circuit basis. See *Configuration*, section D2.4 for information on fault signalling.

You can change trunk conditioning at any time; however, any change results in service interruption. If any circuits on the link are cross-connected when the trunk conditioning attributes are being changed, a disruption in service warning message is displayed.

Note

Primary rate circuits configured to carry CPSS messages apply two-way trunk conditioning regardless of the type of trunk conditioning selected.

Primary rate link alarms

Table D1-1 lists the types of alarms raised when a fault is detected on the T1 or Tributary T1 link.

Table D1-1: Primary Rate Link Alarms

Alarm Class	Type of Fault	Clearing
Red	Frame alignment is lost on the T1 link.	Frame alignment is regained.
Yellow	Equipment at the far end of the T1 link has lost frame alignment or it has declared another alarm associated with the link, such as a Framing Err Rate Exceeded alarm.	Remote equipment is no longer transmitting the alarm.
Failed State	Ten severely errored seconds occur in a row.	Ten non-severely errored seconds occur in a row.
Framing Err Rate Exceeded	Terminal framing bit (Ft) error rate exceeds approximately 10^{-3} for a period of 4 to 6 seconds.	Ft error rate is below approximately 10^{-4} for 9 to 11 seconds.
CSU Loopback Activated	CSU loopback is activated on the T1 link.	CSU loopback is removed.

One-way trunk conditioning

With one-way trunk conditioning, when a fault occurs on a T1 or Tributary T1 link, the information and signalling paths are broken in the direction of the fault – the transmit path from the primary rate circuit (T1 or Tributary T1) to the connected circuit.

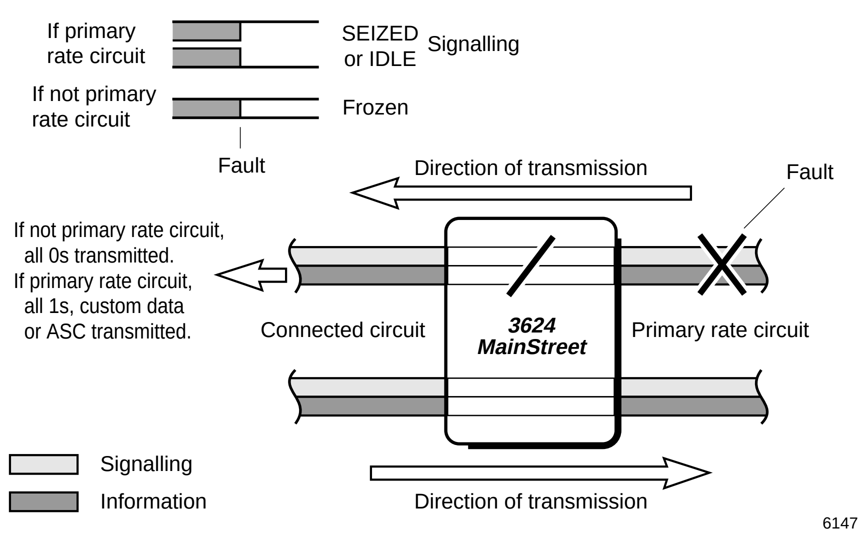
Transmission in the other direction is not affected. See Figure D1-2.

The primary rate circuit on the side of the fault sends information to its mate circuit (the circuit it is cross-connected to), that the connection is broken. The mate circuit then conditions the line (sends fault signals) between it and the far end voice or data device.

On the signalling path, the circuit sends the fault signals defined for it to the far end circuit. On the information path, the signals it sends depends on what type of circuit it is:

- ❑ all zeros if the circuit is not a primary rate circuit
- ❑ all ones or custom data if the circuit is a primary rate circuit
- ❑ an ASC if the circuit is a primary rate circuit that has been configured for DDS rate adaption

Figure D1-2: One-way Trunk Conditioning



Note

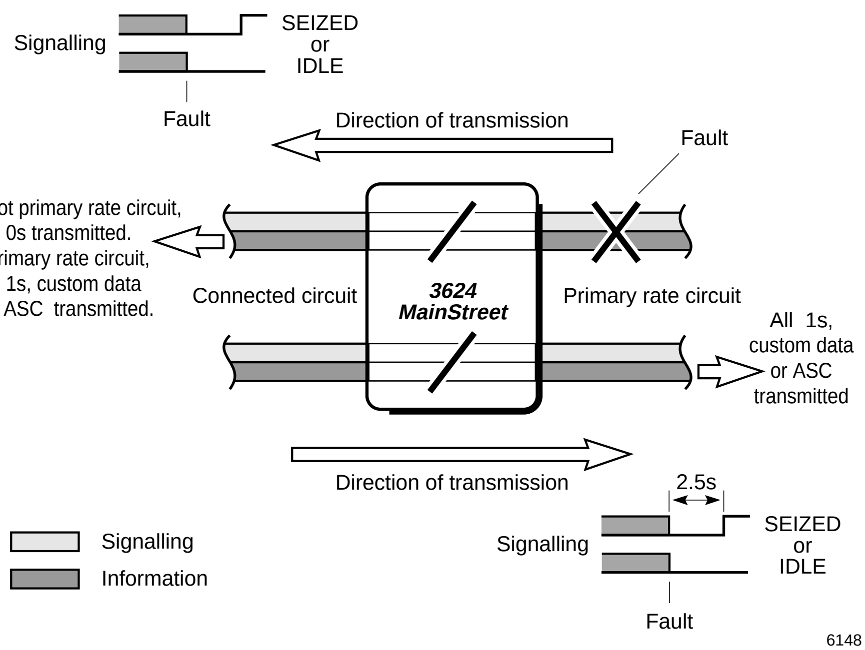
If a yellow alarm occurs on the T1 link, it indicates a fault in the receive path of the primary rate circuit. In this case, one-way trunk conditioning does not apply; therefore, the information and signalling paths are not broken in either direction.

If a CSU Loopback Activated alarm occurs, two-way trunk conditioning is performed regardless of whether one-way or two-way is selected.

Two-way trunk conditioning

With two-way trunk conditioning, when a fault occurs the information and signalling paths are broken in both the transmit and receive directions. See Figure D1-3.

Figure D1-3: Two-way Trunk Conditioning



As with one-way trunk conditioning, the primary rate circuit on the side of the fault sends information to its mate circuit that the connection is broken, and the mate circuit sends fault signals on the signalling path to the far end device. The primary rate circuit also conditions the line in the other direction, and sends the fault signals defined for it on the signalling path. On the information path, the signals sent by the circuits depend on the type of circuit:

- all zeros if the circuit is not a primary rate circuit
- all ones or custom data if the circuit is a primary rate circuit
- an ASC if the circuit is a primary rate circuit that has been configured for DDS rate adaption

To define the type of trunk conditioning

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS — MORE — TRUNK_COND.
4. Select either ONE_WAY or TWO_WAY. The default is TWO_WAY.

D1.7 Fault Classes

Trunk conditioning can be enabled or disabled for various classes of T1 link or Tributary T1 module faults. See Table D1-1 for the list of fault classes.

If trunk conditioning is enabled (ON) for a fault class, one- or two-way trunk conditioning is applied (as configured) when an alarm in that class is raised. If trunk conditioning is disabled (OFF) for a fault class, the system performs no trunk conditioning when an alarm in that class is raised.

To enable or disable trunk conditioning for a fault class

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS — MORE — TRUNK_COND.
4. Select a fault class and configure it as ON or OFF. The default is ON.

D1.8 Alarm Declaration and Clearing Times

Both ends of a primary rate link should use the same alarm declaration and clearing times, since both ends of the link should initiate and terminate trunk conditioning at approximately the same time. If the declaration time or clearing time is changed, the change may not take effect immediately.

To set the alarm declaration time

The alarm declaration time determines how long a fault must persist before an alarm is declared. A longer time should be configured when no alternate route is available or when the T1 link is subject to frequent short outages. A shorter time should be configured when an alternate path exists, in order to minimize the length of time that service is disrupted.

The time can be set for alarms in the red class and is preset to 2.7 seconds for the yellow class. The time is not applicable to the other alarm classes.

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS — MORE — ALARM_TIME.
4. Select DECLARE and enter the time. The time is a number from 1 to 300, representing tenths of seconds (0.1 to 30 seconds in 0.1 second increments).

   For example, to set an alarm declaration time of 1.4 seconds, enter 14. To set an alarm declaration time of 20 seconds, enter 200.

To set the alarm clearing time

The alarm clearing time determines how long a fault must be cleared before a raised alarm is cleared. When an alternate route exists, a longer alarm clearing time should be configured to ensure that connections to the T1 link that declared the fault are not restored until the link is stable. A shorter alarm clearing time should be configured when no alternate path exists, in order to minimize the length of time that service is disrupted.

The same time can be set for alarms in the red and yellow classes. The time is not applicable to the other alarm classes.

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS — MORE — ALARM_TIME.
4. Select CLEAR and enter the time. The time is a number from 1 to 300, representing tenths of seconds (0.1 to 30 seconds in 0.1 second increments).

   For example, to set an alarm clearing time of 4 seconds, enter 40.

D1.9 Yellow Alarm Support for ESF Framing

The *3624 MainStreet* node supports yellow alarm handling as described in AT&T Pub 62411 (October, 1988) service requirements. This feature affects T1 connections only when the T1 link or Tributary T1 module is configured for ESF framing. Yellow alarm handling with D4 framing complies with Pub 62411.

With a CSU installed on the Control card, the node conforms to AT&T Pub 62411 (December, 1990).

PUB 62411 (October, 1988) yellow alarm support

When a *3624 MainStreet* node is connected to another node that supports Pub 62411 (October, 1988), yellow alarms for ESF framing are processed as follows.

When the *3624 MainStreet* node declares a red alarm due to a fault condition on the T1 aggregate link, it sends a yellow alarm to the far end as shown in Figure D1-4. If trunk conditioning has been configured for the connected circuits, the far end applies trunk conditioning to them.

Once the fault condition is corrected and the red alarm is cleared, the unit stops sending the yellow alarm to the far end. The far end immediately responds as it did prior to the fault condition.

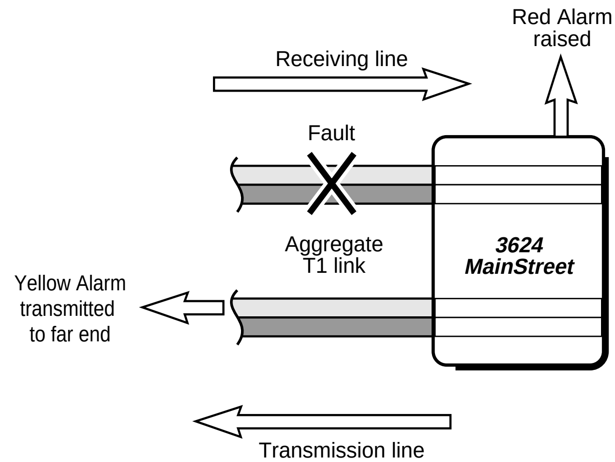
PUB 62411 (October, 1985) yellow alarm support

When a *3624 MainStreet* node is connected to another node that supports Pub 62411 (October, 1985), yellow alarms for ESF framing are processed as follows.

When the unit declares a red alarm due to a fault condition on the T1 aggregate link, it sends a yellow alarm to the far end as shown in Figure D1-4. If trunk conditioning has been configured for the connected circuits, the far end applies trunk conditioning to them.

Once the fault condition is corrected and synchronization is regained, but before the red alarm is cleared, the *3624 MainStreet* node stops sending the yellow alarm to the far end. The far end waits for the alarm clear time to elapse, then responds as it did prior to the fault condition.

Figure D1-4: Yellow Alarm Support



D1.10 Yellow Alarm Clearing for ESF Framing

A yellow alarm can be cleared when:

- ❑ synchronization is regained
- ❑ the red alarm is cleared

The YELLOW_CLR softkey is always visible on the NMTI screen, but can be activated only when the T1 link or Tributary T1 module is configured for ESF framing.

To clear a yellow alarm

1. From the CONFIG menu, select POSITION.
2. Enter <T1> for the T1 aggregate, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select OPTIONS — MORE — ALARM_TIME.
4. Select YELLOW_CLR, then select ON_RESYNCH to have the alarm cleared when synchronization is regained, or ON_RED_CLR, to have the yellow alarm cleared when the red alarm is cleared.

D2. T1 and Tributary T1 Circuit Configuration

This chapter describes the operating parameters for the T1 aggregate and Tributary T1 circuits.

Each T1 and Tributary T1 circuit is a 64 kb/s channel. The following operating parameters can be configured:

- robbed bit signalling
- data bit inversion
- signalling type
- fault signalling

Note

The FUNCTION softkey is used to set some of the above parameters. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

D2.1 Robbed Bit Signalling

When robbed bit signalling is enabled, the least significant bit (bit position 8) of every channel in frames 6 and 12 (if D4 framing is used) or frames 6, 12, 18 and 24 (if ESF framing is used) is overwritten with signalling information.

If a DCM or DNIC circuit with a bandwidth of 64 kb/s or greater is connected to a T1 circuit, robbed bit signalling must be disabled for the T1 or the Tributary T1 circuit.

Robbed bit signalling can be:

- ❏ enabled (default)
- ❏ disabled

The robbed bit signalling default configuration automatically changes when it is cross-connected to certain circuit types, as shown in Table D2-1.

Table D2-1: Robbed Bit Signalling and Circuit Cross-connections

Circuit Type	RBS after Cross-connection
DNIC/DCM/OCU	OFF
OCU with SW56	ON
CPSS	OFF (T1 aggregate only)

To enable or disable robbed bit signalling

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position and circuit number, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuits

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module
3. Select FUNCTION, then select RBS_ON to enable robbed bit signalling, or RBS_OFF to disable robbed bit signalling.

D2.2 Data Bit Inversion

If a T1 or Tributary T1 circuit is connected to a voice or data circuit, the *3624 MainStreet* node automatically matches data bit inversion to the type of circuit connected. Data bit inversion must be changed only where there is a requirement to convert between the ITU-T alternate digit inversion PCM output code format and the AT&T true-sign inverted magnitude PCM output code format. Digital signals on the T1 or Tributary T1 can be converted on a per circuit basis.

The inversion options are:

- ❑ data – bits are not inverted (default)
- ❑ voice – bits are inverted, therefore "0" bits are sent as "1" bits and vice versa. Select voice if you expect the circuit traffic to include a lot of zeros.

The data inversion default configuration automatically changes when it is cross-connected to certain circuit types, as shown in Table D2-2.

Table D2-2: Data Inversion and Circuit Cross-connections

Circuit Type	Data Inversion after Cross-connection
DNIC/DCM/OCU	DATA
CPSS	DATA (T1 aggregate only)
Voice circuit	VOICE

When the circuits have been connected, the default for bypass connections is data for both circuits. If the remote circuits are voice circuits, change this parameter after the connection is made.

To select data bit inversion

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position and circuit number, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuits

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module
3. Select FUNCTION, then select VOICE to enable data bit inversion. Select DATA to disable data bit inversion.

D2.3 Signalling Type

The two signalling options are:

- signalling on (default)
- signalling off

To create a clear 64 kb/s channel (a channel for which signalling is not passed), select no signalling and turn off robbed bit signalling.

Note

The signalling types are used only in T1-to-T1 connections. In addition, T1 circuits of different signalling types cannot be interconnected. T1_NOSIG can connect only to T1_NOSIG and T1_SIG can connect only to T1_SIG.

To enable or disable signalling

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position and circuit number, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuits

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module
3. Select MORE — SIG_TYPE.
4. Select SIG to turn signalling on, and NO_SIG to turn signalling off.

D2.4 Fault Signalling

Fault signalling specifies the bit codes that the *3624 MainStreet* node applies to a circuit if it is not cross-connected, or if the interface to which it is cross-connected is not available (not physically present or out of synchronization), and if fault signalling has been defined for the circuit.

The options are:

- seized
- idle
- none (default)
- custom

Seized and idle codes

Seized makes the circuit appear busy, while idle makes it appear available. For primary rate to tail circuit connections (for example, T1 to LGS), the seized and idle signalling codes are determined by the connection type. For intermediate connections, the codes default to E&M signalling codes:

- seized 1111
- idle 0000

These codes can be changed to handle circuits configured for other signalling types. See "Custom fault signalling", below.

If a circuit is configured for seized fault signalling, when a fault occurs the idle code is transmitted for 2.5 seconds, then the seized code is transmitted until the fault is cleared. If the circuit is configured for idle fault signalling, the idle code is transmitted until the fault is cleared.

No fault signalling

Selecting None disables trunk conditioning for an individual T1 or Tributary T1 circuit. If you turn fault signalling off for any circuit, no trunk conditioning is applied to that circuit regardless of how trunk conditioning for the link is configured.

To select seized, idle or no fault codes

1. From the CONFIG menu, select CIRCUIT.

2. Enter the module position and circuit number, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuits

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

3. Select FAULT_SIG, then select the appropriate fault code.

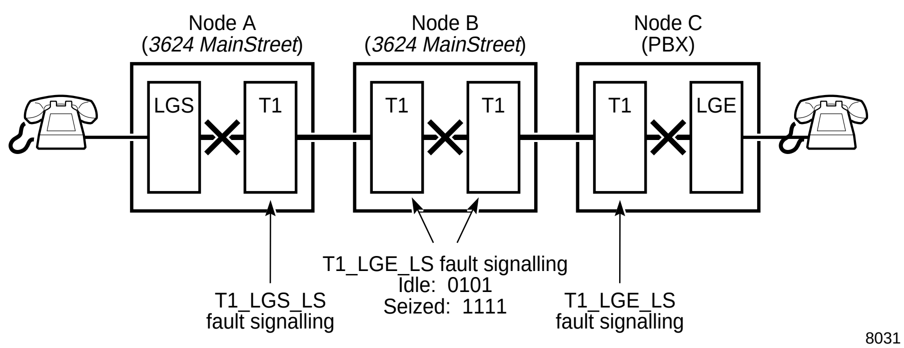
Custom fault signalling

The seized and idle codes are determined by the circuit type that the T1 circuit is cross-connected to. For example, a T1 circuit cross-connected to an LGS_LS circuit would use LGS_LS fault signalling. Intermediate circuits in a connection path (for example, T1 to Tributary T1 connections), always default to E&M signalling. If the circuit at the far end of the connection is not an E&M circuit, the codes sent will be incorrect.

Custom fault signalling allows you to configure the bit codes transmitted to the intermediate nodes, to accommodate for circuits that do not recognize E&M signalling.

As shown in Figure D2-1, the T1 circuits are automatically configured for the correct fault signalling when they are cross-connected to the LGS / LGE circuits. The T1 circuits in node B have been customized to send the correct LGE fault signalling; therefore, these codes will be recognized at the far end PBX.

Figure D2-1: Custom Fault Signalling for Intermediate Nodes



The configurable codes are:

❑ code_1 – the 4-bit ABCD code sent for the first 2.5 seconds of the fault (default is 0000)
❑ code_2 – the 4-bit ABCD code sent for the remainder of the fault (default is 1111)
❑ data – the default data to be sent during a fault (default is 11111111)

Note

The 4-bit code is valid for ESF framing only. If using D4 framing, only the first two bits (AB) are valid.

If fault signalling is set in D4 mode, and framing is changed to ESF, the first two bits are repeated (ABAB). If fault signalling is set in ESF mode, and framing is changed to D4, only the AB bits are used.

To define custom fault codes

1. From the CONFIG menu, select CIRCUIT.

2. Enter the module position and circuit number, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuits

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

3. Select FAULT_SIG — MORE — CUSTOM.

4. Select CODE_1 and enter the 4-bit seized or idle code that will be sent for the first 2.5 seconds of the fault.

5. Select CODE_2 and enter the 4-bit seized or idle code that will be sent for the remainder of the fault.

The NMTI display lists the typical signalling codes, as shown in Figure D2-2, below. The default is E&M signalling. To change the fault signalling, change the code bits to match the signalling type that you want.

Figure D2-2: Typical Signalling Codes

```
3624 MainStreet   620C-ab-cd   LONERANGER       Alarms:1        22-AUG-96  2:30P

 Circuit   Name     Type          Function          Fault     Status

 M01-01             T1_SIG        RBS_ON, VOICE      CUSTOM    Configured

CURRENT SIGNALLING: CODE_1 : 0000  CODE_2 : 1111  DEFAULT DATA : 11111111

COMMON  TYPE        IDLE    SEIZED            TYPE          IDLE    SEIZED
CODES:  E&M         1111    0101              LGS_EM        1101    1001
                                              LGS_LS        1101    1001
        LGE_LS_EM   0000    1111              LGS_GS        1101    1101
        LGE_GS      1111    0000              LGS_EM        1101    1101
        LGE_DPT     0101    0000              LGS_PLAR      1101    0101
                                              LGS_PLAR_FXO  1101    0101
        MRD         0000    1111              LGS_GS_DNIS   1101    0101
                                              LGS_LS_DNIS   1101    0101
                                              LGS_PLAR_D3   1101    0101


 CONFIG CIRCUIT 1-1 FAULT_SIG

  1-             2-CODE_1        3-CODE_2        4-DATA          5-
  6-             7-              8-CANCEL        9-QUIT          0-
```

If you change the fault signalling from custom to another type, the custom signalling defaults back to E&M.

E1. LGS Module

The LGS module is a dual-circuit module that provides an interface to subscriber equipment such as PBX and key system ports or single telephones. It is functionally equivalent to the FXS circuit.

This chapter describes how to configure the LGS module and circuit parameters:

- ❏ module variant
- ❏ TLPs
- ❏ signalling type
- ❏ wink time
- ❏ fault signalling

The module position must be specified before the module and circuits can be configured.

Note

The procedures that follow use the FUNCTION softkey. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

E1.1 LGS Module Variants

Figure E1-1 illustrates the information displayed on the LGS variants. The impedance, line reversal and PCM are preset for each variant.

Figure E1-1: LGS Module Variants

```
3624 MainStreet   620C-ab-cd                    Alarms:1    25-JUL-96    3:24P

#    Configured   Installed    Status        Name     Options

M01  LGS          Empty        Empty                  0156-06


 NUMBER   RX TLP  TX TLP  IMPEDANCE   LINE REV   PCM
 0156-02   0/-7    0/-7     600         no       MuLaw
 0156-03   0/-7    0/-7     600         yes      MuLaw
 0156-06  -3/-10  +4/-3     600         no       MuLaw
 0156-07  -3/-10  +4/-3     600         yes      MuLaw
 0156-08  -3/-10  +4/-3     600+2.16    yes      MuLaw






 CONFIG POSITION 1 OPTIONS


  1-0156-02       2-0156-03        3-               4-0156-07        5-0156-08
  6-              7-               8-CANCEL         9-QUIT           0-
```

To specify the LGS module variant

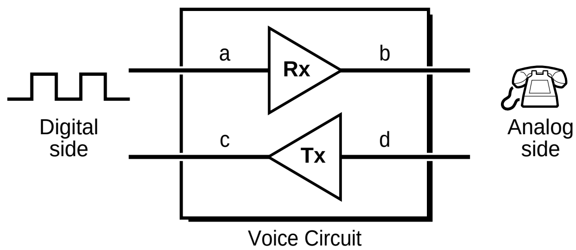
1. From the CONFIG menu, select POSITION.
2. Enter the module position (1 to 12) for the LGS module.
3. Select TYPE — VOICE — LGS.
4. Select OPTIONS, then select the appropriate module variant.

Module variant 0156-08 (manufacturing code C or greater) supports on-hook transmission, meaning that the voice path is present whether the interface is in the on-hook or off-hook state. This enables the module to be used in short-loop, on-site applications to provide support for the CLASS series of services. CLASS service provides features such as call trace, call screen, call name identity and calling party identity on call waiting.

E1.2 LGS Module TLPs

The TLP specifies the receive and transmit levels (in decibels) of the signal from a voice circuit, with respect to the digital trunk. See Figure E1-2. The receive TLP refers to the digital-to-analog level (the difference between **a** and **b**) and the transmit TLP refers to the analog-to-digital level (the difference between **d** and **c**).

Figure E1-2: TLPs

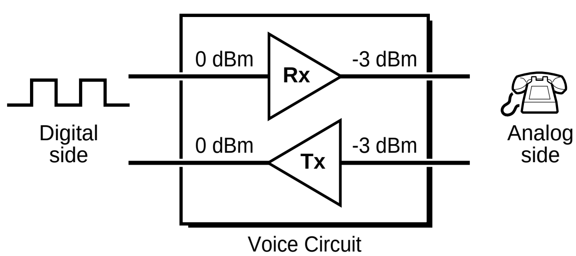


A TLP is measured with respect to 0 dBm on the digital side. Zero dBm is equal to 1 mW of power imposed upon an impedance of 600 Ω at a frequency of 1004 Hz. Zero dBm on the digital side is the digital signal required to produce 0 dBm on the analog side of a standard digital-to-analog converter.

Example: A receive TLP of –3 means that a digital input of 0 dBm produces an analog output of –3 dBm, as shown in Figure E1-3. The higher the receive TLP, the louder the phone conversation sounds.

A transmit TLP of –3 means that an analog signal of –3 dBm is needed to produce 0 dBm on the digital side. The higher the transmit TLP, the quieter the phone conversation sounds for a given input signal level.

Figure E1-3: Receive and Transmit TLP Example



TLP ranges for the LGS circuits

Table E1-1 lists the receive and transmit TLP ranges and default settings for all LGS circuits.

Table E1-1: TLP Ranges for LGS Circuits

LGS Circuits	TLP Range (dBm)	Steps (dBm)	Default (dBm)
LGS (0156-02)	Rx: 0 to –7 Tx: 0 to –7	1.0 1.0	0.0 0.0
LGS (0156-03)	Rx: 0 to –7 Tx: 0 to –7	1.0 1.0	0.0 0.0
LGS (0156-06)	Rx: –3 to –10 Tx: +4 to –3	1.0 1.0	–7.0 0.0
LGS (0156-07)	Rx: –3 to –10 Tx: +4 to –3	1.0 1.0	–7.0 0.0
LGS (0156-08)	Rx: –3 to –10 Tx: +4 to –3	1.0 1.0	–7.0 0.0

To set receive and transmit TLP values for the LGS circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGS module.
3. Select LEVELS.
4. Select RX_TLP and enter the TLP value for the receive TLP.
5. Select TX_TLP and enter the TLP value for the transmit TLP.

E1.3 Signalling Types for the LGS Module

The signalling type specifies the operating mode of a circuit. Table E1-2 describes the signalling options.

Table E1-2: Signalling Types for LGS Circuits

Signalling Type	Description
LS	The LGS circuit idle state is ground on the Tip lead and battery on the Ring lead. When a subscriber seizes the line by going off-hook, the interface generates and maintains a constant loop current. The LGS circuit initiates calls to the CPE by applying ringing voltage on the T/R leads. The LGS circuit detects T/R loop closure when the subscriber is off-hook.
GS	The LGS circuit idle state is battery on Ring lead and Tip lead open. The open state is created by generating a high impedance between the Tip lead and ground. When the CPE grounds the Ring lead to initiate a call, the LGS circuit responds by grounding the Tip lead. The subscriber circuit acknowledges the response by removing the Ring ground and closing the T/R loop. To initiate calls to the CPE, the LGS circuit applies ringing voltage on the T/R leads and ground on the tip. The circuit detects T/R loop closure when the subscriber is off-hook. The call terminates when either end opens the T/R loop creating an on-hook state.
LS_EM	LGS interfaces convert between CPE loop start signalling and network E&M signalling. If a Tone or DDS module is installed, the LGS interfaces also provide ringback tone.
GS_EM	LGS interfaces convert between CPE ground start signalling and network E&M signalling. If a Tone or DDS module is installed, the LGS interfaces also provide ringback tone.
DPO	DPO is a one-way version of loop start for DID circuits. A one-way DID trunk is assumed from a CO to a PBX where the LGS circuit is located at the CO. The LGS circuit idle state is ground on the Tip lead and battery on the Ring lead. The CO initiates a call by closing the T/R loop. The far end circuit acknowledges the seizure by initiating a wink which is passed on by the LGS circuit to the CO. When the CPE provides answer supervision, the LGS circuit passes it to the CO by generating line reversal. This functionality is available only in the LR (07) and CI (08) modules. The call terminates when either end goes on-hook, opening the loop and returning the battery condition to normal.
LS_DNIS	LS_DNIS mode provides DNIS compatibility for loop start PBX trunks. The circuit can be programmed to pass up to 22 DTMF digits to the CPE. The duration of the wink is also programmable.
GS_DNIS	GS_DNIS mode provides DNIS compatibility for ground start PBX trunks. The circuit can be programmed to pass up to 22 DTMF digits to the CPE. The duration of the wink is also programmable.
PLAR	PLAR operation provides a pre-defined connection path between two dedicated subscribers. The idle state is the same as for LS with the Tip lead at ground potential and the Ring lead at battery voltage. A subscriber going off-hook causes a loop current which is detected by the PLAR circuit. This generates a cadenced Ring of two seconds on, four seconds off. The Ring voltage is applied until the called subscriber answers or until the calling subscriber terminates the attempt. If the *3624 MainStreet* node has a Tone or DDS module, ringback tone is generated to the calling party. The call terminates when either end opens the T/R loop creating an on-hook state.
PLAR_FXO	PLAR FXO mode provides PLAR functionality with PLAR-to-FXO signalling conversion for connections to FXS far end equipment. The circuit functions in the same fashion as in PLAR mode.
PLAR_D3	PLAR_D3 mode provides PLAR function using D3 signalling. This allows PLAR functionality on networks that contain D3 channel banks.

Note

The DPO softkey does not appear if the LGS circuit is on a module without line reversal capability.

To set the signalling type for the LGS circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGS module.
3. Select FUNCTION, then select one of the signalling types listed in Table E1-2.

E1.4 Wink Time for the LGS Module

LGS circuits that are configured as LS_DNIS or GS_DNIS have a signal that lasts for a configurable period of time, called the wink duration. The wink duration is followed by a configurable delay, called the post-wink duration (or digit time).

To configure the wink and post-wink duration

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGS module.
3. Select FUNCTION — MORE.
4. Select WINKTIME and enter the wink duration. The wink duration is configurable in the range of 50 to 400 ms, in 50-ms increments. The default is 250 ms.
5. Select DIGITTIME and enter the post-wink duration. The post-wink duration is configurable in the range of 750 ms to 4.25 seconds, in 50-ms increments. The default is 750 ms.

E1.5 Fault Signalling for the LGS Module

The *3624 MainStreet* node applies fault signalling to the circuit if the equipment to which it is cross-connected is not physically present or is out of synchronization. The options are:

- ❑ seized
- ❑ idle (default)

When seized, the node transmits MOS ("multiplexer out of sync") codes to the DSU when the circuit is not connected or the network is not in synchronization. When idle, CMI ("control mode idle") codes are transmitted. Seized makes the circuit appear busy, while idle makes it appear available.

On the network side, when an OCU circuit is connected to a T1 channel and T1 synchronization is present, the DSU codes are passed transparently to the network. If there is no DSU connected to the OCU, the OCU circuit transmits ASC codes to the network.

The manner in which fault signalling is transmitted depends on trunk conditioning. See *Configuration*, section D1.6.

To define fault codes for the LGS circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGS module.
3. Select FAULT_SIG, then select either SEIZED or IDLE.

Note

Changing the fault signalling is permitted on the NMTI while the circuit is cross-connected; however, changes do not take effect until the next circuit cross-connection.

E2. LGE Module

The LGE module is a dual-circuit module that provides an interface to subscriber trunks and PBX extension ports. It is functionally equivalent to the FXO circuit.

This chapter describes how to configure the LGE module and circuit parameters:

❏ module variant
❏ TLPs
❏ signalling type
❏ fault signalling

The module position must be specified before the module and circuits can be configured.

Note

The procedures that follow use the FUNCTION softkey. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

E2.1 LGE Module Variants

Figure E2-1 illustrates the information displayed on the LGE variants. The impedance and PCM are preset for each variant.

Figure E2-1: LGE Module Variants

```
3624 MainStreet   620C-ab-cd                    Alarms:1    25-JUL-96     3:54P

#    Configured   Installed     Status        Name     Options

M02  LGE           Empty        Empty                  0526-01


NUMBER   RX TLP  TX TLP  IMPEDANCE   PCM
0526-01   0/-7    0/-7     600      MuLaw
0526-03  -3/-10  +3/-4     600      MuLaw









CONFIG POSITION 2 OPTIONS


 1-             2-0526-03         3-              4-              5-
 6-             7-                8-CANCEL        9-QUIT          0-
```

To specify the LGE module variant

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1 to 12) for the LGE module.
3. Select TYPE — VOICE — LGE.
4. Select OPTIONS, then select the appropriate module variant.

E2.2 LGE Module TLPs

The TLP specifies the receive and transmit levels (in decibels) of the signal from a voice circuit with respect to the digital trunk. For more information about TLPs, see *Configuration*, section E1.2.

TLP ranges for the LGE circuits

Table E2-1 lists the receive and transmit TLP ranges and default settings for all LGE variants.

Table E2-1: TLP Ranges for LGE Circuits

LGE Circuit	TLP Range (dBm)	Steps (dBm)	Default (dBm)
LGE (0526-01)	Rx: 0 to –7 Tx: 0 to –7	1.0 1.0	0.0 0.0
LGE (0526-03)	Rx: –3 to –10 Tx: +3 to –4	1.0 1.0	–7.0 0.0

To set receive and transmit TLP values for the LGE circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGE module.
3. Select LEVELS.
4. Select RX_TLP and enter the TLP value for the receive TLP.
5. Select TX_TLP and enter the TLP value for the transmit TLP.

E2.3 Signalling Types for the LGE Module

The signalling type specifies the operating mode of a circuit. Table E2-2 lists and describes the signalling types.

Table E2-2: Signalling Types for LGE Circuits

Signalling Type	Description
LS	In the idle state, the circuit receives ground on the Tip lead and battery on the Ring lead from the CPE. The LGE circuit responds to loop closure from the far end CPE, which generates an off-hook state to the CPE. The CPE initiates calls by generating ringing voltage on T/R to the LGE circuit. The LGE responds to loop closure from the far end.
GS	In the idle state, the circuit receives ground on the Tip lead and battery on the Ring lead from the CPE. A call initiated from the far end is passed to the CPE by the LGE circuit grounding the Tip lead, at which time it closes the loop. The CPE initiates calls by generating ringing voltage on the T/R loop which is detected by the LGE circuit. The LGE circuit responds to loop closures from the far end. The call terminates when either end opens the T/R loop creating an on-hook state.
DPT	The LGE DPT circuit is the complement to the LGS DPO circuit and is located at the CPE end of the DID trunk. In the idle state, the circuit receives ground on the Tip lead and battery on the Ring lead from the CPE. The circuit is seized by the CO at the far end. This seizure is passed to the CPE by closing the T/R loop. The circuit detects the wink from the PBX as an indication that the PBX is ready to receive dialling and passes this wink to the CO. When the called subscriber answers, the DPT circuit responds to a T/R line reversal and passes the line reversal on to the CO. The call terminates when either end opens the T/R loop creating an on-hook state.

To set the signalling type for the LGE circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGE module.
3. Select FUNCTION, then select one of the signalling types listed in Table E2-2.

E2.4 Fault Signalling for the LGE Module

The unit applies fault signalling to the circuit if the equipment that it is cross-connected to is not physically present or is out of synchronization. The default fault signalling is idle. See *Configuration*, section E1.5 for more information on fault signalling.

To define fault codes for the LGE circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the LGE module.
3. Select FAULT_SIG, then select either SEIZED or IDLE.

E3. E&M Module

The E&M module is a dual-circuit module that formats voice signals from customer premise equipment, such as a PBX, for transmission onto the T1 aggregate link.

Two variants are available, each providing a choice of transmission over 2- or 4-wire paths. For the 4-wire path, different transmission level settings are offered for standard and extended ranges.

This chapter describes how to configure the E&M module and circuit parameters:

- module variant
- 2- and 4-wire audio transmission
- standard and extended TLPs
- fault signalling

The module position must be specified before the module and circuits can be configured.

E3.1 E&M Module Variants

Figure E3-1 illustrates the information displayed on the E&M variants. The impedance and PCM are preset for each variant.

Figure E3-1: E&M Module Variants

```
3624 MainStreet   620C-ab-cd                     Alarms:1    25-JUL-96   4:10P

#    Configured   Installed    Status        Name     Options

M03  E+M          Empty        Empty                  0157-03 2-WIRE


 NUMBER   RX TLP  TX TLP  IMPEDANCE  EXT GAIN   PCM
 0157-01  +4/-3.5  +4/-3.5   600        yes     MuLaw
 0157-03  -3/-10   +4/-3.5   600        yes     MuLaw









 CONFIG POSITION 3 OPTIONS


  1-0157-01          2-              3-               4-              5-
  6-4-WIRE           7-              8-CANCEL         9-QUIT          0-
```

To specify the E&M module variant

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1 to 12) for the E&M module.
3. Select TYPE — VOICE — E&M.
4. Select OPTIONS, then select the appropriate module variant.

E3.2 Audio Transmission Path

E&M transmissions can be sent over 2-wire or 4-wire paths. If you select 4-wire transmission, an extended range of TLPs becomes available. See section E3.3.

Changing a circuit from 2-wire to 4-wire operation and vice versa returns the receive and transmit TLPs to their default values.

To select 2-wire or 4-wire transmission paths

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1 to 12) for the E&M module.
3. Select TYPE — VOICE — E&M.
4. Select OPTIONS, then select 2_WIRE or 4_WIRE transmission.

E3.3 E&M Module TLPs

The TLP specifies the receive and transmit levels (in decibels) of the signal from a voice circuit with respect to the digital trunk. For more information about TLPs, see *Configuration*, section E1.2.

TLP ranges for the E&M circuits

If the E&M module is configured for 4-wire audio transmission, the TLP range can be set to:

❑ standard range
❑ extended range

Table E3-1 lists the standard and extended TLP ranges for all E&M circuits, and gives the default settings.

Table E3-1: TLP Ranges for E&M Circuits

E&M Module	Module Ranges	TLP Range (dBm)	Steps (dBm)	Default (dBm)
E&M (0157-01)	Standard	Rx: +4 to –3.5 Tx: +4 to –3.5	0.5 0.5	0.0 0.0
	Extended	Rx: +3.5 to +11 Tx: –19.5 to –12	0.5 0.5	+7.0 –16.0
E&M (0157-03)	Standard	Rx: –3.5 to –10 Tx: +4 to –3.5	0.5 0.5	–7.0 0.0
	Extended	Rx: +3.5 to +11 Tx: –19.5 to –12	0.5 0.5	+7.0 –16.0

To set receive and transmit TLP values for the E&M circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the E&M module.
3. Select LEVELS.

   If the E&M module has been configured for 4-wire audio transmission, the EXTENDED softkey appears.
4. Select EXTENDED to use the extended TLP ranges. Select STANDARD to use the standard TLP ranges. If the E&M module has been configured for 2-wire audio transmission, the standard range always applies.
5. Select RX_TLP and enter the TLP value for the receive TLP.
6. Select TX_TLP and enter the TLP value for the transmit TLP.

If you change the audio transmission path and the new range does not support the configured TLP, the values are set to zero.

E3.4 Fault Signalling for the E&M Module

The unit applies fault signalling to the circuit if the equipment that it is cross-connected to is not physically present or is out of synchronization. The default is idle. See *Configuration*, section E1.5 for more information on fault signalling.

To define fault codes for the E&M circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the E&M module.
3. Select FAULT_SIG, then select either SEIZED or IDLE.

E4. MRD Module

The MRD module is a dual-circuit module that provides an interface to a specialized telephone or a key system.

This chapter describes how to configure the TLP parameters for the circuits.

The module position must be specified before the circuits can be configured.

E4.1 MRD Module TLPs

The TLP specifies the receive and transmit levels (in decibels) of the signal from a voice circuit with respect to the digital trunk. For more information about TLPs, see *Configuration*, section E1.2.

TLP ranges for MRD circuits

Table E4-1 lists the receive and transmit TLP ranges and defaults for all MRD circuits.

Table E4-1: TLP Ranges for MRD Circuits

TLP Range (dBm)	Steps (dBm)	Default (dBm)
Rx: 0 to –15	1.0	0.0
Tx: 0 to –15	1.0	0.0

To set receive and transmit TLP values for the MRD circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the MRD module.
3. Select LEVELS.
4. Select RX_TLP and enter the TLP value for the receive TLP.
5. Select TX_TLP and enter the TLP value for the transmit TLP.

F1. DNIC Module

The DNIC module enables data equipment to be connected to T1 aggregate digital networks through a *26XX MainStreet* series DTU. It provides terminations for basic rate 2B+D data transmission over a single twisted pair of wires. HCM and transparent multiplexing, subrate multiplexing and multidrop data bridging are supported.

Note

To operate a DNIC module, a DTU module must be installed in the Control card DTU socket as described in *Installation*, chapter C1.

The DNIC module has two circuits, labelled A and B. A two-port DTU (*2601*, *2602*, *2603* and *2610 MainStreet*) provides two data device ports (A and B), which are available for up to two data devices. Data device port A automatically cross-connects to DNIC circuit A, and data device port B automatically cross-connects to DNIC circuit B.

The *2606* and *2608 MainStreet* DTUs provide eight data device ports multiplexed onto two aggregate ports (A and B). Multiplexer port A automatically cross-connects to DNIC circuit A, and multiplexer port B automatically cross-connects to DNIC circuit B.

DNIC circuit configuration involves configuring the operating parameters of the DTU connected to the DNIC module.

This chapter describes how to configure the DNIC circuit parameters:

❑ device mode
❑ device gender
❑ duplex method
❑ RTS/CTS delay
❑ control leads
❑ data structure (character length, stop bits, parity)
❑ clocking
❑ multidrop data bridge

For information on configuring the rate adaption method and parameters, see *Configuration*, chapters G1 through G4.

For two-port DTUs, configure circuit A to set the parameters for DNIC circuit A and data device port A, then configure circuit B to set the parameters for DNIC circuit B and data device port B.

For the *2608 MainStreet* DTU, configure circuit B to set all data device ports with the same parameters.

For the *2606 MainStreet* DTU, configure circuits A and B to set the parameters for the DNIC circuits, then configure each data device port (1 to 8) separately.

The module position must be specified before the circuits can be configured. You must also know the operating parameters of the connected data devices.

Note

The procedures that follow use the FUNCTION softkey. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

F1.1 Selecting a DTU Type

Before configuring the DTU port parameters, you must configure DNIC port A to match the type of DTU. The type is automatically copied to DNIC port B.

To select a DTU type

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A) for the DNIC module.
3. Select MORE — TYPE.
4. Select the type of DTU. If you are configuring a *2606 MainStreet* DTU, select 2606. For all other DTUs, select 2_PORT.

F1.2 Device Mode for the DNIC Module

Data circuits support two device modes:

- ❑ asynchronous
- ❑ synchronous (default)

Asynchronous devices transmit data one character at a time. A character can be represented by 5, 6, 7 or 8 bits, with start and stop bits used to mark the beginning and end of the character. If asynchronous is selected, transparent rate adaption cannot be used.

Synchronous devices transmit data in a continuous stream of characters, and maintain synchronization through separately transmitted timing signals.

For the *2608* and *2610 MainStreet* DTUs, the A circuit (*p*-A), which configures the aggregate port, is always synchronous. The B circuit (*p*-B), which configures the branch ports, is always asynchronous. For all other DTUs, the device mode is configurable.

To configure the device mode for the DNIC module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — I/F_MODE.
4. Select ASYNC or SYNC.
5. To configure the device mode for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) and the DTU device port (1 to 8). Repeat steps 3 and 4.

F1.3 Device Gender for the DNIC Module

DNIC circuits support two device genders transmitted over twisted wire pairs:

- ❏ DTE
- ❏ DCE (default)

The device gender indicates which wire in the pair is used to send or receive the data or control lead. A DTE device sends data or control leads on one of the wires; a DCE device sends signals on the other wire.

A TXD signal is data transmitted from a DTE device to a DCE device (DTE sends and DCE receives). An RXD signal is data transmitted from a DCE device to a DTE device (DCE sends and DTE receives).

In general, terminals and printers are DTE while modems are DCE. However, there are many exceptions. If the operating manual for the device indicates that the TXD signal is outgoing, the device is DTE; if it is incoming, the device is DCE. The opposite is true for the RXD signal.

To configure the device gender for the DNIC module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — I/F_MODE.
4. Select DTE or DCE.
5. To configure the device gender for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

F1.4 Duplex Method for the DNIC Module

DNIC circuits support two duplex modes:

❏ half-duplex
❏ full-duplex (default)

Half-duplex transmission uses a single transmission path. Two connected devices can transmit and receive, but not at the same time.

Full-duplex transmission uses two independent transmission paths, one in each direction. This allows two connected devices to transmit and receive data simultaneously.

If you select full-duplex, the RTS/CTS delay option cannot be configured. The duplex method is automatically configured when a circuit is configured for a multidrop data bridge.

To configure the duplex method for the DNIC module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — I/F_MODE.
4. Select HALF_DPLX or FULL_DPLX.
5. To configure the duplex method for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

F1.5 RTS/CTS Delay for the DNIC Module

The RTS and CTS control leads regulate the direction of data flow on half-duplex lines. When one device wants to send a message to another, it asserts RTS. The modem connected to this device asserts CTS after a time delay. The time delay must be long enough to allow the line to clear any messages coming into the device. This time delay is called RTS / CTS delay.

Example: The RTS / CTS delay is used in multidrop data bridges to make a slave device wait long enough to guarantee that a transmission path has been established to the master device. An RTS / CTS delay that is too short results in messages being lost. A delay that is too long decreases response time. The optimum value depends on your network.

Note

For DNIC circuits, the RTS / CTS delay is only configurable if the circuit is configured for half-duplex mode or as a multidrop slave.

To configure the RTS/CTS delay for the DNIC module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — I / F_MODE.
4. Select RTS / CTS, then enter a delay time (0 to 1250 ms in 10-ms increments). The default is 0 ms.
5. To configure the RTS / CTS delay for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

The actual RTS to CTS delay time may be up to 20 ms longer than the configured delay time. This delay is in addition to any transmission delay (which may be up to 500 ms on satellite links).

F1.6 Control Leads for the DNIC Module

Control leads provide the handshaking required for call setup, call clearing and synchronization. The control leads that can be configured are:

- DTR
- RTS
- ALB
- RDL
- DSR
- DCD
- CTS
- RI

If the device is configured as synchronous, DTR and DSR are not functional.

Control leads can be configured as:

- high
- low
- end-to-end

When the control leads are configured as end-to-end, the state of the local lead follows that of the signal source at the remote end of the network. This option is available only if HCM rate adaption is selected.

On the NMTI display, the input leads for DTU ports are listed in the left column and the outputs are listed in the right column.

When the DDS 2 Module is installed and DDS rate adaption is selected, end-to-end control signalling is available only on the RTS / DCD pair.

Table F1-1 shows the control leads with their default settings.

Table F1-1: DNIC Module Control Leads

Operating Mode	Inputs	Default	Outputs	Default
DCE	DTR	END_TO_END	DSR	FORCED_ON
	RTS	END_TO_END	DCD	END_TO_END
	ALB	END_TO_END	CTS	END_TO_END
	RDL	END_TO_END	RI	FORCED_OFF
DTE	DSR	END_TO_END	DTR	FORCED_ON
	DCD	END_TO_END	RTS	END_TO_END
	CTS	END_TO_END	ALB	END_TO_END
	RI	END_TO_END	RDL	FORCED_ON

DTUs and control leads

For 56 kb/s transparent channels, when RTS is set for end-to-end operation, the value of RTS is forced into bit position 8. The far end DTU maps RTS to its own DCD lead going to the DTE devices. With both DTUs set for end-to-end signalling, incoming RTS in bit position 8 is mapped to DCD.

For the *2602 MainStreet* DTU, which supports X.21 devices, the control lead (C) is represented on the NMTI by RTS (if DTE) or DCD (if DCE). The indication lead (I) is represented on the NMTI by DCD (if DTE) or RTS (if DCE). The other control leads are not used.

For the *2608 MainStreet* DTU, only two inputs (DTR and RTS) and two outputs (DSR and DCD) are supported for the B circuit. This circuit is always DCE. This parameter is not relevant to the A circuit.

For the other DTUs, all control leads are configurable as detailed above.

Note

Control leads are the only interface parameter that can be set for a circuit configured as a timing source. Control leads can be changed if a circuit is cross-connected.

To configure control leads for the DNIC module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — CTRL_LEADS.
4. Select INPUTS or OUTPUTS, then select a control lead.
5. Configure the control lead by selecting ON, OFF to END_TO_END.
6. To configure the control leads for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 to 5.

F1.7 Data Structure for the DNIC Module

The configurable data characteristics are:

- ❏ character length
- ❏ number of stop bits
- ❏ parity

For the *2608* and *2610 MainStreet* DTUs, these parameters can be set for the B circuit only.

For the *2601*, *2602*, *2603* and *2606 MainStreet* DTUs, these parameters can be set for both A and B circuits.

To set the character length for the DNIC module

Character length is the number of data bits used to transmit a character in asynchronous transmission. Character length can be set to:

- ❏ 5 bits
- ❏ 6 bits
- ❏ 7 bits
- ❏ 8 bits (default)

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — CHAR_LEN.
4. Select the appropriate character length.
5. To set the character length for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

To set the stop bits for the DNIC module

Stop bits signify the end of a character in asynchronous transmission. The stop bit formats are:

- ❏ 1 bit (default)
- ❏ 2 bits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — STOP_BITS.
4. Select 1_BIT or 2_BITS.
5. To set the stop bits for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

To set the parity for the DNIC module

Parity is an error detection method that adds an extra bit to each transmitted character. It is based on the number of zeros or ones in each character. Parity can be set to:

- ❑ none (default)
- ❑ odd
- ❑ even
- ❑ mark
- ❑ space

1. From the CONFIG menu, select CIRCUIT.

2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.

3. Select FUNCTION — PARITY.

4. Select the parity method.

5. To set the parity for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

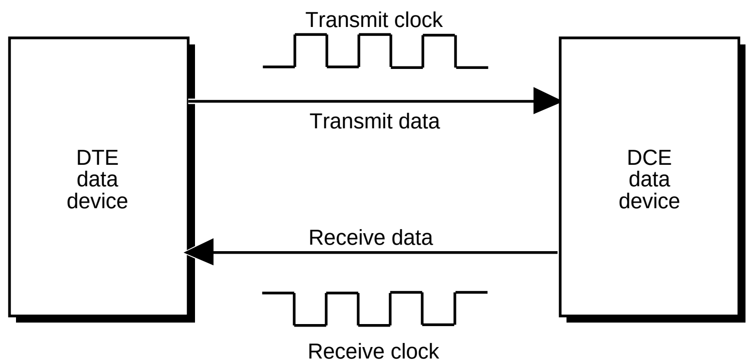
Note

The sum of the start bit (always 1), character length, stop bits and parity (0 for no parity or 1 for odd, even, mark or space) must be between 8 and 11, inclusive. For example, if the character length is set to 5 bits and the number of stop bits is set to 1, the parity cannot be set to none, as this would add up to 7 bits. If the number of bits is not between 8 and 11, relevant softkeys do not appear.

F1.8 Clocking for the DNIC Module

Synchronous data devices require two timing sources: one for receive data and one for transmit data. The timing source for the receive data is called the receive clock, and the timing source for the transmit data is called the transmit clock. DTE devices use the transmit clock to transmit data, while DCE devices use the transmit clock to receive data. See Figure F1-1.

Figure F1-1: Transmit and Receive Clocks



To specify the source of the transmit clock for the DNIC module

The source of the transmit clock between the data circuit and the attached local device can supplied by:

- ❑ the attached device (external)
- ❑ the data circuit to which the device is attached (internal)
- ❑ a remote source (slave)

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — CLOCKING.
4. Select a clocking source – EXTERNAL, INTERNAL or SLAVE.
5. To set the clocking source for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

The internal option is not available if transparent or DDS rate adaption is selected.

The parameter setting depends on whether the circuit is in DCE or DTE mode and the gender of the attached device, as shown in Table F1-2.

Table F1-2: Transmit Clock Parameter Settings for Device Genders

Device Mode	Circuit Mode	Transmit Clock Options
DTE	DCE	External means the user equipment provides the transmit clock via the XCLK pin from the DTU. Internal means the BRG in the DTU provides the transmit clock. The BRG is locked to system timing. Internal is only available with HCM rate adaption. Slave means the circuit derives its transmit clock timing from the data stream.
DCE	DTE	You can select slave (default), external, or internal as the clocking source of the attached DCE device.

The clocking source cannot be set for the *2608* and *2610 MainStreet* DTUs.

To specify the state of the clock signals for the DNIC module

You can configure the effect that the *3624 MainStreet* node has on clock signals passing through it. The clocks can be:

- ❏ locked, indicating that the data clocks are locked to the *3624 MainStreet* node timing
- ❏ independent, indicating that the data clocks are passing through the unit transparently

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — CLOCKING.
4. Select the state of the clock signals – either LOCKED or INDEPNT.
5. To configure the state of the clocking signals for the *2606 MainStreet* DTU ports, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

If the clocking for a circuit is independent, the clocking information is embedded in the signalling bit of an HCM frame and passed through transparently. In independent mode, deviations of up to 50 b/s relative to the nominal rate can be accommodated.

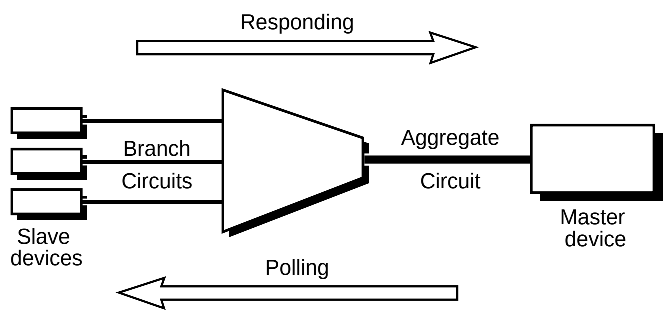
For more information, contact your Newbridge representative and request Configuration Note NCN305, entitled *Data Interface Clocking.*

F1.9 Multidrop Data Bridge for the DNIC Module

In a multidrop data bridge, two or more circuits take turns using the same bandwidth to communicate with another circuit.

Example: Several terminals may take turns communicating with a computer. The one circuit that all the other circuits communicate with (the circuit connected to the host computer) is designated the master. The remaining circuits (connected to terminals) are designated slaves. Refer to Figure F1-2.

Figure F1-2: Multidrop Data Bridge



The master device controls the shared bandwidth by polling the slave devices one after the other, asking each if it has data to send to the master. Only one slave may transmit at a time.

Each data circuit is designated as one of the following:

- master
- slave
- disabled (default)

One circuit in a multidrop data bridge must be designated the master. If HCM rate adaption is used, the *3624 MainStreet* node automatically changes the configuration of the master circuit to full-duplex and turns signalling off.

All other circuits in the multidrop data bridge are designated slaves. The *3624 MainStreet* node automatically changes the configuration of the slave circuit to half-duplex and turns signalling off.

The data on each type of circuit must occupy the same amount of bandwidth with the same starting data position. Each slave device transmits data in that bandwidth at a different time. The master device sends its polling messages and looks for data from the slave devices in that bandwidth.

If the circuit is configured as DCE, the DCD control lead must be forced on. If the circuit is configured as DTE, the RTS control lead must be forced on.

The copy adjust function must not be used when configuring circuits that are part of the same multidrop data bridge. See *Configuration*, section G3.5.

To configure a DNIC circuit for a multidrop data bridge

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — I/F_MODE.
4. Select MULTI-DROP, then select MASTER, SLAVE or DISABLE.
5. To configure the *2606 MainStreet* DTU ports for multidrop data bridging, enter the module position (1 to 12) for the DNIC module, and the DTU device port (1 to 8). Repeat steps 3 and 4.

F2. RS-232 Direct Connect Module

The RS-232 DCM is a dual-circuit module used to provide two synchronous or asynchronous network interfaces.

Data devices connect directly to the RS-232 DCM; therefore, the DCM does not require a DTU module on the Control card or DTUs to be attached to it.

This chapter describes how to configure the RS-232 DCM parameters:

❑ device mode (synchronous or asynchronous)
❑ device gender (DTE or DCE)
❑ duplex method
❑ RTS / CTS delay
❑ control leads
❑ data structure (character length, stop bits, parity)
❑ clocking
❑ multidrop data bridge

For information on configuring the rate adaption method and parameters, see *Configuration*, chapters G1 through G4.

The module position must be specified before the circuits can be configured. You must also know the operating parameters of the connected data devices.

Note

The procedures that follow use the FUNCTION softkey. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

F2.1 Device Mode for the RS-232 DCM

RS-232 DCM circuits support two device modes:

❑ asynchronous
❑ synchronous (default)

For more information on device modes, see *Configuration*, section F1.2.

To configure the device mode for the RS-232 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select ASYNC or SYNC.

F2.2 Device Gender for the RS-232 DCM

RS-232 DCM circuits support two device genders:

❑ DTE
❑ DCE (default)

For more information on device genders, see *Configuration*, section F1.3.

To configure the device gender for the RS-232 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select DTE or DCE.

F2.3 Duplex Method for the RS-232 DCM

The duplex method is not configurable. It is set to full-duplex and is automatically changed when a circuit is configured for a multidrop data bridge.

F2.4 RTS/CTS Delay for the RS-232 DCM

The RTS/CTS delay is configurable only if the circuit has been configured as a multidrop data bridge slave. For more information about RTS/CTS delay, see *Configuration*, section F1.5.

To configure the RTS/CTS delay for the RS-232 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select RTS/CTS, then enter a delay time (0 to 140 ms in 10-ms increments). The default is 0 ms.

F2.5 Control Leads for the RS-232 DCM

Control leads provide the handshaking required for call setup, call clearing and synchronization. For more information, refer to *Configuration*, section F1.6.

The control leads that can be configured are:

- ❏ DTR
- ❏ DSR
- ❏ RTS
- ❏ CTS
- ❏ DCD

The control leads that are applicable to the operating mode of the RS-232 DCM are shown in Table F2-1.

Table F2-1: RS-232 DCM Control Leads

Operating Mode	Inputs	Default	Outputs	Default
Async DCE	RTS DTR	END_TO_END END_TO_END	CTS DSR	END_TO_END FORCED_ON
Async DTE	DCD DSR	END_TO_END END_TO_END	RTS DTR	END_TO_END FORCED_ON
Sync(1) DCE (Slave or External)	RTS	END_TO_END	CTS(2)	END_TO_END
Sync(1) DTE (Internal)	–		RTS	END_TO_END
Sync(1) DTE (Slave or External)	DCD	END_TO_END	RTS	END_TO_END

Notes

1. If the device is configured as synchronous, DTR and DSR are not functional.
2. Local CTS follows local RTS in sync DCE mode.

Note

In sync DCE mode, an RTS lead raised on the local end is propagated to the far end as DCD. The far end must be able to extract the lead as DCD and pass it on to the user equipment. RS-232 DCMs have limited control lead capability, and therefore cannot extract and pass on the DCD lead to be output as CTS. In order to operate in sync DCE mode, then, the user must have an RS-232 DTU at the far end providing full control lead support.

When the control leads are configured as end-to-end, the state of the local signal follows that of the signal source at the remote end of the network. This option is only available if HCM rate adaption is selected.

When a DDS module is installed and DDS rate adaption is selected, end-to-end control signalling is available only on the RTS / CTS pair (for async DCE) and the DCD / RTS pair (for async DTE). For synchronous modes, end-to-end control signalling is available as shown in Table F2-1.

To configure control leads for the RS-232 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — CTRL_LEADS.
4. Select INPUTS or OUTPUTS, then select a control lead.
5. Configure the control lead by selecting ON, OFF or END_TO_END.

F2.6 Data Structure for the RS-232 DCM

The configurable data characteristics are:

- character length
- number of stop bits
- parity

For more information about data structure, see *Configuration*, section F1.7.

To set character length for the RS-232 DCM

The character length can be set to:

- 5 bits
- 6 bits
- 7 bits
- 8 bits (default)

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — CHAR_LEN.
4. Select the appropriate character length.

To set stop bits for the RS-232 DCM

The stop bit formats are:

- 1 bit (default)
- 2 bits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — STOP_BITS.
4. Select 1_BIT or 2_BITS.

To set parity for the RS-232 DCM

The parity can be set to:

- ❏ none (default)
- ❏ odd
- ❏ even
- ❏ mark
- ❏ space

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — PARITY.
4. Select the parity method.

F2.7 Clocking for the RS-232 DCM

Synchronous data devices require two timing sources: one for receive data and one for transmit data. For more information about clocking, see *Configuration*, section F1.8.

To specify the source of the transmit clock for the RS-232 DCM

The source of the transmit clock between the data circuit and the attached local device can be set. If the circuit is in DCE mode, the transmit clock options are slave or external. If the circuit is in DTE mode, the options are slave, external or internal.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — CLOCKING.
4. Select a clocking source – EXERNAL, INTERNAL or SLAVE.

The internal option is not available if transparent or DDS rate adaption is selected.

To configure the RS-232 DCM for receive clock inversion

RS-232 DCMs with manufacturing code D or greater can be configured for receive clock inversion. Receive clock inversion can compensate for possible phase shifts between the transmit clock and receive data signals. This feature may be used to resolve problems with speeds above 34.8 kb/s on RS-232 circuits.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — CLOCKING.
4. Select either RX_INV or NO_RX_INV. The default is no inversion.

To specify the state of the clock signals for the RS-232 DCM

The clock can also be:

❏ locked to the timing of the *3624 MainStreet* node (HCM or transparent rate adaption)

❏ independent, indicating that the data clocks pass through transparently

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — CLOCKING.
4. Select the state of the clock signals – either LOCKED or INDEPNT.

Caution

When a DCM is configured as DTE, use slave locked rather than internal locked. DCMs do not support external independent clocking at 1200 b/s; therefore, use slave locked at this data rate. Failure to do so may result in a high bit error rate.

F2.8 Multidrop Data Bridge for the RS-232 DCM

In a multidrop data bridge, two or more circuits take turns using the same bandwidth to communicate with another circuit. For more information about multidrop data bridging, see *Configuration*, section F1.9.

To configure an RS-232 circuit for a multidrop data bridge

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the RS-232 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select MULTI-DROP, then select MASTER, SLAVE or DISABLE. The default is disabled.

F3. X.21 and V.35 Direct Connect Modules

The X.21 and V.35 DCMs are single-circuit modules that provide a synchronous or asynchronous network interface.

The DCMs have data devices connected directly to them; therefore, they do not require a DTU module on the Control card or DTUs to be connected to them.

This chapter describes how to configure the X.21 and V.35 DCMs:

❏ device mode
❏ device gender
❏ duplex method (V.35 DCM only)
❏ RTS/CTS delay (V.35 DCM only)
❏ control leads
❏ data structure
❏ clocking
❏ multidrop data bridge (V.35 DCM only)

For information on configuring the rate adaption method and parameters, see *Configuration*, chapters G1 through G4.

The module position must be specified before the circuits can be configured. You must also know the operating parameters of the connected data devices.

Note

The procedures that follow use the FUNCTION softkey. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

F3.1 Device Mode for the X.21 and V.35 DCMs

The X.21 and V.35 DCMs support two device modes:

- ❏ asynchronous
- ❏ synchronous (default)

For more information on device modes, see *Configuration*, section F1.2.

To configure the device mode for the X.21 and V.35 DCMs

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION – I/F_MODE.
4. Select ASYNC or SYNC.

F3.2 Device Gender for the X.21 and V.35 DCMs

The X.21 and V.35 DCMs support two device genders:

- ❏ DTE
- ❏ DCE (default)

For more information on device genders, see *Configuration*, section F1.3.

To configure the device gender for the X.21 and V.35 DCMs

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select DTE or DCE.

F3.3 Duplex Method for the V.35 DCM

Data circuits support two duplex modes:

- ❑ half-duplex
- ❑ full-duplex (default)

For more information on duplex methods, see *Configuration*, section F1.4.

The duplex method for the X.21 DCM is not configurable. It is automatically set to full-duplex.

The duplex method for the V.35 DCM can be configured. It is automatically changed when a circuit is configured for a multidrop data bridge.

To configure the duplex method for the V.35 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the V.35 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select HALF_DPLX or FULL_DPLX.

F3.4 RTS/CTS Delay for the V.35 DCM

For more information about RTS/CTS delay, see *Configuration*, section F1.5.

The RTS/CTS delay range does not apply to X.21 circuits.

For the circuit on the V.35 DCM, the RTS/CTS delay is configurable only if the circuit has been configured as half-duplex.

To configure the RTS/CTS delay for the V.35 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the V.35 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select RTS/CTS, then enter a delay time (0 to 160 ms in 10-ms increments). The default is 0 ms.

The actual RTS to CTS delay time may be up to 5 ms longer than the configured delay time. This delay is in addition to any transmission delay (which may be up to 500 ms on satellite links).

F3.5 Control Leads for the X.21 and V.35 DCMs

Control leads provide the handshaking required for call setup, call clearing and synchronization. For more information, see *Configuration*, section F1.6.

Table F3-1 lists the configurable control leads for the DCMs.

Table F3-1: X.21 and V.35 DCM Configurable Control Leads

DCM	Control Lead
X.21	C I
V.35	RTS ALB DCD CTS

Note

To ensure that an adequate ones density is maintained for super-rate data circuits, RTS must be forced on.

Table F3-2 shows the control leads that are applicable to the operating mode of the X.21 and V.35 DCMs. If the device is configured as synchronous, DTR and DSR are not applicable for V.35 DCMs.

Table F3-2: X.21 and V.35 DCM Control Leads for DTE and DCE Modes

Module	Operating Mode	Inputs	Default	Outputs	Default
X.21	DTE	I	END_TO_END	C	END_TO_END
	DCE	C	END_TO_END	I	END_TO_END
V.35	DTE	DCD –	END_TO_END	RTS ALB	END_TO_END END_TO_END
	DCE	RTS –	END_TO_END	DCD CTS	END_TO_END END_TO_END

When the control leads are configured as end-to-end, the state of the local signal follows that of the signal source at the remote end of the network. This option is available only if HCM rate adaption is selected.

When the DDS 2 module is installed and DDS rate adaption is selected, end-to-end control signalling is available only on the I/C pair (for X.21 DCMs) and on the DCD/RTS pair (for V.35 DCMs).

Note

Control leads are the only interface parameter that can be set for a circuit configured as a timing source. Control leads can be changed while a circuit is cross-connected.

To configure control leads for the X.21 or V.35 DCM

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — CTRL_LEADS.
4. Select INPUTS or OUTPUTS, then select a control lead.
5. Configure the control lead by selecting ON, OFF or END_TO_END.

F3.6 Data Structure for the X.21 and V.35 DCMs

The configurable data characteristics are:

- ❑ character length
- ❑ number of stop bits
- ❑ parity

For more information about data structure, see *Configuration*, section F1.7.

To set character length for the X.21 or V.35 DCM

The character length can be set to:

- ❑ 5 bits
- ❑ 6 bits
- ❑ 7 bits
- ❑ 8 bits (default)

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — CHAR_LEN.
4. Select the appropriate character length.

To set the stop bits for the X.21 or V.35 DCM

The stop bit formats are:

- ❑ 1 bit (default)
- ❑ 2 bits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — STOP_BITS.
4. Select 1_BIT or 2_BITS.

To set the parity for the X.21 or V.35 DCM

The parity can be set to:

- none (default)
- odd
- even
- mark
- space

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — PARITY.
4. Select the parity method.

F3.7 Clocking for the X.21 and V.35 DCMs

Synchronous data devices require two timing sources: one for receive data and one for transmit data. For more information about clocking, see *Configuration*, section F1.8.

To specify the source of the transmit clock for the X.21 or V.35 DCM

The source of the transmit clock between the data circuit and the attached local device can be set. Table F3-3 shows the transmit clock parameter settings for device mode and device genders.

Table F3-3: Transmit Clock Parameter Settings for Device Genders

Module	Circuit Mode	Transmit Clock Options
V.35(1)	DCE	internal
	DTE	slave external internal
X.21(1)	DCE	slave
	DTE	slave

Notes

1. When the device mode is synchronous, the clocking source is selected between the DCM and the attached data device.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — CLOCKING.
4. Select a clocking source – EXTERNAL, INTERNAL or SLAVE.

The internal option is not available if transparent or DDS rate adaption is selected.

To specify the state of the clock signals for the X.21 or V.35 DCM

The clock can also be:

- ❏ locked to the timing of the *3624 MainStreet* node (default)
- ❏ independent, indicating that the data clocks pass through transparently

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — CLOCKING.
4. Select the state of the clock signals – either LOCKED or INDEPNT.

Note

Configuring a V.35 DCM as DCE – EXTERNAL – LOCKED (for transparent or HCM rate adaption) is only valid if the clock supplied by the attached DTE device is synchronized with the T1 port.

When the V.35 DCM is running at super-rate speed, DCE – EXTERNAL – LOCKED and DTE – EXTERNAL – LOCKED are only valid for speeds of 64, 128, 256, 512 or 1024 kb/s.

See *Configuration*, chapter B4 for information on system timing, and chapters G2 and G3 for information on rate adaption.

F3.8 Multidrop Data Bridge for the V.35 DCM

In a multidrop data bridge, two or more circuits take turns using the same bandwidth to communicate with another circuit. For more information about multidrop data bridging, see *Configuration*, section F1.9.

Multidrop data bridging is supported on V.35 circuits only.

To configure a V.35 circuit for a multidrop data bridge

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1) for the X.21 or V.35 DCM.
3. Select FUNCTION — I/F_MODE.
4. Select MULTI-DROP, then select MASTER, SLAVE or DISABLE. The default is disabled.

F4. OCU Module

The OCU module is a dual-circuit module available in two variants. This chapter describes how to configure the OCU module parameters:

- ❑ interface speed
- ❑ switched 56 data service
- ❑ secondary channel capability (OCU 3)
- ❑ fault signalling

You cannot configure a circuit to provide both switched 56 data service and secondary channel capability at the same time.

A DDS or DDS 2 module is not required on the *3624 MainStreet* node to support OCU module features.

The module position must be specified before the circuits can be configured. You must also know the operating parameters of the connected data devices.

Note

The procedures that follow use the FUNCTION softkey. This softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

F4.1 OCU Module Variants

Table F4-1 describes the OCU module variants.

Table F4-1: Description of OCU Variants

Variant	Part Number	Description
OCU 2	90-0693-02	Provides an interface between the user's local loop and the DDS network through the T1 link Supports switched 56 data service on the T1 link Not recommended for new installations
OCU 3	90-0693-03	Provides an interface between the user's local loop and the DDS network through the T1 link Supports switched 56 data service on the T1 link Provides 19.2 and 64 kb/s data rates, secondary channel support and latching channel loopback (loopback B) capability Recommended for new installations

If a module position is configured for one variant and another variant is installed, a "Wrong Module" alarm is generated. See *Installation*, chapter D2 for the pin and signal assignments.

Figure F4-1 illustrates the information displayed on the OCU variants.

Figure F4-1: OCU Module Variants

```
3624 MainStreet    620C-ab-cd        LONERANGER       Alarms:1     22-AUG-96  2:30P

#    Configured   Installed    Status        Name     Options

M02   OCU         Empty        Empty                  OCU_3


 MODULE    SWITCHED 56    SECONDARY CHANNEL
 OCU_2        yes              no
 OCU_3        yes              yes






 CONFIG POSITION 2 OPTIONS


  1-               2- OCU_2          3-               4-              5-
  6-               7-                8-CANCEL         9-QUIT          0-
```

To specify the OCU module variant

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1 to 12) for the OCU module.
3. Select TYPE — DATA — OCU.
4. Select OPTIONS, then select the appropriate module variant.

F4.2 Interface Speed for the OCU Module

The interface speed is the rate at which the device is transmitting data. The speeds supported for the OCU modules are:

- ❑ 2.4 kb/s
- ❑ 4.8 kb/s
- ❑ 9.6 kb/s (default)
- ❑ 19.2 kb/s (valid for OCU 3 only)
- ❑ 56 kb/s
- ❑ 64 kb/s (valid for OCU 3 only)

To set the interface speed for the OCU module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the OCU module.
3. Select FUNCTION — I/F_SPEED.
4. Select the appropriate interface speed.

F4.3 Switched 56 Data Service for the OCU Module

Switched 56 data service from a carrier service can be enabled. The attached equipment provides dialling, originating and answer control.

Switched 56 data service can be:

- enabled
- disabled (default)

The interface speed for the OCU 2 or OCU 3 variant must be set to 56 kb/s prior to setting switched 56 data service. You cannot change the interface speed while switched 56 data service is enabled.

To configure the OCU module for switched 56 data service

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the OCU module.
3. Select FUNCTION, then select SW56_ON or SW56_OFF.

F4.4 Secondary Channel for the OCU Module

Secondary channel capability is available for OCU 3 modules only. The options are:

- enabled
- disabled (default)

Secondary channels support interface speeds between 2.4 and 56 kb/s. This option cannot be selected when the interface speed is set to 64 kb/s.

To configure the OCU module for secondary channel capability

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the OCU module.
3. Select FUNCTION, then select SC_ON or SC_OFF.

F4.5 Fault Signalling for the OCU Module

The *3624 MainStreet* node applies fault signalling to the interface being configured if the equipment to which it is cross-connected is not physically present or is out of synchronization.

The two types of fault signalling are:

❑ seized
❑ idle (default)

See *Configuration*, section E1.5 for more information on fault signalling.

To define fault codes for the OCU circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the OCU module.
3. Select FAULT_SIG, then select either SEIZED or IDLE.

F5. 2WTO Module

The 2WTO module is a dual-circuit module used primarily to pass analog modem data over a permanent 2-wire local loop, although it can also pass analog voice. "TO" (Transmission Only) indicates that T1 signalling information is not passed.

Line impedance for both circuits is set to either 600 or 900 ohms. Each circuit offers its own range of transmission level settings. If a DDS 2 module is installed on the Control card, a 2713 Hz network-invoked loopback tone detection feature can also be enabled.

This chapter describes how to configure the 2WTO module:

- ❑ line impedance
- ❑ TLPs
- ❑ 2713 Hz loopback tone detection
- ❑ fault signalling

The module position must be specified before the circuits can be configured.

F5.1 Line Impedance for the 2WTO Module

The 2WTO module supports a line impedance of 600 or 900 ohms. Setting the line impedance sets both circuits to this value.

To set the line impedance for the 2WTO module

1. From the CONFIG menu, select POSITION.
2. Enter the module position (1 to 12) for the 2WTO module.
3. Select TYPE — DATA — MORE — 2WTO.
4. Select OPTIONS, then select either 600 or 900.

F5.2 2WTO Module TLPs

The TLP specifies the receive and transmit levels (in decibels) of the signal from a voice circuit with respect to the digital trunk. For more information, refer to *Configuration*, section E1.2.

TLP ranges for the 2WTO circuits

Table F5-1 lists the receive and transmit TLP ranges and defaults for the 2WTO circuits.

Table F5-1: TLP Ranges for 2WTO Circuits

TLP Range (dBm)	Steps (dBm)	Default (dBm)
Rx: +7 to –8.5	0.5	–3.0
Tx: +16.5 to +1	0.5	+13.0

To set receive and transmit TLP values for the 2WTO circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the 2WTO module.
3. Select LEVELS.
4. Select RX_TLP and enter the TLP value for the receive TLP.
5. Select TX_TLP and enter the TLP value for the transmit TLP.

F5.3 2713 Hz Loopback Tone Detection for the 2WTO Module

If a DDS 2 module is installed on the Control card, each 2WTO circuit can be configured so that a loopback A is initiated when a network-generated 2713 Hz tone is detected on the line. If you try to configure for tone detection when there is no DDS 2 module, the NMTI displays a warning.

The two configuration choices are:

- tone detector on
- tone detector off (default)

The loopback is activated upon detection of a 2713 Hz tone lasting 2.5 seconds or longer. The loopback is deactivated by detecting a second 2713 Hz tone lasting 0.9 seconds or longer. If a second tone is not detected after 20 minutes, the unit automatically deactivates the loopback and reconfigures the circuit for tone detection.

For more information on loopbacks, see *Maintenance*, section B2.9.

To enable tone detection for the 2WTO module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the 2WTO module.
3. Select MORE, then select either TN_DET_ON or TN_DET_OFF.

F5.4 Fault Signalling for the 2WTO Module

The *3624 MainStreet* node applies fault signalling to the circuit if the equipment to which it is cross-connected is not physically present or is out of synchronization. The fault codes are:

- seized
- idle (default)

See *Configuration*, section E1.5 for more information.

To define fault codes for the 2WTO module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the 2WTO module.
3. Select FAULT_SIG then select either SEIZED or IDLE.

F6. 4WTO Module

The 4WTO module is a dual-circuit module used primarily to pass analog modem data over a permanent 4-wire local loop, although it can also pass analog voice. "TO" (Transmission Only) indicates that T1 signalling information is not passed.

Each circuit offers its own range of transmission level settings. If a DDS 2 module is installed on the Control card, a 2713 Hz network-invoked loopback tone detection feature may also be enabled.

This chapter describes how to configure the 4WTO module:

- TLPs
- 2713 Hz loopback tone detection
- fault signalling

The module position must be specified before the circuits can be configured.

F6.1 4WTO Module TLPs

The TLP specifies the receive and transmit levels (in decibels) of the signal from a voice circuit with respect to the digital trunk. For more information, see *Configuration*, section E1.2.

TLP ranges for 4WTO circuits

Table F6-1 lists the receive and transmit TLP ranges and defaults for 4WTO circuits.

Table F6-1: TLP Ranges for 4WTO Circuits

TLP Range (dBm)	Steps (dBm)	Default (dBm)
Rx: +7 to –8.5	0.5	–3.0
Tx: +16.5 to +9.0	0.5	+13.0

To set receive and transmit TLP values for the 4WTO circuits

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the 4WTO module.
3. Select LEVELS.
4. Select RX_TLP and enter the TLP value for the receive TLP.
5. Select TX_TLP and enter the TLP value for the transmit TLP.

F6.2 2713 Hz Loopback Tone Detection for the 4WTO Module

If a DDS 2 module is installed on the Control card, each 4WTO circuit can be configured so that an analog loopback is initiated when a network-generated 2713 Hz tone is detected on the line. See *Configuration*, section F5.3 and *Maintenance*, section B2.9 for more information.

The options are:

❑ tone detector on
❑ tone detector off (default)

To enable tone detection for the 4WTO module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the 4WTO module.
3. Select MORE, then select either TN_DET_ON or TN_DET_OFF.

F6.3 Fault Signalling for the 4WTO Module

The *3624 MainStreet* node applies fault signalling to the circuit if the equipment to which it is cross-connected is not physically present or is out of synchronization. The fault codes are:

- seized
- idle (default)

See *Configuration*, section E1.5 for more information.

To define fault codes for the 4WTO module

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1 or 2) for the 4WTO module.
3. Select FAULT_SIG, then select either SEIZED or IDLE.

G1. Rate Adaption Overview

The specifications for T1 define a framing structure that allocates the available bandwidth in 64 kb/s channels. This structure is based on the sampling rate of 8000 8-bit samples per second required for digitizing one voice call.

Data devices often operate at rates well below 64 kb/s, but the framing structure for a T1 link does not specifically support these rates. Rate adaption allows subrate data devices to use a 64 kb/s channel. Rate adaption multiplexes data from devices transmitting at less than 64 kb/s onto a T1 channel.

G1.1 Configuring the Node for Rate Adaption

The *3624 MainStreet* node can perform three types of rate adaption:

- ❑ transparent
- ❑ HCM (default)
- ❑ DDS

The node can combine circuits that are a mixture of transparent and HCM rate adaption on one 64 kb/s channel. A mixture is not possible with DDS rate adaption circuits.

DDS rate adaption is only available if a DDS or DDS 2 module is installed and if the DSP position is configured as DDS or DDS 2.

If the device mode for the data device is synchronous, any method of rate adaption can be used. If the device mode is asynchronous, only HCM or DDS can be used.

To select a rate adaption method

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module that you are configuring for rate adaption.
3. Select FUNCTION — RATE_ADAPT.
4. Select METHOD, then select TRANSPAREN, HCM or DDS.

G1.2 Configuring the *2606 MainStreet* DTU for Rate Adaption

The eight DTU ports on the *2606 MainStreet* DTU (referred to as branch circuits) can be configured for either transparent or HCM rate adaption, and combined onto the two DNIC ports (referred to as aggregate circuits). The cross-connections are allowed only if the rate adaption parameters match.

Configuration of an aggregate circuit involves specifying the amount of bandwidth allocated for transparent and HCM data, up to 64 kb/s in total.

Configuration of the branch circuits involves specifying transport bandwidth and position for the circuit. The data for each branch circuit must occupy unique elements of bandwidth, so that the data does not overlap when the branch circuits are cross-connected to the aggregate. The exception is if the circuits are configured for multidrop data bridging, in which case the circuits must occupy the same position so that the data overlaps exactly.

See *Configuration*, chapters G2 and G3 for more information on transparent and HCM rate adaption.

Note

The *2606 MainStreet* DTU cannot be configured for DDS rate adaption.

G1.3 Copying Circuit Configurations

For circuits that are configured for rate adaption, you can automatically adjust the data position of the second circuit to follow the data of the first circuit, by using the COPY_ADJ softkey. The transport bandwidth allocated for the first circuit is also copied to the new circuit.

See *Configuration*, chapters G2, G3 and G4 for information on transport bandwidth and transport position.

To copy rate adaption parameters

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position and circuit number of the circuit you want to copy from, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select COPY_ADJ to copy the parameters of this circuit.
4. Enter the module position and circuit number of the circuit you want to copy to, using the same form as in step 2.

   The parameters of the first circuit are copied to the second, and the transport position of the second circuit is set to follow the position of the first.

To copy the configuration to all circuits on the same interface type, press <Esc>, then select ALL.

G2. Transparent Rate Adaption

A transparent channel carries data, signalling and framing information from a device to the *3624 MainStreet* node, without adding any signalling or framing information. Transparent rate adaption supports synchronous data running at a rate that is a multiple of 8 kb/s. If a device is transmitting asynchronous data, transparent rate adaption cannot be used.

This chapter describes how to set the following parameters for transparent channels:

❑ transport bandwidth
❑ transport position

Note

The FUNCTION softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

G2.1 Transport Bandwidth for Transparent Rate Adaption

The transport bandwidth is the bandwidth allocated to the data device. For transparent rate adaption, setting the transport bandwidth establishes a channel for a data device with an interface speed that is a multiple of 8 kb/s.

A 64 kb/s transparent channel is made up of eight 8 kb/s elements named B7 through B0. The NMTI represents the amount of bandwidth allocated to a transparent channel by the number of elements containing a D, where each D represents 8 kb/s of bandwidth. Elements that do not contain a D represent unused bandwidth. The total bandwidth is also displayed beside the "Rate Adaption" heading. The default is 64 kb/s (8 elements).

Figure G2-1 shows a 32 kb/s transparent channel as represented on the NMTI screen.

Figure G2-1: Transparent Channel Display

```
3624 MainStreet  620C-ab-cd                    Alarms:1   25-AUG-96   9:32A

    DATA CCT: M01-01  NAME:

  B7 B6 B5 B4 B3 B2 B1 B0     Configured As   : SYNC - DCE - FULL DUPLEX
   D  D  D  D                 Rate Adaption   : TRANSPARENT - 32 kbps
                              Transport Posn  : B7
                              Interface Speed : NA
                              Data Position   : NA
                              Signalling      : NA
                              MultiDrop       : DISABLED
                              Clock           : SLAVE - LOCKED



   D - DATA



 CONFIG CIRCUIT 1-1 FUNCTION RATE_ADAPT


  1-METHOD          2-TRANSP_BW        3-TRANSP_POS        4-              5-
  6-                7-                 8-CANCEL            9-QUIT          0-
```

Note

Setting the transport bandwidth establishes both the amount of a 64 kb/s channel used and the subrate interface speed of the device.

To specify transport bandwidth

When specifying the transport bandwidth, enter the number of elements rather than the total bandwidth.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) of the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select TRANSP_BW, then enter the number of 8 kb/s elements (1 to 8).

To specify transport bandwidth for DNIC circuits (*2606 MainStreet* DTU only)

When specifying transport bandwidth for a DNIC port that connects a *2606 MainStreet* DTU, you must ensure that adequate bandwidth is allocated for HCM rate adaption as well, if any of the branch circuits will be passing HCM data. See *Configuration*, chapter G3 for information on HCM rate adaption.

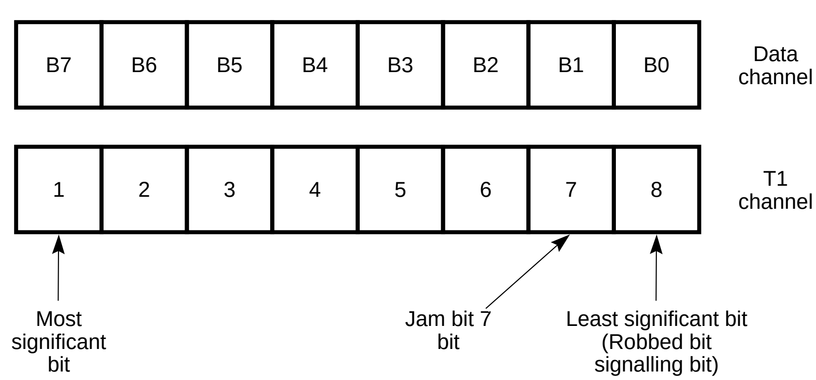
1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — TRANSP_BW, then enter the number of 8 kb/s elements (1 to 8).

Considerations when setting transport bandwidth

If a transparent DCM or DNIC circuit is connected to a T1 channel that has jam bit 7 or robbed bit signalling enabled, usable transport bandwidth will be lost.

Figure G2-2 shows the element numbering for a transparent channel and the corresponding bit numbering of a T1 channel.

Figure G2-2: Bit Numbering Conventions



Note

If you are using a transport bandwidth of 56 kb/s or less for non-binary 8-zero suppression, set RTS to On to guarantee ones density.

Examples

The following examples illustrate the effects of robbed bit signalling, jam bit 7 and binary 8-zero suppression on the usable bandwidth.

- ❏ If the transport bandwidth is 64 kb/s (eight elements), and the user's data protocol ensures an adequate ones density, jam bit 7 does not alter bit 7 (B1) if enabled.
- ❏ If the transport bandwidth of the channel is 56 kb/s (seven elements), the *3624 MainStreet* node automatically sets bit 8 (B0) to 1, ensuring an adequate ones density. Therefore, jam bit 7 does not alter bit 7 (B1) if enabled.
- ❏ The RTS control lead signal is transported over bit 8 (B0). If RTS goes "low", bit 8 (B0) is changed to 0. Therefore, to ensure an adequate ones density, you must configure RTS to "high" (on) (refer to the appropriate data interface module chapter).
- ❏ If the user's data protocol does not ensure an adequate ones density and bit 8 (B0) is altered (for example, by robbed bit signalling or RTS signalling), jam bit 7 may alter bit 7 (B1), making B1 unavailable for data. The transport bandwidth must be 48 kb/s (six elements) or less to prevent data errors.
- ❏ If a transparent circuit with a transport bandwidth of 64 kb/s (eight elements) is connected to a T1 channel with robbed bit signalling enabled, robbed bit signalling must be turned off or the bit 8 (B0) position not used (reduce the transport bandwidth to 56 kb/s (seven elements) or less). Selecting binary 8-zero suppression ensures an adequate ones density in the data stream and disabling robbed bit signalling allows the use of 64 kb/s of bandwidth.

G2.2 Transport Position for Transparent Rate Adaption

When the transport bandwidth is set, the unit automatically starts with element B7 and fills to the right until the required bandwidth is allocated. The transport position allows you to redefine the starting element from the default.

To configure a number of circuits as a multidrop data bridge, you must arrange the starting elements and the transport bandwidth so that data from different devices do not occupy the same element.

Element B*n* defines the starting element, where *n* is a number from 0 to 7. The transport position is displayed on the NMTI screen by the position of the leftmost D and is listed on the right side of the screen beside "Transport Posn" (see Figure G2-1).

Table G2-1 indicates the allowable transport positions as determined by the transport bandwidth.

Table G2-1: Transport Bandwidth vs. Transport Position for Transparent Rate Adaption

Transport Bandwidth	Transport Position
64 kb/s (8 elements)	B7 only
56 kb/s (7 elements)	B6 or B7
48 kb/s (6 elements)	B5, B6, or B7
40 kb/s (5 elements)	B4, B5, B6, or B7
32 kb/s (4 elements)	B3, B4, B5, B6 or B7
24 kb/s (3 elements)	B2, B3, B4, B5, B6 or B7
16 kb/s (2 elements)	B1, B2, B3, B4, B5, B6 or B7
8 kb/s (1 element)	B0, B1, B2, B3, B4, B5, B6 or B7

Note

The *3624 MainStreet* node gives priority to transport position over transport bandwidth. Changing the transport position may change the transport bandwidth. If there are not enough elements to the right of the transport position, the NMTI reduces the transport bandwidth to the available amount, even if you have configured it for more. To increase the transport bandwidth, you may need to change the transport position first.

To specify transport position

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) of the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select TRANSP_POS, then enter the transport position in the form <B*n*>, where *n* is the starting element (7 to 0).

To specify transport position for DNIC circuits (*2606 MainStreet* DTU only)

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — TRANSP_POS, then enter the transport position in the form <B*n*>, where *n* is the starting element (7 to 0).

G3. HCM Rate Adaption

HCM rate adaption is a proprietary rate adaption scheme developed by Newbridge. It enables users to establish data channels for a wider variety of interface speeds than is possible with other rate adaption techniques.

This chapter describes how to set the following parameters for HCM channels:

- ❑ transport bandwidth
- ❑ transport position
- ❑ interface speed
- ❑ signalling
- ❑ data position

Some parameters are not applicable to both circuits of the *2608* and *2610 MainStreet* DTUs.

The transport bandwidth, transport position and interface speed are relevant to circuit A, which configures the aggregate port.

The interface speed is relevant to circuit B, which configures the eight asynchronous ports.

Note

The FUNCTION softkey might not appear if the specified circuit is connected, in which case you must disconnect the circuit before changing its function.

G3.1 HCM Frames

HCM rate adaption divides a 64 kb/s channel into 80 elements, which are transmitted at a rate of 800 elements per second. Each element represents one bit (800 b/s of bandwidth).

The NMTI displays an HCM frame as a 10-row by 8-column matrix, as shown in Figure G3-1. The rows are named F0 to F9 and the columns are named B7 to B0. An element is identified by its row and column, for example, F3-B2.

Figure G3-1: HCM Frame

```
3624 MainStreet   620C-ab-cd                      Alarms:1   25-AUG-96  11:16A

   DATA CCT: M01-01  NAME:

    B7 B6 B5 B4 B3 B2 B1 B0    Configured As   : SYNC - DCE - FULL DUPLEX
 F0  F  S  D  D  D  D  D  D    Rate Adaption   : HCM - 64 Kbps
 F1  D  D  D  D  D  D  -  -    Transport Posn  : B7
 F2  -  -  -  -  -  -  -  -    Interface Speed : 9600 bps
 F3  -  -  -  -  -  -  -  -    Data Position   : F0-B5
 F4  -  -  -  -  -  -  -  -    Signalling      : ON
 F5  -  -  -  -  -  -  -  -    MultiDrop       : DISABLED
 F6  -  -  -  -  -  -  -  -    Clock           : SLAVE - LOCKED
 F7  -  -  -  -  -  -  -  -
 F8  -  -  -  -  -  -  -  -
 F9  -  -  -  -  -  -  -  -

   D - DATA   F - FRAMING BIT   S - SIGNALING BIT


 CONFIG CIRCUIT 1-1 FUNCTION RATE_ADAPT

  1-METHOD         2-TRANSP_BW       3-TRANSP_POS      4-SIG_OFF      5-I/F_SPEED
  6-DATA_POSN      7-                8-CANCEL          9-QUIT         0-
```

Elements containing a D represent the bandwidth allocated to an HCM channel, where each D represents 800 b/s of bandwidth.

Because the HCM frame pattern is independent of the T1 aggregate framing pattern, the start of the HCM frame must be flagged. This is accomplished by specifying the first element as a framing bit, which is indicated by an F on the NMTI screen.

An element containing an S represents the bit position reserved for the signalling bit stream, which includes the clock adjustment if clocking is configured as independent.

The F and S each occupy one element. Any element that does not contain an F, S or D represents unused bandwidth.

G3.2 Transport Bandwidth for HCM Rate Adaption

The transport bandwidth is the bandwidth allocated to the data device. For HCM rate adaption, setting the transport bandwidth does not establish the maximum allowable interface speed for the data device. The interface speed is set separately.

The default setting for transport bandwidth is 64 kb/s. You do not need to reduce the transport bandwidth unless the HCM channel will be:

- ❑ subrate multiplexed with transparent channels, or
- ❑ transported on a T1 aggregate channel on which some bit positions are not available for data, such as a T1 link that uses robbed bit signalling

The transport bandwidth can be set in increments of 8 kb/s. It is set by entering the number of columns (one through eight). Each column has ten 800 b/s elements and thus represents 8 kb/s of bandwidth. The default is 64 kb/s (eight columns).

The bandwidth is indicated by the number of columns containing characters, and is displayed beside the "Rate Adaption" heading (see Figure G3-1).

The maximum bandwidth available to the data device is 63.2 kb/s (64 kb/s minus 800 b/s for the framing bit). If signalling is on for the circuit, the signalling bit stream takes up an additional 800 b/s, leaving 62.4 kb/s of bandwidth available.

To specify transport bandwidth

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select TRANSP_BW then enter the number of 8 kb/s columns (1 to 8).

To specify transport bandwidth for DNIC circuits (*2606 MainStreet* DTU only)

When specifying transport bandwidth for a DNIC port that is connecting a *2606 MainStreet* DTU, you must ensure that adequate bandwidth is allocated for transparent rate adaption as well, if any of the branch circuits will be passing transparent data. See *Configuration*, chapter G2 for information on transparent rate adaption.

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (A or B) for the DNIC module.
3. Select FUNCTION — HCM_BW, then enter the number of 8 kb/s columns (1 to 8).

Considerations when setting transport bandwidth

If an HCM circuit is connected to a T1 channel that has jam bit 7 or robbed bit signalling enabled, the resulting loss of usable transport bandwidth must be considered. For more information, refer to *Configuration*, section G2.1.

The column numbering for an HCM frame corresponds to the bit numbering of a T1 channel.

G3.3 Transport Position for HCM Rate Adaption

In HCM rate adaption, transport position defines the column in which the F bit is located. The F bit is always in the first row (F0). The transport position is set by entering the column position in the form B*n*, where *n* is the column number (0 through 7). The default is B7.

You do not need to change the transport position unless the circuit will be subrate multiplexed with transparent data on another node that supports subrate multiplexing. You must then move the F bit so that transparent channel columns are not included in the transport bandwidth of the HCM circuit.

To specify transport position

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select TRANSP_POS, then enter the transport position in the form <B*n*>, where *n* is the starting element (7 to 0).

G3.4 Interface Speed for HCM Rate Adaption

The interface speed is the rate at which the device transmits data. In an HCM frame, the number of Ds (representing 800 b/s) indicates the interface speed. For interface speeds of 2400 b/s or less, 2400 b/s of bandwidth is allocated (represented by three Ds on the NMTI screen).

The interface speeds supported by each module type and device mode are listed in Table G3-1. The default speed is 9600 b/s.

Table G3-1: HCM Interface Speeds

Module	Device Mode	Interface Speed (b/s)
DNIC	Asynchronous	150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
	Synchronous	150, 300, 600, 1200, 2400, 4800, 8000, 9600, 16000, 19200, 32000, 38400, 48000, 56000
RS-232 DCM (1, 2)	Asynchronous	150, 300, 600, 1200, 2400, 4800, 9600, 19200
	Synchronous	1200, 2400, 4800, 9600, 19200, 32000, 38400, 48000, 56000
RS-232 DCM (1, 3)	Asynchronous	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400
	Synchronous	150, 300, 600, 800, 1200, 1600, 2400, 4000, 4800, 7200, 8000, 9600, 12000, 14400, 16000, 16800, 19200, 24000, 28800, 32000, 38400, 40000, 48000, 56000, 57600
V.35 DCM	Asynchronous	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400
	Synchronous	150, 300, 600, 800, 1200, 1600, 2400, 4000, 4800, 7200, 8000, 9600, 12000, 14400, 16000, 16800, 19200, 24000, 28800, 32000, 38400, 40000, 48000, 56000, 57600
X.21 DCM	Asynchronous	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400
	Synchronous	150, 300, 600, 800, 1200, 1600, 2400, 4000, 4800, 7200, 8000, 9600, 12000, 14400, 16000, 16800, 19200, 24000, 28800, 32000, 38400, 40000, 48000, 56000, 57600
OCU	N/A	2400, 4800, 9600, 19200 (4), 56000, 64000 (4)

Notes

1. For DNIC modules connected to RS-232 devices and for RS-232 DCMs, operation at interface speeds above 38.4 kb/s is not guaranteed. For speeds above 38.4 kb/s, V.35 or X.21 interfaces should be used. If speeds above 38.4 kb/s are being used for RS-232, short high-grade shield cable should be used. Configuring the module for receive clock inversion may also resolve problems with speeds above 38.4 kb/s (manufacturing code D or greater).
2. Manufacturing codes A and B.
3. Manufacturing code D or greater.
4. For OCU 3 module circuits only.

Oversampling

Asynchronous rates of up to 2400 b/s that are not listed in Table G3-1 can be supported by oversampling. To oversample, set the interface mode to synchronous, then multiply the desired asynchronous interface speed by 16. Enter the next highest synchronous interface speed listed above.

Example: To support 110 b/s (asynchronous), set the interface mode to synchronous. Set the interface speed to 2400 b/s (16 x 110 b/s = 1760 b/s, and 2400 b/s is the next highest synchronous rate supported).

Note

The tolerance for overspeed and underspeed is ± 2.5% for asynchronous devices.

To set the interface speed

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module you are setting the speed for.
3. Select FUNCTION — RATE_ADAPT.
4. Select I/F_SPEED, then enter the speed (in b/s).

G3.5 Signalling for HCM Rate Adaption

The signalling parameter determines whether the HCM frame includes a signalling bit stream (S).

The signalling can be set to:

- ❑ signalling on (default)
- ❑ signalling off

Turning signalling off means that no bandwidth is taken up by signalling, and signalling is not transmitted through the network.

To enable or disable signalling

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select SIG_OFF or SIG_ON.

Note

If signalling is on, the NMTI automatically fills in the signalling bit to the left of the data position.

G3.6 Data Position for HCM Rate Adaption

The data position specifies the location of the first D. The data position is set by entering the row and column position in the form F*f*-B*n*, where *f* is the row number (0 through 9) and *n* is the column number (7 through 0). The D bit cannot occupy the same element as the F bit. The default data position is F0-B5.

You must change the data position when you are:

- ❑ changing the transport position or transport bandwidth so that the data position is no longer within the HCM frame
- ❑ subrate multiplexing the HCM rate adapted circuit with another HCM rate-adapted circuit, so that the D bits do not occupy the same elements

Note

The NMTI automatically fills in the signalling bit to the left of the data position.

To specify the data position

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select DATA_POS and enter the data position in the form <F*f*-B*n*>, where *f* is the row number (0 to 9) and *n* is the column number (7 to 0).

Note

The framing bit F defines the leftmost bit position of the transport bandwidth.

The first D bit must be in one of the columns defined by the F bit and the transport bandwidth.

Example: If the framing bit is in position F0-B7 and the transport bandwidth is going to be changed to five columns, the first D must be in column B7, B6, B5, B4 or B3. It cannot be in columns B2, B1 or B0.

G4. DDS Rate Adaption

DDS rate adaption converts HCM format into a "6+2 envelope" data format for connection to public synchronous network services such as AT&T's Dataphone Digital Service. Use DDS if you are connecting data equipment to public data network facilities using DDS DS0-A format.

DS0-A channels carry data from a single circuit using DDS rate adaption on a T1 link. DDS rate adaption is available for 2.4, 4.8, 9.6 and 56 kb/s bandwidths.

This chapter describes how to set the following parameters for DDS rate adaption:

❏ DDS format
❏ interface speed

Note

The DSP module position must be configured as DDS or DDS 2 before DDS rate adaption can be used, unless an OCU module is installed.

G4.1 DDS Rate Adaption Formats

DDS channels have two forms:

- ❑ 56 kb / s channels
- ❑ subrate channels – for speeds below 56 kb / s

Format for a 56 kb/s channel

A 56 kb / s DDS channel consists of seven data bits in bit positions 1 to 7 and a network control bit (C) in bit position 8, as shown in Figure G4-1.

Figure G4-1: Format for a 56 kb/s DDS Channel

1	2	3	4	5	6	7	8
D	D	D	D	D	D	D	C

The control bit is a logical "1" if data bits 2 through 7 contain customer data. This ensures that the ones density requirement for the T1 link is met, since there can never be more than seven consecutive zeros.

The control bit is a logical "0" if data bits 2 through 7 contain a network control code. The ones density requirement is met, since an all zero network control code is invalid.

Format for subrate channels

For speeds below 56 kb / s (9.6, 4.8 and 2.4 kb / s), a DDS channel consists of a logical "1" in bit position 1 (older AT&T equipment may insert a "0"), six data bits in positions 2 through 7 and a network control bit (C) in bit position 8.

The control bit is a logical "1" if the data bits contain customer data. This ensures that the ones density requirement for the T1 link is met, since there can never be more than seven consecutive zeros.

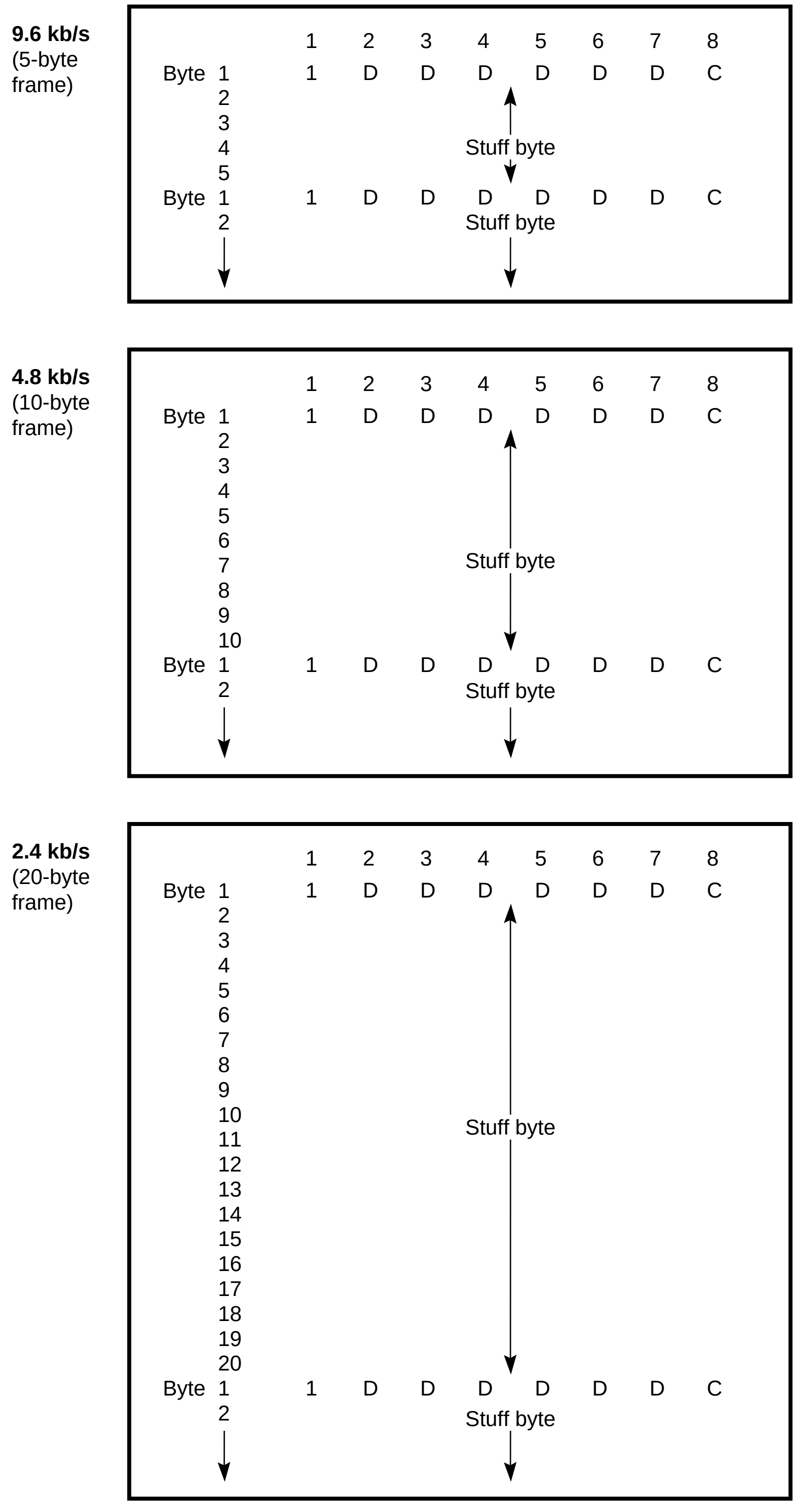
The control bit is a logical "0" if the data bits contain a network control code. The ones density requirement is met, since an all zero network control code is invalid.

In a 64 kb / s T1 channel, 8-bit bytes are transmitted at a rate of 8000 b / s. DDS subrate speeds are adapted to the 64 kb / s channel by sending new data:

- ❑ every 5th byte for 9.6 kb / s channels
- ❑ every 10th byte for 4.8 kb / s channels
- ❑ every 20th byte for 2.4 kb / s channels

Each byte contains six data bits as illustrated in Figure G4-2. Bytes that do not carry new data carry "stuff bytes”, which are repetitions of the latest data byte.

Figure G4-2: Rate Adaption Format for Subrate DDS Channels



Error correction

For DDS 2 modules, error correction is supported on DS0-As carrying data at rates of 2.4, 4.8 and 9.6 kb/s from the network. Error correction is based on a majority vote on each group of five repeated bytes (three bytes out of five).

G4.2 Interface Speed for DDS Rate Adaption

The interface speed is the rate at which the device transmits data. The speeds supported are:

- 2.4 kb/s
- 4.8 kb/s
- 9.6 kb/s (default)
- 56 kb/s

All the interface speeds are supported for synchronous data. For asynchronous data, 56 kb/s is not supported.

To set the interface speed

1. From the CONFIG menu, select CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module you are configuring.
3. Select FUNCTION — RATE_ADAPT.
4. Select I/F_SPEED, then enter the speed (in b/s).

A1. LED Functions

The LEDs provide alarm and status information on the *3624 MainStreet* node and the network. LEDs are located on:

- the chassis cover (for wall-mount units) or the faceplate (for rack-mount drawer units)
- the Control card
- the Universal card
- the modules

This chapter describes the functions of the LEDs.

A1.1 Chassis Cover LEDs

The chassis cover of the wall-mount and rack-mount units contain six LEDs. Figures A1-1 and A1-2 show the location of the LEDs.

Figure A1-1: Wall-mount Unit LEDs

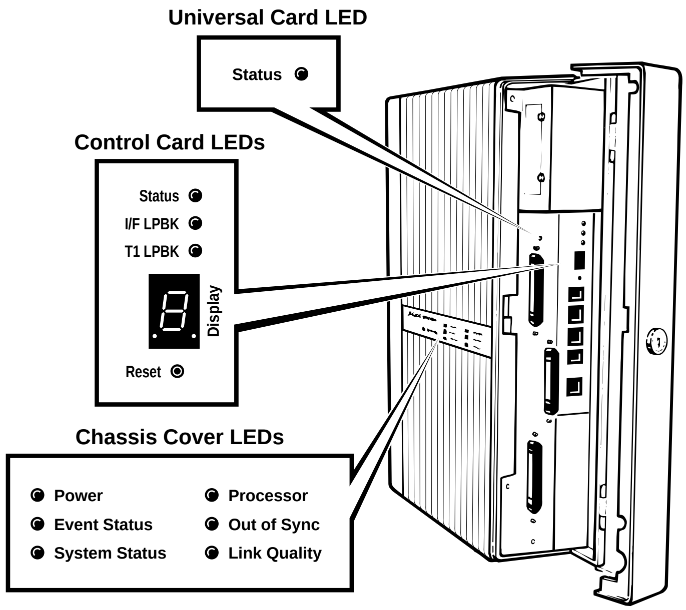
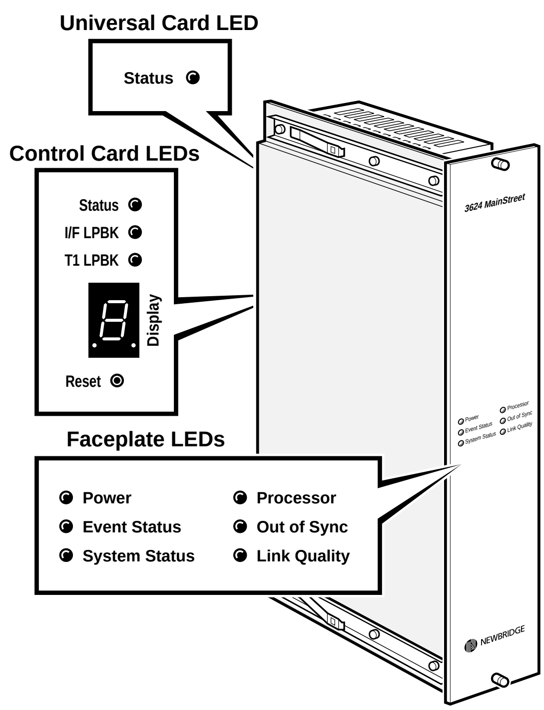
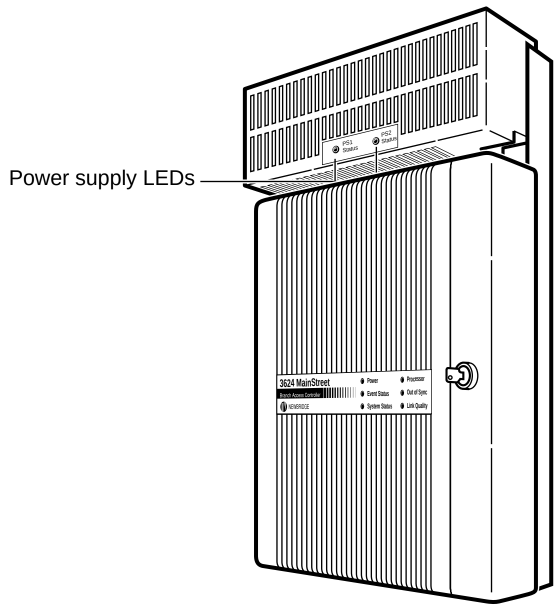


Figure A1-2: Rack-mount Drawer LEDs



The redundant unit has two LEDs that are visible on the front panel of the redundant chassis. The LEDs display the status of both power supplies. Figure A1-3 shows the location of the LEDs.

Figure A1-3: Redundant Unit LEDs



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If the system is operating normally, the following apply:

- ❑ Power LED lights steadily
- ❑ Processor LED flashes in one-second intervals
- ❑ Event Status, System Status, Out of Sync, and Link Quality LEDs are off
- ❑ power supply LEDs are green

Table A1-1 lists the possible states for the LEDs.

Table A1-1: LED States

LED	Status	Meaning
Power	Steady green	Power is on (normal operation)
	Off	No power to the system
Event Status	Steady yellow	An unacknowledged alarm is in the major alarm queue (see *Maintenance*, chapter A2 for details on the major alarm queue)
	Off	Normal operation
System Status	Steady red	System problem
	Off	Normal operation
Processor	Steady green	System problem
	Flashing green	Normal operation
Out of Sync	Steady red	Communication with T1 link is lost
	Off	Normal operation
Link Quality	Steady red	T1 line is in an error state
	Off	Normal operation
Power supply (two LEDs)	Steady green	Power rails are within specification
	Steady red	At least one rail of the power supply is not within specification
	Off	Power supply is insufficiently powered

Table A1-2 lists actions to take if an LED indicates a problem.

Table A1-2: Troubleshooting LED Problems

Problem	Action or Indication
Power LED is off	❏ Check that the power switch or circuit breaker is on. ❏ Check that the power cable is correctly attached to the system and to a power source. ❏ Check that the wiring harness connector from the power supply to the Control card is correctly seated. ❏ Check that the ribbon cable from the Control card to the chassis cover (or faceplate) is correctly attached at both ends. ❏ Check the fuse to see if it is burnt out. (See *Maintenance*, chapter C2.) ❏ Ensure that the power rails are at the correct voltage. (See *Maintenance*, chapter C2.)
Event Status LED is lit (1)	Check the major alarm queue.
System Status LED is lit (2)	Indicates one of the following conditions: ❏ There is a problem with the LIM, CSU, DDS module, T1 interface, Tone module, or connected DTUs. ❏ A module position configured as "Empty" contains a module, or vice versa. ❏ A circuit is out of sync with its associated DTU. ❏ Trunk conditioning is being applied because of a T1 link failure.
Processor LED is on steady	Check the seven-segment display on the Control card: ❏ If it displays a number steadily, note the number and contact your service representative for help. ❏ If it is unlit, turn the power switch off and then on. If the display still does not flash, contact your service representative.
Out of Sync LED is lit	❏ Ensure that the T1 line is connected to connector J4 on the Control card. ❏ Ensure that the LIM or CSU is properly seated. ❏ Ensure that the other end is transmitting. ❏ Ensure that the T1 operating parameters are compatible with the network.
Link Quality LED is lit	An error state is caused by one of the following conditions: ❏ The T1 line has experienced a framing error rate greater than 1x10E-3 for 5 consecutive seconds. This puts the line in the Framing Error state, which is not cleared until the framing error rate is less than 1x10E-6 for 10 consecutive seconds. ❏ The T1 line is using ESF and the CRC error rate is greater than 1x10E-3 for 10 consecutive seconds, or the T1 line is using D4 framing and the BPV error rate is greater than 1x10E-3 for 10 consecutive seconds. Either of these conditions puts the line in the Failed State, which is not cleared until the error rate is less than 1x10E-6 for 10 consecutive seconds.

Notes

1. When the Event Status LED is lit, the Event Status relay closes, providing a trigger to drive an external device. The Event Status LED goes off when all alarms in the major alarm queue are acknowledged.
2. When the System Status LED is lit, the System Status relay closes, providing a trigger to drive an external device. The System Status LED goes off when the appropriate action is taken to correct the problem.

A1.2 Control Card LEDs

The Control card LEDs are shown in Figures A1-1 and A1-2. The Control card contains:

- ❏ status LED
- ❏ two loopback LEDs
- ❏ a seven-segment alphanumeric display

Status LED

In normal operation, the Control card Status LED is on (steady). If the LED flashes or does not illuminate, it indicates a problem with the Control card.

Loopback LEDs

The I/F LPBK LED is lit if there is a loopback on any Universal card circuit.

The T1 LPBK LED is lit if there is a loopback on the T1 link or any of its 64 kb/s channels (T1 circuits). See *Maintenance*, chapter B2 for information on loopbacks.

Seven-segment display

The seven-segment display can be configured to indicate one of the following:

- ❏ number of alarms in the major alarm queue (default)
- ❏ number of the last alarm
- ❏ number of the background test currently running

For a one-digit number, the display shows the number for 0.5 seconds then goes blank for 0.5 seconds. For a two-digit number, the display shows the first digit followed by the second digit 0.25 seconds later, then goes blank for 0.5 seconds.

If the display is not flashing, turn the power switch off and then on. If the display still does not flash, contact your service representative.

For details on the major alarm queue and alarm code numbers, see *Maintenance*, chapter A2. For details on background tests, see *Maintenance*, chapter B1.

To configure the seven-segment display

1. From the MAINT menu, select DISPLAY.

2. Select ALRM_COUNT, LAST_ALARM or BKGND_TEST.

Power indicator

In normal operation, the power indicator (dot) on the seven-segment display is illuminated to indicate that power is being supplied to the system.

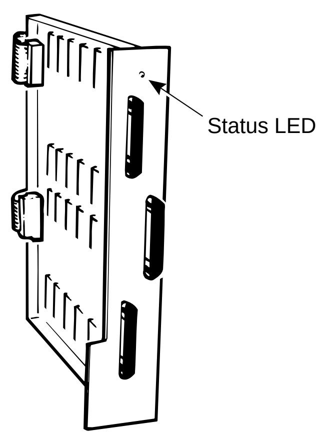
If the power indicator does not light, check that:

- the power cord is firmly plugged in at both ends (check both cords on redundant units)
- the power switch or circuit breaker is on (check both switches or circuit breakers on redundant unit)
- there is power at the outlet
- the fuse is good, as described in *Maintenance*, chapter C2

A1.3 Universal Card LED

The Universal card has a single red status LED as shown in Figure A1-4. During normal operation, the LED is on (steady). If it flashes or does not illuminate, it indicates that the system does not recognize the card.

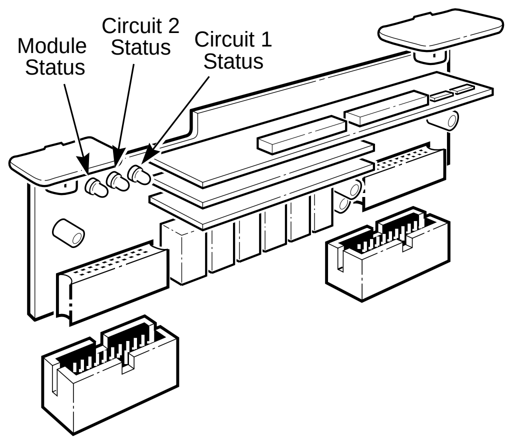
Figure A1-4: Universal Card Status LED



A1.4 Module LEDs

The voice modules, the RS-232 DCM, and the 2WTO, 4WTO and OCU modules each have three LEDs, as shown for the LGS module in Figure A1-5.

Figure A1-5: LGS Module LEDs

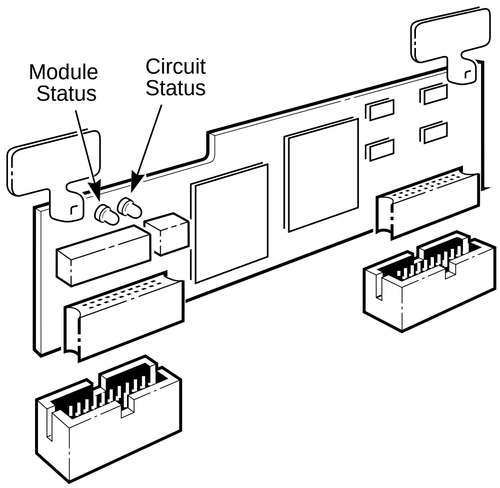


Note

On OCU 2 modules, the positions of the circuit status LEDs are reversed.

The DNIC module, the X.21 DCM, and the V.35 DCM each have two LEDs, as shown for the X.21 DCM in Figure A1-6.

Figure A1-6: X.21 DCM LEDs



Module status LED

The outermost yellow or green LED indicates module status. In normal operation, the module status LED is on (steady).

If the module status LED does not light, the installed module does not match the type configured for the module position. Reconfigure the module position to match the type of module installed. See *Configuration*, chapter C1.

If the module status LED flashes, a fault has been detected on one of the circuits.

Circuit status LED

On the voice modules, the RS-232 DCM, and the 2WTO, 4WTO and OCU modules, each circuit has a red or green status LED.

The X.21 and V.35 DCMs each have a single circuit status LED (green).

On the DNIC module the circuit status LED is called the line status LED (red).

Table A1-3 lists the condition indicated by a lit status LED for each module.

Table A1-3: Circuit Status Indicators

Module	Lit LED Status
LGS	A call is active on the circuit.
LGE	A call is active on the circuit.
E&M	A call is active on the circuit.
MRD	A ring voltage is being detected by or is being generated by the circuit.
RS-232 DCM	When the circuit is configured for HCM or DDS rate adaption, the LED lights when the data is in synchronization. The LED is continuously lit if transparent rate adaption is selected.
2WTO and 4WTO	The circuit is connected to another circuit within the node. The LED lights to follow the E-lead of the other circuit. The circuit is connected across a T1 link and RBS is turned on. The LED lights to follow the E-lead of the other circuit. The circuit is connected but the equipment to which it is connected is not physically present or is out of synchronization, and fault signalling type is Seized.
OCU	The circuit is processing a data signal.
X.21 DCM and V.35 DCM	When the LED is continuously lit, it indicates that the circuit is configured for transparent rate adaption. When the circuit is configured for HCM, the LED lights whenever HCM synchronization is achieved.
DNIC	The attached DTU is in synchronization with the DNIC module.

Tributary T1 Module LEDs

The Tributary T1 module has three LEDs:

- ❑ module status LED (green) – indicates normal operation
- ❑ alarm status LED (red) – indicates that the module is in red or yellow alarm
- ❑ loopback LED (orange) – indicates that the module is out of service because a loopback is being performed on it

A2. Alarms and Traps

This chapter describes:

- viewing, classifying and logging alarms
- monitoring or raising external alarms
- SNMP traps

A2.1 Alarm Conditions

The *3624 MainStreet* node continuously monitors the system for abnormal conditions or significant events. When an abnormal condition is detected, an alarm record is created and stored in one of three alarm queues, depending on how it has been classified. The alarm queues are:

- ❑ major
- ❑ minor
- ❑ diagnostic

Each queue can hold up to 64 alarms. See section A2.2 for information on classifying alarms.

Alarms are displayed with the most recent alarm at the top of the list. Figure A2-1 illustrates a sample major alarm queue display and Table A2-1 describes the display elements.

Figure A2-1: Alarm Queue Display

```
3624 MainStreet   620C-ab-cd                   Alarms:8    06-AUG-96    1:21P

 #    Date       Time Stat  Id        Code             SubCode Parameters

 8  06-AUG-94   1:20P  U   20  Revision/Feature Mismatch   M10   a,5,0
 7  06-AUG-94   1:18P  U   17  Revision/Feature Mismatch   M07   7,5,0
 6  05-AUG-94  10:18A  U   15  Revision/Feature Mismatch   M06   6,5,0
 5  04-AUG-94   9:17P  U   13  Revision/Feature Mismatch   M05   5,5,0
 4  03-AUG-94  11:08P  U    9  Device Failed               CTL   e,0,0
 3  01-AUG-94   8:03A  U    6  Device Failed               CTL   e,0,0
 2  01-AUG-94   6:01A  A    3  Red Alarm                   T1
 1  01-AUG-94   5:00A  A    1  Synch Source Changed              5,12,0







 ALARMS MAJOR


  1-ACK_ALL        2-            3-DELETE_ALL        4-DELETE          5-ACK
  6-               7-            8-CANCEL            9-QUIT            0-
```

Table A2-1: Alarm Queue Display Elements

Column	Description
#	Indicates the number of alarms in the alarm queue, with the last alarm at the top of the list. Use the alarm number as the identifier when acknowledging or deleting the alarm.
Date	Indicates the date that the alarm occurred.
Time	Indicates the time that the alarm occurred.
Stat	Indicates whether an alarm is unacknowledged (U) or acknowledged (A).
Id	Unique number assigned by the system when the alarm occurs. This ID does not change when the alarm is acknowledged or deleted.
Code	Identifies the type of alarm as shown in Table A2-2.
Subcode and Parameters	For diagnostic use by Newbridge field service personnel.

Table A2-2 lists types of alarms that can occur. Alarms marked with an asterisk (*) have corresponding clearing alarms, that occur when the condition that caused the alarm is removed or repaired. Clearing alarms appear in the same queue as the original alarm.

Table A2-2: Alarm Conditions

Alarm	Description
54016 Status Reset	A request has been received from the network to reset the quality statistics of a primary rate link.
Busy Out Applied*	A circuit has been temporarily placed out of service.
CSU Loopback Activated*	A CSU loopback has been activated on the T1 link by the network.
Database Reset	The node database has been reset, converted or reinstated.
DB Conversion Failure	The generic swap has been rejected because the newer generic could not restore the database backed up by the older generic.
DB Info Backup Failed	The generic swap requested by the network manager has been rejected because the generic could not back up the database.
Device Failed	The background or directed diagnostics detected a failed device. Locate and replace the device.
Domain Mismatch	A CPSS link has been created between two nodes that have different domain numbers. The node continues trying to bring up the CPSS link (without raising further alarms) until the CPSS circuit is disconnected or the nodes are configured with the same domain identifier.
Equipment Failure	The printer configured for the serial port cannot be detected by the system.
External Alarm Raised	If the alarm connector (J7) is enabled as an open circuit, this alarm means the circuit is open. If enabled as closed, the circuit is closed.
Failed State	The T1 link experienced ten consecutive severely errored seconds and has been taken out of service.
Framing Err Rate Exceeded	The error threshold for the T1 link has been exceeded.
Line Loopback Activated	A T1.403 loopback request has been activated by the T1.403 network.
Module Dead	A module has been marked as dead.
Module Failure*	A module is either not responding to the system or it failed the startup diagnostics. The first parameter identifies the module.
Module Removed	A module was removed. No action is required.
Module Reset	A module has been reset via the NMTI.
Network Layer Mismatch	A CPSS link has been created between two nodes running incompatible versions of CPSS. The node at this end of the link will continue trying to bring up the CPSS link (without raising further alarms) until the CPSS circuit is disconnected or the nodes are configured with the same version of CPSS.
Network Loopback Active*	A 2713 Hz tone-activated loopback is in progress on a 2WTO or 4WTO module.
Network Loopback Timeout	A 2713 Hz tone-activated loopback has timed out before deactivation by the network.
NVM Error(1)	There is a problem with the non-volatile RAM on the Control card. Record the alarm subcode and parameters, then run the DIRECTED test no. 3 (see *Maintenance*, chapter B1). After the test, record information on the NVM given in the MAINT NVM_DATA menu.
Payload Loopback Activated	The AT&T 54016 network has activated a payload loopback.
Power Rail Failed	One of the power rails does not have power.
Print-out Aborted	The printout session has been aborted because the print queue is full.
Print-out Interrupted	The printout session has been interrupted due to an equipment failure.
Red Alarm*	Framing cannot be found on the T1 link.

continued

Table A2-2: Alarm Conditions (continued)

Alarm	Description
Revision/Feature Mismatch	The Control card and software versions are mismatched, a necessary Control card module is missing, or a 4WT0 module with an unknown variant ID is installed. Parameter 1 indicates the position number. Parameter 2 identifies the alarm cause: 0 – unknown cause 1 – the card and software are incompatible 4 – the FDL_CPSS softkey has been selected with an incompatible Control card 5 – a DTU IC is needed in the DTU socket 6 – a DTU IC is needed in the FDL socket 9 – the installed module has an unknown variant ID Parameter 3 indicates the unknown variant of the 4WT0 module.
Ring Generator Failed	The ringing generator failed.
Router Algorithm Mismatch	This alarm applies to nodes running the same version of CPSS but different versions of the version 1 router routing algorithm. The alarm occurs when a CPSS v2 link is created between two nodes running incompatible versions of the CPSS routing algorithm. The node will continue trying to bring up the CPSS link (without raising further alarms) until the CPSS circuit is disconnected or the nodes are configured to run the same version of the CPSS v2 routing algorithm.
Signalling Fault	This alarm indicates that a card or circuit has generated an abnormal amount of signalling activity to the Control card. If a card caused the excessive activity, it is held in reset for 30 minutes before being returned to service. If a circuit was responsible for the excessive signalling, it is disconnected and must be reconnected via the CONFIG CIRCUIT CONNECT menu.
Super-rate Conn Removed	A super-rate connection between a DCM and the T1 link was temporarily removed because of a "Reserved position violation".
Synch Source Changed	The synchronization source has been changed.
Synch Source Failure	The timing source has been lost. No action is required.
Synch Src Recovery Failed	The system attempted to recover a lost timing source but did not succeed. No action is required.
System Advisory (DA)[1]	This is a diagnostic software alarm related to Device Administration.
System Advisory (SA)[1]	This is a diagnostic software alarm related to System Administration.
System Restart	The node has restarted. Parameter 1 indicates a current active code, either 2 (Bank A), 3 (Bank B) or 5 (PROM). Parameter 2 indicates the reason for the restart, such as: 0 – power up 2D – NMTI reset 2E – push-button reset 2F, 30, 31 – database conversion failed when changing generics 39 – network manager reset Parameter 3 indicates a startup test failure. Each bit set to 1 indicates that a corresponding test failed: Bit 0 corresponds to RAM test Bit 1 corresponds to ROM test Bit 2 corresponds to processor test Bit 3 corresponds to EDX test Bit 4 corresponds to timer test Bit 13 corresponds to code RAM Bit 14 corresponds to DX test
Tail Circuit Gone*	The connection between an OCU module and a DSU has been lost. This alarm is not raised if the OCU module is removed. Locate the problem and reconnect or replace the equipment as necessary. OR The connection between a DNIC module and a DTU is lost. This alarm is not raised if the DNIC module is removed. Locate the problem and reconnect or replace the equipment as necessary.

continued

Table A2-2: Alarm Conditions (continued)

Alarm	Description
Wrong DTU Type Installed	The DTU connected to the DNIC module does not match the type configured.
Wrong Interface Card	A voice or data interface module installed on the Universal card does not match the type configured for the position. Reconfigure the position.
Wrong Module in Position	The module installed in a position does not match the type configured for the position. The first parameter is the module position number. Either reconfigure the position or install the type of module configured.
Wrong/No Module Installed	No module or the wrong module has been installed.
Yellow Alarm*	The far end cannot find the T1 framing.

Notes

1. An abnormal operating condition which may affect system operation. To verify whether system operation is affected, note the circumstances leading to this alarm and all alarm details, and advise the Newbridge field support office.

A2.2 Classifying Alarms

Alarms are pre-configured to appear in one of three alarm queues, depending on their priority. Figure A2-2 shows a screen example of the default configuration.

Figure A2-2: Default Alarm Classification

```
3624 MainStreet   620C-ab-cd                     Alarms:2    04-AUG-96    2:20R

Code #       Code           Priority    Code #       Code        Priority
-------------------------------------  ----------------------------------
  1 System Advisory (SA)      MAJOR    15 Revision/Feature Mismatch MAJOR
  2 Wrong Module In Position  MAJOR    16 Module Failure            MAJOR
  3 NVM Error                 MAJOR    17 Module Removed       DIAGNOSTIC
  4 Red Alarm                 MAJOR    18 Tail Circuit Gone    DIAGNOSTIC
  5 Yellow Alarm              MAJOR    19 Power Rail Failed         MAJOR
  6 System Advisory (DA)      MAJOR    20 Ring Generator Failed     MAJOR
  7 External Alarm Raised     MAJOR    21 Failed State              MAJOR
  8 Synch Source Failure      MAJOR    22 Busy Out Applied          MAJOR
  9 Wrong/No Module Installed MAJOR    23 CSU Loopback Activated    MAJOR
 10 Wrong Interface Card      MAJOR    24 Database Reset            MAJOR
 11 Device Failed             MAJOR    25 Signalling Fault          MAJOR
 12 Framing Err Rate Exceeded MAJOR    26 Module Reset              MAJOR
 13 Synch Source Changed      MAJOR    27 Module Dead               MAJOR
 14 Synch Src Recovery Failed MAJOR    28 Domain Mismatch           MAJOR

 ALARMS CONFIG "?"
 Enter the alarm code number.

  1-            2-PAGE_UP         3-              4-              5-
  6-            7-                8-CANCEL        9-QUIT          0-
```

The alarm priorities are set as:

- major – alarms that will disrupt the system
- minor – alarms that need attention but do not immediately threaten service
- diagnostic – advisory alarms

The alarms can be reclassified for a different alarm queue. However, you cannot reclassify an alarm if it is currently in an alarm queue.

To set an alarm priority

1. From the ALARMS menu, select CONFIG. A list of all alarms and their priorities is displayed.
2. If the list is several pages in length, press <Esc>, then select PAGE_DOWN and PAGE_UP to move through the list and find the alarm you want to reconfigure.
3. Enter the code number of the alarm as shown on the screen.
4. Select the alarm priority – MAJOR, MINOR or DIAGNOSTIC.

A2.3 Viewing, Deleting and Acknowledging Alarms in the Queue

When an alarm occurs, it is entered in its alarm queue. Each alarm queue can hold up to 64 alarms. The 64th alarm in a queue generates a "Too Many Alarms" alarm to indicate that the queue is full. All subsequent alarms for that queue are discarded until some of the existing ones are deleted.

To view an alarm

1. From the ALARMS menu, select the alarm queue you want to view – MAJOR, MINOR or DIAGNOSTIC.

2. Scroll through the list of alarms using the EARLIER and LATER functions.

To delete an alarm

1. From the ALARMS menu, select the alarm queue that holds the alarm you want to delete.

2. Select DELETE, then enter the alarm number – the number in the # column on the NMTI display.

   To delete all alarms in the queue at once, select DELETE_ALL.

To acknowledge alarms

You can acknowledge a specific alarm or all alarms in a queue.

If there are any unacknowledged alarms in the major alarm queue, the Event Status LED is lit, and any external alarm devices that are connected are triggered. See section A2.5 for information on external alarms.

1. From the ALARMS menu, select the alarm queue that holds the alarm you want to acknowledge.

2. Select ACK, then enter the alarm number – the number in the # column on the NMTI display.

   To acknowledge all alarms in the queue, select ACK_ALL.

A2.4 Logging Alarms

Alarms can be logged to a local device, such as a printer, if one is connected to a serial port on the *3624 MainStreet* node. Alarms can also be logged to a remote NOC equipped with *46XX MainStreet* series network manager software. This remote logging can either be through a primary rate link or a modem.

All three options can be active simultaneously. The default logging is to a local device.

To specify how alarms are logged

1. From the ALARMS menu, select MORE.
2. Select LOGGING, then select which logging options – remote, modem or local – are on or off.

A2.5 External Alarm Devices

External devices can be raised or monitored through the J7 Alarms connector.

Activating an external device

If there is an unacknowledged alarm in the major alarm queue, the Event Status LED illuminates. If an external alarm device is connected to the external alarm connector, it is also triggered.

If a system problem exists, the System Status LED is illuminated and drives the System Status relay pins. The use of the external alarm connector is described in *Installation*, chapter D5. System problems are listed in *Maintenance*, Table A1.2.

The external alarm indication must be enabled through NMTI.

Monitoring an external device

An external device can be monitored by the *3624 MainStreet* node for change of state through the Alarm In pins (see *Installation*, chapter D5). The alarm state can be set as an open or closed circuit. When a change of state occurs, this causes an "External Alarm Raised" alarm.

Monitoring the power supply status

In a redundant power supply system, the J7 connector can be connected to the alarm connector on the power supply selector card, to monitor the status of the power supplies.

The external alarm must be enabled and configured as an open circuit.

To enable the external alarm

1. From the ALARMS menu, select EXTNL_ALRM.
2. Select ENABLE to enable the node to monitor or activate external alarm devices.
3. Select the alarm state as either an open or closed circuit – OPEN_CCT or CLOSED_CCT. The default is closed.

A2.6 SNMP Traps

An SNMP trap message is an alarm or status message that is generated by the SNMP agent for the node, and sent to the SNMP manager. The SNMP agent can produce the following standard traps:

- ❑ coldStart – occurs at system startup if the serial port has been configured for PPP/IP, or when the serial port is reconfigured for PPP/IP while the node is already up. The trap is sent only if the PPP link is up.
- ❑ linkDown – indicates a failure on one of the node interfaces. The trap is sent when there is a transition from any operational state to a down state (for T1 interfaces, the trap is generated on the red alarm state).
- ❑ linkUp – indicates that a node interface has come up. The trap is sent when there is a transition from a down state to an up, dormant or testing state (for T1 interfaces, the trap is generated on the red alarm cleared state).
- ❑ authenticationFailure – occurs when the node receives a protocol message that was not properly authenticated
- ❑ enterprise traps – traps created specifically for the node. The *3624 MainStreet* node supports one enterprise trap that sends messages for all alarms in the major alarm queue. The node cannot specify which alarms in the major alarm queue are SNMP traps; therefore, all alarms are sent to the SNMP manager even if they are not SNMP-specific.

The authenticationFailure trap can be turned off through SNMP.

To configure managers to receive traps

The node controls which SNMP managers receive trap messages. For information on assigning managers to receive traps, see *Configuration*, section A3.2.

In order for an SNMP manager to receive traps from the node, it must also be configured to receive them. If using HP OpenView on a UNIX system, the enterprise name and ID must be added on the manager. This can be done in two ways.

Loading 362X.mib

1. Select the Options → Load / Unload MIBs menu and display the list of loaded MIBs.

2. If the file Alarm.mib is in the list, highlight it and select Unload MIBs.

   If desired, repeat the above step to unload the files RFC1213 and Newbridge.smi.

3. Click on the Load button.

4. Enter the file name (362X.mib) in the "MIB File to Load" box, or highlight the file in the Directories box.

5. Click on the OK button.

   The application asks if you want to load the TRAP-TYPE definitions.

6. Click on the OK button.

   An information window appears, explaining how to view the SNMP trap-type that has been loaded.

7. Click on the Close button.

8. Select the Options → Event Configuration menu and display the list of loaded enterprise traps. Highlight the trap "nncExtAlarmTraps" with the enterprise ID ".1.3.6.1.4.1.123.4.2.2".

9. Highlight the event name "majorQalarm" in the Event Identification Table.

10. Select the Edit → Modify Event menu. Set the Event Category to "enterprise trap", and change the Event Log message to "Trap received from $A : $1".

11. Click on the OK button.

12. Select the File → Save menu and save the configuration.

    The enterprise traps are now configured.

Configuring the manager manually

1. Select the Event Configuration menu, then select Edit → Add → Enterprise Identification.
2. Enter the enterprise name (nncExtAlarmTraps) and the enterprise ID (.1.3.6.1.4.1.123.4.2.2).
3. Click on the Add button.
4. Highlight the above entry in the table and select Edit → Add → Event.
5. Enter the event name (majorQAlarm), then set the Generic Trap field to "Enterprise Specific" and the Specific Trap Number to 1.
6. Set the Event Category to "enterprise trap", and change the Event Log message to "Trap received from $A : $1."
7. Click on the OK button.
8. Select the File → Save menu and save the configuration.
9. For standard traps: select the Event Configuration menu and highlight the Enterprise Name "ENTERPRISES" with enterprise ID ".1.3.6.1.4.1".
10. Highlight the event name "SNMP_Cold_Start".
11. Select Edit → Modify Event and set the Event Category to "Status Events".
12. Click on the OK button.
13. Repeat steps 10 to 12 for all entries in the Event Identification table for ENTERPRISES.
14. Select the File → Save menu and save the configuration.

The SNMP standard traps may also be configured under the enterprise ID .1.3.6.1.4.1.123.1.1.19. This is done using the Add Event menu of HP OpenView. Change the generic trap field name to the name of the trap that you are adding (for example, coldStart). Each standard trap must be added separately.

Alarm MIB (included in 362X.mib)

The Newbridge alarm MIB contains information on the alarms in the major, minor and diagnostic queues. It includes:

- alarm queue number – either major, minor or diagnostic
- alarm queue entry
- alarm status
  - non TEP-1(E)
  - unacknowledged, not remedied
  - unacknowledged, remedy unacknowledged
  - acknowledged, not remedied
  - acknowledged, remedy unacknowledged
  - acknowledged, remedy acknowledged
  - clearing alarm unacknowledged
  - clearing alarm acknowledged
- administrative status of the alarm queue entry – used as a set variable for acknowledging an alarm
- alarm queue entry string – text string that is displayed in the NMTI alarm queue menu, and is sent with an enterprise trap (for major alarm queues only)

B1. System Diagnostics

This chapter describes diagnostic tests and maintenance procedures performed on the modules and cards on the *3624 MainStreet* node.

The node can perform a number of system-wide and device-specific diagnostic tests, either automatically or manually. If a test is unsuccessful, or if the time taken to complete that test exceeds the preset limit, the Device Failed alarm is raised in the alarm queue. By accessing the fault list, you can determine which circuit failed a diagnostic test. See section B1.3.

Diagnostics do not busy out a circuit or remove it from service. If a circuit is required for a call while a test is in progress, the test on that circuit is stopped. Diagnostics also bypass circuits engaged in a call. Section B1.5 describes how to busy out a circuit.

B1.1 Diagnostic Tests

Table B1-1 lists the diagnostic tests performed by the *3624 MainStreet* node. You can run all the tests in the background or you can select a particular test.

Table B1-1: Diagnostic Tests

Test #	Function	Description
1	Program Integrity	A checksum is performed over the processor program space.
2	RAM Integrity	A cyclical byte-wide read/write test is performed over the entire RAM.
3	NV RAM Integrity	A checksum is performed over the entire NVM.
4	Digital Loopback	A digital loopback is performed on the information link between the interface card CODEC and the Control card.

B1.2 Background Diagnostics

There are two types of background diagnostic tests:

- ❑ system background diagnostics (tests 1 to 3)
- ❑ circuit background diagnostics (test 4)

System background diagnostics (tests 1 to 3) can be set to run in the background so that the system can keep track of faults as they occur. If background diagnostics are disabled and then enabled again, they resume testing where they left off.

Circuit background diagnostics can be configured on a specific T1 circuit. Each circuit must be enabled individually in order for the test to run.

Note

Background diagnostics are not supported by the subrate and super-rate circuits of the X.21 or V.35 DCMs, or by the circuits of the OCU module, the DNIC module or the RS-232 DCM.

To enable system background diagnostics

1. From the MAINT menu, select DIAG.

2. Select ENABLE to enable the diagnostics.

If background diagnostics are enabled, you can stop the current test and restart the background diagnostics at test 1. Select RESTART to start the testing over.

To enable circuit background diagnostics

1. From the CONFIG menu, select CIRCUIT.

2. Enter the module position and circuit of the circuit you want to run diagnostics on, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuit

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1 or 2) for the voice or data module

3. Select MORE, then select ENAB_DIAG to enable diagnostics on the circuit.

B1.3 Directed Diagnostics

You can select one of the four tests to run once, 10 or 100 times, or continuously. After running the test the specified number of times, the system automatically resumes the background diagnostic tests (if enabled).

If running test 4, you must specify the number of the T1 circuit to be tested. If the specified circuit is busy, the NMTI displays the message, "Device momentarily unavailable for testing" until the circuit is ready to be tested, at which time the directed test is carried out.

Note

Directed diagnostics are not supported by the subrate and super-rate circuits of the X.21 or V.35 DCMs, or by the circuits of the OCU module, the DNIC modules, the RS-232 DCM or the Tributary T1 module.

To run a directed test

1. From the MAINT menu, select DIAG.

2. Select DIRECTED, then enter the test number (1 to 4).

3. If running test 4, enter the module position and circuit of the circuit you want to run diagnostics on, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuit

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1 or 2) for the voice or data module

4. Select the number of times you want the test to run – X1, X10, X100 or LOCK (to run the test continuously).

To stop a directed test, select HALT.

B1.4 Viewing Diagnostics

You can view:

- ❑ the number and description of the currently running diagnostic test
- ❑ a list of all supported diagnostic tests
- ❑ each failed circuit and the test it failed

The NMTI displays the circuit(s) on the T1 aggregate module. To determine which background diagnostic test the circuit failed, check the alarm queue. See *Maintenance*, chapter A2.

To view information on diagnostic tests

1. From the MAINT menu, select DIAG.

2. Select the type of information you want to view.

   To view the failed circuits, select FAULT_LIST, then enter the module position (1 to 12) of the module you want to view.

B1.5 Busy-out

The busy-out feature is used to temporarily place a T1 or Tributary T1 circuit out of service. When a circuit is out of service, you can perform maintenance functions such as loopbacks. A circuit that is busied out is blocked from attempts to place it back in service or change any part of its configuration.

A circuit remains in the busy-out state until you change it back to the unbusy state or until the system is restarted.

When a T1 circuit that is part of a super-rate group is busied out, the disconnection is performed on all the circuits within the super-rate group. The temporary disconnection must be set on the first circuit within the group, otherwise the error message, "Maintenance cannot be performed on this type of circuit", is displayed.

An additional maintenance function is provided for busy-out of fractional Tributary T1 links. This allows you to perform such maintenance functions as line loopbacks.

To place a circuit out of service

1. From the MAINT menu, select ON_CIRCUIT or ON_MODULE (to busy out the Tributary T1 module).
2. If you select ON_CIRCUIT, enter the module position and circuit of the circuit you want to busy out, in the form:

   <T1-*cc*>, where *cc* is the circuit number (1 to 24) for the T1 circuit

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1 or 2) for the voice or data module
3. If you select ON_MODULE, enter the module position (1, 2, 3, 4, 7, 8, 9, 10) of the Tributary T1 module.
4. Select BUSY_OUT to place the circuit or module out of service.

B1.6 Viewing and Editing Signalling Leads

Circuits send and receive signalling information. Analog circuits send signalling information via voltage levels on the signalling leads. Digital circuits send signalling information via signalling bits in the data stream.

Incoming signalling information indicates the state of the remote end, while outgoing signalling information transmits the state of the local end.

The *3624 MainStreet* node allows you to examine incoming and outgoing signalling leads. This is a useful troubleshooting tool as it enables you to view the far end conditions and determine, for example, whether the telephone is off-hook or what signal patterns are being sent.

You cannot view the signalling leads on T1 circuits that are part of a super-rate group, as robbed bit signalling is off for super-rate data circuits.

Table B1-2 lists the signalling leads for the circuit types.

Table B1-2: Incoming and Outgoing Signalling Leads

Circuit Type	Incoming Signalling Leads	Outgoing Signalling Leads
E&M	M-lead	E-lead
LGS	Loop_Current Ground_Detect	Ringing Tip_Open Reverse_Bty
LGE	Ringing Tip_Ground Forward_Feed Reverse_Feed	Loop_Closure Ring_Ground
DNIC	Sync LQ1 LQ2	Force Unsync
OCU	Off-hook DSU Status Loopback	–
T1	ABCD	ABCD
Tributary T1	ABCD	ABCD

Note

For T1 and Tributary T1 circuits, the incoming and outgoing signalling leads are not shown if RBS_OFF is selected.

To view signalling information

1. From the MAINT menu, select ON_CIRCUIT.
2. Enter the module position and circuit of the circuit you want to view, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select SHOW_SIGNL.

A sample screen is shown in Figure B1-1.

Figure B1-1: Signalling Leads Display

```
3624 MainStreet   620C-ab-cd                   Alarms:1    04-AUG-96    1:35P

Circuit      Type   Loopback        Status                  Connection

M02-1         OCU    None           Connected                T1-1



                     Scans:   Off Hook          DSU        NTWK_Loopback
                                  0              1              1

                     Drives   Off Hook
                                  1


 MAINT ON_CIRCUIT  M02-1 SHOW_SIGNL

  1-               2-               3-                4-               5-
  6-               7-               8-CANCEL          9-QUIT           0-
```

To change the state of outgoing signalling leads

The abbreviation and the digital representation of the signals are displayed on the screen – where 0 indicates off and 1 indicates on.

Outgoing signalling leads can be changed to force conditions at the local end. For example, it may be useful for the DTUs to lose synchronization or to force a telephone to ring.

1. From the MAINT menu, select ON_CIRCUIT.
2. Enter the module position and circuit of the circuit you want to view, in the form:

   <T1-*cc*>, where *cc* is the circuit number for T1 circuits (1 to 24)

   <*pp*-*cc*>, where *pp* is the module position (1, 2, 3, 4, 7, 8, 9, 10) and *cc* is the circuit (1 to 24) for the Tributary T1 module

   <*pp*-*c*>, where *pp* is the module position (1 to 12) and *c* is the circuit (1, 2, A or B) for the voice or data modules
3. Select SET_SIGNAL, then enter the state of the lead – 0 or 1.

DNIC circuit signalling leads

The Sync signal indicates DTU synchronization. If synchronization is not turned on, the DTU is not synchronized and communication between the *3624 MainStreet* node and the DTU is not possible. See *Configuration*, chapter F1 for information on synchronizing DTUs.

The LQ1 and LQ2 signals are a noise margin (zero to three) indicating the quality of the link between the *3624 MainStreet* node and the DTU. The higher the number, the higher the link quality.

When the "Forced Unsync" lead is turned on, it causes the DTU to lose synchronization. The DTU regains synchronization when the lead is turned off.

The signals of the DTU corresponding to each DNIC circuit can be determined if the DTU is in synchronization. In this case, a CTRL_LEADS softkey appears. When selected, it displays the DTU inputs and outputs. The output status is set via the CONFIG CIRCUIT FUNCTION menu.

B1.7 Card and Module Information

You can display information about T1 aggregate, Control card or Universal card modules such as module type, module identification (ID) and interface type. This information can be used if you need to contact your Newbridge representative when you have problems with one of the modules.

To display data on cards or modules

1. From the MAINT menu, select ON_MODULE.
2. Enter the module position or card name, in the form:

   <T1> for the T1 module

   <DSP> for the resource module

   <MEM> for the memory module

   <*pp*>, where *pp* is the module position (1 to 12) for the voice or data modules

   <CTL> for the Control card

A sample screen display is shown in Figure B1-2.

Figure B1-2: Module Information Display

```
3624 MainStreet   620C-R0-10                     Alarms:5    25-AUG-96    9:06A





    Module Type         : LGS
    Module ID           : $0
    Status              : Ok







 MAINT ON_MODULE 4

  1-                 2-                  3-               4-              5-
  6-RESET_POSN       7-                  8-CANCEL         9-QUIT          0-
```

B1.8 Resetting Modules

Modules can be reset through the NMTI. The reset command is equivalent to pulling the module out and pushing it back into place.

To reset a module

1. From the MAINT menu, select ON_MODULE.
2. Enter the module position (1 to 12) of the module you want to reset.
3. Select RESET_POSN.

B2. Loopbacks

Loopbacks are a maintenance function used to isolate faults in equipment or transmission lines. When a loopback occurs, a signal is sent out and looped back at some point in the transmission path, and the outgoing signal is then compared to the returning signal.

The *3624 MainStreet* node offers several loopbacks so that the signal can be returned at different points in the path. This allows you to check progressively longer sections of the transmission, knowing the fault is between the last successful loopback and the first unsuccessful loopback.

All loopbacks are temporary; that is, loopback information is not stored in non-volatile memory. With some loopbacks, the signal is passed through as well as being looped back.

This chapter describes the loopbacks that can be performed on the modules and DTUs.

Note

The T1.403 module supports remote activation of payload and line loopbacks. See *Maintenance*, chapter B3 for more information.

B2.1 Initiating Loopbacks

The unit performs unidirectional and bi-directional loopbacks on voice and data circuits, as well as on individual channels on the T1 link. T1 loopbacks test the end-to-end connections over the T1 line. These types of loopbacks can be initiated from the node.

To initiate loopbacks on circuits

Loopbacks are initiated circuit by circuit.

1. From the MAINT menu, select ON_CIRCUIT.
2. Enter the module position (1 to 12) and circuit (1, 2, A or B) for the module.
3. Select the loopback type – A, B or C.

To cancel the loopback, select UNDO_LPK. To remove all loopbacks at once, select UNDO_MAINT.

To initiate equipment or line loopbacks

1. From the MAINT menu, select ON_MODULE.
2. Enter <T1>, or enter the module position (1, 2, 3, 4, 7, 8, 9, 10) for the Tributary T1 module.
3. Select LOOPBACK, then select EQUIPMENT or LINE.

To cancel the loopback, select UNDO_LPK.

Caution

Initiating a loopback causes all calls in progress on the affected circuit to be dropped. No new calls can be initiated while the circuit is looped back.

Network-invoked loopbacks (such as DDS, CSU and 2713 Hz tone-activated loopbacks) cannot be removed at the node. You cannot initiate a loopback from the node (via NMTI) while a network-invoked loopback is in progress.

Up to five loopbacks can be in progress simultaneously. When this number is reached, loopback softkeys do not appear for circuits that are not in a loopback state. In addition, the NMTI displays a cautionary message.

B2.2 Loopback LEDs

Loopback LEDs on the Control card are lit when there is a loopback on any circuit or the T1 line.

When a loopback test is run on a circuit, it appears on the NMTI display with the suffix "–M", indicating that it is under maintenance.

Network-invoked loopbacks appear under the "Loopback" heading on the NMTI display.

B2.3 Voice Interface Module Loopbacks

Loopbacks can be performed on the LGS, LGE, E&M and MRD modules.

Loopback A

Loopback A for voice interface modules is a unidirectional loopback that extends from the DX located on the Control card. The signal loops back at the digital side of the CODEC on the voice interface module.

Loopback B

Loopback B is a unidirectional loopback that extends from the DX and loops back at the analog side of the CODEC.

Note

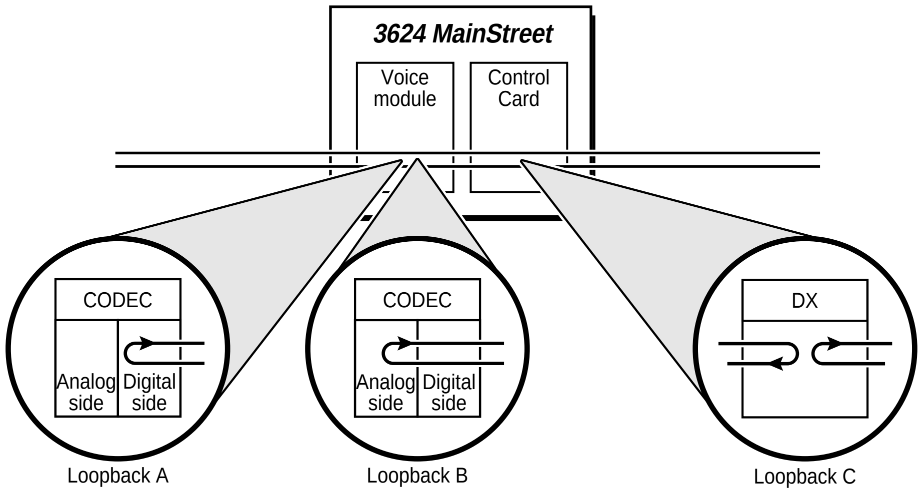
Loopback B is not supported for E&M circuits configured for 4-wire. Signal gain may be produced during a Loopback B on an LGS circuit.

Loopback C

Loopback C is a bi-directional loopback. Unlike the unidirectional loopbacks, where the signal is looped and returned to the origin, the end-to-end signal is interrupted and looped back to each end.

Figure B2-1 shows loopbacks A, B and C.

Figure B2-1: Voice Interface Module Loopbacks



B2.4 *2601*, *2602* and *2603 MainStreet* DTU Loopbacks

The loopbacks described below can be performed on the *2601*, *2602* and *2603 MainStreet* DTUs.

Loopback A

Loopback A occurs on both lines (port A and port B) simultaneously. Loopback A extends from the DX on the Control card and loops back on the DNIC module header.

If loopback A is present on a DNIC circuit, no loopbacks are available for the other circuit on the module.

When loopback A is removed, communication between the DNIC circuit and the DTU must be re-established. This means that the softkeys LOOPBACK_B and LOOPBACK_C are not available for approximately four seconds after the end of loopback A. Refresh the screen to see the softkeys (press <Esc> <R>).

Loopback B

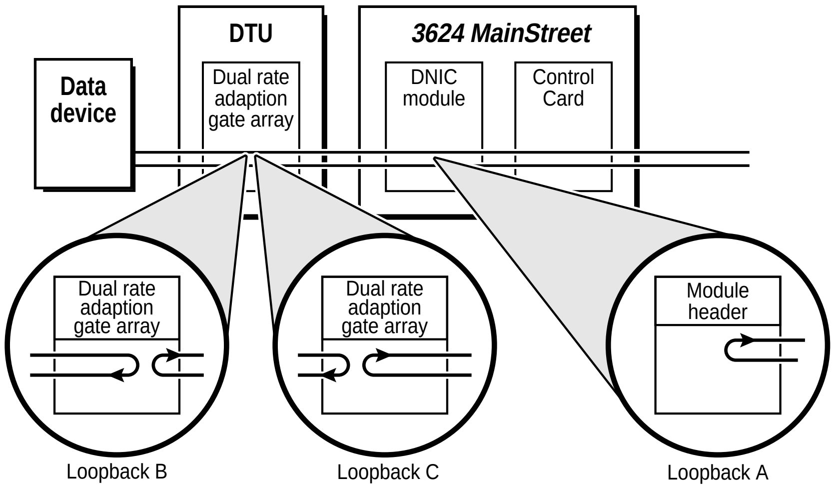
Loopback B is a bi-directional loopback that can be initiated on either port A or B. The signal from the Control card is looped back in the DTU DRAGA chip, on the side closest to the DNIC module. The signal from the data device is looped back in the DRAGA chip also, but on the inside of the DRAGA.

Loopback C

Loopback C is a bi-directional loopback. The signal from the Control card is looped back within the DTU DRAGA. The signal from the data device is looped back in the DTU at the DRAGA, on the side closest to the data device.

Figure B2-2 shows loopbacks A, B and C.

Figure B2-2: *2601*, *2602* and *2603 MainStreet* DTU Loopbacks



B2.5 *2606 MainStreet* DTU Loopbacks

The loopbacks described below can be performed on the *2606 MainStreet* DTUs.

Loopback A

Loopback A occurs on port A and port B simultaneously. Loopback A extends from the DX on the Control card and loops back on the DNIC module.

Loopback B

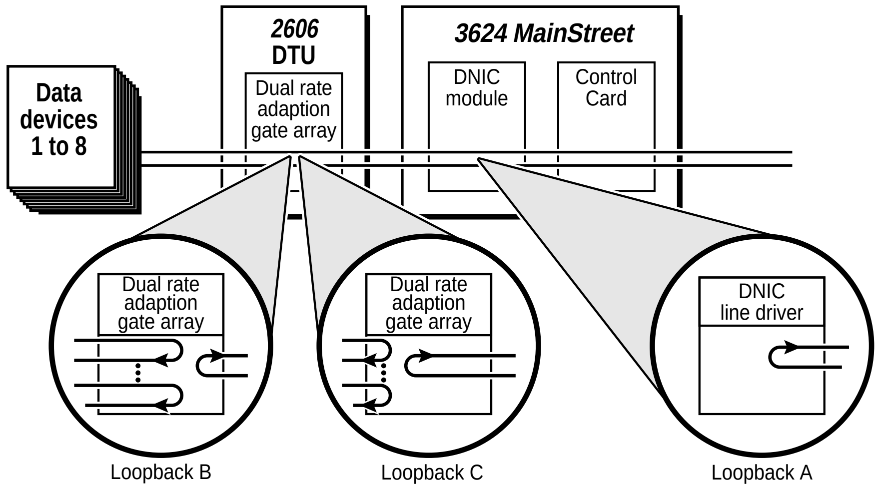
Loopback B is a bi-directional loopback that can be initiated from either circuit A or B. The signal from the Control card is looped back within the DTU DRAGA chip, on the side closest to the DNIC module. The signals from the data devices connected to the selected aggregate port are looped back on the side closest to the DNIC module.

Loopback C

Loopback C is a bi-directional loopback that can be initiated from either port A or B. The signal from the Control card is looped back within the DTU DRAGA chip. The signals from the data devices connected to the selected aggregate port are looped back in the DTU at the DRAGA on the side closest to the data device.

Figure B2-3 shows loopbacks A, B and C.

Figure B2-3: *2606 MainStreet* DTU Loopbacks



B2.6 *2608* and *2610 MainStreet* DTU Loopbacks

For *2608* and *2610 MainStreet* DTUs, the selection of port A via the NMTI accesses the aggregate port A on the DTU. The selection of port B simultaneously accesses the eight asynchronous ports on the other side of the DTU.

Loopback A on port A

Loopback A is a unidirectional loopback that extends from the DX and loops back on the DNIC module. It occurs on port A only.

If loopback A is present on a DNIC circuit, no other loopbacks are available for the other circuit on the module.

When loopback A is removed, communication between the DNIC circuit and the DTU must be re-established. This means that the softkeys LOOPBACK_B and LOOPBACK_C are not available for approximately four seconds after the end of loopback A. Refresh the screen to see the softkeys (<Esc> <R>).

Loopback B on port A

Loopback B on port A is a bi-directional loopback. It extends from the DX and loops back on the DRAGA in the DTU. The signals from all eight data devices are looped back on the inside of the DRAGA.

Loopback C on port A

Loopback C is a bi-directional loopback. The signal from the Control card is looped back within the DTU DRAGA. The signals from the eight data devices are looped back in the DRAGA, on the side closest to the data device.

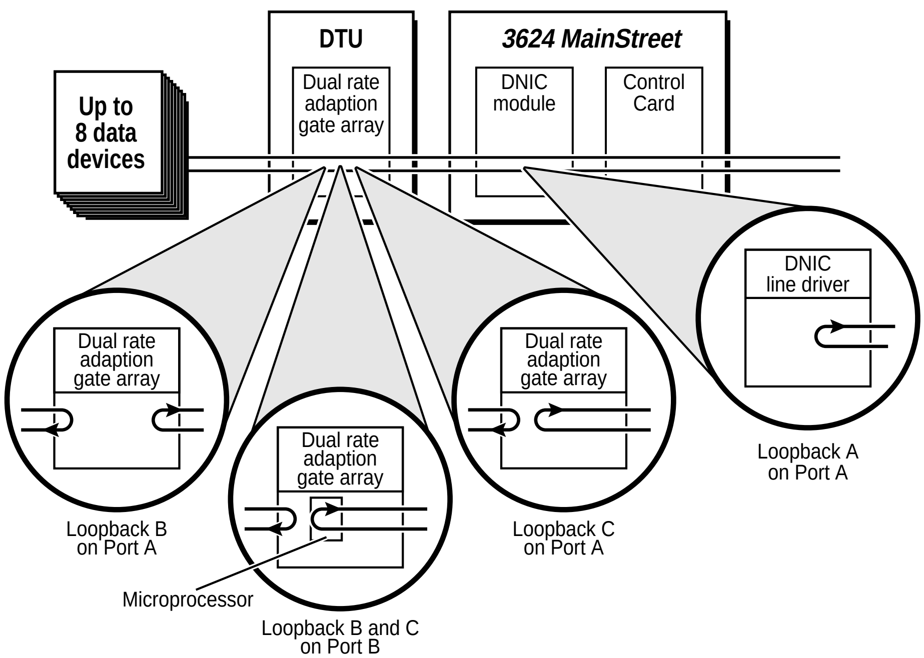
Loopback B or C on port B

When loopback B or C is selected for port B, a bi-directional loopback is initiated. The software loopback signal extending from the DX is looped back in the DTU microprocessor.

The signals extending from the eight data devices are looped back simultaneously at the eight asynchronous interfaces on the DTU. These loopbacks are hardware loopbacks.

Figure B2-4 shows the *2608* and *2610 MainStreet* loopbacks.

Figure B2-4: *2608* and *2610 MainStreet* DTU Loopbacks



B2.7 OCU Module Loopbacks

OCU module loopbacks can be invoked through the NMTI or through the network.

When invoked from the NMTI, these loopbacks are known as loopback A, B or C. When invoked from the network, loopback A is known as an OCU loopback, and loopback B is known as a channel (or CSU) loopback. Loopback C on an OCU module can only be invoked via the NMTI.

All OCU modules support NMTI-invoked loopbacks A and C, and network-invoked alternating loopbacks A and B. The OCU 3 module also supports NMTI-invoked loopback B, and network-invoked latching loopbacks A and B. Table B2-1 summarizes OCU loopback support.

Table B2-1: OCU Loopback Support

Loopback			Module	
Type	**Invoked by**		**OCU 2**	**OCU 3**
A (OCU)	NMTI		√	√
	Network	Alternating	√	√
		Latching		√
B (channel/CSU)	NMTI			√
	Network	Alternating	√	√
		Latching		√
C	NMTI		√	√

The presence of a network-invoked loopback is indicated by "Network_Lpbk" on the NMTI screen. You cannot initiate a loopback from the node while a network-invoked loopback is in progress.

Note

To perform a network-invoked alternating loopback on an OCU 3 module configured for switched 56 data service, the test centre must take the circuit off hook before initiating the loopback. Similarly, to perform a network-invoked latching loopback on an OCU 3 module configured for switched 56 data service, the test centre must control the RBS signalling bits to achieve successful loop-up.

Loopback A (OCU)

Loopback A (or OCU loopback) is a unidirectional loopback. The loopback occurs at the initiating node. The signal passes through the Control card and is looped back on the OCU module.

This loopback can also be initiated through a network-generated loopback code. See section B2.14 for more information.

Loopback B (channel)

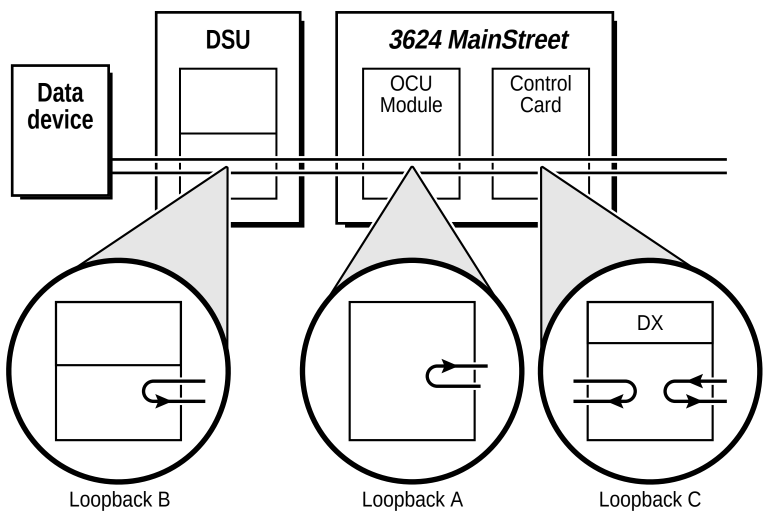
Loopback B (or channel loopback) is a unidirectional loopback. The loopback occurs at the input of the DSU. This loopback can also be initiated through a network-generated loopback code.

Loopback C

Loopback C is a bi-directional loopback. One section of the signal is looped back at the Control card and returns toward the network. The section of the signal coming from the data device passes to the Control card and loops back within the Control card. Loopback C can only be invoked via the NMTI.

Figure B2-5 shows the OCU module loopbacks.

Figure B2-5: OCU Module Loopbacks



B2.8 DCM Loopbacks

The RS-232 DCM, and the subrate and super-rate circuits of the X.21 and V.35 DCMs support loopbacks B and C.

Loopback B

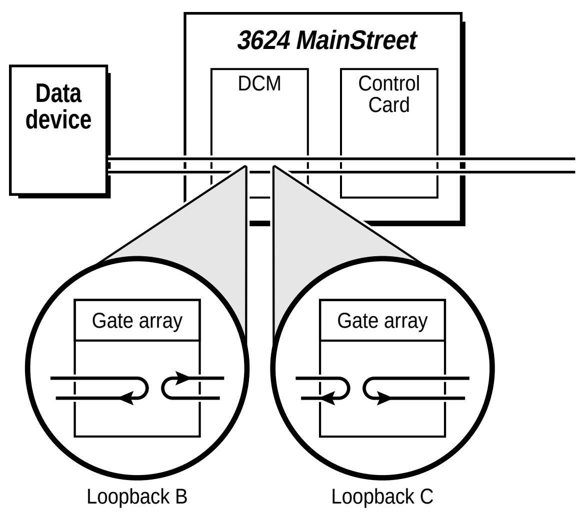
Loopback B is a bi-directional loopback that extends from the DX and loops back in the gate array as close as possible to the network side.

Loopback C

Loopback C is a bi-directional loopback that extends from the DX and loops back in the gate array as close as possible to the attached data device.

Figure B2-6 shows loopbacks B and C.

Figure B2-6: RS-232, X.21 and V.35 DCM Loopbacks



B2.9 2WTO and 4WTO Module Loopbacks

The loopbacks described below can be performed on the 2WTO and 4WTO modules.

Loopback A

Loopback A for 2WTO and 4WTO modules is a unidirectional loopback that extends from the DX located on the Control card. The signal loops back at the digital side of the CODEC.

When a DDS 2 module is installed on the Control card, loopback A can also be activated and deactivated by a network-invoked 2713 Hz tone. (See *Configuration*, section F5.3.) Network-invoked loopbacks cannot be undone at the node.

If a 2713 Hz tone-activated loopback is in progress, the message "Loopback A (net)" is shown on the NMTI screen.

Loopback B

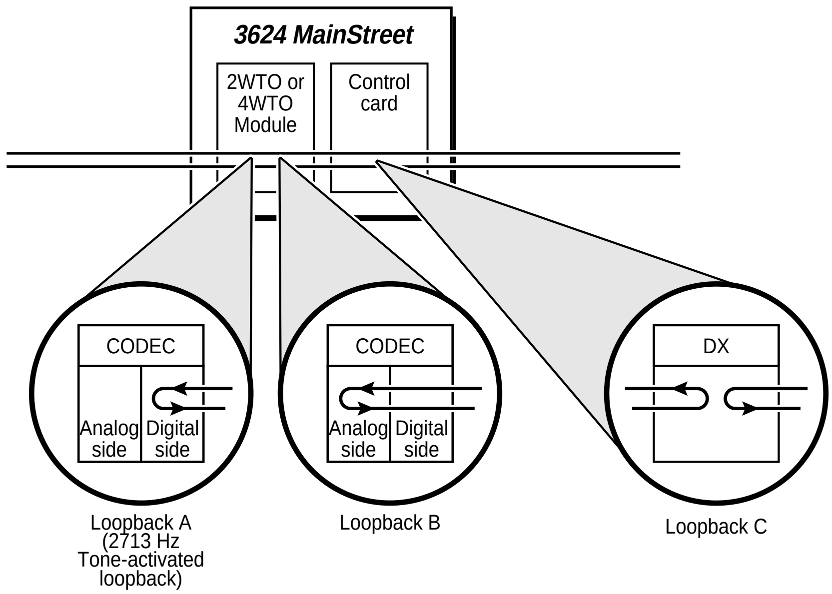
Loopback B is a unidirectional loopback that extends from the DX and loops back at the analog side of the CODEC.

Loopback C

Loopback C is a bi-directional loopback. Unlike the unidirectional loopbacks, where the signal is looped and returned to the origin, the end-to-end signal is interrupted and looped back to each end.

Figure B2-7 shows the 2WTO and 4WTO loopbacks.

Figure B2-7: 2WTO and 4WTO Module Loopbacks



B2.10 T1 Aggregate Circuit Loopbacks

The loopbacks described below can be performed on the T1 aggregate circuit.

Loopback A

Loopback A can be selected for only one T1 circuit at a time. When loopback A is selected, that circuit is looped back on the T1. Loopback A cannot be performed on super-rate T1 circuits. If loopback A is attempted on a super-rate circuit, an error message is displayed.

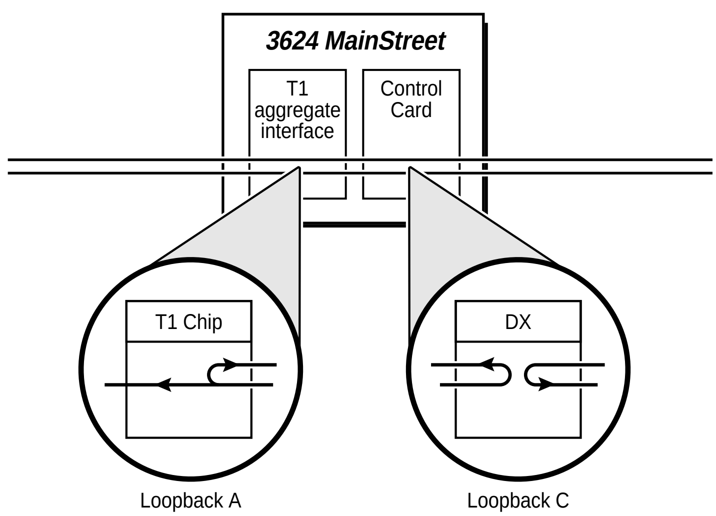
Loopback C

Loopback C is a bi-directional loopback. The loopback occurs at the node where the loopback was initiated and the signal is looped back at the Control card.

When loopback C is initiated on a T1 circuit that is part of a super-rate group, it is performed on all circuits in the group. The first circuit of the super-rate group must be identified when the loopback is performed, or the message "Maintenance cannot be performed on this type of circuit" is displayed.

Figure B2-8 shows loopbacks A and C.

Figure B2-8: T1 Circuit Loopbacks



B2.11 T1 Aggregate Link Loopbacks

T1 link loopbacks – equipment and line – are used to test the end-to-end connections. When these loopbacks are initiated, the entire T1 link is looped back.

Caution

Initiating a loopback causes all calls in progress to be dropped, and no new calls can be initiated on the line while it is looped back. It is recommended that you perform T1 loopbacks only in extreme cases or when node traffic is minimal.

Equipment loopback

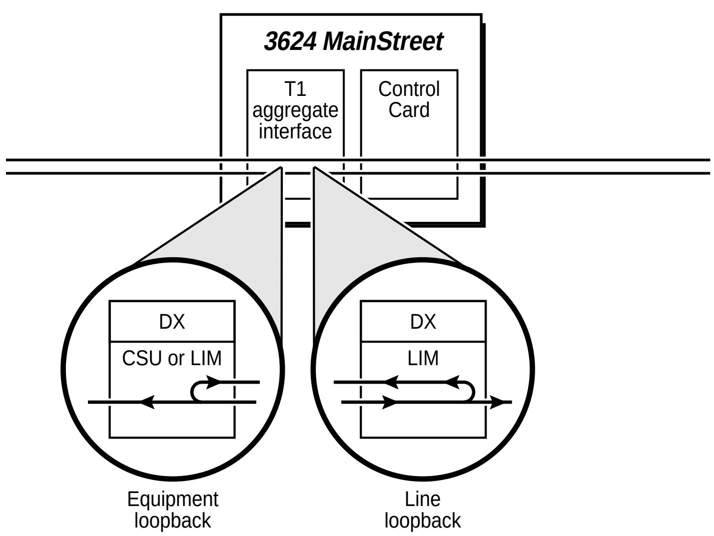
With the equipment loopback, the signal from the Control card is looped back on the T1 interface.

Line loopback

The signal received from the T1 line is looped back at the LIM on the Control card. The line loopback is not available if the LIM is not installed.

Figure B2-9 shows the equipment and line loopbacks.

Figure B2-9: T1 Equipment and Line Loopbacks



B2.12 Tributary T1 Circuit Loopbacks

The loopbacks described below can be performed on the Tributary T1 circuits.

Loopback A

Loopback A can only be selected for one Tributary T1 circuit at a time. When loopback A is selected, that circuit is looped back on the T1 chip of the Tributary T1 module.

Loopback A cannot be performed on super-rate Tributary T1 circuits. If loopback A is attempted on a super-rate circuit, an error message is displayed.

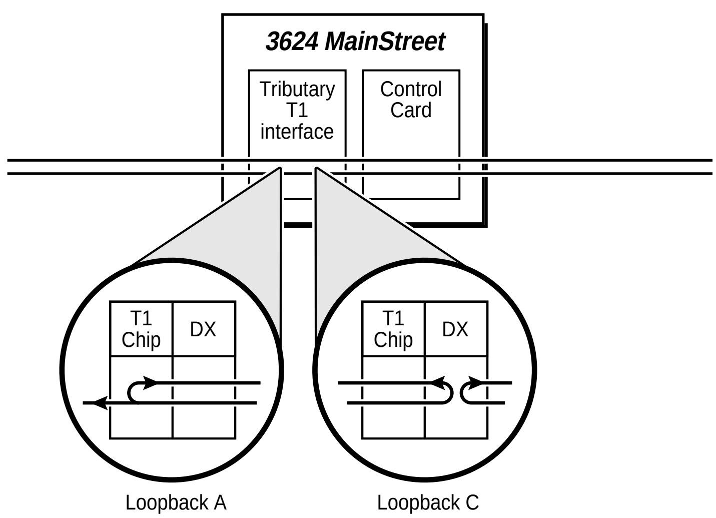
Loopback C

Loopback C is a bi-directional loopback. The loopback occurs at the node where the loopback was initiated, and the signal is looped back at the DX chip of the Tributary T1 module.

When loopback C is initiated on a T1 circuit that is part of a super-rate group, it is performed on all circuits in the group. The first circuit of the super-rate group must be identified when the loopback is performed, otherwise the message, "Maintenance cannot be performed on this type of circuit" is displayed.

Figure B2-10 shows loopbacks A and C.

Figure B2-10: Tributary T1 Circuit Loopbacks



B2.13 Tributary T1 Link Loopbacks

Tributary T1 link loopbacks – equipment and line – are used to test the end-to-end connections. When these loopbacks are initiated, the entire T1 link is looped back.

Caution

Initiating a loopback causes all calls in progress to be dropped, and no new calls can be initiated on the line while it is looped back. It is recommended that you perform T1 loopbacks only in extreme cases or when node traffic is minimal.

Equipment loopback

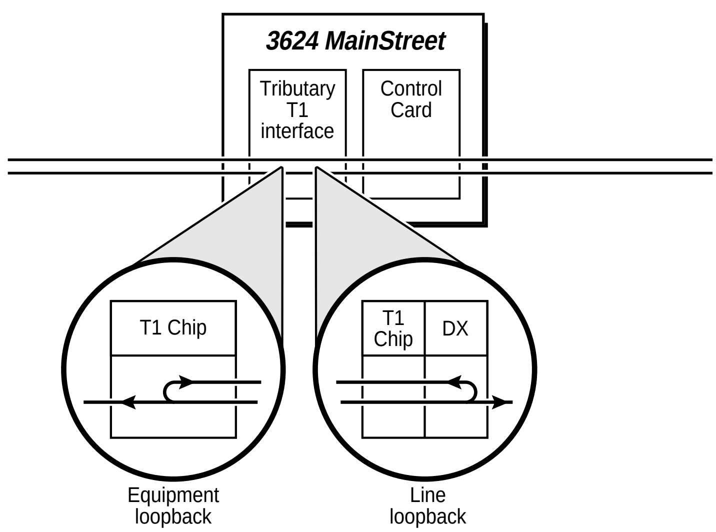
With the equipment loopback, the signal is looped back from the Tributary T1 line interface to the network.

Line loopback

The signal received from the Tributary T1 line is looped back at the T1 line interface of the Tributary T1 module to the Tributary T1 line.

Figure B2-11 shows the Tributary T1 module equipment and line loopbacks.

Figure B2-11: Tributary T1 Equipment and Line Loopbacks



B2.14 Network-invoked DDS Loopbacks

If you subscribe to AT&T DDS, the DDS network may occasionally use a control code to request a loopback to assist in fault isolation on a per-channel basis. The three types of DDS loopbacks are:

- ❑ OCU
- ❑ DSU
- ❑ channel (or CSU)

The *3624 MainStreet* node supports alternating DDS loopbacks.

The three DDS loopbacks have equivalent Newbridge loopbacks (A, B, and C respectively). You cannot use the NMTI to initiate loopbacks A, B or C when a DDS loopback is in progress. A DDS loopback over-rides any active local loopback.

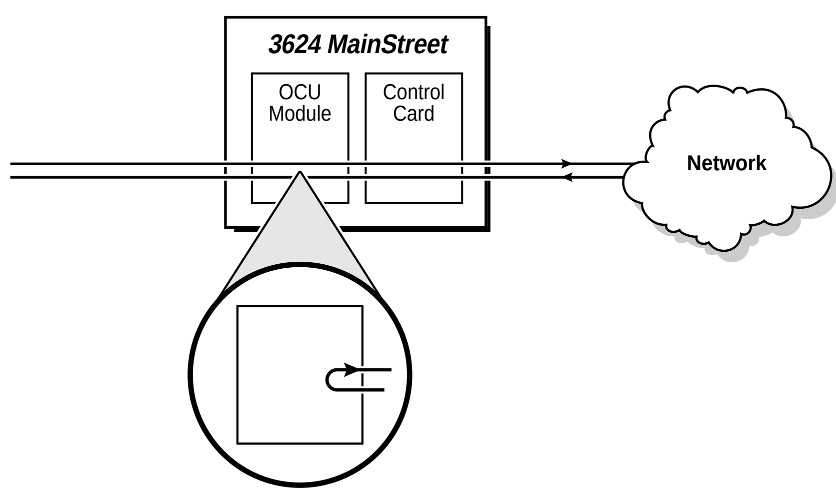
The presence of a network-invoked loopback is indicated by "Network_Lpbk" on the NMTI screen.

Network-invoked loopbacks cannot be removed at the node.

Loopback A (OCU)

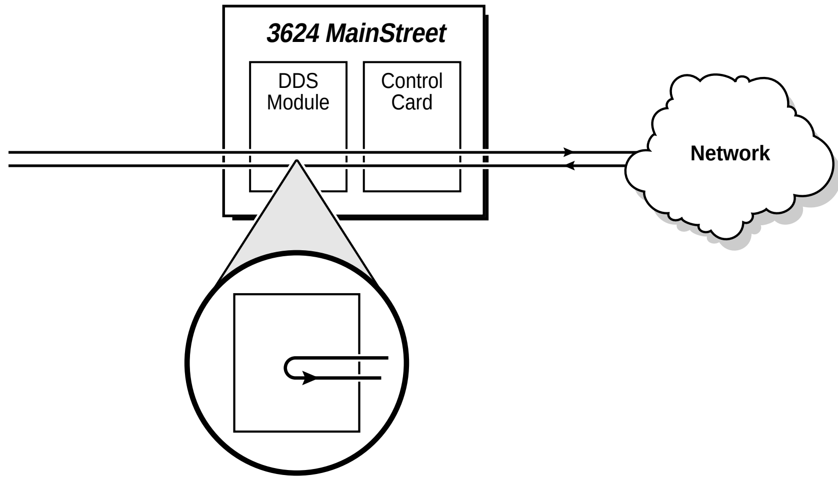
For DS0s connected to an OCU module, OCU loopbacks are detected and implemented by the OCU module, as shown in Figure B2-12.

Figure B2-12: OCU Loopback, OCU Module Connection



For DS0s connected to DTUs and DCMs, OCU loopbacks are implemented in the DDS module, as shown in Figure B2-13.

Figure B2-13: OCU Loopback, DTU and DCM Connection



Loopback B (DSU)

For DS0s connected to OCU modules, DSU loopbacks are implemented by passing the loopback request on the attached CSU / DSU equipment.

For DS0s connected to DTUs and DCMs, DSU loopbacks are implemented as loopback B.

Loopback C (channel)

For DS0s connected to OCU modules, channel (or CSU) loopbacks are implemented by passing the loopback request on the attached CSU or DSU equipment.

For DS0s connected to DTUs and DCMs, CSU loopbacks are implemented as loopback C.

Figure B2-14 shows the DSU and channel loopbacks for a DCM connection.

Figure B2-14: DSU and Channel Loopbacks, DCM Connection

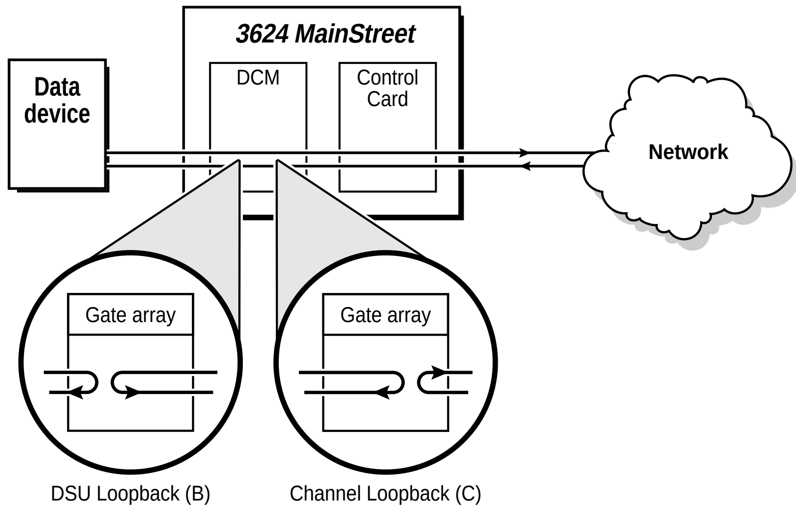
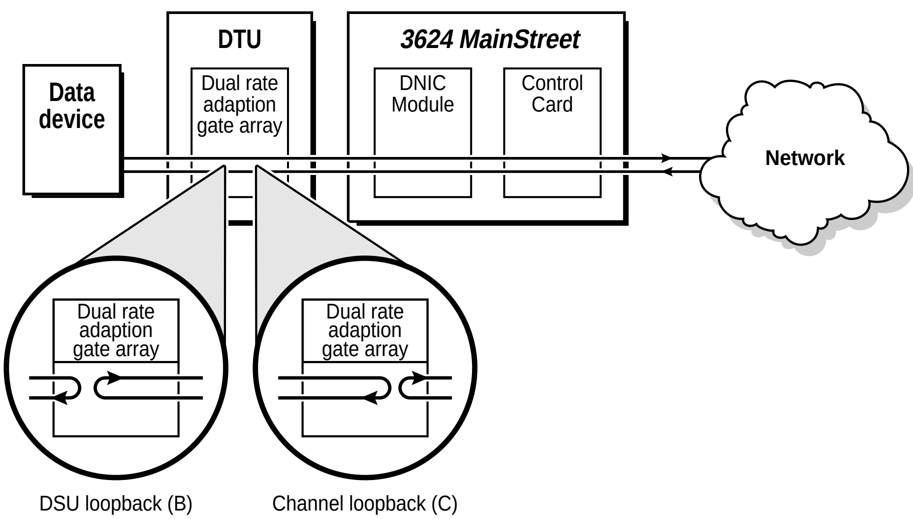


Figure B2-15 shows the DSU and channel loopbacks for a DTU connection.

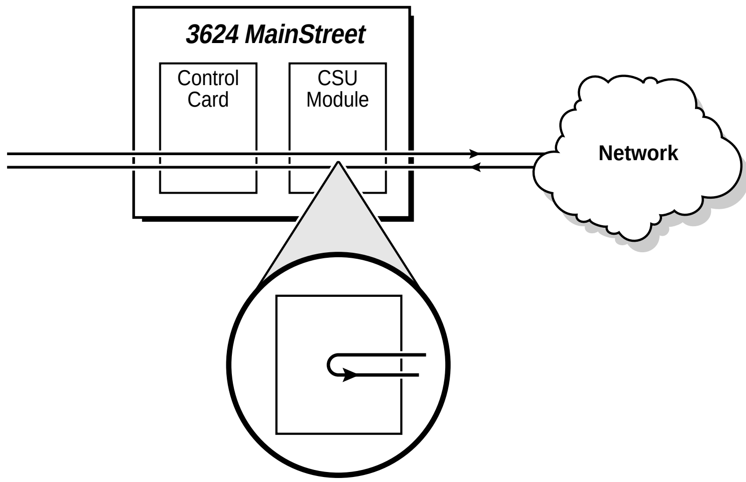
Figure B2-15: DSU and Channel Loopbacks, DTU Connection



B2.15 Network-invoked CSU Loopback

When a CSU is installed on the Control card, the T1 link also supports a network-invoked CSU loopback on the T1 side of the node, as illustrated in Figure B2-16. Network-invoked loopbacks cannot be removed at the node.

Figure B2-16: CSU Loopback, Network-invoked



When CSU trunk conditioning is enabled, the *3624 MainStreet* node raises an alarm upon detection of a network-invoked loopback, and removes the link from service. See *Configuration,* section D1.6 for information on trunk conditioning.

When CSU trunk conditioning is disabled and the *3624 MainStreet* node detects a network-invoked loopback, it raises an alarm but leaves the link in service.

B2.16 2713 Hz Tone-activated Loopback

If a DDS 2 module is installed on the Control card, each 2WTO or 4WTO circuit can be configured so that a loopback A or B is initiated when a network-generated 2713 Hz tone is detected on the line. If you try to configure for tone detection when there is no DDS 2 module, the NMTI displays a warning.

See Figure B2-7 for the 2WTO and 4WTO 2713 Hz tone-activated loopback.

The loopback is activated upon detection of a 2713 Hz tone lasting 2.5 seconds or longer. The loopback is deactivated by detecting a second 2713 Hz tone lasting 0.9 seconds or longer. If a second tone is not detected after 20 minutes, the *3624 MainStreet* node automatically deactivates the loopback and reconfigures the circuit for tone detection.

See *Configuration*, chapters F5 and F6 for more information on configuring for 2713 Hz tone detection in 2WTO and 4WTO.

B3. Statistics

This chapter describes the performance monitoring statistics collected by the *3624 MainStreet* node. These statistics include:

- ESF quality statistics
- ANSI T1.403 statistics

B3.1 ESF Quality Statistics

The *3624 MainStreet* node gathers ESF quality statistics measuring the performance of the T1 primary rate link as defined in AT&T Pub 54016. The statistics are based on CRC-6 error events.

The 54016 feature enables networks to retrieve these statistics and to reset the event counters and other interval timers involved in ESF statistics collection. The statistics are available over the FDL channel when it is connected to the 54016 network channel. See *Configuration,* section D1.5 for more information.

Payload loopback

When the FDL carries 54016 messaging, the network can request a payload loopback, which is a logical loopback designed to test the *3624 MainStreet* node at the DS-1 interface. The NMTI screen displays the circuit that is in loopback, and the node raises a "Payload loopback activated" alarm.

To display ESF quality statistics

From the STATS menu, select 54016.

A sample display is shown in Figure B3-1.

Figure B3-1: ESF Quality Statistics Display

```
3624 MainStreet   620C-ab-cd                      Alarms:6      5-JAN-96    3:50P

   Link Quality:  Position:T1   Type:T1 ESF       Status:Red Alarm

                Current Interval   Last Hour   Last 24-Hour   Worst Interval
                   ( 90 sec)                                        3:32P

   ES                  10              20             25             1
   BES                  1               2              3             1
   SES                  1               1              1             1
   UAS                  0               0              0             0
   CSS                  0               0              0             0
   LOFC                 1               1              1             1

   Error Events: 13
   Valid Intervals:  2



 STATS 54016


  1-CLR_STATS       2-CLR_ERR_EV       3-AUTO_PRINT      4-MAN_PRINT      5-
  6-                7-                 8-CANCEL          9-QUIT           0-
```

The display elements are described in Table B3-1.

Table B3-1: Description of ESF Quality Statistics Display

Item	Description
Link Quality, Position, Type, Status	Indicates the type of statistics, position of the T1 link, the type of link and its framing format, and the status of the link.
Current Interval	Lists the statistics for the current 15 minute interval. The number of elapsed seconds in the interval are shown in parentheses under the column heading. Current interval statistics are updated every second, but only appear when you refresh the screen by pressing <Esc> <R>.
Last Hour	Displays the statistics accumulated over the last hour.
Last 24-Hour	Displays the statistics accumulated over the last 24 hours.
Worst Interval	Lists the statistics for the interval with the most out of service time within the last 24 hours. The time that the interval ended is shown in parentheses under the column heading.
ES	Lists the number of seconds with one or more CRC-6 error events, one or more OOF (1) events, or one or more CS (2).
BES	Indicates the number of seconds with more than one but less than 320 CRC-6 error events.
SES	Indicates the number of seconds with 320 or more CRC-6 error events, or one or more OOF.
UAS	Shows a count of one second intervals during which the customer installation is in an unavailable state(3).
CSS	Indicates the number of seconds with one or more CS.
LOFC	Indicates the accumulated count of the number of times an LOF (4) is declared.
Error Events	Indicates the number of error events since the last reset.
Valid Intervals	Indicates the number of valid intervals since the last reset.

Notes

1. OOF – Out of frame begins when any two of four consecutive frame synchronizing bits received from the network are incorrect.
2. CS – A controlled slip occurs when a DS-1 frame is replicated or deleted by the *3624 MainStreet* node.
3. UST – The unavailable state is declared once 10 consecutive SES have occurred, and is cleared once 10 consecutive seconds with no SES have elapsed.
4. LOF – Loss of frame is declared after 2.5 seconds of continuous loss of signal or OOF; this triggers the Red Alarm. LOF is cleared when the Red Alarm is cleared.

B3.2 Printing ESF Quality Statistics

If the *3624 MainStreet* node has a printer connected to one of its serial ports, the ESF quality statistics can be printed out manually or automatically.

To print manually

When you select manual printing, the ESF quality statistics for the last 24-hour period are printed immediately.

1. From the STATS menu, select 54016.
2. Select MAN_PRINT.

To print automatically

The system can be configured to automatically print the ESF quality statistics at 15-minute intervals in a 24-hour period. The default is disabled.

If you enable automatic printing, you can specify the time of day that the printout occurs. Enter the time in the format <*hh:mm*A> or <*hh:mm*P>. The printout will occur at the end of the 15-minute interval that the specified time falls into. The default print time is 12:00 a.m.

You can also specify that statistics print automatically only if the number of errored seconds in a 15-minute time interval exceeds a preset threshold. The default threshold is 300. If the number of errors is under the threshold setting for the time interval, the system prints a message to that effect.

1. From the STATS menu, select 54016.
2. Select AUTO_PRINT.
3. Select DAILY_ON to enable automatic printing.
4. Select PRINT_TIME to set the time of day that the printout occurs. Enter the time in the format <*hh:mm*A> or <*hh:mm*P>, where A is AM and P is PM. The default is 12:00 AM.
5. Select THRESHOLD to set the number of errored seconds that must occur before the statistics are printed. Enter the number (0 to 900). The default is 300.

   If you set the threshold to 0, statistics are printed every 15 minutes.

B3.3 Resetting the Statistics

The ESF statistics and the error event counter can be reset (cleared) locally. The statistics can also be reset remotely by the network, through the FDL channel. If the network requests that the statistics be cleared, they cannot be cleared locally.

In order to avoid statistics being lost at the *3624 MainStreet* node, you can configure the system to automatically print statistics whenever the network requests a reset. If this option is disabled (default setting), a network reset request will cause a "Reset TABS Received" alarm. The requested reset is performed and the affected statistics are lost.

To reset statistics locally

1. From the STATS menu, select 54016.
2. Select CLR_STATS to reset the ESF statistics.
3. Select CLR_ERR_EV to reset the error event counter.

To enable automatic printouts before a network reset

1. From the STATS menu, select 54016.
2. Select AUTO_PRINT, then select TABS_ON.

B3.4 ANSI T1.403 Statistics

The T1.403 module supports T1 performance monitoring as outlined in the ANSI T1.403 specifications. When enabled in the configuration menu, the T1.403 module supports network-invoked payload and line loopbacks, and transfers performance reports to the network for diagnostic purposes. Statistics collected include synchronization, line code violation and slip statistics. These statistics are not displayed at the node.

To collect T1.403 statistics for the network

1. From the CONFIG menu, select:

   POSITION — T1

2. Select OPTIONS, then select T1.403.

B4. Viewing CPSS Routing Information

Each *3624 MainStreet* node that is part of a Newbridge network constructs a CPSS routing table containing information on the network nodes.

The unit knows which nodes it can send CPSS messages to, how far it is from those nodes, and which route it should use to send the messages. The routing information display is used to assist in diagnostic and maintenance operations.

You can view four tables that show different routing information, including:

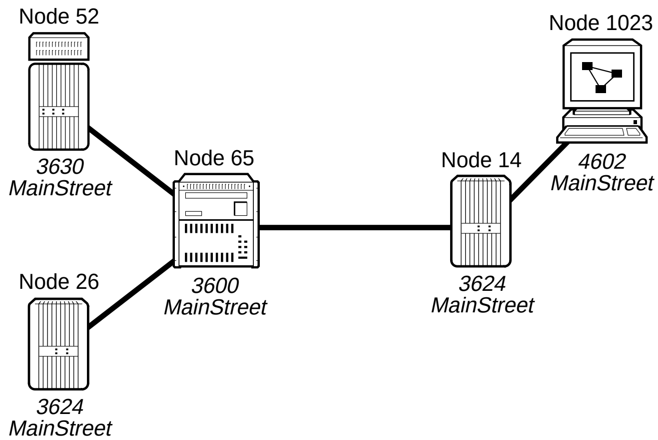
- all nodes in the network
- all nodes in the network that are a specified number of hops away from the *3624 MainStreet* node
- all nodes in the network that the *3624 MainStreet* node communicates with using a specific circuit
- links configured on the *3624 MainStreet* node

This chapter describes how to view the routing information.

B4.1 Viewing Network Nodes

Figure B4-1 illustrates a simple Newbridge network.

Figure B4-1: Simple Newbridge Network



A hop is equivalent to one CPSS link to a node and is independent of physical distance. For example, if messages sent from Node 14 to Node 26 travel through a link to Node 65, and through another link to Node 26, then Node 26 is two hops away from Node 14.

Each CPSS link is assigned a cost. The value of the cost is used by the router algorithm when selecting a CPSS link to send CPSS messages along. See *Configuration*, chapter A4 for information on CPSS cost.

To view CPSS network node information

You can view information on some or all of the nodes in the network known to your node. The display does not include nodes in other domains. For information on domains, see *Configuration*, section A4.4.

1. From the MAINT menu, select MORE — ON_CPSS.
2. Select SHOW_NODES, then enter the number of the node you want to view (1 to 999).

   The NMTI displays information on all nodes equal to or greater than that number.

A sample screen is shown in Figure B4-2.

Figure B4-2: Node Display

```
3624 MainStreet   620C-ab-cd                      Alarms:2    04-AUG-96    9:06A

Node: 14    Domain:  1   Large Pkts: Disabled     Nodes in Domain:  5

Node Cost Cl  Circuit    Node Cost Cl  Circuit    Node Cost Cl  Circuit
---------------------  ---------------------   ----------------------

65   25   N/A  T1-07     26   25  N/A  T1-07      1023  25  N/A   SP1
52   25   N/A  T1-07









MAINT MORE ON_CPSS SHOW_NODES 3


 1-PREV_PAGE       2-NEXT_PAGE         3-                 4-            5-
 4-                7-                  8-CANCEL           9-QUIT        0-
```

Table B4-1 describes the display elements.

Table B4-1: Node Display Elements

Column	Description
Node (top line)	Indicates the node number.
Domain	Indicates the domain to which this node belongs.
Large Packets	Indicates large packet usage on this node. Large packets are used for CPSS communication with a version 2 router network.
Nodes in Domain	Indicates the total number of nodes that are reachable via CPSS from this node.
Node	Indicates the node number of the node listed.
Cost	Indicates the CPSS cost of the link assigned to the node listed. Note that cost is displayed in its numerical form.
Cl (Class)	This field is not applicable (marked N/A) for *3624 MainStreet* nodes.
Circuit	Indicates the circuit the unit is using to transmit CPSS messages. "SP1" and "SP2" stand for Serial Ports 1 and 2, respectively.

To view CPSS cost-dependent information

You can view information on all the known nodes in the network equal to or greater than a specified CPSS cost. The cost is a numeric value between 1 and 254. The display does not include nodes in other domains.

1. From the MAINT menu, select MORE — ON_CPSS.
2. Select COST, then enter the CPSS cost (1 to 254).

   The NMTI displays information on all nodes that are equal to or greater than the node number you enter.

To view CPSS circuit-dependent information

You can view information on all nodes in the network accessed via a specified circuit. The display does not include nodes in other domains.

1. From the MAINT menu, select MORE — ON_CPSS.
2. Select VIA_LINK, then enter the circuit number of the T1 circuit (1 to 24), in the form <T1-cc>.
3. Enter the node number (1 to 999) of the node that is accessed by the circuit.

   Information is displayed on all nodes that are equal to or greater than the node number you enter.

To view CPSS links

You can view all CPSS links configured on your node.

1. From the MAINT menu, select MORE — ON_CPSS.
2. Select SHOW_LINKS.

Figure B4-3 shows a sample display.

Figure B4-3: CPSS Links Display

```
3624 MainStreet   620C-ab-cd                     Alarms:2    04-AUG-96    9:06A

Node: 14    Domain:  1    Large Pkts: Disabled     Nodes in Domain:  5

CPSS_Circuit     Mate_Circuit  Link_State  End_Node  Bias/Cost   Far_End
------------     ------------  ----------  --------  ---------   -------
CPSS  (shared)     *T1-01        DOWN      Unknown   Normal: 25  Unknown
SP-2  (CPSS_MODEM)                UP          1017  Against: 50   CPSSv1






   Asterisks indicate current connections.

MAINT MORE ON_CPSS SHOW_LINKS


 1-PREV_PAGE      2-NEXT_PAGE      3-               4-               5-
 4-               7-               8-CANCEL         9-QUIT           0-
```

Table B4-2 describes the display elements.

Table B4-2: CPSS Links Display Elements

Column	Description
CPSS Circuit	Indicates the different types of CPSS connections that exist on this node.
Mate Circuit	Indicates which circuits the CPSS circuits are connected to (where applicable). Asterisks indicate current connections.
Link State	Indicates the network layer's link status of the CPSS circuits. The states are: ❑ Up – The CPSS circuit is operational. ❑ Down – The CPSS circuit is not operational due to an error condition. ❑ Disabled – The CPSS circuit is not operational due to management action.
End Node	The node number of the node at the far end of the CPSS link. If the link is connected to a feeder node, the node number of its backbone node is displayed. "Unknown" means that this information is unavailable to the node.
Bias/Cost	Indicates the CPSS cost of the link (bias and numeric value) as configured at this end (the local end). This value may differ from the cost configured at the far end of the link. "N/A" indicates that this information is not available to the node. Valid biases are: Normal, Against, and Towards.
Far End	Indicates the type of CPSS (CPSS v1 or CPSS v2) enabled on the node at the far end of the CPSS link. "Unknown" means that this information is unavailable to the node.

C1. Database Management

This chapter describes the following database management functions:

- backing up, verifying and restoring the database
- viewing information about NVM allocation
- downloading software upgrades over the network

C1.1 Backing Up, Verifying and Restoring the Configuration Database

The configuration database should be backed up periodically in case the file becomes corrupted. This section explains how to perform a backup, how to verify that the backup file has the same settings as the current file, and how to restore the database if the file becomes corrupted or if the system must be reconfigured.

To back up the database

The backup option creates a backup copy of the configuration database on an external device. When the backup commands are issued from a terminal running the NMTI session, the backup file is saved to a PC. When the backup commands are issued from a *46XX MainStreet* series network manager, the backup file is saved to the computer running the *46XX MainStreet* network manager program.

During a backup, calls in progress continue and new calls can be initiated.

Before backing up the database, ensure that the backup device is connected to one of the serial ports and that it is ready to receive the data transfer. For example, a PC must be running software that captures incoming serial data to be stored in an ASCII file.

For baud rates of 2400, 4800 and 9600 b/s, the flow control must be set to XON/XOFF or DTR. DTR flow control is supported on serial port 2 only. If the device is not using flow control, ensure that it is able to receive the data continuously, regardless of the baud rate selected for the transfer.

1. From the MAINT menu, select MORE.
2. Select DATABASE — BACKUP.

   To stop the procedure, select CANCEL.

The backup procedure can last up to several minutes, depending on the selected baud rate and the complexity of the configuration database.

To verify the configuration settings

The configuration settings of the backup file should be verified with the current settings stored on the *3624 MainStreet* node. The file verification can be performed whenever the external device holding the backup file is accessible to the system.

The same baud rate must be used for both the backup and verify procedures. For baud rates of 2400, 4800 and 9600 b/s, the flow control must be set.

1. From the MAINT menu, select MORE.
2. Select DATABASE — VERIFY.

   To stop the procedure, select CANCEL.

When the verification procedure is complete, the node displays the message "Database successfully verified" if the two databases are identical. If they are not identical, an error message is displayed.

To restore the database

It may be necessary to restore the database when:

- ❑ the system configuration file has been damaged
- ❑ new software has been loaded and the system must be reconfigured
- ❑ the Control card has been replaced

You can restore a backup configuration file from a PC or *46XX MainStreet* series network manager connected directly to the *3624 MainStreet* node. You cannot restore a database using a *46XX MainStreet* series network manager that is connected via a modem.

Before restoring the database, ensure that the external device is connected to one of the serial ports and that it is ready to send the backup file to the node. For baud rates of 2400, 4800 and 9600 b/s, the flow control must be set.

1. From the MAINT menu, select MORE.

2. Select DATABASE — RESTORE.

   To stop the procedure, select CANCEL.

Caution

The system is disabled while configuration settings are being restored. All calls in progress are dropped and no new calls can be initiated. Configuration settings should be restored when node traffic is minimal.

If the data transfer finishes without errors, the system restarts automatically with the new configuration. If an error occurs, the system erases the new configuration data and reloads the factory-set (default) configuration.

When the configuration database is restored, the node name and number, passwords and session time return to their defaults, but access levels are restored from the backup file.

C1.2 Viewing and Resetting the Non-volatile Memory

The node configuration settings are stored in non-volatile memory on the motherboard. You can view information on the size and usage of the NVM blocks, and you can reset the NVM if the display indicates that the memory has been corrupted.

To view the NVM

1. From the MAINT menu, select MORE.
2. Select DATABASE — NVM_DATA.

A sample display is shown in Figure C1-1.

Figure C1-1: NVM Data Display

```
3624 MainStreet   620C-ab-cd                  Alarms:5    02-AUG-96   3:27P

    Block Size            :     48
    Allocated Blocks      :     97
    Free Blocks           :    400
    Bad Blocks            :      0
    Total Blocks          :    497









 MAINT MORE DATABASE NVM_DATA

  1-               2-               3-                4-               5-
  6-               7-               8-CANCEL          9-QUIT           0-
```

If the NVM was corrupted, information on the repaired block(s) is displayed. If bad blocks exist but no repair information is listed, it indicates that the bad blocks occurred in unused space.

To reset the NVM

If any bad blocks appear in the display, you can reset the NVM to the default values.

Before proceeding, make sure to disconnect any PCs or *46XX MainStreet* series network managers from the *3624 MainStreet* node.

Caution

Resetting the NVM overwrites the current configuration database with the default configuration database. If you plan to restore the database, ensure that you have an up-to-date backup file before proceeding. See section C1.1.

1. From the MAINT menu, select MORE.
2. Select DATABASE — RESTORE.
3. Display the NVM as described above.

   If no bad blocks appear, restore the configuration database as described in section C1.1.

   If bad blocks reappear, the NVM must be replaced. Contact your Newbridge representative.

C1.3 Downloading New Software

If you have the Flash memory module installed, you can download software upgrades either locally or over the network, rather than having to physically replace the software PROMs. See *Installation*, chapter A1 for more information on memory modules.

The Flash memory module contains two code banks: active and inactive. The active bank holds the current software. The downloaded software is saved in the inactive bank to minimize downtime during the downloading process.

Software upgrades can be downloaded:

- ❑ locally through a serial port, using either the Craft Interface or the *4601A* or *46020 MainStreet* Network Manager
- ❑ over a LAN through an FTP connection, using a node or network manager
- ❑ over the T1 line from a remote site (through CPSS), using either the *4601A* or *46020 MainStreet* network managers

---

Note

If software is downloaded over CPSS or FTP while an NMTI session is running, the NMTI session will run at a significantly slower speed.

For detailed information on the downloading procedure, see the appropriate network or node manager documentation.

To download software through FTP

If the node is configured as an entity in a TCP/IP local area network, software can be downloaded from a network manager through an FTP connection. The node must be:

- ❑ connected to the LAN through a terminal server or external router (see *Installation*, chapter D4)
- ❑ assigned a unique IP address (see *Configuration*, chapter A2)
- ❑ configured for PPP/IP traffic through the serial port (see *Configuration*, chapter B2)

Only one FTP connection can be established at a time, and only one software downloading session can be active at a time.

The node acts as an FTP server. When the FTP connection is made, you are prompted to enter a name and password. The name is either "5" or "Admin", and the password is the level 5 password used to access the NMTI. The name and password are not case sensitive.

If you do not enter your name and password within five minutes, the connection is dropped.

Note

The file must be downloaded in binary format.

The file must be a valid downloadable file. If it is invalid, the download procedure is cancelled and the flash memory remains intact. If the file is valid, the downloading procedure begins and the downloaded software is saved in the inactive bank of flash memory.

When downloading is in progress, the configuration of the serial port should not be changed from PPP/IP. If you attempt to change the configuration, the message "Software downloading in progress, PROCEED will terminate" will appear. If you proceed, the FTP connection will shut down immediately.

If there is no activity for 30 minutes after you have logged in, the FTP connection is dropped.

C1.4 Activating the New Software

The new software is not activated until you change the active bank and reset the system.

To display information on the software generic

1. From the MAINT menu, select ON_MODULE.
2. Enter <MEM>.
3. Select SW_GENERIC.

A screen similar to the one in Figure C1-2 is displayed.

Figure C1-2: Software Generic Display

```
3624 MainStreet   620C-ab-cd                       Alarms:4   06-Apr-96 2:43P


                                        Code Space Information
                                   Bank A                          Bank B
      Generic                   : 620B-H0-00                      620B-H0-01
      Date of Last Download     : 01-Jan-96                       01-Mar-96
      Time of Last Download     : 2:00P                           2:00P
      Status                    : OK                              OK
      Database Status           : Compatible                      To be converted
      Database Current          : Current                         2:43P / 02-Jan-96

      Boot Bank Generic         : 80-1728-01-01
      Active Bank               : Bank A
      Next Active Bank          : Bank A



 MAINT ON_MOD MEM SW_GENERIC


  1-NEXT_ACTIV        2-             3-                4-             5-
  6-RESET             7-             8-CANCEL          9-QUIT         0-
```

The screen shows:

- software generic contained in each code bank
- date and time of the last download
- status of the code banks and corresponding databases
- active bank
- next active bank – bank that will be active when the system is reset

The Status field displays the status of the software in each code bank. If the software code is valid, the status is OK. If the code is corrupt, or if there is no code in the bank, the status is Corrupt. A bank with corrupt code cannot be selected as the next active bank.

The status of the database can be displayed as:

- ❑ Compatible – indicates that the database is compatible with the software generic in the associated code bank
- ❑ To be converted – indicates that the inactive code bank contains a newer load, and the database will be converted if the associated code bank is made active
- ❑ Mismatch – indicates that the inactive code bank contains an older load which is not compatible with the database. The database will be erased if the associated code bank is made active.

The "Database Current" field indicates which database is currently being used, and the last time that the inactive database was active.

To change the active bank

1. From the MAINT menu, select ON_MODULE.
2. Enter <MEM>.
3. Select SW_GENERIC, then select NEXT_ACTIV.
4. Select the bank that you want to be active – BANK_A or BANK_B.

Note

The network manager automatically configures the new downloaded software as the next active bank.

To reset the system

Once the new software is selected as active, the system must be reset through the NMTI or by issuing a reset command from the network manager. A hardware reset will not activate the new software.

1. From the MAINT menu, select ON_MODULE.
2. Enter <MEM>.
3. Select SW_GENERIC, then select RESET.

Note

Resetting the unit causes a disruption in service; therefore, you should perform the reset when any disruption will be minimal.

Database conversion

The Control card contains 32 kb NVRAM used to store a current software database. If the new software does not have the same generic release number as the current software, the database formats may not be compatible. Therefore, the active database must be converted to the next active software format.

If the new software is no more than two release numbers greater than the currently active software, the active database is automatically converted when the system is reset through the NMTI or by a network manager. After the node is reset, the new software restores the database from a backup made by the previous generic. If the database is restored normally, a "Database Reset Convt 2" alarm is raised.

If the database cannot be restored, the previous version of software runs. This ensures that if an error occurs with the conversion process, the communication link with a network manager can be restored. On startup, the previous software raises a "Database Conversion Failure" alarm and a "System Restart" alarm. Table C1-1 lists the alarm codes that indicate problems with the conversion.

Table C1-1: Restart Alarm Messages

Code	Meaning
2F	The database backup does not exist.
30	The database backup checksum is invalid.
31	An error occurred while restoring the database.

If the new software release is less than the currently active software, or more than two release numbers greater, the database is not converted. In this case, the new software checks if its database is compatible, and if it is, it uses the database. A "Database Reset Re-in 3" alarm is raised, indicating that the software reinstated the database from its own database backup.

If it is not compatible, the database is erased and the software uses a new database that is set to default values. A "Database Reset Erasd 1" alarm is raised, indicating that the database has been erased.

C2. Hardware Maintenance

If the Power LED is off, it indicates a hardware problem. This chapter describes two maintenance procedures that should be performed if this problem occurs:

- ❑ replacing the fuse on the wall-mount unit and rack-mount drawer
- ❑ testing the power rail voltage

Warning

To ensure continued fire protection, the replacement fuse must be a 4 A / 250 V slow-blow ceramic type.

C2.1 Replacing the Fuse

The procedures below explain how to replace the fuse in the wall-mount and desktop units.

To replace the fuse in the wall-mount unit

1. Unlock the side door.

2. Set the power switch to the Off (O) position.

Warning

The unit must be powered down before it is unplugged. Failure to do so may damage the power supply.

---

3. Unplug the power cord from the ac source and then unplug the other end from the power supply.

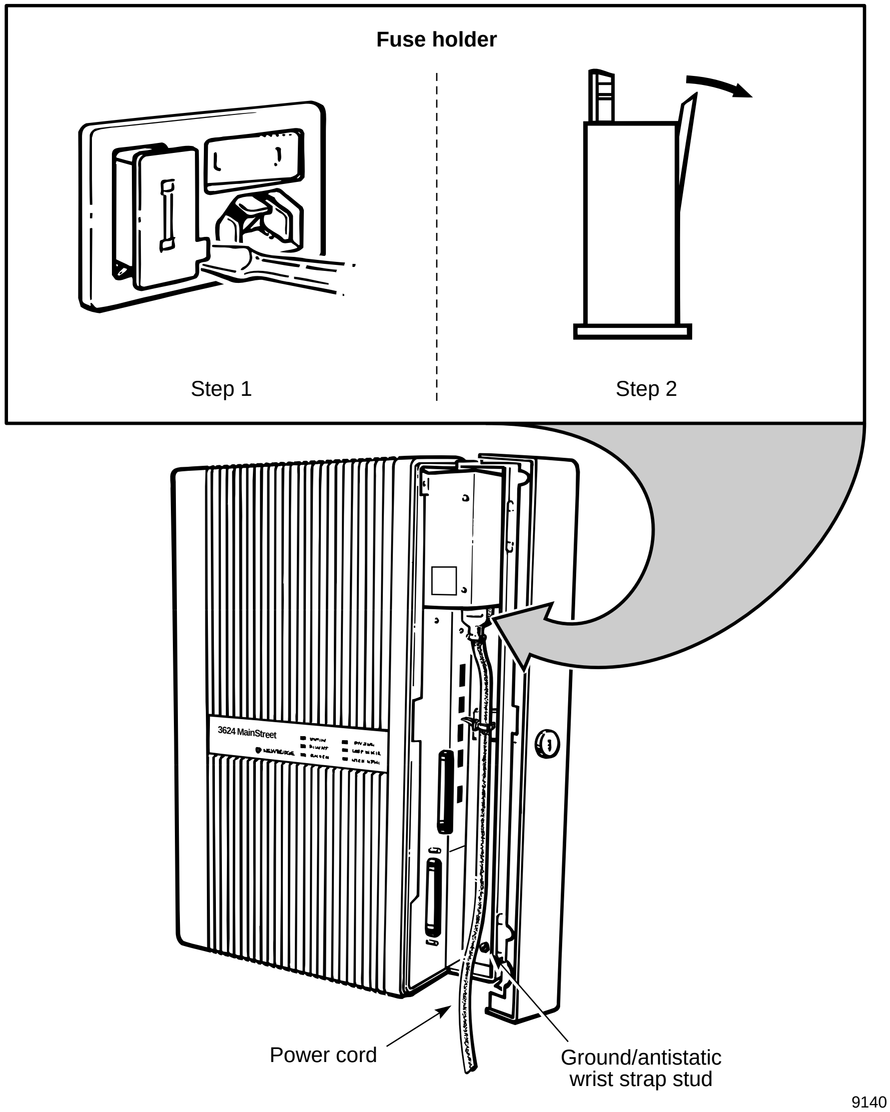
4. Undo the two screws holding the chassis cover in place.

5. Undo the two screws holding the Universal card in place and swing the Universal card out of the way.

6. With a small slot screwdriver, pry the fuse holder away from the power section and pull the holder out. Refer to Figure C2-1.

7. Lift up on the tab and pull the fuse compartment clear of the fuse holder. Remove the fuse.

Figure C2-1: Fuse Removal, Wall-mount Unit



8. Check the fuse for continuity and replace it if necessary. The replacement fuse must be a slow-blow ceramic type with a 4 A / 250 V rating.
9. Re-assemble the fuse holder and re-install it in the power section.
10. Swing the Universal card back into place and secure it with the two screws.
11. Close the chassis cover and secure it with the two screws.
12. Reconnect the power cord and set the power switch to the On (|) position.
13. Ensure that the unit completes its startup diagnostics. See *Installation*, section D1.6.
14. Close and lock the side door.

To replace the fuse in the rack-mount drawer unit

1. Locate the fuse holder at the back of the shelf unit.
2. Set the power switch to the Off (O) position.

Warning

The unit must be powered down before it is unplugged. Failure to do so may damage the power supply.

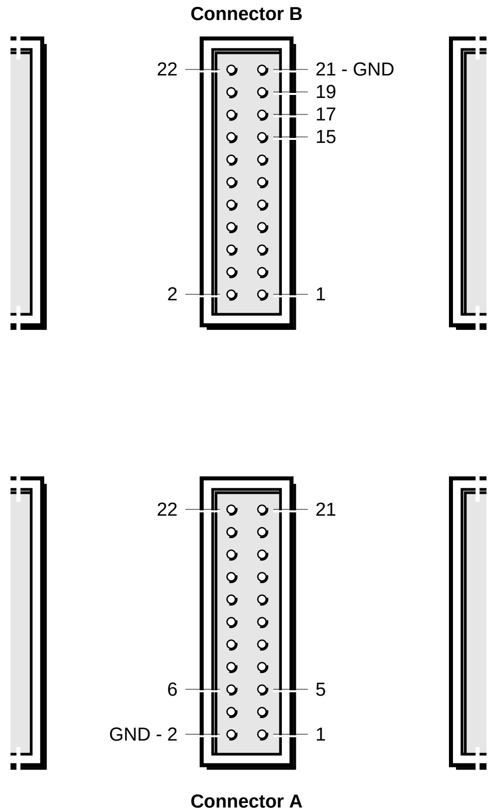
---

3. Unplug the power cord from the ac source and then unplug the other end from the power supply.
4. With a small slot screwdriver, pry the fuse holder away from the power section and pull the holder out.
5. Lift up on the tab and pull the fuse compartment clear of the fuse holder. Remove the fuse.
6. Check the fuse for continuity and replace it if necessary. The replacement fuse must be a slow-blow ceramic type with a 4 A / 250 V rating.
7. Re-assemble the fuse holder and re-install it in the power section.
8. Reconnect the power cord and set the power switch to the On (|) position.
9. Ensure that the unit completes its startup diagnostics. See *Installation*, section D1.6.

C2.2 Measuring the Power Rails

The power rails are tested using the male connectors of any module position on the Universal card. Figure C2-2 shows the pins that are used to measure the power rails.

Figure C2-2: Power Rail Test Points



To test the voltage

Test the voltage between ground (GND) and the desired test point using a voltmeter. If the voltage is not within the required range, contact a Newbridge service representative. Voltages and tolerances are shown in Table C2-1.

Table C2-1: Pin Voltages and Tolerances

Connector	Pin #	Voltage	Tolerance
A	1	+5 V dc	± 5% (+4.75 to +5.25 V dc)
	5	–5 V dc	± 5% (–5.25 to –4.75 V dc)
	6	+2.5 V dc	±0.005% (+2.499 to +2.501 V dc)
B	15	55-80 Vrms ac	—
	17	+15 V dc	± 5% (+14.25 to +15.75 V dc)
	19	–15 V dc	± 5% (–15.75 to –14.25 V dc)
	22	+5 V dc	± 5% (+4.75 to +5.25 V dc)

Parts and Accessories

Parts

The parts listed below are available from your Newbridge representative.

		Part	Part Number
Basic System:	**Wall-mount**	*3624 MainStreet* Basic System 115 V	90-2002-01
		3624 MainStreet Basic System 48 V	90-2003-01
		3624 MainStreet Basic System 24 V	90-2798-01
		3624 MainStreet Basic System 100 V	90-2002-03
		3624 MainStreet Basic System Redundant Power Supply	90-2894-01
	Rack-mount	*3624 MainStreet* Basic System 115 V Drawer	90-2002-02
		3624 MainStreet Basic System 48 V Drawer	90-2003-03
		3624 MainStreet Basic System 100 V Drawer	90-2002-04
Universal Cards:	**Wall-mount**	Universal Interface Card (48 V)	90-0154-02
		Universal Interface Card	90-0154-05
	Rack-mount	Universal Interface Card (48 V)	90-0154-03
		Universal Interface Card	90-0154-06
Memory Modules		Memory Module, 620C	90-2004-32
		Flash Memory Module, 620C	90-2193-12
T1 Modules		CSU 2 Module	90-0161-02
		LIM Module	90-0567-01
		T1 IHTU-C Module	90-2200-01
		T1 IHTU-R Module	90-2200-02
		FT1 IHTU-C Module	90-2200-03
		FT1 IHTU-R Module	90-2200-04
Resource Modules		DDS Module	90-0160-01
		DDS 2 Module	90-0160-02
		Tone Module	90-0512-01
Voice Interface Modules		LGS Module (0/–7 dB)	90-0156-02
		LGS Module (0/–7 dB), pkg of 6	90-0097-02
		LGS Module (48 V)	90-0156-03
		LGS Module (+4/–10 dB)	90-0156-06
		LGS Module (+4/–10 dB), pkg of 6	90-0097-06
		LGS Module (LR)	90-0156-07
		LGS Module (LR), pkg of 6	90-0097-07
		LGS Module (CI)	90-0156-08
		LGS Module (CI), pkg of 6	90-0097-08
		LGE Module (0/–7 dB)	90-0526-01
		LGE Module (0/–7 dB), pkg of 6	90-0525-01
		LGE Module (+4/–10 dB)	90-0526-03
		LGE Module (+4/–10 dB), pkg of 6	90-0525-03
		E&M Module (Type I)	90-0157-01
		E&M Module (Type I), pkg of 6	90-0098-01
		E&M Module (+4/–10 dB)	90-0157-03
		E&M Module (+4/–10 dB), pkg of 6	90-0098-03
		MRD Module	90-0627-01

	Part	Part Number
Data Interface Modules	DNIC Module	90-0158-01
	DNIC Module, pkg of 6	90-0099-01
	RS-232 DCM	90-0611-01
	RS-232 DCM, pkg of 6	90-0610-01
	OCU 2 Module	90-0693-02
	OCU 2 Module, pkg of 6	90-0692-02
	OCU 3 Module	90-0693-03
	OCU 3 Module, pkg of 6	90-0692-03
	X.21 DCM	90-0432-01
	X.21 DCM, pkg of 6	90-0431-01
	V.35 DCM	90-0523-01
	V.35 DCM, pkg of 6	90-0520-01
	36SM Blank Module, pkg of 3	90-1374-01
	2WTO Module	90-1686-01
	4WTO Module	90-0157-05
	4WTO Module, pkg of 6	90-0098-05
26XX MainStreet	*2601 MainStreet* RS-232 DTU	90-0044-99
Data Termination Units	*2601 MainStreet* RS-232 DTU-ANM	90-0468-99
	2602 MainStreet X.21 DTU-ANM	90-0107-99
	2603 MainStreet V.35 DTU-ANM	90-0108-99
	2606 MainStreet Sync / Async RS232 DTU	90-0883-99
	2608 MainStreet Octal RS-232 DTU	90-0366-99
	2610 MainStreet PAD	90-0882-99
	2614 MainStreet Frame Relay DTU	90-2433-99
	DTU wall-mount plate adapter	90-0340-01
	Rack-mount shelf (115 V)	90-0531-01
	Rack-mount shelf and AC / AC power converter (115 / 230 V)	90-0531-03
	Rack-mount AC / AC power converter (115 / 230V)	90-0531-04
	Power adapter (115 V)	90-0315-01
	Power adapter (230 V)	90-0316-40
	Power adapter (–24 / –48 Vdc)	90-0317-01
Miscellaneous	Tributary T1 Module (3-slot)	90-1982-01
	T1-403 Module	90-2234-01
	DTU Module	90-0159-01
	Control Card 3	90-0166-05
	Redundant system selector card	90-2895-01
	36SM Installation Kit	90-0530-11
	V.35 AMP Champ M / F Cable	90-1587-01
	AC Power Cords 20 pkg	90-0341-01
	Antistatic Strap 20 pkg	90-0341-02
	AC power supply 80 to 90 V Ringer, 115 V, 20 Hz	90-0163-02
	DC power supply 90 V Ringer 48 V, 20 Hz	90-0164-02
	DC power supply 90 V Ringer +24 V, 20 Hz WM	90-2797-01
	AC power supply 80 V Ringer 100 V, 16 Hz	90-0163-07
	Rack-mount kit (19-inch)	90-0338-03
	Rack-mount kit (23-inch)	90-0338-02
	36SM Rack Blanking Plate Kit	90-1313-01
	36SM Rack Shelf Assembly Kit	90-1313-02
	36SM Rack DC Connector Kit	90-1313-03
	36SM Rack Mount 23-inch Adapters	90-1313-04
Documentation	*3624 MainStreet* Release 12.0 Documentation Package	90-1988-12

	Part	Part Number
Distribution Panels	Universal Distribution Panel, wall-mount	90-2256-01
	RS-232 Distribution Panel	90-0350-02
	V.35 Distribution Panel (DB-25)	90-0349-02
	V.35 Distribution Panel (M34)	90-1066-02
	Non-EMC Distribution Panel cable (1.5 m [5 ft])	90-2341-01
	Non-EMC Distribution Panel cable (3 m [10 ft])	90-2341-02
	Non-EMC Distribution Panel cable (6 m [20 ft])	90-2341-03
	EMC Distribution Panel cable (1.5 m [5 ft])	90-2342-01
	EMC Distribution Panel cable (3 m [10 ft])	90-2342-02
	EMC Distribution Panel cable (6 m [20 ft])	90-2342-03
	Distribution Panel rack-mount bracket	90-2254-01
	36 SM V.24 / RS-232 DCE Personality Module	90-2258-01
	36SM X.21 DCE Personality Module	90-2258-02
	36SM V.35 / DB25 Personality Module	90-2258-03
	36SM V.35 / M34 Personality Module	90-2258-04
	36SM Voice / RJ11 Personality Module	90-2258-05
	Voice Direct Personality Module	90-2258-09
	36SM Tributary T1 RJ45 Personality Module	90-2258-10
	V.35 / M34 deeper cover (wall-mount)	90-2302-01

Accessories

The accessories listed below are available from your Newbridge representative.

	Part	Part Number
Serial port connections (J5 and J6)	RJ45 to RJ45 1-m (3 ft) cable	90-0138-01
	RJ45 to RJ45 2-m (6 ft) cable	90-0120-01
	RJ45 to RJ45 5-m (16 ft) cable	90-0121-01
	RJ45 to RJ45 10-m (32 ft) cable	90-0122-01
	RJ45 to RJ45 15-m (49 ft) cable	90-0139-01
	For connecting a modem to connector J5 (DTE):	
	DB25 Male adapter	90-0026-01
	DB25 Female adapter	90-0141-01
	For connecting a terminal to connector J6 (DCE):	
	DB25 Male adapter	90-0025-01
	DB25 Female adapter	90-0045-01
T1 connections (J4)	For a *3624 MainStreet* equipped with a CSU Module or for connection to an external CSU equipped with an RJ45 or RJ48 8-wire jack:	
	RJ45 to RJ45 2-m (6 ft) cable	90-0120-01
	For connection to an external CSU equipped with bantam jacks:	
	RJ45 to RJ45 2-m (6 ft) cable	90-0120-01
	RJ45 to RJ45 10-m (32 ft) cable	90-0122-01
	RJ45 to RJ45 15-m (49 ft) cable	90-0139-01
	For connection to standard telco wiring:	
	RJ45 to RJ45 2-m (6 ft) cable	90-0120-01
	RJ45 to RJ45 10-m (32 ft) cable	90-0122-01
	RJ45 to RJ45 15-m (49 ft) cable	90-0139-01
Voice and data circuit connections (J1, J2 and J3)	AMP Champ Male to AMP Champ Female 2 m (6 ft) cable	90-0555-01
	AMP Champ Male to AMP Champ Female 4 m (13 ft) cable	90-0555-02
	AMP Champ Male to AMP Champ Female 8 m (26 ft) cable	90-0555-03
	AMP Champ to 3x M34 cable	90-2800-01
	AMP Champ 66-series punch block	90-0551-01
	AMP Champ to Krone punch block	90-0080-01
Adapters	DB9-RJ45 female user configurable adapter	90-0133-01
	Circular 8 to RJ45 adapter	90-0135-01

Acronyms

2WTO	2-Wire Transmission Only
4WTO	4-Wire Transmission Only
ALB	Analog Loopback
ASC	Abnormal Station Code
BES	Bursty Errored Seconds
BPV	Bipolar Violation
BRG	Baud Rate Generator
CLASS	Custom Local Area Signalling Service
CMI	Control Module Idle
CO	Central Office
CODEC	Coder / decoder
CPE	Customer Premise Equipment
CPSS	Control Packet Switching System
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CS	Controlled Slips
CSS	Controlled Slip Seconds
CSU	Channel Service Unit
CTS	Clear To Send
DCD	Data Carrier Direct
DCE	Data Communications Equipment
DCM	Direct Connect Module
DDS	Dataphone Digital Service
DID	Direct Inward Dialling
DNIC	Data Network Interface Circuit
DNIS	Dialed Number Identification Service
DPO	Dial Pulse Originating
DPT	Dial Pulse Terminating
DRAGA	Dual Rate Adaption Gate Array
DS-0	Digital Service Level 0
DS-1	Digital Service Level 1
DSP	Digital Signal Processor
DSR	Data Set Ready
DSU	Data Service Unit
DSX-1	Digital System Cross-Connect Level 1
DTE	Data Termination Equipment
DTMF	Dual-Tone Multifrequency

DTR	Data Terminal Ready
DTU	Data Termination Unit
DX	Digital Cross-Connect
E&M	Receive and Transmit, Ear and Mouth
EDG	Energy Dumping Ground
EDX	Extended Digital Cross-connect
EMC	Electromagnetic Compatibility
ES	Errored Seconds
ESF	Extended Superframe Format
FDL	Facility Data Link
FTP	File Transfer Protocol
FXO	Foreign Exchange Office
FXS	Foreign Exchange Subscriber
GND	Ground
GS	Ground Start
HCM	High Capacity Multiplexing
HDLC	High Level Data Link Control
HDSL	High-bit-rate Digital Subscriber Line
IHTU	Integrated HDSL Terminal Unit
IP	Internet Protocol
IPX	Internet Packet Exchange
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunications Union – Telecommunications
LAN	Local Area Network
LBO	Line Build-Out
LED	Light Emitting Diode
LGE	Loop Start / Ground Start - Exchange
LGS	Loop Start / Ground Start - Subscriber
LIM	Line Interface Module
LOF	Loss of Frame
LOFC	Loss of Frame Count
LS	Loop Start
MIB	Management Information Base
MOS	Multiplexer Out Of Sync
MRD	Manual Ringdown
NMTI	Node Management Terminal Interface
NOC	Network Operations Centre
NVM	Non-volatile Memory
NVRAM	Non-volatile RAM
OCU	Office Channel Unit

OOF	Out of Frame
OOS	Out of Service
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PLAR	Private Line Automatic Ringdown
PPP	Point-to-Point Protocol
PROM	Programmable Read-Only Memory
PSTN	Public Switched Telephone Network
RAM	Random Access Memory
RBS	Robbed Bit Signalling
RDL	Remote Digital Loopback
REN	Ringer Equivalency Number
RI	Ring Indicator
RR	Ring Return
RTS	Request To Send
RXD	Receive Data
SES	Severely Errored Seconds
SNMP	Simple Network Management Protocol
T/R	Tip/Ring
TCP	Transmission Control Protocol
TEP-1(E)	Telecommunications Equipment Practice 1(E)
TLP	Transmission Level Point
TO	Transmission Only
TR	Tip Return
TXD	Transmit Data
UAS	Unavailable Seconds
UDP	Universal Distribution Panel
UL	Underwriters Laboratories

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