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IMACS

Integrated Multiple Access Communications Server

System Reference Guide

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Premisys Communications

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FCC Registration number:

1H5SNG-73866-DD-E(integral CSU)
B468NR-68618-DM-E(internal modem)

Canadian Certification number:1932 5217 A
Canadian DOC Load number:5

Ringer Equivalence number:

0.2A (internal modem)

Approvals:

UL listed to UL# 1459 Second Edition, Third Edition
CSA listed to C22.2 No. 950-M89

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Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in this Reference Guide.

2. This product is intended to be used with a three-wire grounding type plug - a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.

Prior to installation, use an outlet tester or a voltmeter to check the AC receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem. If a three-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

3. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.



Notice!

DO NOT place anything directly on top of unit that can block air holes.

4. Do not allow anything to rest on the power cord and do not locate the product where persons could step or walk on the power cord.

5. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

6. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer.

7. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

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8. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.

9. Electrostatic Discharge (ESD) protection must be used when handling circuit card assemblies and all other electronic parts covered in this manual.



WARNING!

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with this Reference Guide, 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 his own expense.

The authority to operate this equipment is conditioned by the requirement that no modifications will be made to the equipment unless the changes or modifications are expressly approved by the manufacturer.

Disclaimer for Shielded Cables

This equipment was tested with shielded input/output, and interface cables. It is recommended that shielded cables be used to reduce interference whenever interference is suspected.

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Product Description

This integrated access system allows you to take advantage of the sophisticated network services available from long-distance companies, telephone companies, specialized carriers and PTTs. By using these new services, you can increase the capabilities of your private network and simultaneously reduce costs. This Reference Guide will help you put your system to work in your networking environment.

This system takes the place of many network access devices, including:

- CSUs
- DSUs
- Channel banks
- Drop-and-insert multiplexers
- Digital cross-connect systems

By taking over the functions of all these network access devices, a single system allows linking a wide range of voice and data equipment over the network, among them:

- LAN bridges and routers
- PBXs (analog or digital) and key systems
- Fax machines
- Terminals and computers
- Telephones
- Modems
- Video CODECs

Using this Reference Documentation

This product reference documentation can consist of several individual reference guides, each covering a specific user module. Depending upon your specific application, the overall reference documentation may include the following complete reference guides.

- System (Common Equipment) Reference Guide
- Voice Card(s) Reference Guide
- Data Card(s) Reference Guide
- Alarm Card(s) Reference Guide
- Server Card(s) Reference Guide

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System Reference Guide

This System Reference Guide assists technicians in unpacking, assembling, configuring, and operating the integrated access device.

Chapter 1, *System Overview*

Chapter 2, *System Installation*

Chapter 3, *System Configuration and Operation*

Chapter 4, CPU Card

Chapter 5, *Interface Card*

Chapter 6, WAN Card

Appendix A, *System Specifications*

Appendix B, *Error Messages*

Appendix C, *Glossary*

User Cards Reference Guides

There are four individual Reference Guides associated with this product. The User Card manuals are: Alarm Cards Reference Guide (Alarm Cards), *Publication 999-001967*, Data Cards Reference Guide (HSU, SRU, FRAD, etc., Cards), *Publication 999-001968*, Server Cards Reference Guide (ADPCM Cards), *Publication 999-001969*, and Voice Cards Reference Guide (E&M, FXS, FXO, etc., Cards), *Publication 999-001970*.

Customer Service and Ordering Information

Technical Support

If you require technical assistance with installation, operation, or maintenance of your system, or if you want to return a product under Warranty for repair, please contact your distributor.

If you purchased this product from an authorized dealer, distributor, Value Added Reseller (VAR), or third party, please contact that vendor for technical assistance and warranty support.

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Ordering Information

To order equipment, cables, or additional copies of this Reference Guide, please contact your distributor.

Safety/Regulatory Information

Always observe the following precautions. Only qualified technicians should perform these tasks.

1. Never install telephone wiring during a lightning storm.

2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

4. Use caution when installing or modifying telephone lines.

5. See the UL Statement for Voice Cards.

6. Never attempt to remove the power panel without first disconnecting input power cables.

7. Never attempt to operate this system when the power panel screws are removed. They provide the safety ground for the system.



Notice!

Passive Cooling Requirements. DO NOT Stack Units on top of one another. There MUST be at least 1” clearance between units.

Power Supply Safety Information

The following information applies only to systems with redundant power supplies.

1. An equipment grounding conductor not smaller in size than the ungrounded branch-circuit supply conductors must be installed as part of the circuit that supplies the product or system. Bare, covered or insulated grounding conductors are acceptable.

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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 must be connected to ground at the service equipment.

2. The receptacles in the vicinity of the product or system must be of a grounding type. The equipment-grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.

Operator Services Requirements

This equipment is capable of giving users access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities may be in violation of the Telephone Operator Consumer Services Improvement Act of 1990 and Part 68 of the FCC Rules.

Safety Precautions

The equipment is designed and manufactured in compliance with Safety Standard EN60950. However, the following precautions should be observed to ensure personal safety during installation or service, and prevent damage to the equipment or equipment to be connected.

Grounding

The equipment can be grounded through the power cord as well as the terminal marked ⏚.



Notice!

For detailed information on grounding procedures, please see the Grounding section in this Reference Guide.

Electrostatic Discharge Prevention

The plug-in cards contain components that could be damaged by electrostatic discharge. Before handling any cards, wear a properly grounded wrist strap to prevent possible card damage, or follow other suitable precautions to prevent equipment damage.

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Power Source

AC: 120 Volts @ 2.0 amps / 240 Volts @ 1 amp, 50/60 Hz

DC: +24 Volts @ 3.0 amps / -48 Volts @ 1.5 amps

Additionally, the DC source must provide a means of disconnecting power from the supply, and the supply voltage must be provided from an isolated source complying with SELV requirements of EN60950.

Fusing

To avoid a fire hazard, use only fuses with the specified type and rating with the system.

Panel and Cover Removal

Qualified service technicians should only attempt the removal of covers and panels.



Notice!

Never attempt to operate the equipment with the power panel fasteners removed. Also do not remove power panel covers without first disconnecting the input power.

Regulatory Compliance Information

FCC Part 68 Information

This equipment complies with Part 68 of the FCC rules.

The equipment has FCC Registration Number 1H5SNG-73866-DD-E. This equipment uses the following USOC jacks: RJ11C, RJ21X, RJ2EX, RJ2FX, RJ2GX and RJ2HX.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the maximum RENs for the calling area.

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If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the Telephone Company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The Telephone Company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the Telephone Company will provide advance notice in order for you to make the necessary modifications to maintain uninterrupted service.

This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs. This equipment is hearing aid compatible

CE Marking

The CE mark is affixed to those chassis that conform to the following Commission Directives:

- 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.
- 73/23/EEC on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.
- 91/263/EEC on the approximation of the laws of the Member States concerning telecommunications terminal equipment, including the mutual recognition of their conformity.

Declaration of Conformity

ManufacturerAuthorized Representative in EC

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Fremont, CA 94538Birmingham Business Park

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Ph: (510) 353-7600B37 7YE

United Kingdom

Ph: 011-44-121-788-4100

We declare that the equipment listed herein conforms with the harmonized standards of the following European Commission Directives: 89/336/EEC, 72/23/EEC, and 91/263/EEC.

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Name and Type of Equipment

IMACS/600, IMACS/800, IMACS/900 Integrated Multiple Access Communication Server

Under 89/336/EEC as amended by 92/31/EEC, and 93/68/EEC

In accordance with EN50081-1: EN55022

In accordance with EN50082-1

Under 72/23/EEC as amended by 93/68/EEC

EN60950 with Amendments A1 and A2

Under 91/263/EEC

In accordance with the following Common Technical Regulations:

CTR 12 - as described EC Type Examination Certificate BABT/97/4841

CTR 13 - as described EC Type Examination Certificate BABT/97/4841

CE MARK Affixed

1996

This Declaration is made 10 March 1998.

Country-Specific Regulatory Compliance Information

Canada

Canadian DOC Information

NOTICE TO USERS OF THE CANADIAN TELEPHONE NETWORK

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

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local Telecommunications Company. The equipment must also be installed using an acceptable method of connection. In some cases, the company’s inside wiring

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associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions might not prevent degradation of service in some situations.

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

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



CAUTION!

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

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

Japan

Class A ITE Notification

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

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Europe

European Telecommunication Approvals

Under the Telecommunications Terminal Directive the following connections are approved:

The WAN DUAL card, the WAN SINGLE card, and the 120 ohm version of the DSX/CEPT module are approved for connection to ONP unstructured and structured 2048 kbps digital leased lines with G.703 interfaces, following assessment against CTR12 and CTR13.

United Kingdom

UK Approval Number

The BABT approval number is M606037.

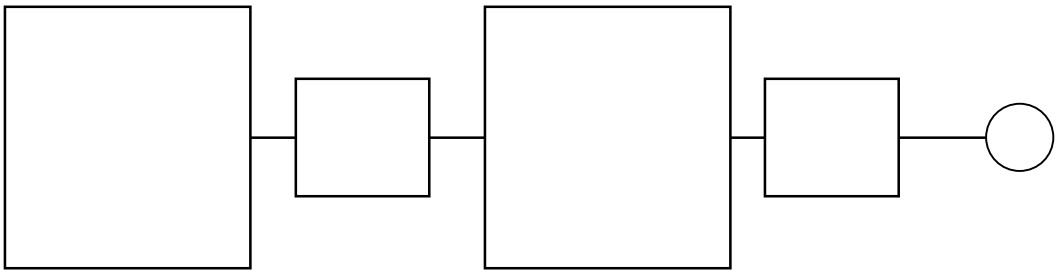
The WAN DUAL card, the WAN SINGLE card, and the 75 ohm version of the DSX/CEPT module, connected via the BNC connector panel are approved for connection to UK 2048 kbps digital leased lines with G.703 (75Ohm) interfaces.

UK Compliance Statements

The E1 Interface is approved in the UK for direct connection to PTO-provided circuits operating at data rates up to 2.4Mbit/s.

The E1 Interface comprises a combination of single or dual WAN cards, CEPT modules, and connector panels as listed in the UK approval documentation.

The approved configuration options are shown below.



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The Interface Card is also listed in the approval documentation and provides a direct metallic path between the CEPT module and appropriate Connector Panel.

The power required by the host and the total of all adapter cards installed within the host environment, together with any auxiliary apparatus, shall not exceed the power specification of the host apparatus.

The power requirements for this E1 interface are:

AC Power Supply

AC Mains:100 - 240 Vrms, 47 - 63 Hz

or

48VDC Power Supply

DC Input:35 - 60 VDC, ± 15%, 120KVA max.

It is essential that, when other option cards are introduced which use or generate a hazardous voltage, the minimum creepages and clearances are maintained. Suitable user protection to ensure compliance with EN 60950 should be present on the card. A hazardous voltage is one that exceeds 42.2V peak AC or 60VDC. If you have any doubt, seek advice from a competent installation engineer before installing other adapters into the host equipment.

The equipment must be installed such that with the exception of the connections to the host, clearance and creepage distances shown in the table below are maintained between the card and any other assemblies that use or generate a voltage shown in the table below. The large distance shown in brackets applies where the local environments is subject to conductive pollution or dry non-conductive pollution which could become conductive due to condensation. Failure to maintain these minimum distances would invalidate the approval.

Germany

German Approval Number

The German approval number is A118 142F.

Safety Warning

SPEZIFISCHE SICHERHEITSMAßNAHMEN

DIE EINRICHTUNG IST GEMÄß DEM SICHERHEITSSTANDARD EN60950 ENTWORFEN UND HERGESTELLT WORDEN. DOCH DIE FOLGENDEN SICHERHEITSMAßNAMEN SOLLEN EINGEHALTEN WERDEN. UM IHRE

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PERSÖNLICHE SICHERHEIT BEI INSTALLATION ODER BEI WARTUNG SICHERZUSTELLEN UND UM SCHADEN AN DER EINRICHTUNG ODER AN DER ZUM ANSCHLUß BESTIMMTEN EINRICHTUNG ZU VERMEIDEN.

ERDUNG

Die Einrichtung kann genauso durch das Netzanschlußkabel wie durch das mit gekennzeichnete Terminal geerdet werden.

STROMVERSORGUNG

Wechselspannung 120/240 Volts 2/1 Amps 50/60 Hertz

Gleichstrom 24/48 Volts 1/1.5 Amps

Die Gleichstromversogung muß zusätzlich den Strom von der Versorgung abstellen können, und die Versorgungsspannung muß von einer isolierten Quelle gemäß der SELV-Voraussetzungen von EN60950 versorgt werden.

SCHMELZSICHERUNG

Um Brandgefahr zu vermeiden, dürfen Sie nur die Sicherung von der vorgeschriebenen Sorte und Nennwerte für die Einrichtung gerbrauchen.

ENTFERNUNG VON PLATTEN UND ABDECKUNGEN

Die Abdeckungen und Platten sollen nur von einem qualifizierten Wartungs- oder Operationsperson entfernt werden.

Betreiben Sie nie die Einrichtung, wenn die Stromplattenverschlüsse entfernt worden sind, und entfernen Sie nie die Stromplattenabdeckung, ohne zuerst die Stromversorgung abzustellen.

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Chapter 1
System Overview

1.1 Introduction

This chapter describes the various chassis models used by the integrated access system. It also shows each chassis and the associated card slot locations.

Three series of chassis models are available. These include the front-loading chassis with power supplies on the side; the front-loading chassis with power supplies on top, and the front- and rear-loading chassis with power supplies on the side, also called the *two-sided* chassis.

The integrated access system uses four basic types of plug-in cards: common (CPU and Interface); user (Voice, Data and Alarm); server (ADPCM); and WAN (for T1 or E1 networks). All cards slide into slots in front of a front-loading chassis, or into both sides of a two-sided chassis. Card guides on the top and bottom of the chassis slots align the cards with the connectors for easy insertion.

1.2 Chassis Types

1.2.1 Front-Loading Chassis with Power Supplies on the Side

Figure 1-1 shows a typical front-loading chassis with the power supplies on the side. Designed to maximize the use of space, this chassis loads cards from the front, with the power supplies on the right side. This chassis is made of steel and has punched-steel card guides.

This front-loading chassis has a common bus that allows all cards to be placed in similar slots. The combination slots for this chassis are P1 to P4 and W1 to W4. These slots are also referred to as slots U1 to U8 when used for voice, data, terminal interface, and/or alarm cards.

Table 1-1 lists the card slot locations for the front-loading chassis with power supplies on the side. Refer to this table when determining your chassis card configuration.

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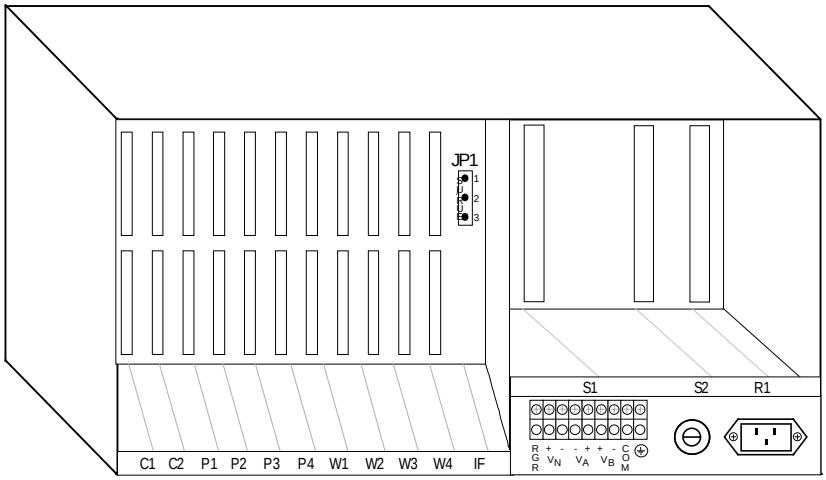


Figure 1-1. Front-Loading Chassis with Power Supplies on the Side

Table 1-1. Card Slots for Front-Loading Chassis with Power Supplies on the Side

Type of Card	# of Cards	Slots Used	Notes
CPU	1 or 2	C1, C2	One required in either slot
Server	0 to 3	P1, P2, P3	ADPCM (P4 is not used for Server Cards)
WAN	1 to 4	W1 to W4	One required
Interface	1	IF	Required
Alarm	0 to 7	P1-4, W1-4	Internal/External, any user slot
E&M Voice	0 to 7	P1-4, W1-4	2/4-wire voice, any user slot
FXS Voice	0 to 7	P1-4, W1-4	2-wire voice, any user slot
FXO Voice	0 to 7	P1-4, W1-4	2-wire voice, any user slot
FXS-C Voice	0 to 7	P1-4, W1-4	2-wire voice, coin, any user slot
FXO-C Voice	0 to 7	P1-4, W1-4	2-wire voice, coin, any user slot
B7R	0 to 7	P1-4, W1-4	FDL Mux, any user slot
BRI Data	0 to 7	P1-4, W1-4	BRI, any user slot
DS0-DP Data	0 to 7	P1-4, W1-4	4-wire data, any user slot
FRAD Data	0 to 7	P1-4, W1-4	FRAD, any user slot
HSU Data	0 to 7	P1-4, W1-4	High-speed data, any user slot
OCU-DP Data	0 to 7	P1-4, W1-4	4-wire data, any user slot
SRU Data	0 to 7	P1-4, W1-4	Sub-rate data, any user slot
Main Power (AC/DC)	1 or 2	S1 and S2	AC or DC power supplies
Optional Power	0 or 1	S2	AC-to-DC converter
Optional Ringer	0 or 1	R1	Ringing generator

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1.2.2 Front-Loading Chassis with Power Supplies on Top

Figure 1-2 shows the front-loading chassis with power supplies on top. This is a tall chassis in which the two power supply slots are in the upper right. This chassis is made of steel and has punched-steel card guides.

This chassis has three server card slots (P1 to P3), four WAN card slots (W1 to W4), and eight user card slots (U1 to U8). Slots F1 and F2 accommodate up to two power supplies, and slots R1 to R5 hold up to five AC-to-DC power converters or ringing generators.

Table 1-2 shows the card slots for the front-loading chassis with the power supplies on top. Use that table to determine your chassis card configuration.

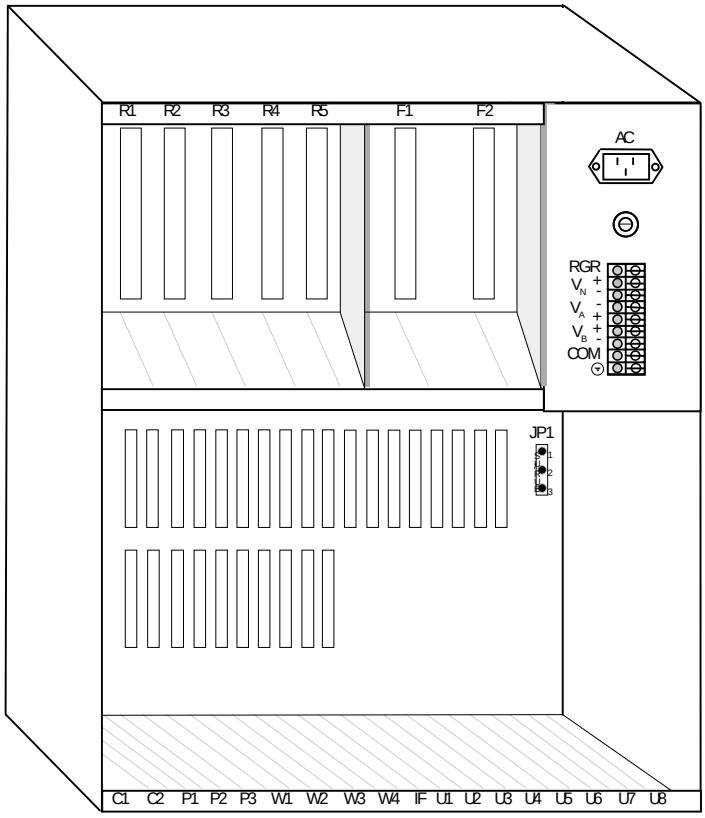


Figure 1-2. Front-Loading Chassis with Power Supplies on Top

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Table 1-2. Card Slots for Front-Loading Chassis with Power Supplies on Top

Type of Card	# of Cards	Slots Used	Notes
CPU	1 to 2	C1, C2	One required in either slot
Server	1 to 3	P1, P2, P3	ADPCM
WAN	1 to 4	W1 to W4	One required
Interface	1	IF	Required
Alarm	0 to 8	U1-U8	Internal/External, any user slot
E&M Voice	0 to 8	U1-U8	2/4-wire voice, any user slot
FXS Voice	0 to 8	U1-U8	2-wire voice, any user slot
FXO Voice	0 to 8	U1-U8	2-wire voice, any user slot
FXS-C Voice	0 to 8	U1-U8	2-wire voice, coin, any user slot
FXO-C Voice	0 to 8	U1-U8	2-wire voice, coin, any user slot
B7R Data	0 to 8	U1-U8	FDL Mux, any user slot
BRI Data	0 to 8	U1-U8	BRI, any user slot
DS0-DP Data	0 to 8	U1-U8	4-wire data, any user slot
FRAD Data	0 to 8	U1-U8	FRAD, any user slot
HSU Data	0 to 8	U1-U8	High-speed data, any user slot
OCU-DP Data	0 to 8	U1-U8	4-wire data, any user slot
SRU Data	0 to 8	U1-U8	Sub-rate data, any user slot
Main Power (AC/DC)	1 or 2	F1-F2	AC or DC power supplies
Optional Power	0 to 2	R1-R5	AC/DC converter
Optional Ringer	0 to 5	R1-R5	Ringing generator

1.2.3 Two-Sided Chassis

Figure 1-3 shows the front of a two-sided chassis. This chassis accepts cards from both the front and rear. It is made of steel and has punched-steel card guides.

The front of the two-sided chassis is the network side; it holds the CPU card, up to three server cards (slots P1 to P3), and up to four WAN cards (slots W1 to W4). The power supplies occupy slots F1 and F2.

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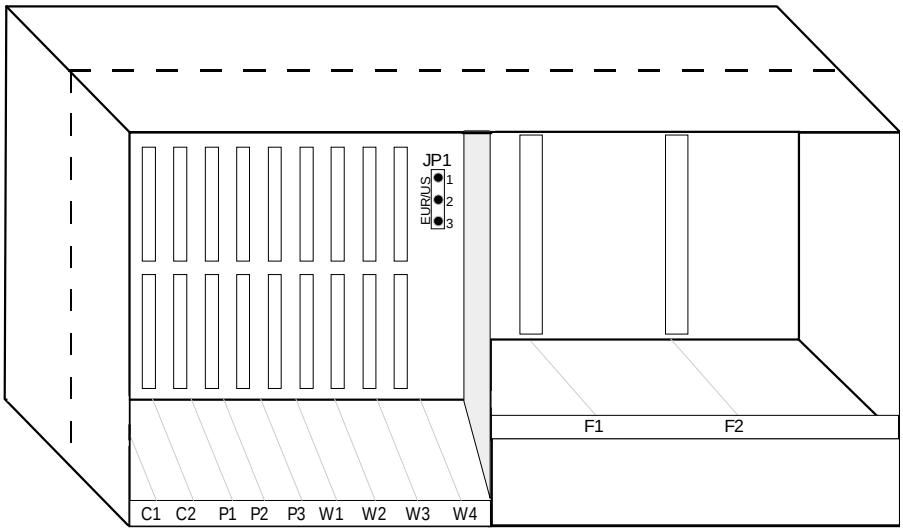


Figure 1-3. Two-Sided Chassis Front View

Figure 1-4 shows the rear of the two-sided chassis, which is the CPE side. The eight user slots (U1 to U8) accommodate a variety of user cards, and the interface slot (IF) is used by the Interface card. Slots R1 to R5 accommodate the optional AC-to-DC power converters and ringing generators. Table 1-3 lists the card slots for these chassis; use that table to determine your chassis card configuration.

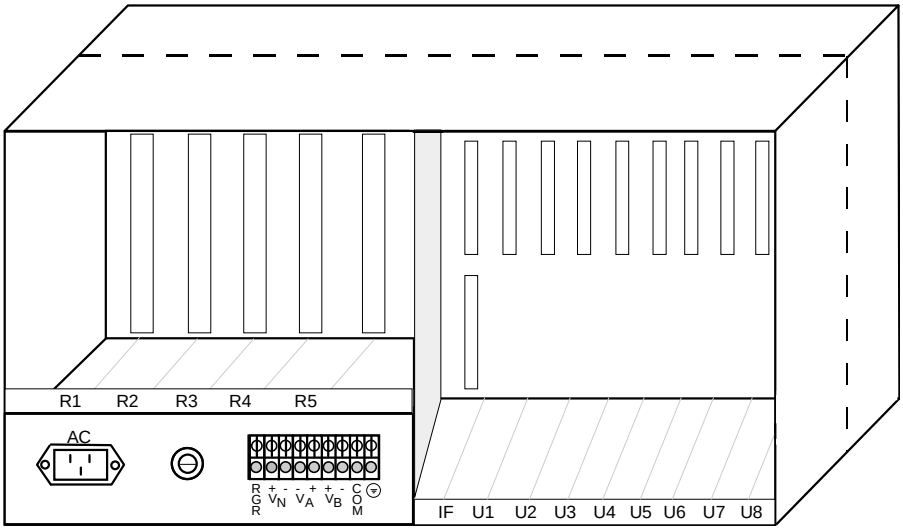


Figure 1-4. Two-Sided Chassis Rear View

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Table 1-3. Two-Sided Chassis Card Slots

Type of Card	# of Cards	Slots Used	Notes
CPU	1 or 2	C1, C2	One required in either slot
Server	1 to 3	P1, P2, P3	ADPCM
WAN	1 to 4	W1-W4	One required
Interface	1	IF	Required
Alarm	0 to 8	U1-U8	Internal/External, any user slot
E&M Voice	0 to 8	U1-U8	2/4-wire voice, any user slot
FXS Voice	0 to 8	U1-U8	2-wire voice, any user slot
FXO Voice	0 to 8	U1-U8	2-wire voice, any user slot
FXS-C Voice	0 to 8	U1-U8	2-wire voice, coin, any user slot
FXO-C Voice	0 to 8	U1-U8	2-wire voice, coin, any user slot
B7R Data	0 to 8	U1-U8	FDL Mux, any user slot
BRI Data	0 to 8	U1-U8	BRI, any user slot
DS0-DP Data	0 to 8	U1-U8	4-wire data, any user slot
FRAD Data	0 to 8	U1-U8	FRAD, any user slot
HSU Data	0 to 8	U1-U8	High-speed data, any user slot
OCU-DP Data	0 to 8	U1-U8	4-wire data, any user slot
SRU Data	0 to 8	U1-U8	Sub-rate data, any user slot
Main Power (AC/DC)	1 or 2	F1, F2	AC or DC power supplies
Optional Power	0 to 2	R1-R5	AC-to-DC converter
Optional Ringer	0 to 5	R1-R5	Ringing generator

1.2.4 Front-Loading Chassis with Enhanced Power Supply

Figure 1-5 shows the front-loading chassis with enhanced power supplies on top. This is a tall chassis in which the two power supply slots are in the upper right. This chassis is made of steel and has improved “v” design card guides that protect the electrical card traces from contact with the chassis.

This chassis has three server card slots (P1 to P3), four WAN card slots (W1 to W4), and eight user card slots (U1 to U8). Slots F1 and F2 accommodate up to two power supplies, and slots R1 and R2 hold up to a maximum of two ring generators. The chassis also includes two low power AC-to-DC converters (NS1, NS2) and a maximum of two high power AC-to-DC converters (HP1, HP2).

Table 1-4 shows the card slots for the front-loading chassis with the power supplies on top. Use that table to determine your chassis card configuration.

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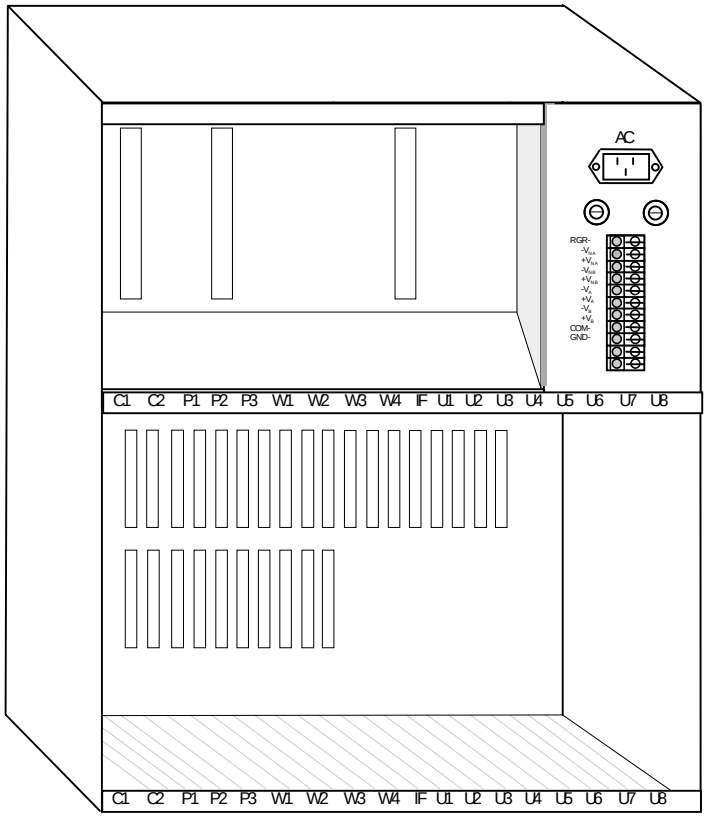
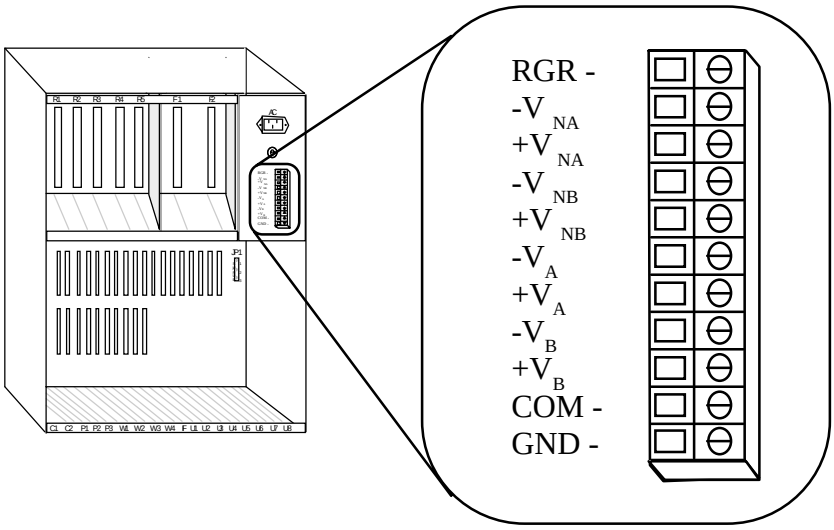


Figure 1-5. Power Enhanced Chassis

The power enhanced chassis works in a specific environment relating to applications using BRI cards. If your environment requires this type of configuration, notify your system administrator for applications design and configuration setup. This chassis comes equipped with a total of 4 power supplies: 2 regular power supplies, 1 redundant and 1 primary (both used for load sharing). See Figure 1-6 for wiring details.

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1. V_{NA} (+ & -) and V_{NB} (+ & -) are dual -48VDC feeds for the data backplane when -48VDC is to be output from the user card. V_{NA} and V_{NB} are independently protected by 8 amp fuses located on the front panel above the TB connector.

2. V_A (+ & -) and V_B (+ & -) are dual feeds for the power supplies located in slots F1 & F2 respectively (see note 3).

3. Power to V_{NA} (+ & -) and V_{NB} (+ & -) must be supplied or jumpered from either V_A (+ & -) and V_B (+ & -) if -48VDC power is required on the data backplane.

Figure 1-6. External Power Source for the Power Enhanced Chassis

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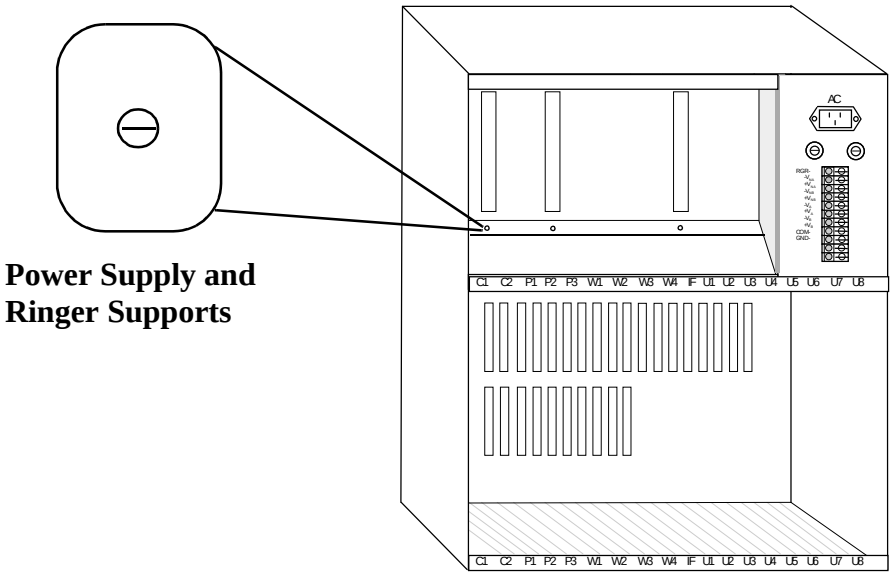


Figure 1-7. Power Supply and Ringer Supports for Power Enhanced Chassis

Table 1-4. Card Slots for Front-Loading Chassis with Enhanced Power Supplies on Top

Type of Card	# of Cards	Slots Used	Notes
CPU	1 or 2	C1, C2	One required in either slot
Server	1 to 3	P1, P2, P3	ADPCM
WAN	1 to 4	W1-W4	One required
Interface	1	IF	Required
Alarm	0 to 8	U1-U8	Internal/External, any user slot
E&M Voice	0 to 8	U1-U8	2/4-wire voice, any user slot
FXS Voice	0 to 8	U1-U8	2-wire voice, any user slot
FXO Voice	0 to 8	U1-U8	2-wire voice, any user slot
FXS-C Voice	0 to 8	U1-U8	2-wire voice, coin, any user slot
FXO-C Voice	0 to 8	U1-U8	2-wire voice, coin, any user slot
B7R Data	0 to 8	U1-U8	FDL Mux, any user slot
BRI Data	0 to 8	U1-U8	BRI, any user slot
DS0-DP Data	0 to 8	U1-U8	4-wire data, any user slot
FRAD Data	0 to 8	U1-U8	FRAD, any user slot
HSU Data	0 to 8	U1-U8	High-speed data, any user slot
OCU-DP Data	0 to 8	U1-U8	4-wire data, any user slot
SRU Data	0 to 8	U1-U8	Sub-rate data, any user slot
Main Power (AC/DC)	1 or 2	F1, F2	AC or DC power supplies
Optional Power	0 to 2	NS1-NS2	AC-to-DC converter
Optional Ringer	0 to 2	R1-R2	Ringing generator
Enhanced Power	0 to 2	HP1-HP2	AC-to-DC converter

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1.3 U.S. and European Chassis Configuration

The chassis can be configured to comply with either U.S. (domestic) or European electrical safety standards by setting a jumper inside each chassis. (Refer to Chapter 2 for details).

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Chapter 2
System Installation

2.1 Introduction

This chapter provides instructions for unpacking and installing the integrated access system chassis and plug-in cards at the user site. It also includes other information you will need to properly install the system, and refers you to other chapters for additional card-level information.

The system can operate on either AC or DC power when equipped with the proper power supply. Refer to the system specifications section in this manual regarding electrical and environmental requirements.

2.1.1 User-Set Switches and Jumpers

Several plug-in cards of the integrated access system contain on-board switches and/or jumpers. Some cards also require you to install sub-modules for proper operation. You must prepare these cards before inserting them into the chassis.

2.1.2 Chassis Installation

2.1.2.1 Unpacking the Chassis and Cards

The integrated access system chassis and cards are packed separately. When you receive your system, unpack the boxes and check the contents for damage. If anything is damaged, contact the shipping carrier to file a claim. The carrier representative will also tell you how to submit a claim, where to send the unit, and give you any special instructions you may need.

Pack the damaged item in its original packing materials and send it by prepaid freight to the address you received. If the original packing materials are unavailable, pack the unit in a sturdy box and surround it with shock-absorbing material.

2.1.3 Pre-Installation Tips

2.1.3.1 Installation Checklist

Install your integrated access system in the following sequence:

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1. Choose a suitable location for the system, as described in this chapter.
2. Unpack and inspect the equipment for damage.
3. Mount the chassis on the desired surface (rack, tabletop, or wall).
4. Set the chassis jumper for U.S. or European operating voltage compliance.
5. Remove the power supply covers from the chassis.
6. Install the chassis ground connections.
7. Install the AC or DC power supplies.
8. Install an AC-to-DC converter (if necessary).
9. Install a ringing generator (if necessary).
10. Install a CPU card.
11. Install the Interface card.
12. Install the WAN cards.
13. Install server cards, as required.
14. Install the user (voice, data, and alarm) cards, as required.
15. Verify the voltage ratings of all power supplies in the chassis.
16. Verify the fuse ratings of all power supplies.
17. Apply power to the system and verify the power LED states.
18. Install the power supply covers on the chassis.

After successfully installing the system, configure the system for operation as follows:

1. Connect a VT100-compatible terminal to the Interface card.
2. Log into the system, then register.
3. Set the Alarm Filters.
4. Configure the CPU card.
5. Configure the Interface card.
6. Configure the WAN cards.
7. Configure all other cards.

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2.1.4 Choosing a Location for Your System

The integrated access system requires a reasonably dust-free, static-free operating environment, such as a computer room. Adequate ventilation is also required at the site. Do not install the chassis in direct sunlight, which may increase the system's operating temperature and affect its operation.

Most of the system plug-in cards have highly sensitive components that could be damaged by static electricity. Whenever you handle any system cards, be sure to observe local electrostatic discharge (ESD) precautions.

The mounting brackets supplied with the chassis are needed for tabletop installation, to ensure proper air flow through the chassis. The top and bottom of each chassis also must be clear of objects.

The system chassis can be installed on a 19-inch or 23-inch equipment rack, attached to a wall, or placed on a tabletop or other level surface. First, though, make sure the desired surface can support the weight of a fully equipped chassis.

The system specifications section in this manual lists the maximum power consumption of each system card. Use this table to calculate the total system power consumption.

The system specifications section in this manual lists some typical current measurements for each card at every DC operating voltage that card uses.

Also be sure to locate the system near all external equipment to which you will connect it. Cable lengths and physical/electrical characteristics are critical to system operation, especially for data signal interfaces. Generally, higher CPE data rates require shorter cables than lower data rates. Also, you must use T1-grade or E1-grade cables for all system connections to those networks. For best results, use the cables supplied by your supplier when connecting your system to the associated external facilities. For more information on system cabling, call your supplier.

2.1.4.1 Rack Installation Tips

When installing the chassis in a rack, allow at least 2 inches (5.1 cm) of space between the chassis and the equipment above and below it for proper ventilation. Use the mounting brackets and attachment hardware furnished with the chassis for this purpose, as outlined in the next section. If you use other mounting hardware, you may damage the chassis.

Also route all cables to their destinations through conduits, to enhance EMC performance and facilitate future system troubleshooting. When routing cables, be sure not to obstruct any chassis vents.

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2.1.4.2 Wall-Mount Installation Tips

To mount the chassis on a wall, first obtain a piece of standard, marine-grade plywood (3/8 inch diameter, typical) and bolt it firmly to the desired mounting surface. This board must be long and wide enough to cover the entire chassis length and height. The surface must be able to support the total weight of the system (chassis plus plug-in cards).

2.1.4.3 Tabletop Installation Tips

The chassis should be placed on a flat, smooth surface (e.g., a table) that is free of contaminants. This surface should be capable of supporting a fully equipped chassis. Be sure to allow enough clearance above and below the chassis for proper air circulation. You must use the metal brackets and feet furnished with the chassis for this purpose.

2.1.5 Installing the Chassis

2.1.5.1 Front-Loading Chassis with Power Supplies on Side

The front-loading chassis with power supplies on the side has eight holes on each side, as shown in Figure 2-1. These holes are for mounting in a standard 19-inch or 23-inch rack (48.2 or 58.4 cm). The holes labeled “T” on the bottom are for tabletop mounting.

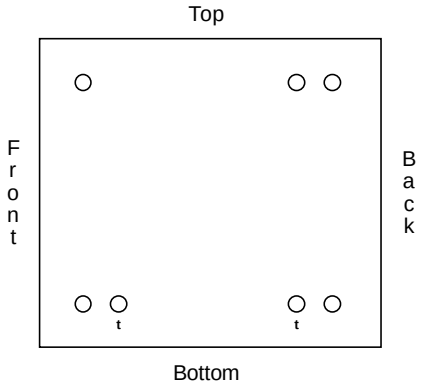


Figure 2-1. Mounting Holes for Front-Loading Chassis with Power Supplies on the Side

Figure 2-2 shows the mounting bracket holes. To mount the chassis in a rack, first attach the brackets to the sides of the chassis, using the four associated 10-32 x 1/4” screws. You can attach the brackets to either the front or rear of the chassis. Then, use the four 12-24 x 1/4” screws to mount the bracketed chassis on the rack.

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The brackets are also reversible for mounting in 19-inch or 23-inch racks (48.2 or 58.4 cm). For a 19-inch rack, attach the long sides of the brackets to the chassis. For a 23-inch rack, attach the short sides of the brackets to the chassis.

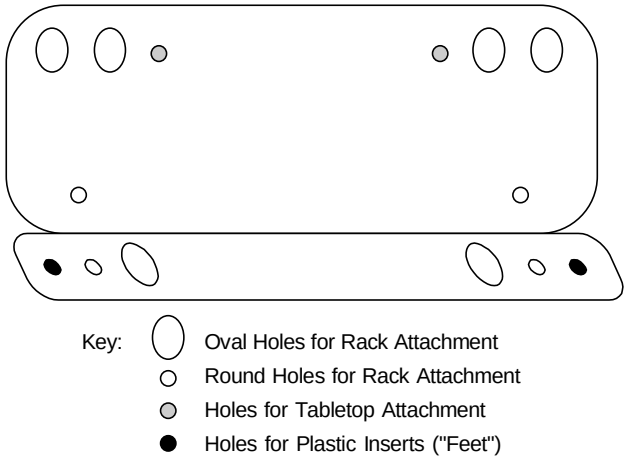


Figure 2-2. Mounting Bracket Holes

If you are placing the chassis on a tabletop or other flat surface, be sure to leave enough clearance for air circulation through the system. Make sure the chassis is accessible from the front, and that it has at least 3/4 inches (2 cm) of room above it. Attach the metal brackets to the chassis sides. Then, insert the plastic abrasion-protective "feet" in the holes near the ends of the bracket.

2.1.5.2 Front-Loading Chassis with Power Supplies on Top

The front-loading chassis with power supplies on top also has eight holes on the bottom of each side, as shown in Figure 2-3. Attach the mounting brackets of Figure 2-3 to these holes on each side of the chassis, in order to mount the chassis in a 19- or 23-inch rack, or attach the brackets to the two holes on the bottom of the chassis for mounting on a tabletop or other flat surface.

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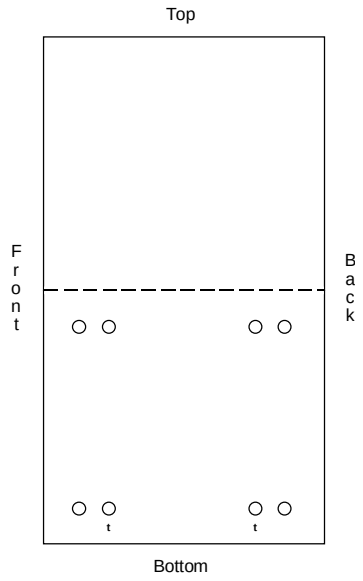


Figure 2-3. Mounting Holes for Front-Loading Chassis with Power Supplies on Top

2.1.5.3 Two-Sided Chassis

The two-sided chassis have 12 holes on each side, as shown in Figure 2-4. These holes facilitate mounting in a 19- or 23-inch rack (48.2 or 58.4 cm). You can attach the front, middle, or rear of this chassis to a rack, using the mounting brackets as previously shown for the front-loading chassis with power supplies on the side. To place a two-sided chassis on a tabletop, attach the mounting brackets to the two holes on the bottoms of the chassis sides.

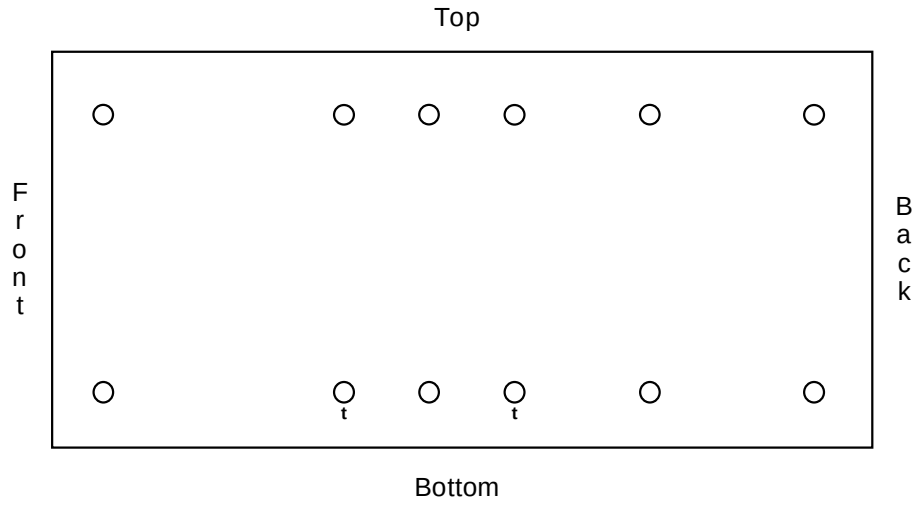


Figure 2-4. Two-Sided Chassis Mounting Holes

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Be sure both the front and rear of the chassis are accessible for inserting and removing cards. The voice, data, and WAN cards, and the power cables, are attached to connectors at the rear of the chassis. Table 2-1 lists the minimum clearances required between the system chassis and the nearest objects.

Table 2-1. Minimum Two-Sided Chassis Clearances

Clearance	Front	Rear	Top	Bottom
Inches	10	15	3/4	2
Centimeters	25	38	2	5

2.2 Power Supplies and Ringing Generators

The power supply and ringing generator system can consist of up to two power supplies, two AC-to-DC converters, and up to five ringing generators. External -48V talk battery and ringing generators may be used instead of the internal units. Use the following guidelines to determine your power supply and ringing generator requirements.

2.2.1 System Power (Redundancy)

The system always requires a 120/240 VAC,-48 VDC, or 24 VDC Power Supply. For backup, you may add a second identical power supply.



Note: *Even though the 24 VDC supply has specifications listed as positive throughout this manual, it can be used with a negative voltage (-24V). Because of the extremely small number of applications that would require -24V, it is not covered in this manual.*

2.2.1.1 -48V Talk Battery Requirements

Talk battery is required whenever you have voice user cards in the system, unless (a) all of those are E&M cards and are used in the Transmission-Only mode, or (b) Type 1 E&M signaling is used. A -48 VDC power source is also required for use with the ALR 4+4 or ALR 4+3PF External Alarm Cards, OCU-DP cards, and to provide sealing current for BRI cards. The -48 VDC talk battery can be provided from an external source, or by using a 115 VAC to -48 VDC Converter. This unit is only available for 115 VAC sources. A similar AC-to-DC Converter is also available for use with either 115 or 220 VAC.

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2.2.1.2 Ringing Generators

Ringing generators are needed if the system has FXS or FXS-C cards, or if it has FXO or FXO-C cards with ports connected to Manual Ringdown (MRD) circuits. The 20 Hz ringing voltage may be provided either by an external source or with a Ringing Generator, which requires the presence of -48 VDC in the system. Two Ringing Generator models are available (105 VAC output and 100 VAC output). **These Ringing Generators cannot be used with external ringing devices.**

The 105V (nominal) unit provides a ringing voltage of 105 VAC at 20 Hz for 11 simultaneously ringing voice ports. The 100V unit similarly provides 100 VAC for the same number of ports. Since most systems will not have that much activity, a single Ringing Generator might provide all of the power necessary to run the system. In a group where incoming calls are at a minimum, 30 to 50 stations could share the same ringing generator. Small groups with heavy incoming call volumes might require two or more Ringing Generators. This card will not "quit" with a heavy load, it will just have weaker and slower ringing abilities. This condition should alert you to the need for additional equipment.



CAUTION!

Do not mix 100V and 105V Ringing Generators in the same chassis.

The compatibility of power sources used together are summarized in the system specification section in this manual.

2.2.1.3 Setting the U.S./European Configuration Jumper

Before inserting any cards into the chassis, set its JP1 jumper for either the U.S. or European configuration. This jumper is shown in Figure 2-5; it is on the resource card backplane and is accessible from the chassis front. The default jumper setting is **US** (for systems in the U.S. and Canada). To change the chassis electrical configuration for European compliance (**EUR**), move the jumper to pins 2 and 3.



U.S. Configuration Eurpoean Configuration

Figure 2-5. JP1 Jumper Settings

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Also be sure to set the same jumper on the system resource cards and external alarm cards to agree with the above setting for the chassis. Refer to the associated chapters in this guide for more information on those card jumpers.

2.3 Installing the System Power Cards

Next, install power supplies, AC-to-DC power converters, and ringing generators into the system chassis, as described in this section. However, do not apply power to the system until you finish installing these cards, AND after making the power and ground connections to the chassis as described in the next section of this chapter.



CAUTION!

Failure to follow the procedures mentioned above will result in damaging the boards.

2.3.1 Talk Battery Supply Fuses

The fuse for the DC Power Supply is in a removable cartridge next to the DC input socket on the front or rear panel (depending on which chassis you may have). The power supply should have a 5amp fuse on it. Refer to the system specifications section in this manual.

2.3.2 AC Power Supply and DC Supply Fuses

The AC power supply and DC Power Supply Fuses already built in. When unpacking the unit a power cord will be in the box. The AC inlet connector is located in the front or rear of the chassis. Refer to the system specification section in this manual.

2.3.3 Installing AC or DC Power Supplies

To install the AC or DC power supply in a chassis, first remove the panel covering the front power slot. Then, hold the power supply by its metal handle and align the printed circuit board (PCB) edges with the rail guides of either power supply slot. Push the unit in until it is firmly seated in the backplane connector, and replace the panel cover. For redundant power supplies, also insert a second AC or DC power supply into the adjacent slot. *You may remove or install power supplies with power applied.*

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If the power supply is installed and power is applied, the green LED on the front panel of the power supply should light. A problem exists if this LED does not light. Verify that the power supply is properly seated in the connector. If so, also check the external power source and connection to the power supply. If the power supply, external power source, and power connection are okay, replace the converter.

Replace the panel cover.

2.3.4 -48V Converters

To install a -48V Converter in a chassis, proceed as follows. Refer to the system specification section in this manual for the -48V Converters, and Figure 2-6 shows the location of the fuse on the converter board.

1. For a two-sided chassis, remove the panel covering the rear power slots. You may insert or remove the module in any of the five rear slots while power is on or off. For a front-loading Chassis, remove the panel covering the front power slots. You may insert or remove the panel while power is on or off.

2. Hold the converter by its metal handle and align the PCB edges with the slot rail guides in the power supply backplane. Gently push the converter in until it is firmly seated in the backplane connector.

3. If the power converter is installed and power is applied, the green LED on the front panel of the converter should light. A problem exists if this LED does not light. Verify that the power supply is properly seated in the connector. If so, also check the external power source and connection to the power supply. If the power supply, external power source, and power connection are okay, replace the converter.

4. Replace the panel cover.



Note: *There are two different types of 100W -48V Converters. One with full range and one limited.*

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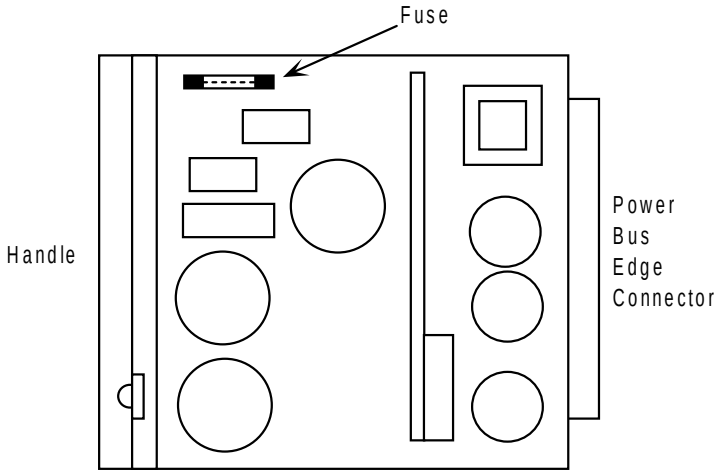


Figure 2-6. -48V Converter Fuse

2.4 Ringing Generators

The ringing generator provides a ringing voltage of either 100 or 105 VAC (nominal) at 20 Hz for simultaneously ringing 11 voice ports. If more than one ringing generator is required in the same chassis, they must have the same model number. **The 100V and 105V Ringing Generators cannot be mixed in a single chassis.**

Make sure the system uses a -48V power source before installing any ringing generators. You can install up to four ringing generators in a two-sided chassis, depending on the availability of its slots. The front-loading chassis can have only one ringing generator each.

When two or more ringing generators are used, the outputs of all ringing generators are linked together by OR circuits on the ringing bus. One generator must be jumpered as the MASTER and the others must be jumpered as SLAVEs. The master ringing generator then synchronizes the ringing signals on the ringing bus. Refer to the system specification section in this manual for the ringing generators.

2.4.1 105V Ringing Generator

To install a 105V Ringing Generator, proceed as follows:

1. **Make sure power is turned off before inserting the ringing generator.**

2. Make sure jumper W201 is installed if this is the only ringing generator in the unit, or if it is the MASTER ringing generator, Figure 2-7. If this is a SLAVE ringing generator, cut jumper W201 with wire cutters.

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3. For a two-sided chassis, remove the panel covering the rear power slots. You can insert the generator into any of the five rear slots. For the front-loading chassis with power supplies on top, remove the panel covering the front power slots, and insert the module in any of the five slots. For the front-loading chassis with power supplies on the side, insert the ringing generator only into slot R1.

4. Hold the unit by its metal handle and align the PCB edges with the slot rail guides in the power supply backplane. Gently push the unit in until it is firmly seated in the backplane connector.

5. If the power supply is installed and power is on, the LED on the rear panel of the ringing generator should flicker at a rate of 20 times per second. A problem exists if this LED is not flickering. Verify that the MASTER/SLAVE settings are correct, and that the unit is firmly seated in the connector. If so, replace the ringing generator (it is faulty).

6. Replace the panel cover.

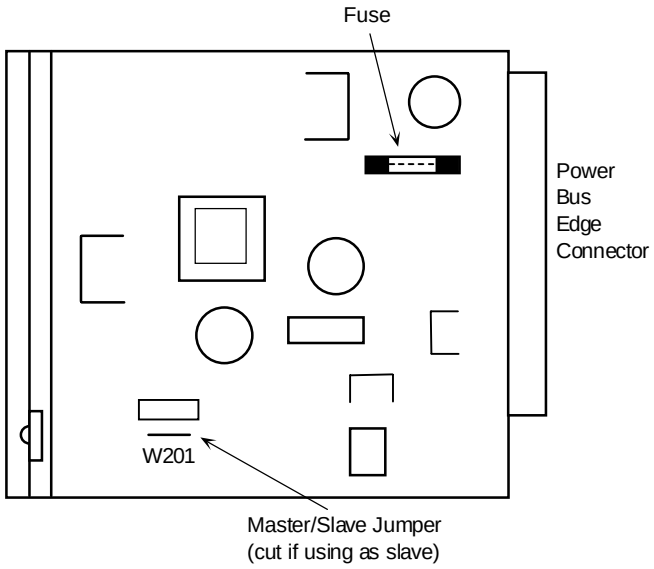


Figure 2-7. 105V Ringing Generator Jumper Setting

2.4.1.1 100V Ringing Generator

To install a 100V Ringing Generator, proceed as follows:

1. **Make sure power is turned off before inserting the ringing generator.**

2. Make sure jumper JP1 is installed between the lower two pins (MASTER) if this is the only ringing generator in the unit, or if it is the MASTER ringing generator. If this is a SLAVE ringing generator, move the JP1 jumper to the SLAVE (upper two) pins.

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3. Also make sure jumper JP2 is installed on the card, Figure 2-8. This jumper ensures electrical compliance with all chassis. **Never remove it for any reason!**

4. For a two-sided chassis, remove the panel covering the rear power slots. You may insert or remove the module in any of the five rear slots. For a front-loading chassis with power supplies on the side, remove the panel covering the front power slots, and insert or remove the module in any of the five slots. For a front-loading chassis with power supplies on top, insert the ringing generator only into slot R1.

5. Hold the ringing generator by the metal handle and align the PCB edges with the slot rail guides in the power supply backplane. Gently push the unit in until it is firmly seated in the backplane connector.

6. When the power supply is installed and power is on, the LED on the rear panel of the ringing generator should flicker at a rate of 20 times per second. A problem exists if this LED is not flickering. Verify that the MASTER/SLAVE jumper settings are correct, and that the ringing generator is firmly seated in the connector. If so, replace the ringing generator (it is faulty).

7. Replace the panel cover.

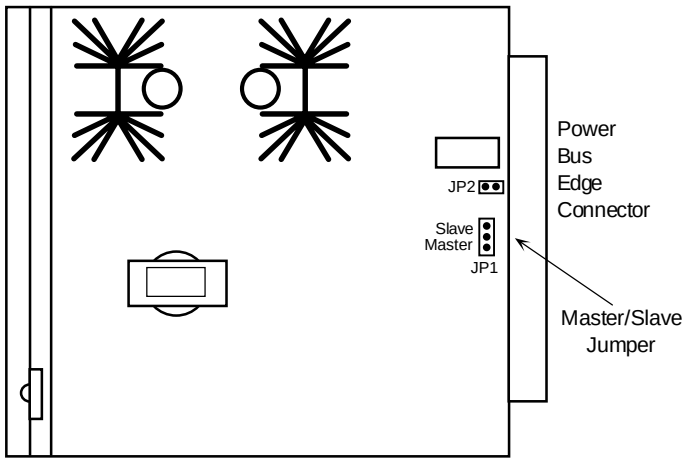


Figure 2-8. 100V Ringing Generator Jumper Settings

2.5 System Power and Ground Connections

After installing the system power cards into the chassis, make the power and ground connections to the chassis as described in this section. Each chassis has a terminal strip for the DC voltage, ringing generator, and ground connections.

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2.5.1 Two-Sided Chassis

Figure 2-9 shows the power connector block on the front-loading chassis with power supplies on the side, and on the two-sided chassis.

Connect the grounds and DC power signals to this block by inserting the wires in the proper slots, then tightening the screws adjacent to the slots to secure the connections. For safety reasons, no more than one-eighth inch (0.125") of each connecting wire should be exposed. **No uninsulated wire should be visible from the power connector block.**

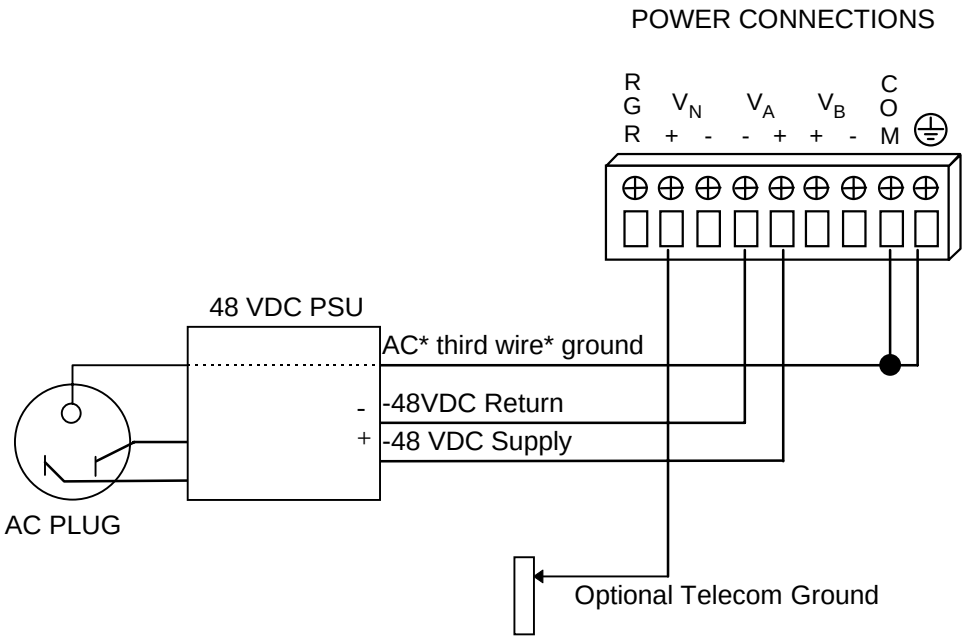
The power connector block also provides dual power connections at $\mathbf{V_A}$ and $\mathbf{V_B}$ where redundant power feeds are required. The $\mathbf{V_A}$ pins feed power supply slot F1, and the $\mathbf{V_B}$ pins feed power supply slot F2.

In addition, you can connect the $\mathbf{V_N}$ pins of the block to an external -48V source for powering voice cards and their circuits. The **COM** (common) pin is for a signal ground connection, and the **RGR** (ringer) pin is for an external 20 Hz ringing input to the chassis. The ringing voltage bias is selected by a connection to V_N+ or V_N-.



Note: *If -48 VDC is applied to V_A or V_B, DO NOT connect external power to V_N.*

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(Note: on Optional Telecom Ground Connection: It may be required when the 48VDC PSU output is not grounded or when the system is AC powered. It is only needed for the proper operation of the Telecom Ground Start and E&M signaling circuits. For Additional information please refer to Field Alert Bulletin 108-000001).

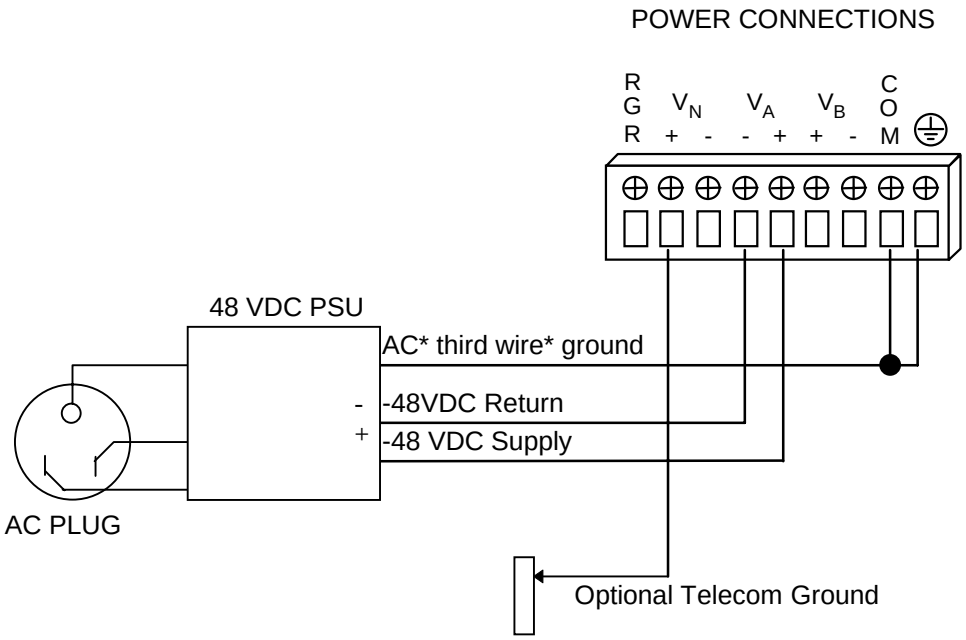
Figure 2-9. Power Connector Block on Two-Sided Chassis and Front-Loading Chassis with Power Supplies on the Side

If your system will be connected to voice circuits that use E&M or FX ground-start signaling, connect the chassis ground terminal to the same chassis ground used by the external PBX or other system. Tying the chassis grounds together will ensure proper signaling operation and transmission between the two ends of each circuit.

2.5.2 Front-Loading Chassis with Power Supplies on the Side

Figure 2-10 shows the power and ground connections to a front-loading chassis with power supplies on the side are the same as those shown above for the two-sided chassis. The front-loading chassis provides the same power block terminals as the two-sided chassis.

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(Note: on Optional Telecom Ground Connection: It may be required when the 48VDC PSU output is not grounded or when the system is AC powered. It is only needed for the proper operation of the Telecom Ground Start and E&M signaling circuits. For Additional information please refer to Field Alert Bulletin 108-000001).

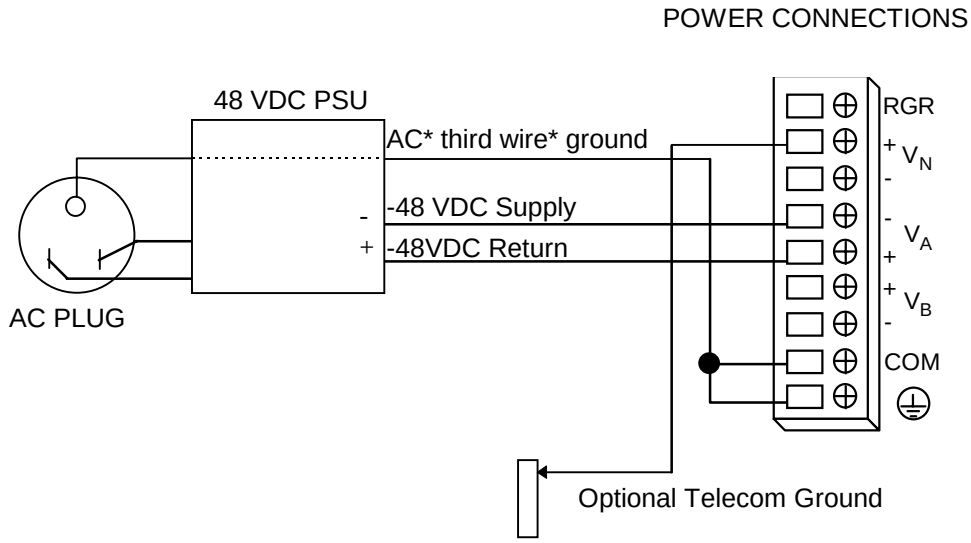
Figure 2-10. Front-Loading Chassis with Power Supplies on the Side

2.5.3 Front-Loading Chassis with Power Supplies on Top

Figure 2-11 shows the power connector block on the front-loading chassis with power supplies on top.. Although the power block is oriented vertically on this chassis, it provides the same connections as the power blocks on the other chassis models.

Note: *If -48 VDC is applied to V_A or V_B, DO NOT connect external power to V_N.*

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(Note: on Optional Telecom Ground Connection: It may be required when the 48VDC PSU output is not grounded or when the system is AC powered. It is only needed for the proper operation of the Telecom Ground Start and E&M signaling circuits. For Additional information please refer to Field Alert Bulletin 108-000001).

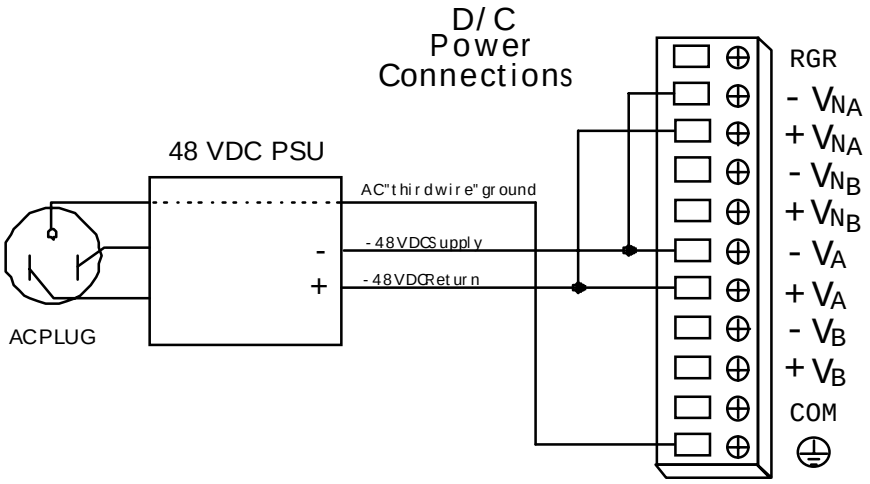
Figure 2-11. Power Connector Block on Front-Loading Chassis with Power Supplies on Top

If your system will be connected to voice circuits that use E&M or FX ground-start signaling, connect the system chassis ground to the same chassis ground used by the external PBX or other CPE. Tying these grounds together will ensure proper signaling operation and transmission between the two ends of each circuit.

2.5.4 Power Enhanced Chassis with Power Supplies in Front

Figure 2-12 shows the power connector block on the front-loading chassis with power enhancement on top. Although the power block is oriented vertically on this chassis, it provides an improved external power connector that requires additinal jumpers to provide power to user cards that apply voltage to the CPE device.

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Note: This diagram only depicts one DC power source which would support the F1 power supply. If a redundant power configuration is desired, then a second power source would be applied to the V_B (+ & -) leads. A separate feed is not required to the V_{NB} (+ & -) leads unless a redundant feed is preferred.

Figure 2-12. Power Enhanced Chassis with Power Block in Front

2.6 Powering Up the System

After connecting the chassis to the external power sources and making the proper ground connections, apply power to the chassis. Plug the AC power cord into the associated electrical outlets, or turn on the external DC power supply. Then, observe the following front-panel LEDs:

1. The green power LED is lit on the power supply faceplate. If redundant power supplies are used, this LED is lit on both cards.

2. If AC-to-DC converters are installed, they’re green power LEDs light.

3. If ringing generators are installed, their green LEDs flicker at a rate of 20 times per second.

If these LEDs are not lit, first verify that the external power source is providing power to the chassis, and check the connection between that source and the chassis. Also be sure each card is firmly seated in its chassis slot.

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If AC-to-DC converters are used, also check their jumper settings as previously described. If all of these conditions are met, replace the card on which the green LED fails to light; that card is faulty.

2.7 Installing the Other Plug-In Cards

Also install the remaining cards into their designated chassis slots.

Some cards have on-board switches or jumpers that you must set before insertion into the chassis. These cards and their settings are summarized at the beginning of this chapter. Also refer to the associated card reference guides for detailed instructions for each card.

2.7.1 Interface Card

Install an Interface (INF) Card into the IF slot of the chassis. Only one INF card is used in each system. This card provides the connections to the external user interface control systems, alarm reporting facilities, and T1 and/or E1 networks.

2.7.2 CPU Cards

Install a CPU-3 XCON Card into slot C1 of the system chassis. If redundant CPU cards are used, also insert an identical card into slot C2. Refer to the CPU section in this manual. After installing these cards, verify that the green LEDs light on their faceplate. If their yellow LEDs light instead, replace the associated cards.

2.7.3 WAN Cards

Install the Wide-Area Network (WAN) Cards into the W1 through W4 chassis slots. Each system can have up to four WAN cards. Each card also requires the proper type of daughterboard modules (T1 DSX/E1 CEPT, T1 CSU, or HDSL), depending on whether it interfaces with a T1, E1 or DSL network. Refer to this manual for more information on the various WAN cards currently available.

After installing the WAN cards, verify that the green LEDs light on their faceplate. If their yellow LEDs light instead, replace the associated cards.

2.7.4 Server Cards

The integrated access system offers various types of server cards, such as ADPCM. Each system can have up to three server cards, which fit in slots P1, P2, and P3 of the chassis. Refer to the Server Card Reference Guide for more information on this card.

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2.7.5 User Cards

The system also has numerous user cards for connections to voice and data circuits at the CPE, and alarm cards for system alarm reporting to/from external facilities. The user cards go in slots U1 to U8 of the two-sided chassis and front-loading chassis with power supplies on top. Or, they go in slots P1 to P4 and W1 to W4 of the front-loading chassis with power supplies on the side.

You can install up to seven user cards into a front-loading chassis with power supplies on the side. If you have this chassis type, you must reserve one of the “W” or “P” slots for either a WAN card or a server card.

2.7.6 Connecting Cables to the Cards

After inserting the cards into the system chassis, connect them to the external equipment, using the cables furnished with the system. The cards have various types of connectors on their faceplate for those connections.

Some cards have 50-pin Amphenol-type jacks on their faceplate. To connect a cable to this type of jack, first plug the male connector of the cable into the jack and push it in all the way. Then, tighten the mounting screws above and below the cable connector.

For modular (RJ-11 and RJ-48) jacks, push the cable’s mating plug into the jack until it snaps into place. However, do not try to force the plug into the jack.

For DB-9 and DB-25 jacks, first plug the cable’s mating connector firmly into the jack. Then, thread the screws on either side of the cable connector into the standoffs above and below the card jacks, and hand-tighten them.

Refer to the individual card chapters in this guide for more information on the associated card jacks and signal pinouts.

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Chapter 3
System Configuration and Operation

3.1 Basic Operations

This chapter provides instructions for configuring the integrated access server for operation after installing it at the equipment site.

Before performing the procedures in this chapter:

1. Be sure your integrated access system is installed and powered up.

2. Determine your system's specific configuration requirements. These depend on your network and customer premises equipment (CPE) interfaces. If this configuration information already exists, obtain it from your system administrator or engineers.

3. Obtain a terminal with VT-100 or VT-102 emulation and an RS-232 cable for these procedures. The terminal will be connected directly to the Interface card in your system. It allows you to access the system and then configure it for operation with your network and CPE.

3.2 System Initialization

System initialization consists of registering your system's initial configuration and then logging into it for additional configuration. These operations are described below.

3.2.1 Registration

To register your system after starting it up for the first time, proceed as follows:

1. Be sure your system and local terminal are both powered up.

2. Connect a VT100-compatible terminal to the TERM jack on the Interface card front panel. Use a cable with an RJ-48 modular plug on one end for this connection.

3. Set up the terminal to operate at 9.6 kbps, 8 data bits, no parity, and 1 stop bit.

4. Press the RETURN key. The Registration Screen of Figure 3-1 appears.

5. Enter your vendor code in the Vendor Code field.

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6. Select the type of chassis used (front-loading with power supplies on the side, front-loading with power supplies on top, or front/rear loading with power supplies on the side).

7. If the vendor code and chassis types selection are both correct, type **Y** to confirm and save that data. Otherwise, type **N** to return to the screen for changes.

The system now automatically restarts with the correct application parameters. Proceed to the next section, log into the system, and start configuring it for operation.

Note: *Vendor Code: 000 is for illustration purposes ONLY.*

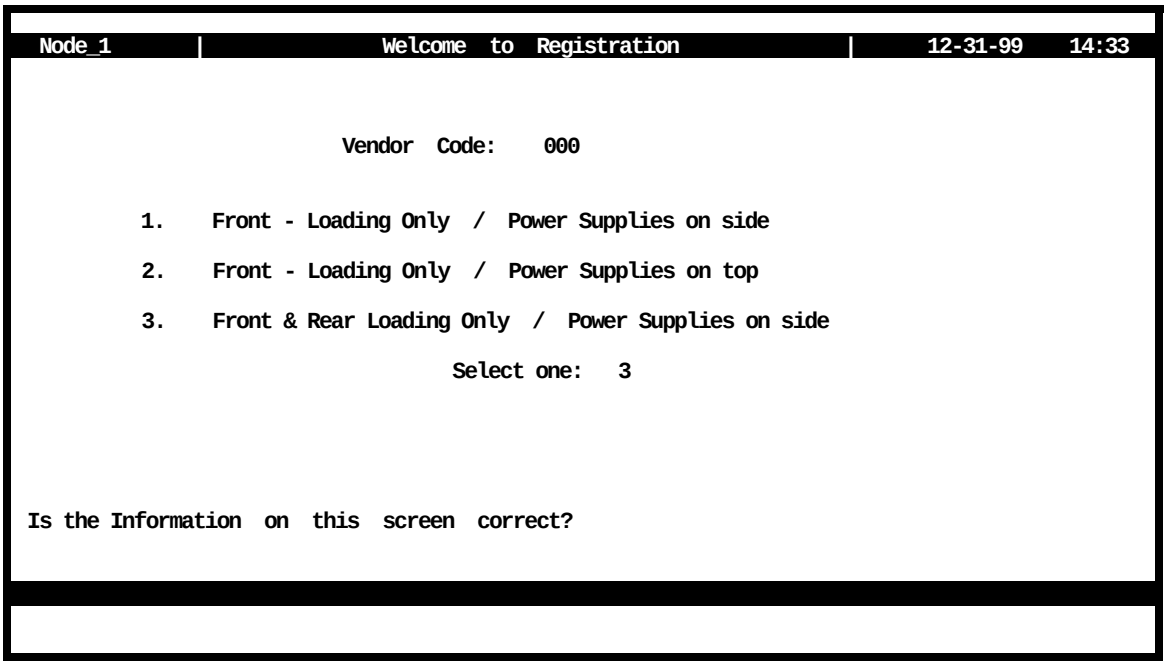


Figure 3-1. Registration Screen

3.3 Basic Screen Map and Legend

To make system access, configuration and testing easy, the system presents you with a series of user interface screens. Each screen displays various fields of information, and you can change the data in those fields as required by your system and external interfaces.

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3.3.1 Starting a Session

The first step in starting an operator session is to log into the system. You must enter a password that allows you to perform the required tasks on the system. The initial (default) login passwords correspond to four different access levels, each allowing you to perform certain tasks. Table 3-1 lists the default passwords and describes the access levels.

The “Superuser” password is the highest level of access, followed by “Manager”, “Operator”, and “Viewer” in sequence. Each level allows you to also perform all operations available to the other levels below it. For example, if you log in under the “Operator” password, you can configure the system and perform diagnostic tests, or you can simply view the current system status and configuration data, which are the only tasks permitted under the “Viewer” password.

All passwords are case-sensitive for maximum security. For example, the system handles **TechMan**, **TECHMAN**, and **Techman** as three different passwords.

You can change your Manager, Operator, and Viewer passwords at any time. See your system administrator to change your password or access levels.

Table 3-1. Default Passwords and Access Level

Access Level	Default Password	Description
superuser	*********	Special access for maintenance and diagnostics, to be used under the direction of a qualified technician. Reserved for internal use only.
manager	Manager	Full access to all configuration options, diagnostic tests, and password control.
operator	Operator	Read/write access to configuration and diagnostic features.
viewer	Viewer	Read-only access to configuration and diagnostic features.

3.3.2 Logging Into the System

To log into the system from a local terminal, proceed as follows. To log in from a remote PC will be discussed later in this reference manual.

1. Press <Enter>. The Login Screen of Figure 3-2 should appear. If not, press <Enter> repeatedly until it does.

2. If the Login Screen does not appear after you press <Enter> several times, check your terminal settings (should be 9.6 kbps, eight data bits, no parity, and one stop bit).

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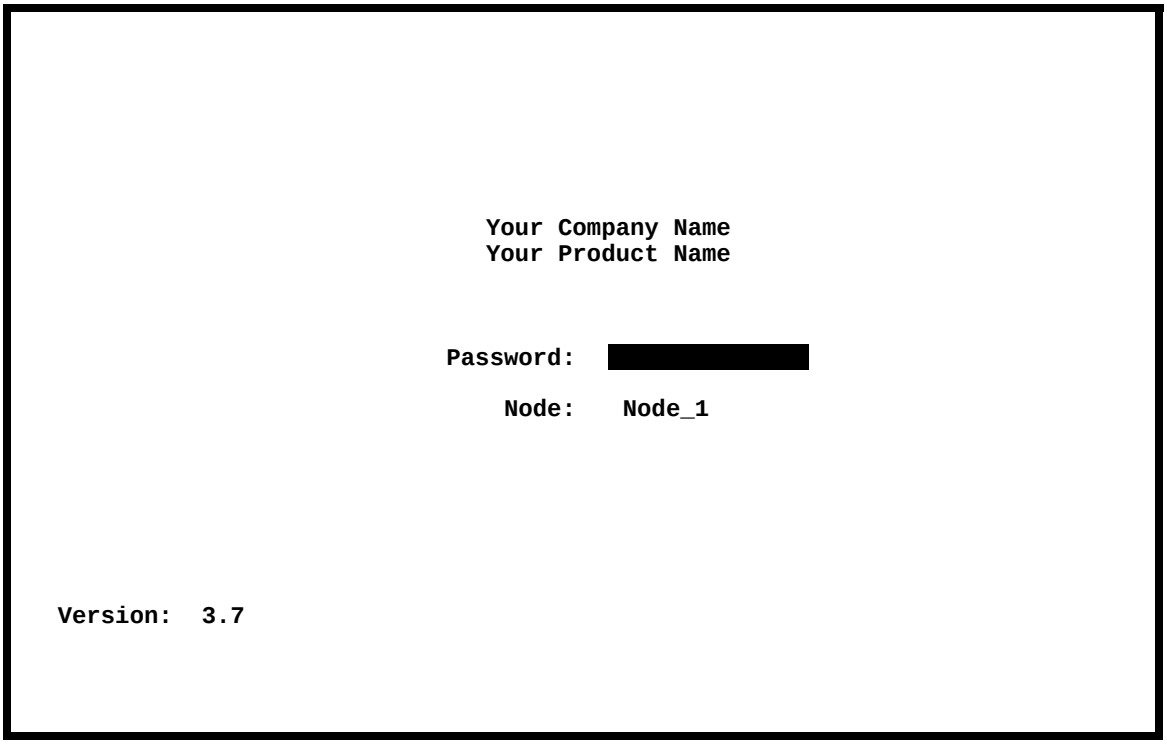


Figure 3-2. Typical Login Screen

3. Contact your system administrator for your Password. Then, press RETURN to accept the password, which will allow you to configure your system after logging in for the very first time. Refer to the next section for descriptions of the various operator password levels.

4. A System Main Screen appears. Figure 3-3 shows this screen for a two-sided chassis and a front-loading chassis with power supplies on top. Figure 3-4 shows a similar screen for a front-loading chassis with power supplies on the side. Refer to the next section for a discussion of the integrated access system's user interface screen hierarchy.

This completes the login process. If you are not familiar with the user interface screens of the system, read the next section before proceeding. Otherwise, continue with the desired operation.

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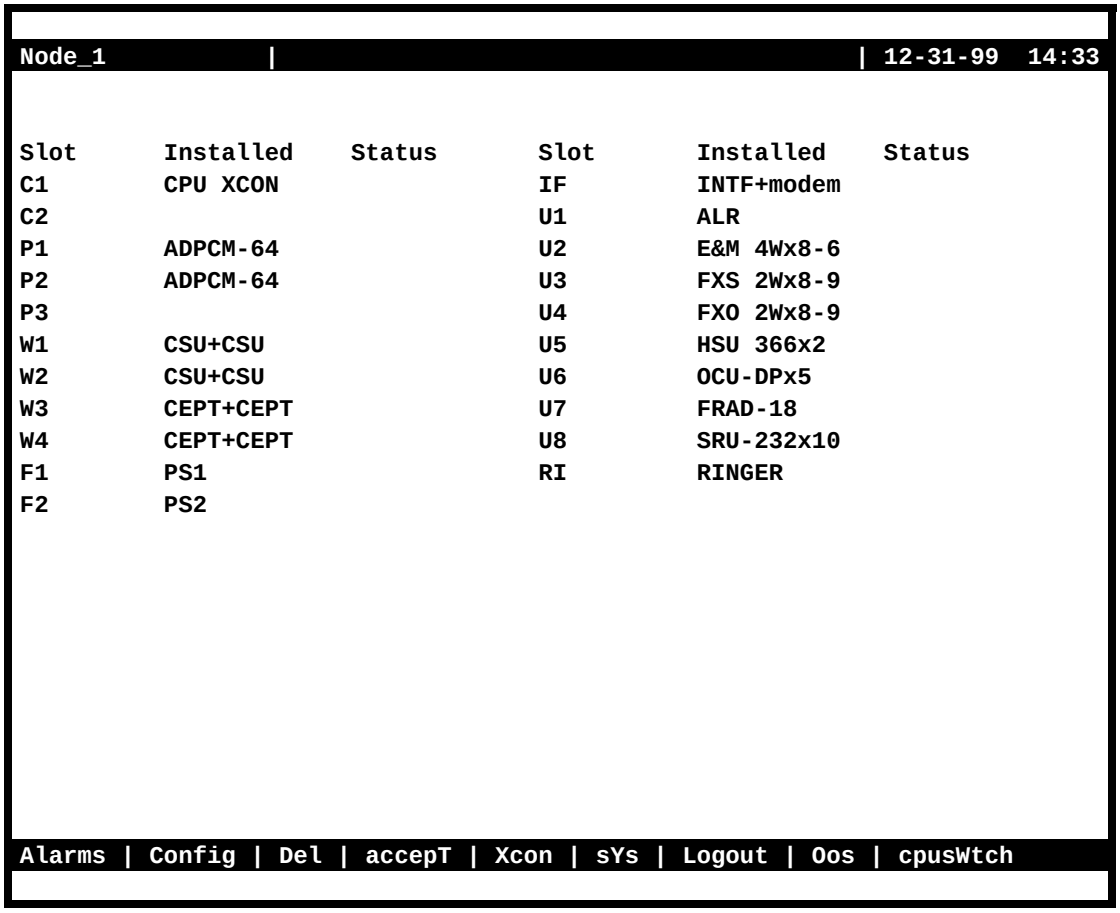


Figure 3-3. Typical System Main Screen
(Two-Sided Chassis and Front-Loading Chassis with Power Supplies on Top)

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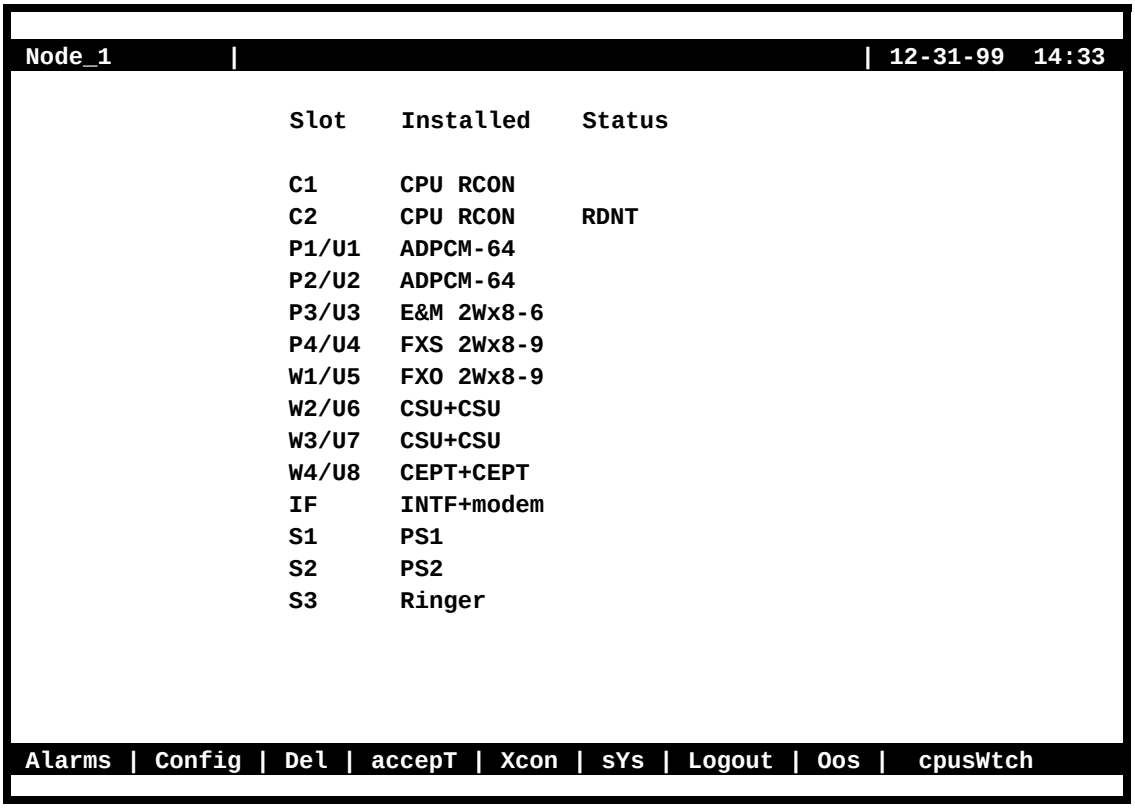


Figure 3-4. Typical System Main Screen (Front-Loading Chassis with Power Supplies on the Side)

3.3.3 System Screens

The system screen will display each card that is currently installed onto the system along with the status and their location.

3.3.3.1 System Main Screen

After you log in, a System Main Screen similar to Figure 3-3 or Figure 3-4 appears, showing all of the cards currently in the system. The chassis slot locations, card types, and current card operational states also appear in this screen.

The highlighted line at the bottom of the screen lists some actions you can perform when you are in that screen. You perform the desired action by typing the associated capital letter on your keyboard. For example, to go to the Alarms Screen (**Alarms** action) and see the current system alarms, press "**a**". Table 3-2 summarizes the System Main Screen actions.

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Table 3-2. System Main Screen Actions

Action	Function
Alarms	Brings up the Alarm Screen. Refer to "Alarms and Alarm Filters" later in this chapter.
Config	Sets up the system using a standard configuration.
Del	Removes an out-of-service (OOS) card from system memory.
accepT	Removes the current card settings. Used when replacing a card in any slot with a different kind of card.
Xcon	Brings up the cross-connect screens.
sYs	Brings up the system screen for high-level system testing and maintenance.
Logout	Logs you off the system.
Oos	Allows authorized operators to take cards out of service.
cpusWtch	Switches from the active CPU card to the redundant CPU card, if the system is configured for CPU redundancy.

3.3.3.2 Voice and Data Card Status

The System Main Screen also shows you the status of the individual circuit ports of all Voice and Data cards in the system. This information appears next to the card type, as shown in Figure 3-5. The lowercase letters in the Status column fields indicate the states of the individual card ports. The possible values for each port are **s** (Standby), **a** (Active), **t** (Test), **l** (currently in a Loopback state), and **r** (on a Redundant WAN card).

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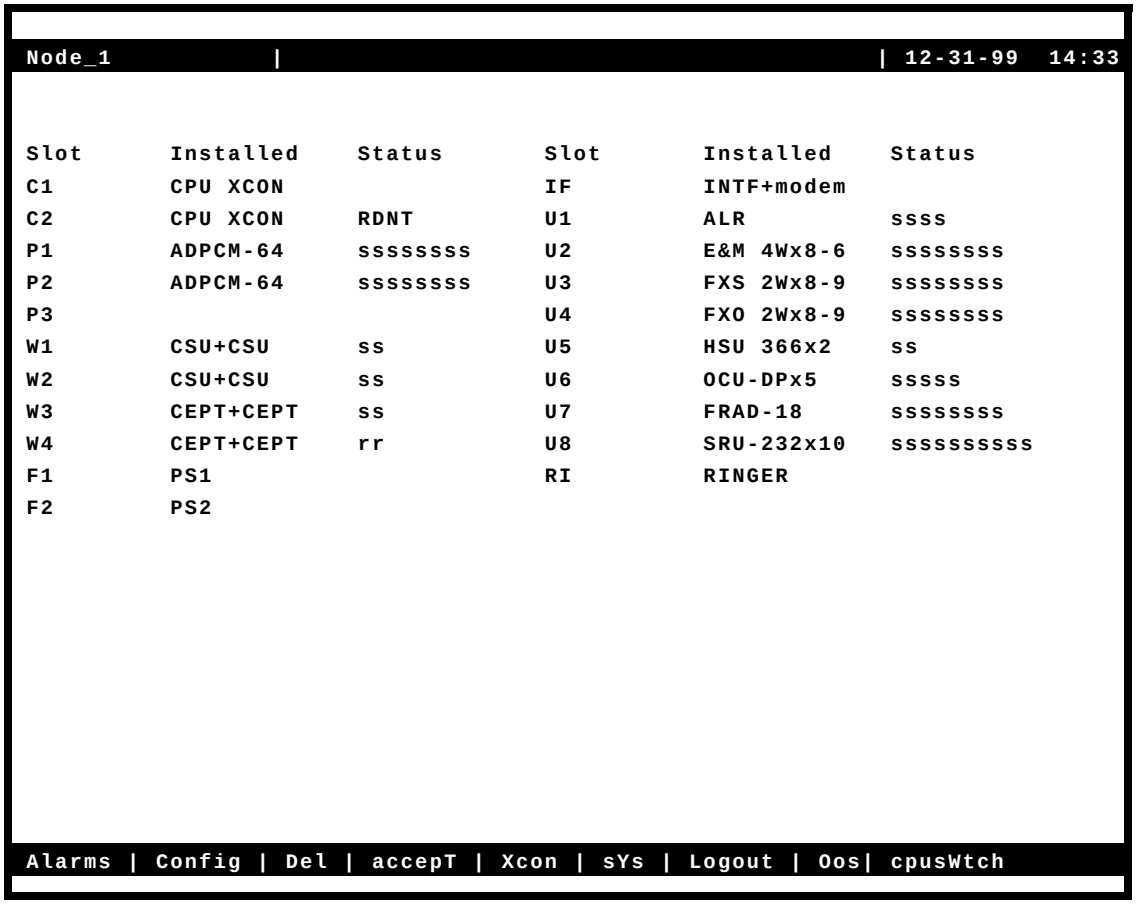


Figure 3-5. Typical Card Status Display

From the System Main Screen, you can also go to other screens, as shown in Figure Figure 3-5. These screens are described in the following paragraphs.

3.3.4 Server Card Status

Port status for the ADPCM Server card is determined in the same way as Voice and Data cards, with the possible status values of **s** (Standby), **a** (Active), and **r** (on a Redundant card).

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3.3.5 Card Main Screens

Each card in the system has a Card Main Screen associated with it. You can go from the System Main Screen to any Card Main Screen and configure that card. From a Card Main Screen, you can go to a Test Screen to perform tests on the card, a Status Screen to see its current operating status, or (in some cases) a Performance Monitor Screen to view transmission performance data.

Figure 3-6 shows a typical Card Main Screen. The highlighted line at the top of every screen is the header. It lists the node name of the system, the current card type and abbreviated description, the card design revision and serial number, and the current system date and time.

The card configuration parameters and current option settings appear in numerous rows and columns below the header. This region of each screen lists the parameters on the left and one or more associated columns of data fields from left to right. You can change the settings in those fields as required for each card.

The status and data entry change line appears just above the bottom line of the screen. When you choose a field to edit and press <Enter>, this line shows the currently available option settings for that field. You will make all configuration changes on this line.

The highlighted area in the upper right corner shows the current alarm status data. In Figure 3-6, an Out-Of-Service (OOS) alarm has occurred on the card in chassis slot U3.

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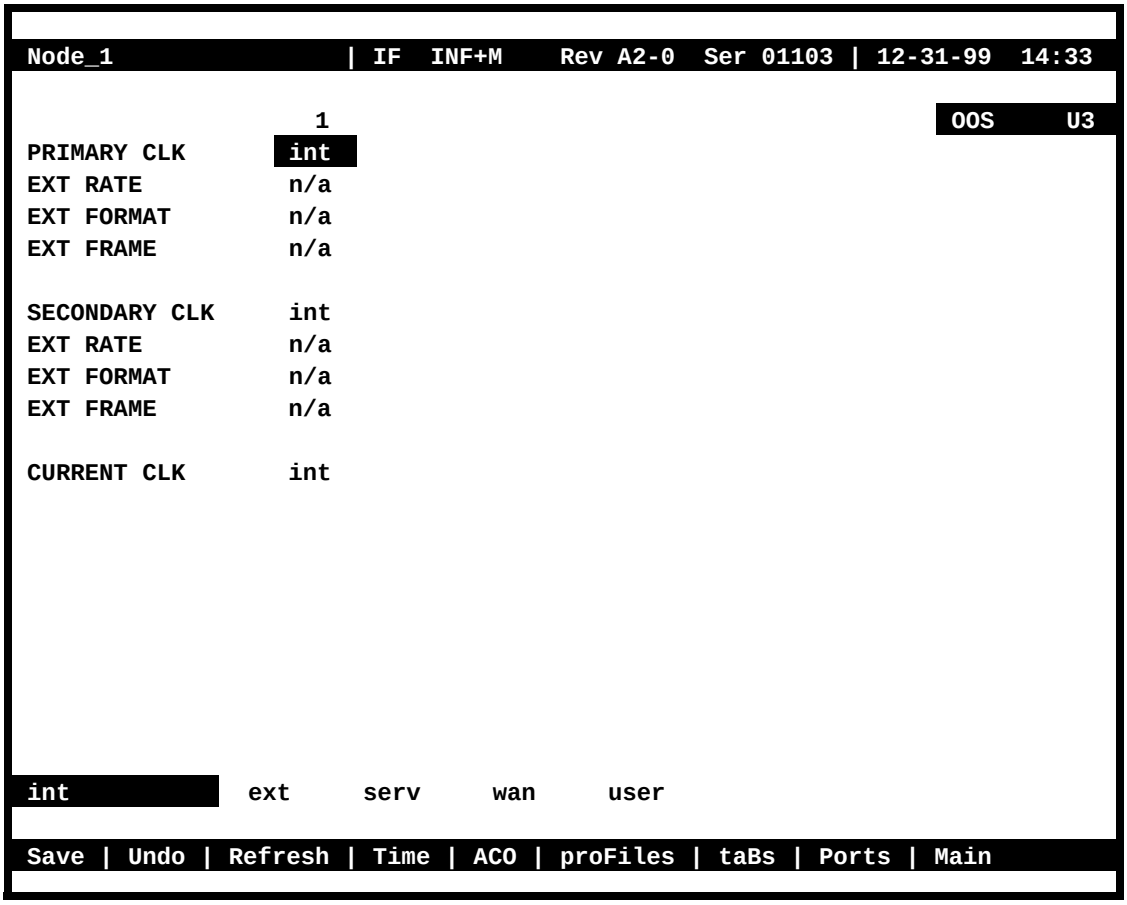


Figure 3-6. Typical Card Main Screen

The bottom line of each Card Main Screen lists other actions you can perform by simply pressing the letter key that corresponds to the capital letter of your desired action. In Figure 3-6, for example, if you press "**s"**, you will invoke the **Save** command, which saves the current option settings in the system's memory. The actions you can choose from this line depends on which card and screen you are currently accessing. Refer to the associated chapters in this guide for descriptions of those actions.

3.3.6 Alarm Screens

Refer to Figure 3-7. To view the current system alarms, you can go from the System Main Screen to an Alarm Screen. From the Alarm Screen, you can then go to an Alarm Filters Screen and set up the alarm reporting filters. Or, you can go to an Alarm History Screen (log) and view alarms that were previously logged by the system. These screens and operations are discussed in the "Alarms and Alarm Filters" section later in this chapter.

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3.3.7 Test and Debug Screen

You can also go from the System Main Screen to a Test and Debug Screen, which allows you to perform system-level maintenance operations. You can back up the system configuration onto an external computer after saving and subsequently editing it, and (if necessary) you can restore that configuration to the system. You also can erase the system configuration and restart the system with a single “zip” command. Or, you can re-register your system configuration if you change to a different chassis.

The system software also has a built-in debugging utility. However, this utility is only available to factory software engineers. The system maintenance functions are described in the “Testing and Debugging” section later in this chapter.

3.3.8 Time Slot Configuration and Cross-Connect Screens

From the System Main Screen, you also can go to a Configuration Screen that lets you automatically configure the system. This time-saving function assigns DS0 time slots of the system’s T1 and E1 WAN lines to certain user voice and data cards in your system. Or, you can go to a lower-level screen that lets you cross-connect DS0 time slots between two T1 or E1 lines connected to the system. These time slot configuration operations later in this manual.

3.4 Card Configuration

3.4.1 Selecting and Configuring Your Cards

The System Main Screen lists all installed cards next to their slot numbers. To access the Main Screen for a card, move the cursor in the Installed column with the arrow keys until the desired card is highlighted, then press <Enter>. The associated Card Main Screen now appears.

Use the arrow keys to move the cursor around in any card screen. When changing card parameters, some settings require you to enter your own values on the keyboard, while others allow you to select from a list of pre-programmed option settings.

To enter a user-defined value in a field, first highlight that field by moving the cursor to it. Then, type the desired value on your keyboard and press <Enter> to store it in that field.

To choose an option setting from a list of displayed options, press <Enter> with the associated parameter field highlighted. A series of available option settings now appears for that field. Use the right-arrow and left-arrow keys to move the cursor to the desired setting, and press <Enter> to store that setting in the highlighted field.

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Be sure to configure each card according to your networking requirements. From the System Main Screen, select each card in turn and change the options for that card from its Main Screen. Select the **Save** command by pressing "**s**" after making all the changes for a card, then press "**m**" to return to the System Main Screen and choose another card. Similarly configure each remaining card in your system.

Once configured, the card settings are permanently stored in NVRAM on the Interface card. This card is labeled INF on its faceplate ejector. You can then replace faulty cards in your system without having to reconfigure the new cards.

If you replace a card with an identical new card type, the system automatically copies the NVRAM data from its Interface card to the new card. However, if you replace a card with different type of card, you must first delete the existing card settings from the slot before the new card will be recognized by the system.

3.4.2 Replacing a User Card with a Server Card

The most common occurrence of this would be replacing a User card (voice or data) with a Server card. The procedure for this is as follows:

1. Physically remove the User card from one of the slots U1/P1 to U3/P3.

2. From the Main Screen, highlight the card slot and press "D" (**D**el). This will delete all settings from the removed card.

3. Place the new Server card in the slot and ensure that it is properly seated.

3.4.3 Recording Your Configuration Settings

You should always record the configuration option settings for each card after you set them. This information may be needed later by other system operators. To record the card configuration data, first photocopy the pages showing the Card Screens in the associated chapters of this guide. Then, mark the option settings you want to use on those pages, and store the pages in a safe place where they can be obtained by others.

You can also record screen settings by "capturing" each edited screen onto your computer terminal while you are logged into the system. To do this, your computer must have a software program capable of capturing the actual screens as text files. The communications software you use to access the system may have this ability. You can then copy the screens to a word processing program, print them out, and store them electronically.

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3.5 Alarms and Alarm Filters

Alarms warn you of problems by reporting possible system hardware or external facility failures. The Alarm sub-screens are accessed from the System Main Screen by pressing the "**A**" key to go to the Alarm Screen (see Figure 3-7 through Figure 3-9). The Alarm Screen displays the currently active alarms (if any) and provides access to the Alarm Filters and Alarm History screens. Figure 3-7 shows a typical Alarm Screen with an active alarm.

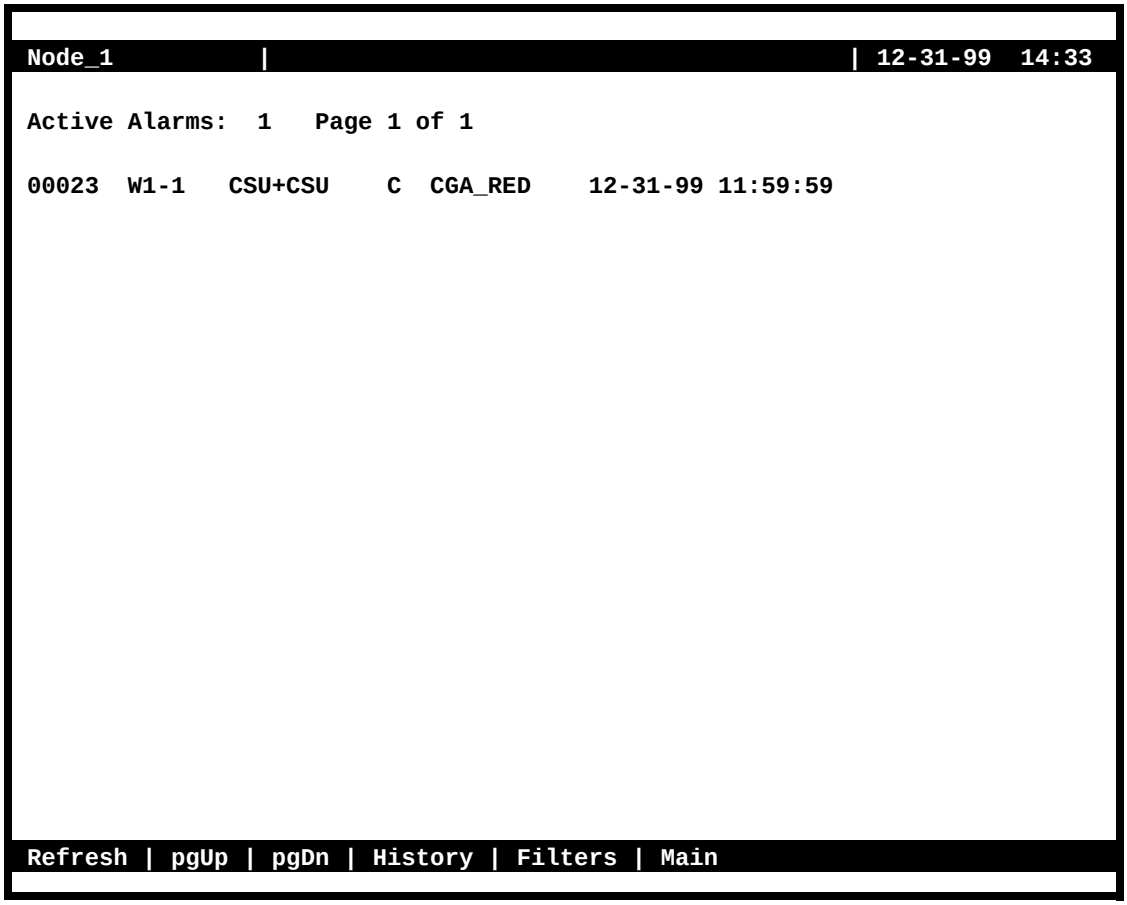


Figure 3-7. Typical Alarm Screen

The first entry (**00023** in the above display) shows the Alarm Sequence Number. This is a sequential number from **1** to **65,535**. It identifies the alarm for tracking and maintenance. In the above example, the Alarm Sequence Number is **23**.

The second entry (**w1-1**) shows the location of the problem by chassis slot number and port number. In this case, the WAN card in chassis slot W1 is affected, and port 1 of that card has reported the alarm.

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The third entry (**CSU + CSU**) shows the type of card affected (in this case, a WAN card with two T1 CSU modules).

The fourth entry shows the alarm modifier (in this case, **C** indicates a critical alarm). See the “Alarms and Alarm Filters” section later in this chapter for more information about alarm modifiers.

The fifth entry (**CGA_RED**) shows the type of alarm generated (in this case, a CGA-Red alarm on WAN port W1-1).

The last two entries show the date and time the alarm was logged (in this case, December 31, 1999, at 11:59:59 a.m.).

3.5.1 Alarm Filter Settings

You can set filters for each alarm so that the alarm reports occurrences in a number of different ways. Figure 3-9 shows the Alarm Filters screen, which is accessed by pressing "**f**" (**Filters** command) on the Alarm Screen.

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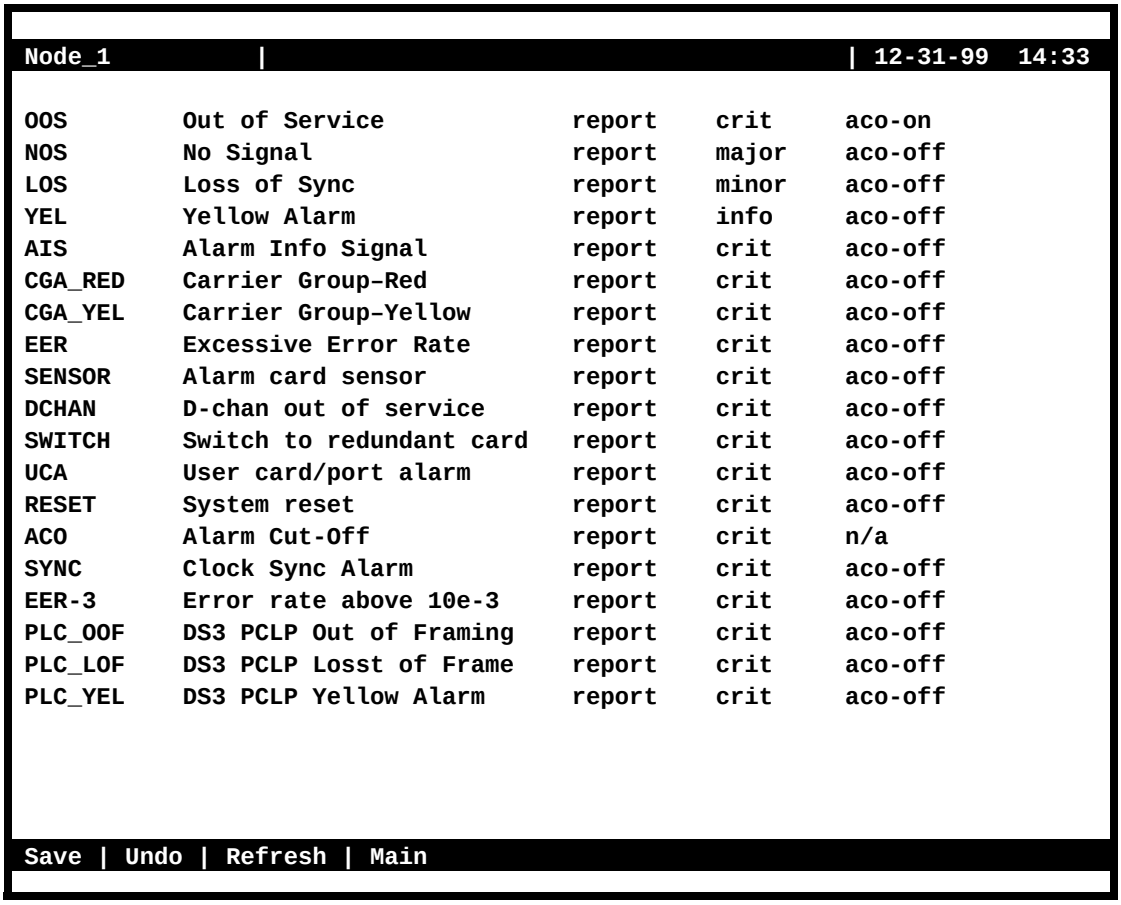


Figure 3-8. Alarm Filters Screen

The first column of the Alarm Filters Screen shows the alarm abbreviation that appears when an alarm is generated. The second column shows the associated full name of each alarm. Table 3-3 describes each alarm appearing in the Alarm Filters Screen.

The third column contains the filters **ignore**, **log**, and **report**. Set the filter to **ignore** if you want the system to ignore the alarm. Or, set it to **log** if you want the system to show the alarm report on the screen and also log it into the Alarm History, as described later in this chapter.

Set the filter to **report** if you want the system to send (report) the alarm indication to a remote device. With this setting, the system will also display the alarm report on the screen and log it into the Alarm History.

The fourth column of the Alarm Filters Screen contains the filter modifiers **info**, **minor**, **major**, and **crit**. This column specifies a level of importance (information only, minor alarm, major alarm, or critical alarm) for each alarm. These settings are described later in this chapter.

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The last column sets the alarm cutoff (ACO) to **aco-off** or **aco-on**. These settings are explained later in this chapter.

The filter in the third column takes precedence over its modifier. If, for instance, you have an alarm filter set to **ignore**, the setting of the modifier as **info**, **minor**, **major,** or **crit** will be ignored. Refer to system specifications section in this manual for alarms and their meanings.

Always set the alarm filters before activating any card ports!

Table 3-3. Alarm Filters

Filter	Alarm	Meaning
OOS	Out of Service	The card, power supply or ringing generator is faulty or has been removed from the unit.
NOS	No Signal	Incoming WAN signal is lost.
LOS	Loss of Synchronization	Frame Alignment is lost.
YEL	Yellow Alarm	The system has received a Yellow Alarm signal from a remote device. Usually received when the device loses WAN signal or synchronization.
AIS	Alarm Information Signal	The system has received a Blue Alarm signal from a remote device. Usually received when the remote or intermediate device has a major failure.
CGA_RED	Carrier Group Alarm - Red	The local incoming WAN signal has a serious problem and trunk conditioning is started. After receiving a RED alarm (NOS or LOS) for 2-3 seconds, the system initiates the appropriate trunk conditioning sequence (see voice cards for information about the TC_CGA setting) and sends a Yellow Alarm to the remote device. If the system is in drop/insert mode, it also sends an AIS signal to the downstream equipment.
CGA_YEL	Carrier Group Alarm - Yellow	The system has initiated trunk conditioning in response to a Yellow Alarm from a remote device. After 2-3 seconds, the system initiates the appropriate trunk conditioning sequence (see voice cards for information about the TC_CGA setting).
ERR	Excessive Error Rate	The error rate measured by the system has exceeded the threshold set on the WAN card.
SENSOR	Alarm Card Sensor	The Alarm Card sensor has received an alarm indication from an attached device.
DCHAN	D-chan out of service	If the network side D channel looses contact with the user side, an alarm message will be generated. The alarm message will show the slot # and D channel # where the problem exists.
SWITCH	Switch to redundant card	The primary card has failed and the system has switched to the redundant card.
UCA	User card/port alarm	One or more active ports on a user card are not working properly. Voice ports will show an alarm for excessive signaling transitions and data ports will show an alarm for exceeding the data error threshold.
RESET	System reset	The system has been reset by either loss of power or by system software upgrade.
ACO	Alarm Cut-Off	The ACO option forces you to manually clear certain alarms. Without this option, self-correcting alarms might not be noticed. When the ACO option is set to either Report or Log and the modifier is set to Major, alarms will report normally but will also generate an ACO alarm. If the modifier is set to Minor, it will not generate the ACO alarm. If the filter is set to **I**gnore, no alarms will be generated.
SYNC	Clock Sync Alarm	The SYNC alarm is generated when either the primary or secondary external clock source is lost. This alarm is in addition to the condition that lost the clock source (CGA-RED or OOS).
ERR-3	Excessive Error Rate (10e-3)	While using transcoder operations for E1 that involve downstream tributaries, wetting EER-3 to “report” will cause an alarm to appear on the local system when E1 transmission errors exceed 10e-3 (1 in 1000). The local EER-3 alarm will identify the effected WAN link (i.e., W1-1) and take it out of service. Simultaneously, the downstream tributary will receive an AIS alarm to warn them of the condition.
PLC_OOF	DS3 PLCP Out of Framing	Physical Layer Convergence Protocol is Out of Framing.
PLC_LOF	DS3 PLCP Loss of Frame	Physical Layer Convergence Protocol has Lost Framing.
PLC_YEL	DS3 PLCL Yellow Alarm	Physical Layer Convergence Protocol is report a Yellow Alarm.

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3.5.2 Alarm Modifiers

Each alarm may also be designated as **info**, **minor**, **major** or **crit**. The filter modifier shows on both the active alarm and alarm history screens.

If the system has an External Alarm card (optional), the occurrence of any alarm designated as **crit** will trigger a form-C relay contact on the External Alarm card. The relay contact action sets off an annunciator or lamp at the equipment site. Similarly, the occurrence of any alarm designated as **major** triggers a different contact and activates another external indicator. Refer to the Alarm Card Reference Guide for more information on the External Alarm cards.

3.5.3 Alarm Cutoff (ACO)

The ACO (Alarm Cutoff) security feature is used by the system to alert an operator to alarms that clear themselves while the system is unattended. The ACO option settings are **aco-on** and **aco-off**. If ACO is set to report or log alarms, any alarm set to report or log with a major modifier brings up an additional alarm message on the screen. You must manually clear this message, which is the ACO alarm message. The ACO is used with the node port of the Interface card. It can also trigger an external alarm device, such as a bell or lamp, that must also be manually cleared.

All ACO alarms must be cleared from the Interface card screen. ACO alarms can be cleared automatically or manually.

3.5.4 Alarm Handling

The **report** alarm function attempts to send alarm information to a remote printer, network management system (NMS), or other device, in addition to recording the alarm in the Alarm History log. These features use the built-in serial port and modem on the Interface card. You also need to change the settings in the Printout Alarms Screen or TCP/IP Screen of the Interface card to activate the alarm reporting functions.

Alarms set to either **log** or **report** record occurrences automatically to the Alarm History Screen. To view that screen, press **“h”** (**History** command) in the Alarm Screen. Figure 3-9 shows a typical Alarm History Screen, in which you can update the log with any new alarms that occur. To do this, press “**r**” to select **Refresh** in the Alarm History Screen. Or, to delete all entries in the log, press “**c**” to select **Clear** in the Alarm History Screen.

The alarm log may contain more than one screen (page) of data. To scroll through the log, press “**u**” or “**d**” (**pgUp** or **pgDn**) to move up one page or down one page at a time. The latest alarms appear at the beginning of the log, which is on Page 1.

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All alarms (except those set to **ignore**) appear in the Alarms field in the upper right corner of the screen, regardless of their setting in the Alarm Filters screen. The display in the Alarms field is an abbreviated version of the alarm name and slot number. For example, OOS U3 indicates that the card in user slot U3 is out of service.

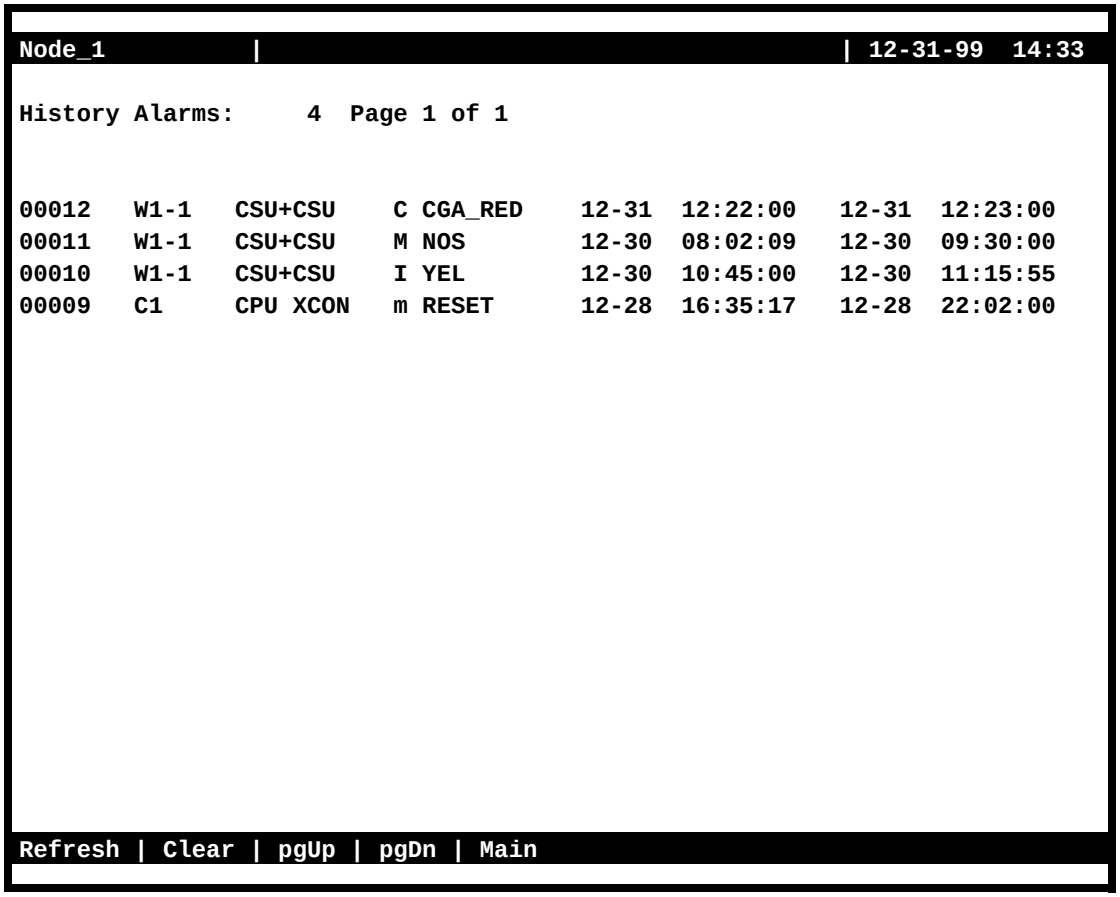


Figure 3-9. Typical Alarm History Screen

3.6 Reinitializing the System

The system stores information about its currently installed cards, the card configuration option settings, WAN connections, passwords, and other data in nonvolatile memory (NVRAM) on the Interface card. This card is labeled INF-E, INF+M, or INF on its faceplate ejector. Your connection to the system is through the Interface card.

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When you remove and replace most card types, the NVRAM remembers the old card's settings. If the same kind of new card is inserted in the slot, you do not need to reprogram the settings. However, if you replace a card with a different type of card, the system lets you delete the old card, so that you can program new parameter settings for the new card (see the **Accept** function described earlier in this chapter).

When you remove and replace an Interface card, the system automatically resets itself. If the new Interface card was not previously used, you must re-register the system. If the new Interface card was previously used, either it will use its internal settings, or the system will request that you "zip" it, causing it to be reprogrammed.

When you remove and replace a CPU card with an **identical** CPU card, the system re-evaluates the Interface card's NVRAM and writes the old parameters (including your current passwords) to the new CPU card. Your CPU card is labeled CPU-3 on its faceplate ejector.

If the CPU card is replaced with an identical CPU card but the new card has a different firmware version, a "zip" must be performed.

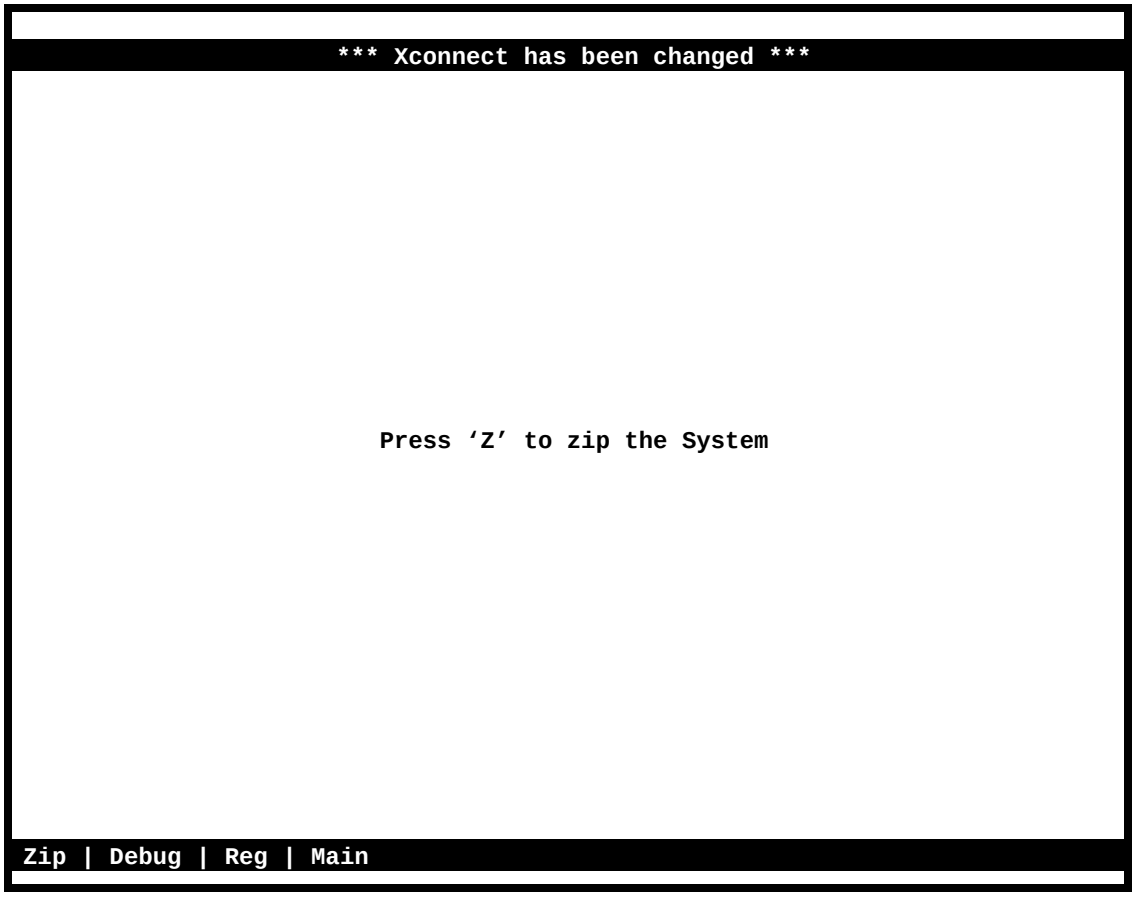


Figure 3-10. Cold-Start NVRAM Test Screen.

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If the new CPU card was inserted accidentally, the cold-start can be stopped by removing the wrong CPU card and replacing it with the correct type of card.



WARNING!

The "Z" command will start the ZIP process. "Zipping" the system deletes all of the information stored on NV-RAM and resets it. All cards must then be completely reconfigured.

When you press "**z**", the system will display the main log-in screen and ask for password authorization from either the Manager or Operator access level. After you enter the correct password, the system asks, "OK to Zip the system (y/n)"? Press "**y"** to have the system test and reinitialize itself. All NVRAM information will be erased from the Interface card, and a new log-in screen will appear.

3.7 Zipping the System

Figure 3-11 shows a typical Zip Screen, which appears when you press "**z**" in the Test and Debug Screen.



CAUTION!

The "Z" (Zip) command allows a user logged in under the Operator or higher password level to reprogram the entire system. Because the options for all cards in the system will be changed back to their original factory settings, be sure to thoroughly consider the consequences of "zipping" your system before doing so.

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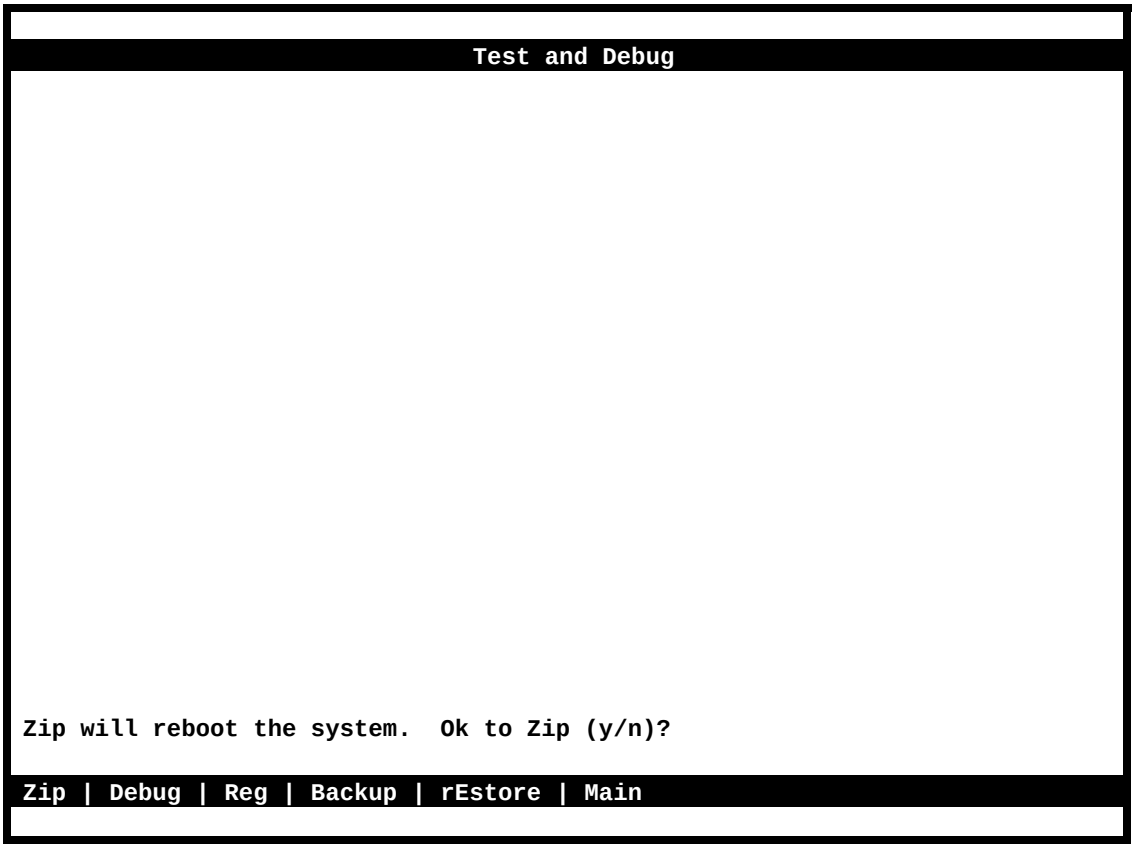


Figure 3-11. Zip Screen

3.7.1 Debugging the System

The **D** (Debug) command is only available to factory software engineers with a password authorization higher than "Superuser." It gives access to the system software coding.

3.7.2 Registering the System

The **R** (Registration) command allows a user with Operator or higher password authority to change the registration of the system. The original registration is explained earlier in this chapter. You must have this information to properly re-register the system. **Do not use this command during normal system operation.**

The registration procedure consists of three steps. First, you must enter the vendor code. Then, you must select the type of chassis used. Finally, confirmation of the proposed changes is required (**Y** = yes, **N** = no).

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3.8 Test, Debug, Backup, & Restore

Advanced configuration and diagnostics are available through the use of the **sYs** (**sYstem**) command from the System Main Screen. Pressing "**y"** brings up the Test and Debug screen shown in Figure 3-12.

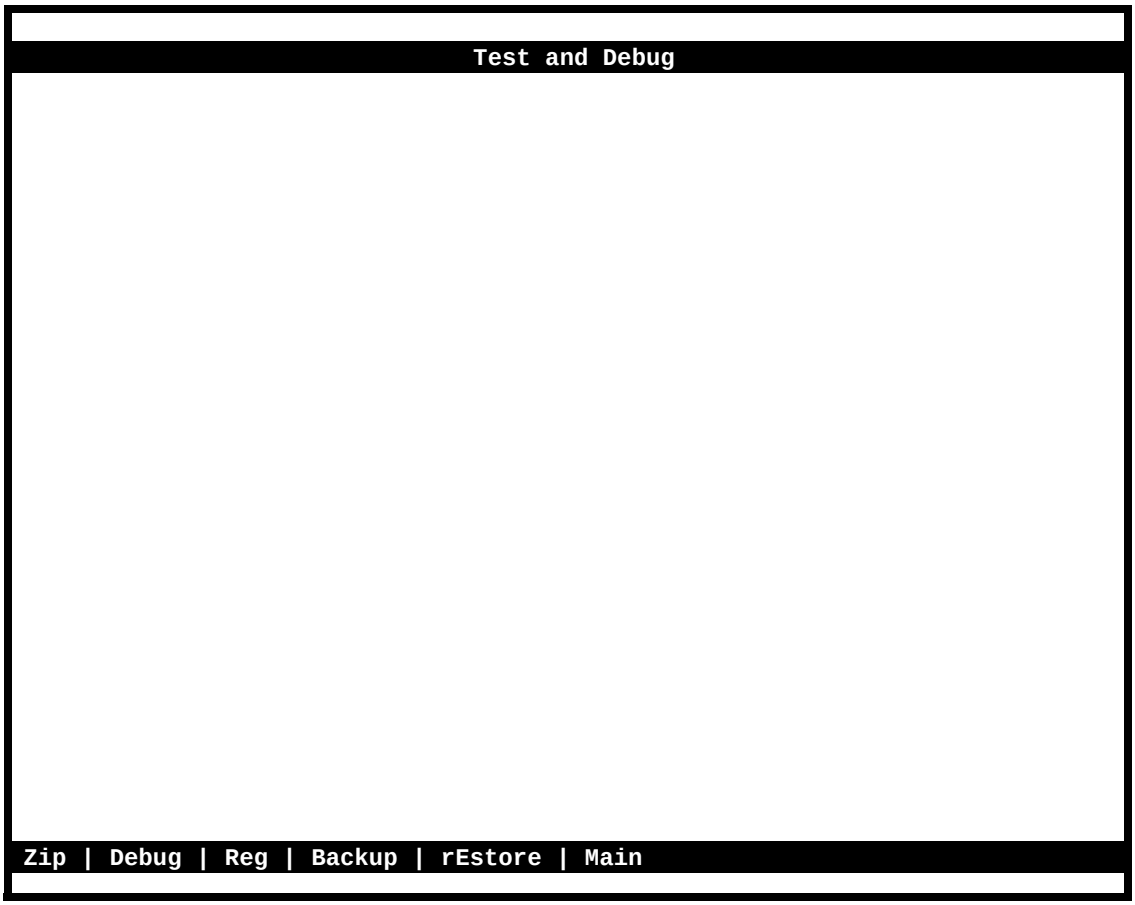


Figure 3-12. System Test and Debug Screen

3.8.1 Backing Up the System to a File

The Backup procedure allows users to save the configuration parameters for all or some cards, as well as the installation table, cross-connects, alarm filters, and alarm history. This information can then be used with the **Restore** command (see below) to restore the parameter data to certain cards or to the whole system. Figure 3-13 shows a sample of the Backup screen. (The Restore screen is nearly identical to this.)

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Because the Backup command creates a simple text file, the actual commands for the Backup procedure will vary depending on the computer system and terminal software you are using to interface with the system. The backup procedure below is specific to Windows 95 using Microsoft Hyper 4 Terminal software, but it can easily be modified to adapt to other systems and software.

You should back up your system after initially configuring it, and each time you subsequently change its configuration. Proceed as follows:

1. From the System Main Screen, press "**y**" to invoke the **sYs** command.

2. Press "**b**" (for **Backup**). This brings up the screen shown in Figure 3-13. The default for all slots and categories is **backup**. To do a full backup, go to Step 3.

If you only want to backup certain cards, use the arrow keys to highlight the slots you do NOT want to backup, and press Enter. Use the left arrow key to highlight **no**, and press <Enter>. The slot or category will not be backed up. If you want to change numerous entries, press "**C**" (for **C**opy) to change the next slot or category to match the current slot or category.

3. In the Microsoft Terminal menu bar, select the "Transfers" pull-down menu.

4. From the "Transfers" pull-down menu, select "Receive Text File."

5. In the "Receive Text File" field, select the name of the file and its directory location. When you select "OK," a bar will appear at the bottom of the screen, with two buttons, **Stop** and **Pause**, as well as the number of bytes and the name of the file being received.

6. Type "**G**" (for **G**o). The screen fills up with scrolling text. When the text stops scrolling, you will see the message "BACKUP COMPLETE, hit 'm' to go back to menu."

7. Turn the Text Capture function off (in this case, by selecting the **Stop** button at the bottom of the screen). The text file containing all the parameters for the selected cards and categories is now saved.

8. Type "**m**" to return to the System Backup screen. This allows you to re-verify that your backup selections were correct.

9. Type "**m**" again to return to the Test and Debug screen.

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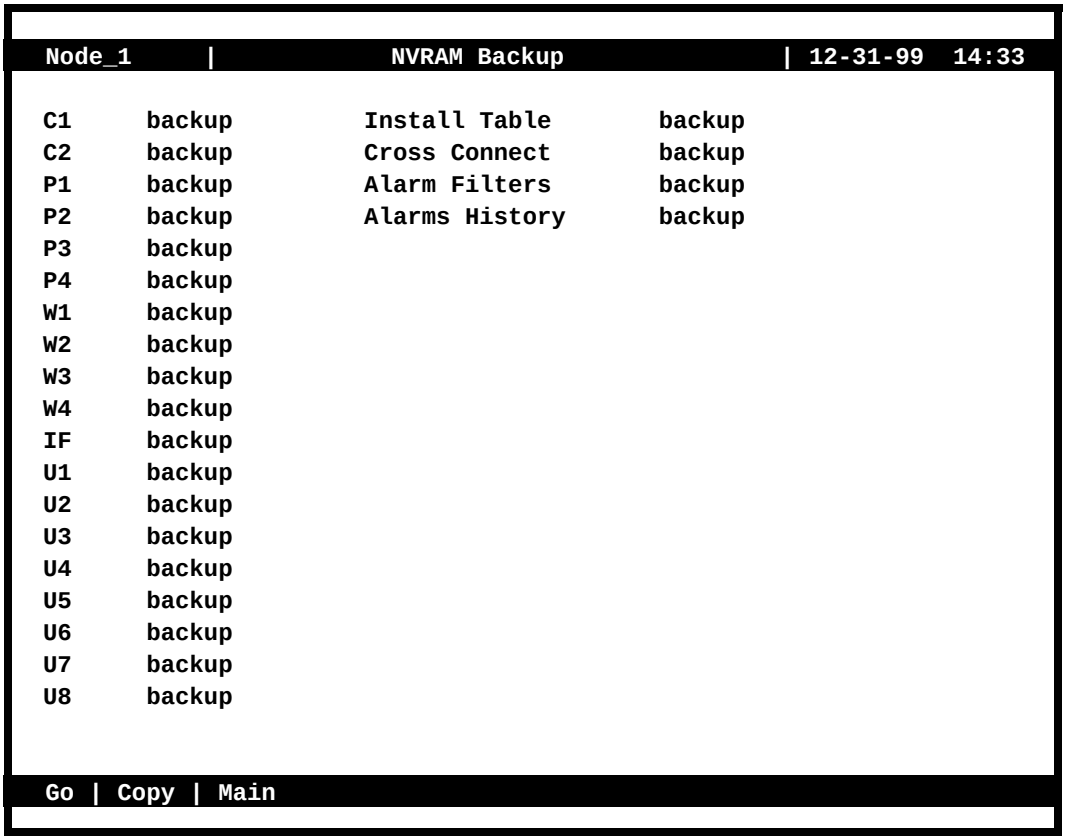


Figure 3-13. Typical System Backup Screen

The information field for each slot defaults to **backup**, meaning that the configuration for that slot will be saved when the backup procedure is run. You can change any slot to **no** (meaning that no information from that slot will be saved) by highlighting the slot and pressing the Enter key. This will allow you to select between **backup** or **no**.

To change a group of consecutive slots to **backup** or **no**, highlight the slot that you want to copy and press **C** (for **Copy**). You can repeat this process to change as many slots as needed.

You should back up your system after initially configuring it, and each time you subsequently change its configuration.

3.8.2 Restoring the System from a File

The **Restore** procedure allows users to restore configuration parameters for all or some cards, as well as the installation table, cross-connects, and alarm filters.

The Restore procedure is detailed below. This procedure is specific to the use of Microsoft Terminal in Windows 95, but can easily be modified for other systems and software.

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1. From the Main Screen, type **Y** (for s**Y**s).

2. Type **E** (for r**E**store). In the screen shown in Figure 3-14, the default for all slots and categories is **restore**. To do a full restore, proceed to Step 3.

If you do **not** want to restore a certain slot, use the arrow keys to highlight it, and press <Enter>. The choices **no** and **backup** appear at the bottom of the screen. Use the left arrow key to highlight no, and press <Enter>. The slots or categories deselected will show **no** after the slot or category and will not be restored. To deselect a number of entries in sequence, press **C** (for Copy) to change the next slot or category to match the entry you have just deselected.

3. Type **G** (for **G**o). You will see the message - "Restore is active. Press <ESC> twice to end".

4. In the Microsoft Terminal menu bar, select the **Transfers** pull-down menu.

5. From the **Transfers** pull-down menu, select Send Text File.

6. At the bottom of the screen, you will see the progress of the file as it is received by the unit. (On some systems, you will not see any progress indicator.) When the restoration is complete, you will see the message "Restore COMPLETED, press <ESC> twice to end." At this point, all parameters for the selected cards and categories have been restored.

7. Pressing **<ESC>** twice will bring up the message "Resetting..." and then show the following prompt: "Restore is done, do you wish to restart now (y/n)?" Selecting **Y** will cause the unit to reinitialize itself using the restored parameters. You will be required to log in again.

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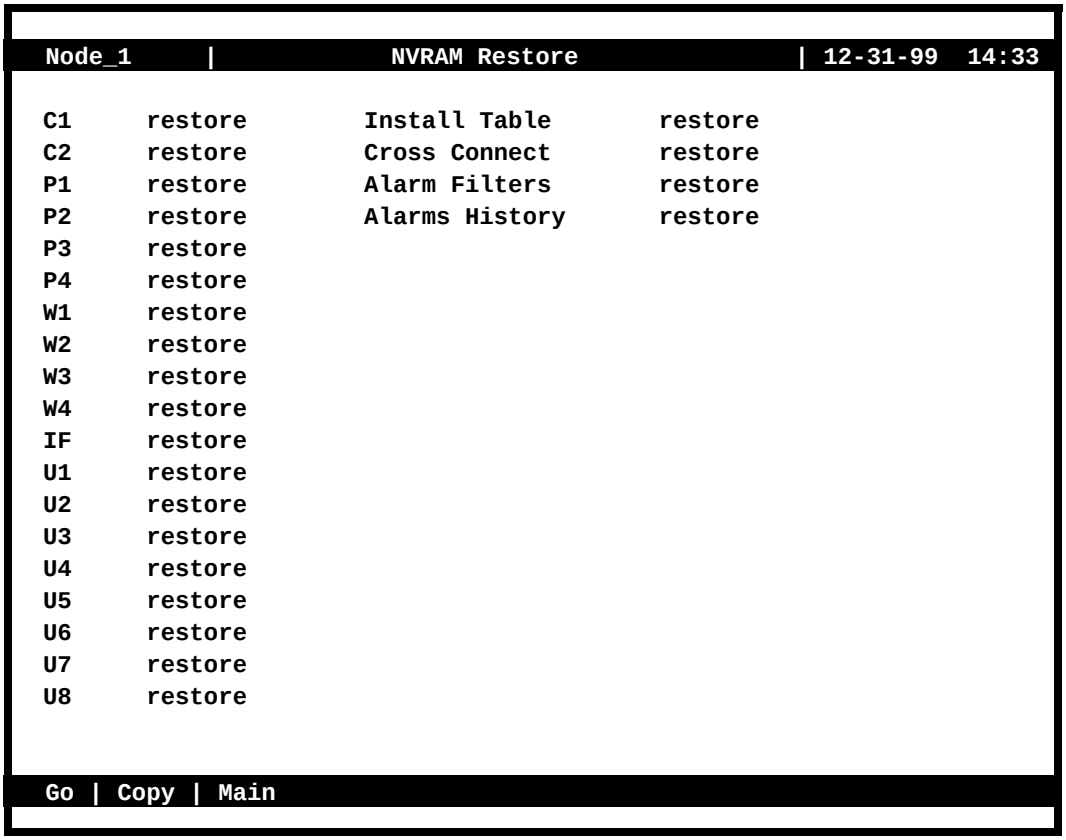


Figure 3-14. Restore Screen

3.9 Time Slot Assignment

This chapter provides instructions for assigning DS0 time slots to the voice and data cards of the integrated access system. It also provides time slot cross-connection and broadcast setup instructions.

The integrated access system maximizes the use of incoming and outgoing T1 and/or E1 lines. You can do this by assigning specific channels, or *DS0 time slots*, to voice and data cards in the system. You also can cross-connect time slots between T1 and/or E1 WAN ports of the system.

The CPU Card allows you to connect one DS0 time slot to another. Throughout this chapter, these connections are called "pass-through" circuits because they link a time slot from one T1 or E1 line to another through the system. You can therefore have up to eight separate T1 or E1 links on four WAN cards, in any cross-connect combination.

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The following sections of this chapter describe several ways for you to administer your networks and correctly allocate transmission bandwidth to meet your needs. The next section deals with assigning time slots to the user voice and data card. The second section describes a time-saving tool known as the *Configuration* option, which automatically assigns sequential WAN time slots to the ports of user voice cards.

The third section deals with cross-connecting WAN time slots to other WAN time slots. The fourth section addresses a special application that supports the ability to broadcast a data signal over multiple WAN aggregates.

The fifth section describes signaling status, signaling, and companding conversion. The last section shows you how to view the time slot map after making your assignments and cross-connections.

This chapter defines "assigning time slots" as the process of connecting user card ports to WAN ports and time slots, and it defines "cross-connecting time slots" as the process of connecting WAN time slots to other WAN time slots in the system.

3.10 Assigning Time Slots to a User Card

You must use a *time slot map* to specify the connections between all incoming and outgoing lines connected to the system. The time slot map lets you split up your T1 and E1 bandwidths into portions required for normal voice and data communications. It contains the connections for all cards in your system.

The integrated access system can work in two different modes. The *drop-and-insert* mode lets you route part of the bandwidth of one T1/E1 link to the user voice and data cards. The system also automatically routes the remaining bandwidth of the originating link to another WAN link.

The *terminal* mode lets you route the bandwidths of both T1/E1 links to user voice and data cards, but you cannot route any parts of one link's bandwidth to another link in the terminal mode. This mode terminates the individual time slots of all system WAN ports at the voice and data cards.

The time slot assignments depend on your networking needs. Figure 3-15 shows typical time slot assignments for a drop-and-insert system with an E&M voice card and an HSU data card on a T1 link. In this example, WAN port 1-1 time slots (TS) 1 through 8 are assigned to ports 1 through 8, respectively, of the E&M card. Time Slots 9 to 16 of the same WAN port are assigned to port 1 of an HSU data card. This port is a high-rate data port that requires eight time slots.

The remaining time slots of WAN port 1-1 are automatically cross-connected to the same time slots of WAN port 1-2. These cross-connections pass data through the system from WAN port 1-1 to WAN port 1-2.

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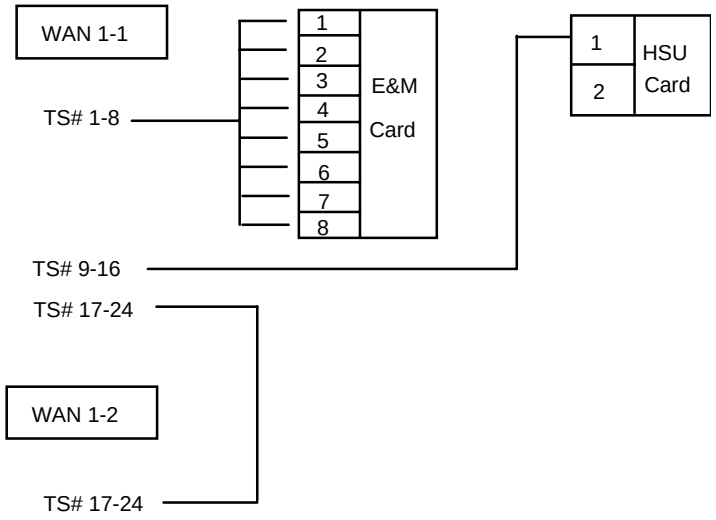


Figure 3-15. Time Slot Assignment Example

Each port of the E&M card can only be assigned a single WAN time slot, or 64 kbps of bandwidth on a T1 or E1 link. The same is true for the ports on all other types of voice cards. However, each port of an HSU data card may need multiple WAN time slots, depending on the data transmission rate of the associated CPE. In Figure 3-15, eight time slots are assigned to port 1 of the HSU card, so its aggregate rate is either 448 kbps (at 56 kb per channel) or 512 kbps (at 64 kb per channel).

All other user cards are assigned WAN time slots in a similar manner. Refer to the individual card chapters for specific instructions.

3.10.1 Assigning a Time Slot to a User Card Port

You can define a time slot map from any user card (data or voice) for connections involving that card, or from a WAN card for cross-connections involving only WAN cards. For example, Figure 3-16 shows the E&M Card Main Screen for the time slot assignments. Assign time slots to a voice card as follows:

1. From the System Main Screen, select the desired voice card and press <Enter>. That card's Main Screen appears.

2. Select the WAN port from which you want to assign time slots to the E&M card. In Figure 3-16, this is **W1-1** (for WAN 1, port 1).

3. Select a time slot (TS) for the first card port. A number appears at the bottom of the screen for the corresponding time slot on the WAN port.

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4. Set the time slot number by using the up and down arrow keys to highlight it, then press the <Enter> key.

5. Change the STATE of the port from **stdby** to **actv**.

6. Repeat steps 2 through 5 for the remaining card ports, to assign time slots to them.

7. Press "**s**" to save your settings, using the **Save** command in the Card Main Screen.

```
Node_1        | U1 E&M 4Wx8ER    Rev A2-0  Ser 01103   | 12-31-99  14:33

          1       2       3       4       5       6       7       8
STATE     actv    actv    actv    actv    actv    actv    actv    actv
WAN/SRV   w1-1    w1-1    w1-1    w1-1    w1-1    w1-1    w1-1    w1-1
TS        01      02      03      04      05      06      07      08
MODE      e&m     e&m     e&m     e&m     e&m     e&m     e&m     e&m
R2 TYPE   n/a     n/a     n/a     n/a     n/a     n/a     n/a     n/a
RX TLP    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
TX TLP    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
CODING    u-law   u-law   u-law   u-law   u-law   u-law   u-law   u-law
TC CGA    idle    idle    idle    idle    idle    idle    idle    idle
LB        off     off     off     off     off     off     off     off
PATTRN    none    none    none    none    none    none    none    none
HYBRID    n/a     n/a     n/a     n/a     n/a     n/a     n/a     n/a
SIG CONV  off     off     off     off     off     off     off     off
RATE      64k     64k     64k     64k     64k     64k     64k     64k
ADPCM     n/a     n/a     n/a     n/a     n/a     n/a     n/a     n/a

Save | Undo | Refresh | Copy | Test | Main
```

Figure 3-16. Typical E&M Card Time Slot Assignments

3.10.2 Assigning Multiple Time Slots to a Port

Figure 3-17 shows the HSU Card Main Screen for the example of Figure 3-15. Assign time slots to this card as follows:

1. From the Main Screen, select the desired HSU card and press <Enter>.

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2. Select the WAN port to which you want to assign the HSU port. In Figure 3-17, this port is **W1-1** (for WAN 1, port 1).

Select the TS table. All time slots of the selected WAN port appear at the bottom of the screen. These are 1 to 24 for a T1 port, or 1 to 31 for an E1 port

Place an "**X**" under each desired time slot, using the space bar to either select or de-select a time slot. Use the right arrow key to move to the next time slot (TS) for selection. Then, press <Enter>. In Figure 3-17, the HSU port is assigned eight time slots (9 to 16).

4. Change the STATE of the port from **stdby** to **actv**.

5. Press "**s**" to save your settings.

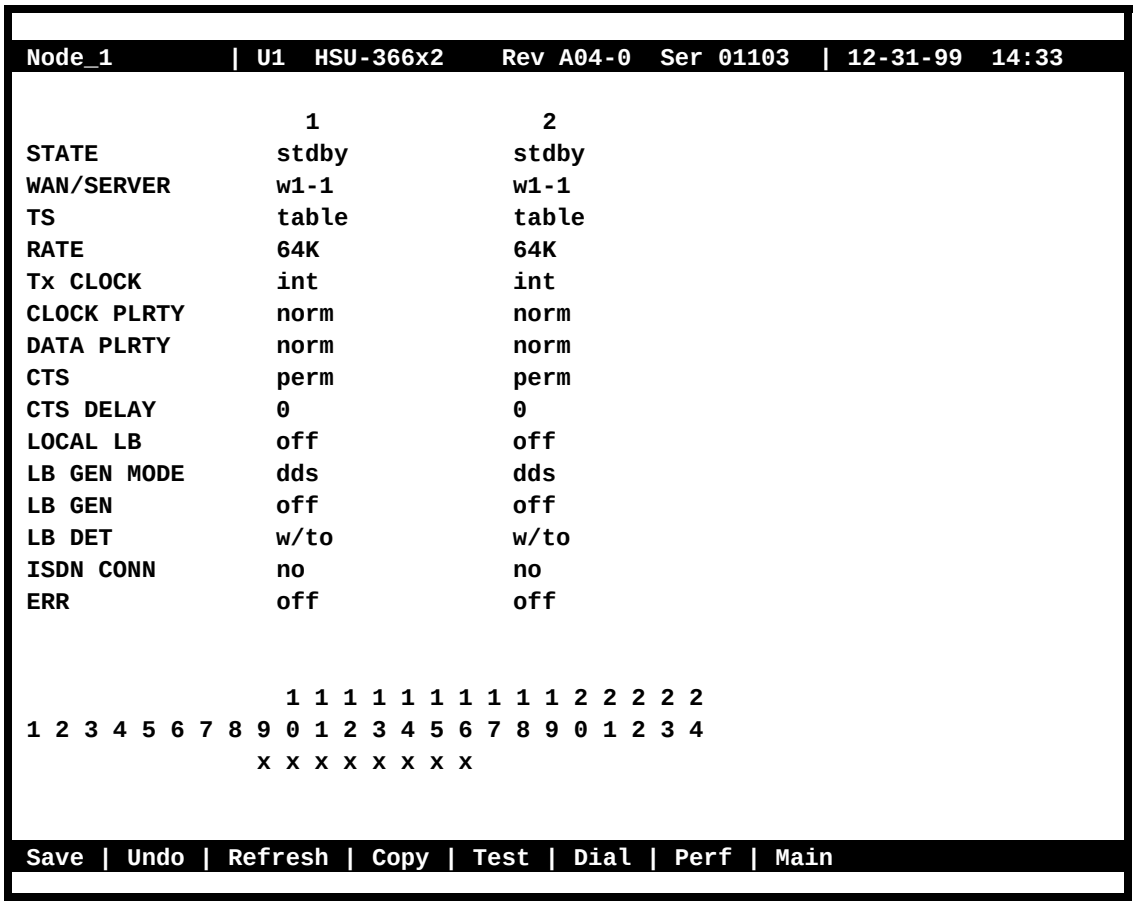


Figure 3-17. Typical HSU Card Time Slot Assignments

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3.10.3 Cross-Connect Model

The Cross-connect model allows you to access two T1/E1 links for each of four WAN cards, for a total of eight T1/E1 links. All WAN card connections to other WAN cards are accomplished through the cross-connect option on the System Main Screen, and must be individually specified. User cards on systems equipped with a CPU XCON card are assigned to WAN time slots.

3.11 Automatic Time Slot Assignment

You can automatically assign time slots to voice (E&M, FXS, etc.) cards. by using the Configuration command in the System Main Screen. Figure 3-18 shows typical time slot assignments from four E&M cards to an E1 WAN port. The Configuration option automatically assigns the eight ports of E&M card 1 to time slots 1 through 8, seven ports of E&M card 2 to time slots 9 through 15, and all eight ports of E&M card 3 to time slots 17 through 24. Time Slots 25 through 31 are similarly assigned to E&M card 4, ports 1 through 7. Time Slot 16 is not assigned to any E&M card ports because it is reserved for channel-associated signaling (CAS) or common channel signaling (CCS) transmission on an E1 line.

For a T1 WAN port, the configuration command would assign time slots 1 through 8 to the eight ports of the first E&M card. Time Slots 9 through 16 would similarly go to the eight ports of a second E&M card, and time slots 17 through 24 would go to a third E&M card.

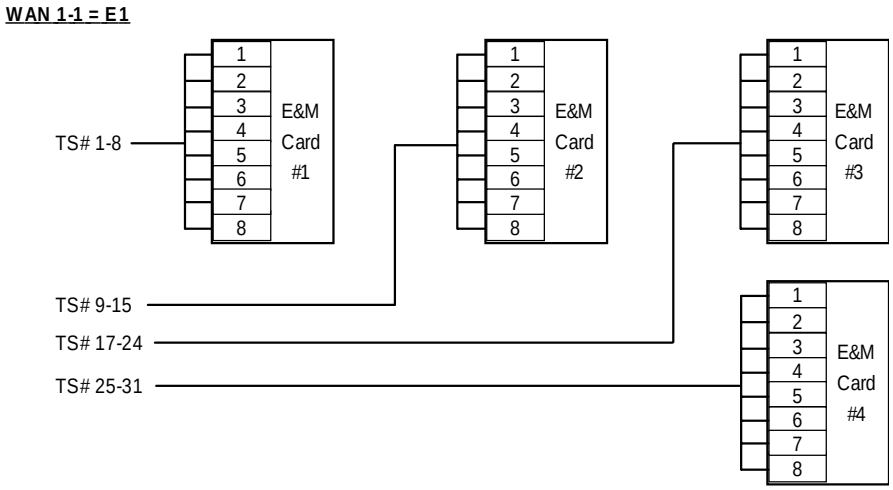


Figure 3-18. Automatic Time Slot Assignment Example

To use the Configuration command, first proceed as follows:

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1. Reserve three vacant adjacent user card slots in the system chassis for T1 operation, or four vacant adjacent user card slots for E1 operation. These slots must have voice cards.

2. Set the MODE of the desired WAN port to **term**.

3. Make sure all voice cards you intend to configure are of the same type.

4. Place the cursor on the first user card slot that will have a card. In Figure 3-19, slots U5 through U8 will be assigned to 30 time slots on the E1 WAN port.

5. Press "**c"** to begin the configuration process.

6. Select the type of voice card from the types listed above the bottom line of the screen, as shown in Figure 3-19. In that screen, **e&m-6** is chosen as the card type (E&M, 600 ohms).

7. Select the WAN port to which you want to assign the voice cards (W1-1 or W1-2), as shown in Figure 3-20.

8. The system automatically builds the necessary time slot structure. Since the user slots are vacant, the system will register Out Of Service (OOS) alarms for each of the four cards, as shown in Figure 3-21.

9. Insert the four voice cards into the chassis, to clear the OOS alarms.

Figure 3-19 shows the WAN Cross-Connect Screen with the correctly assigned time slots.

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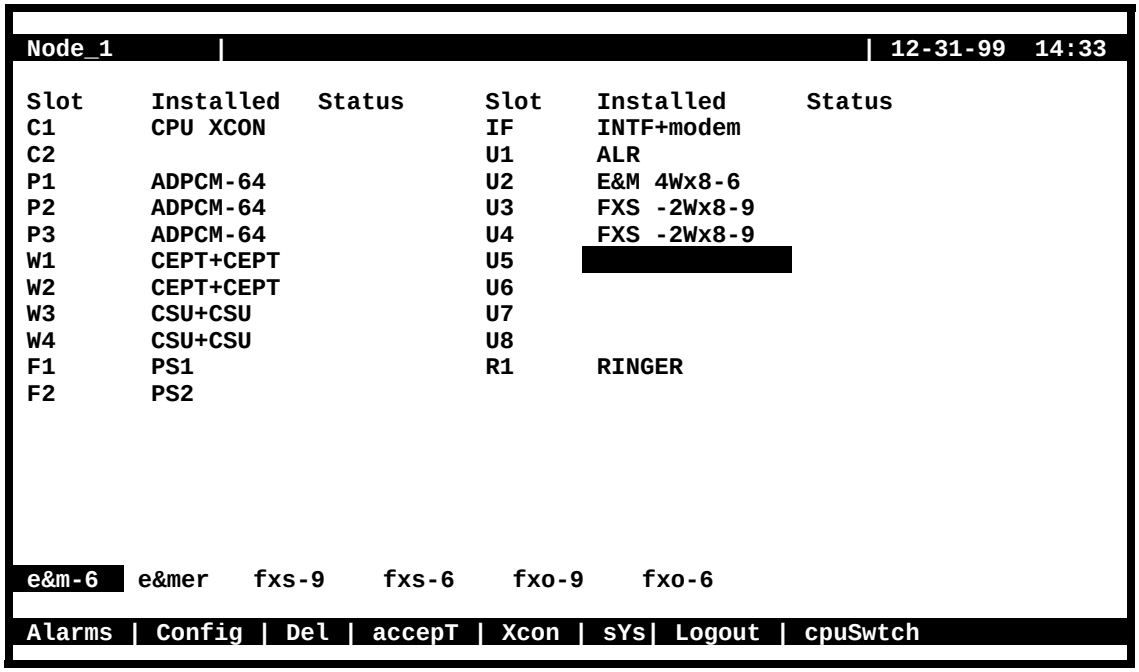


Figure 3-19. Typical Card Slot and Type Selection

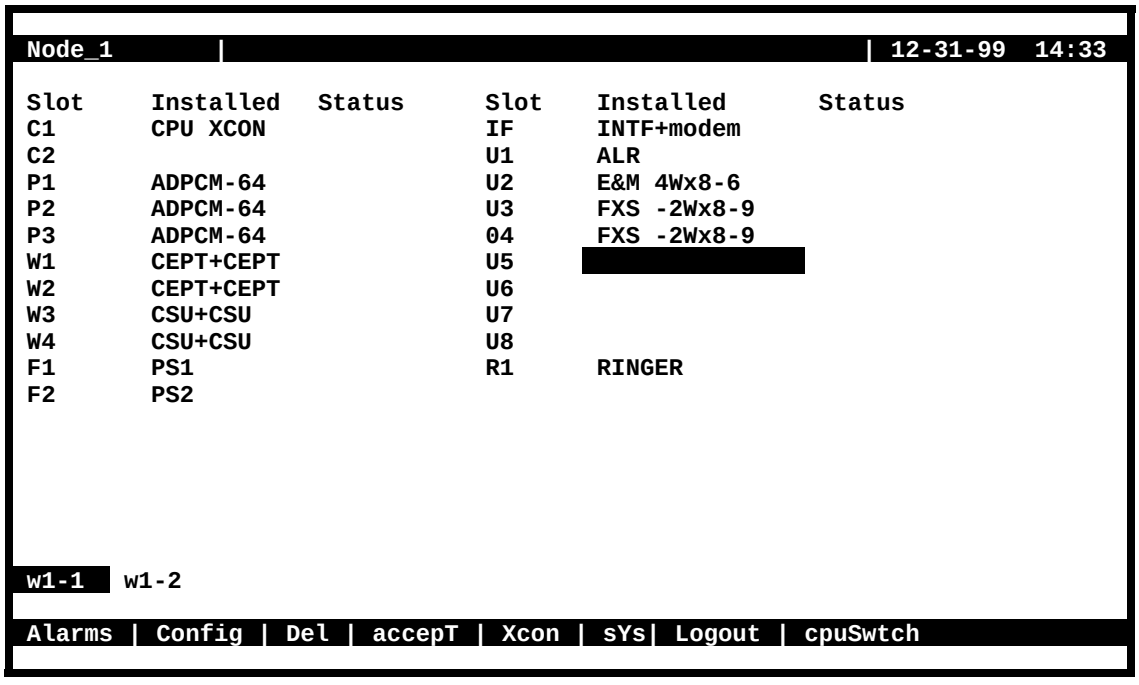


Figure 3-20. Typical WAN Card Selection

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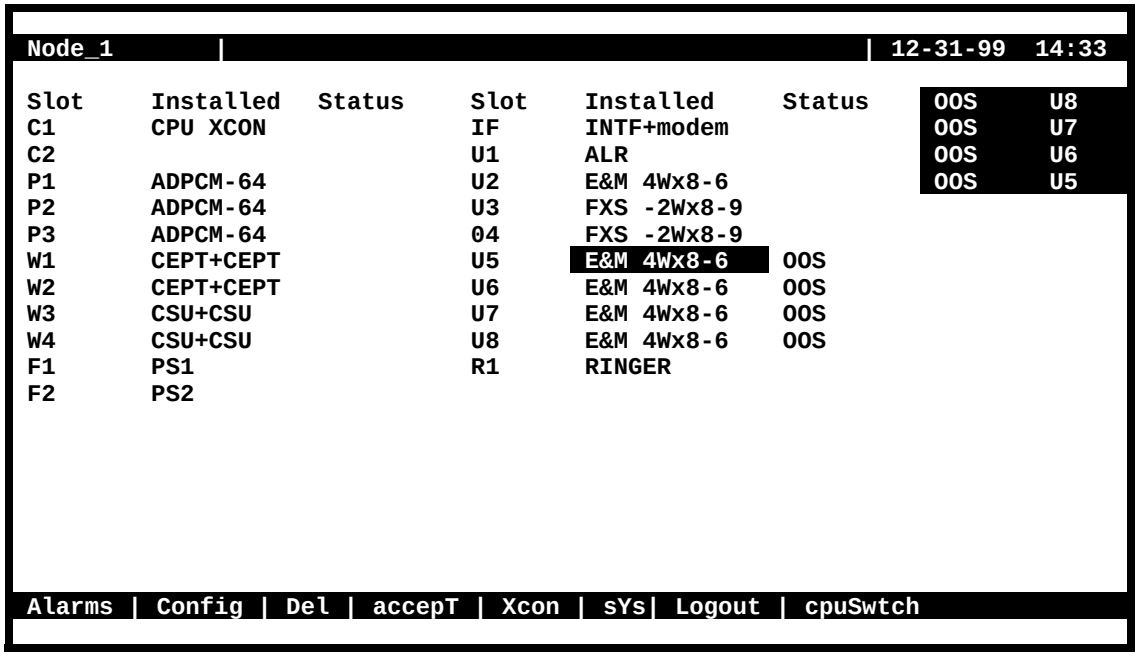


Figure 3-21. Typical System Main Screen with Alarms

In Figure 3-22, the XCON column shows the user card slot and card port to which each time slot of the E1 line is assigned. Time Slot 16 is reserved for signaling (CAS), and time slot 0 is used for signal frame alignment.

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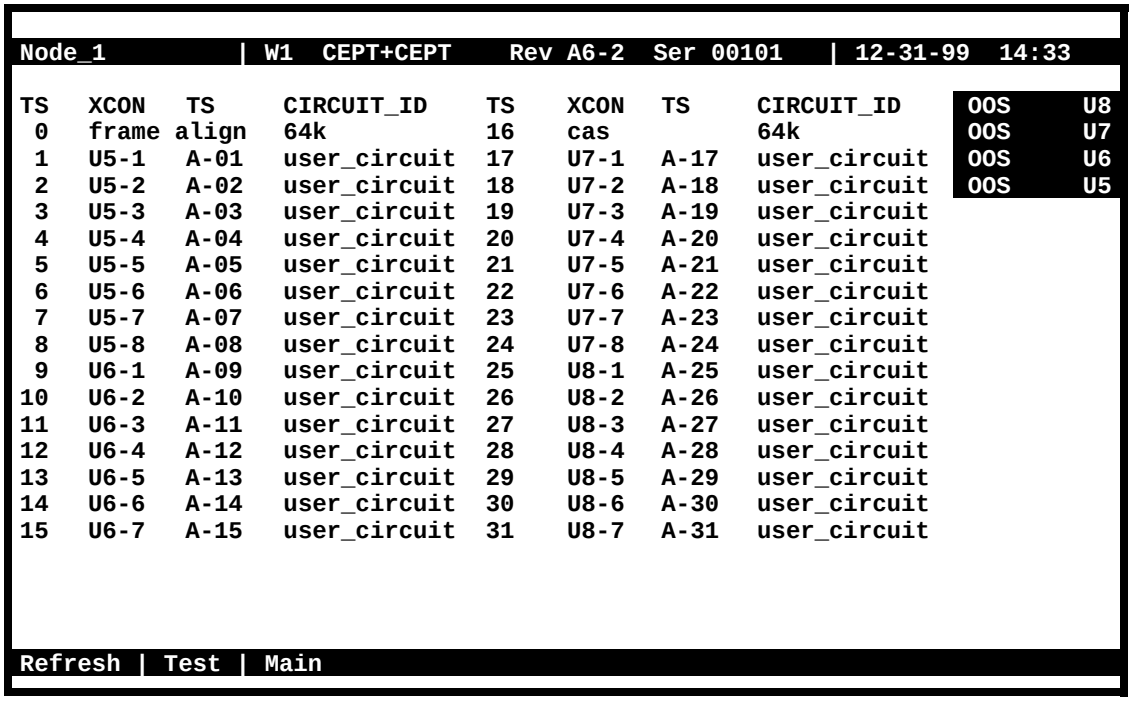


Figure 3-22. Typical WAN Time Slot Assignment Screen

3.12 Cross-Connecting WAN Time Slots

After assigning the user cards to DS0 time slots, you can also assign the remaining WAN time slots for pass-through cross-connections between T1 and E1 links.

In the drop-and-insert (**d-i)** mode (with CPU BCON), all time slots on one T1 or E1 link that are not assigned to voice and data cards will be cross-connected to the other link on a one-to-one basis. No cross-connections are possible in the end-terminal (**term)** mode.

If a dual WAN card in slot W1 is optioned with one T1 port (DSX or CSU) and one E1 port (CEPT), and if that card is set to operate in the **d-i** mode (with CPU BCON), the T1-to-E1 cross-connect map used by the system for unassigned time slots is shown in Table 3-4.

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Table 3-4. T1-to-E1 Cross-Connections in Drop-and-Insert Mode

T1 DS0	E1 DS0	T1 DS0	E1 DS0
1	1	13	17
2	2	14	18
3	3	15	19
4	5	16	21
5	6	17	22
6	7	18	23
7	9	19	25
8	10	20	26
9	11	21	27
10	13	22	29
11	14	23	30
12	15	24	31

You can cross-connect WAN time slots from the System Main Screen. To perform cross-connections, press "**x**" in that screen to invoke the **Xcon** command (with CPU XCON). The CPU Cross-Connect Screen of Figure 3-23 appears. In the cross-connect screen, type "**a**" to add a cross-connect circuit. The **Add** command provides the fields used to program all of the "pass-through" circuits in the network. Figure 3-23 shows a typical CPU Cross-Connect Screen, and Table 3-5 lists the circuit parameters and their options and default settings.

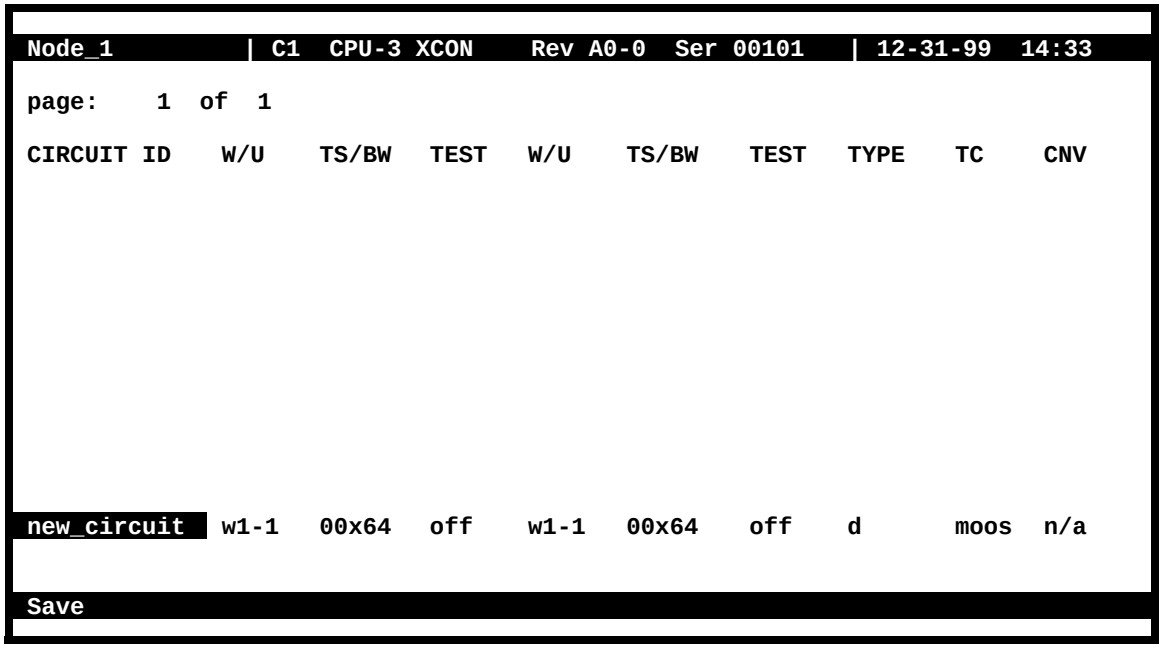


Figure 3-23. Typical CPU Cross-Connect Screen

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Table 3-5. Time Slot Cross-Connection Options and Defaults

Parameter	User Options	Default
CIRCUIT ID	Any combination of letters or numbers up to 14 characters, including spaces	stdby
W/U	w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2	w1-1
TS/BW	table	00
TEST	off all0 all 1 m_oos 1:1 1:7 lpbk 300Hz 1KHz 3KHz	off
W/U	w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2	w1-1
TS/BW	table	00
TEST	off all0 all 1 m_oos 1:1 1:7 lpbk 300Hz 1KHz 3KHz	off
TYPE	v v&s d	d
TC		
v	n/a	no
v&s	e&m fxsl fxsg fxsd plar dpo fxol fxog fxod dpt user*(this selection will require a user-defined bit pattern) mrd	e&m
d	n/a	n/a
CNV		
PCM CONV	none A-mu mu-A	none
SIG CONV	none ANSI-CCITT CCITT-ANSI ABCD-ABAB ABCD-AB01	none

CIRCUIT ID

A *circuit* is defined as a group of one or more DS0 time slots cross-connected from one WAN link to another. Each circuit can carry either voice or data traffic, and needs its own name to facilitate cross-connect management within the system. The Circuit ID field allows you to name individual pass-through circuits. The factory-default ID is "new circuit.” However, you can change the ID to show any relevant title for the pass-through connection, although each circuit ID must be unique. This ID can contain up to 14 numbers, letters (upper-case and lower-case), and spaces, in any combination. Figure 3-24 shows an example of a new circuit, which is named **SF01-NY01**.

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WARNING!

When cross-connecting multiple independent data DS0 time slots (sequential grouped time slots should work) for data. (Supergroup is multiple DS0's sequentially assigned) between WAN aggregates in a cross-connect system. DO NOT attempt to save time by cross-connecting independent data time slots as one super-rate circuit (could cause data errors.) This limitation does not apply to voice time slots.

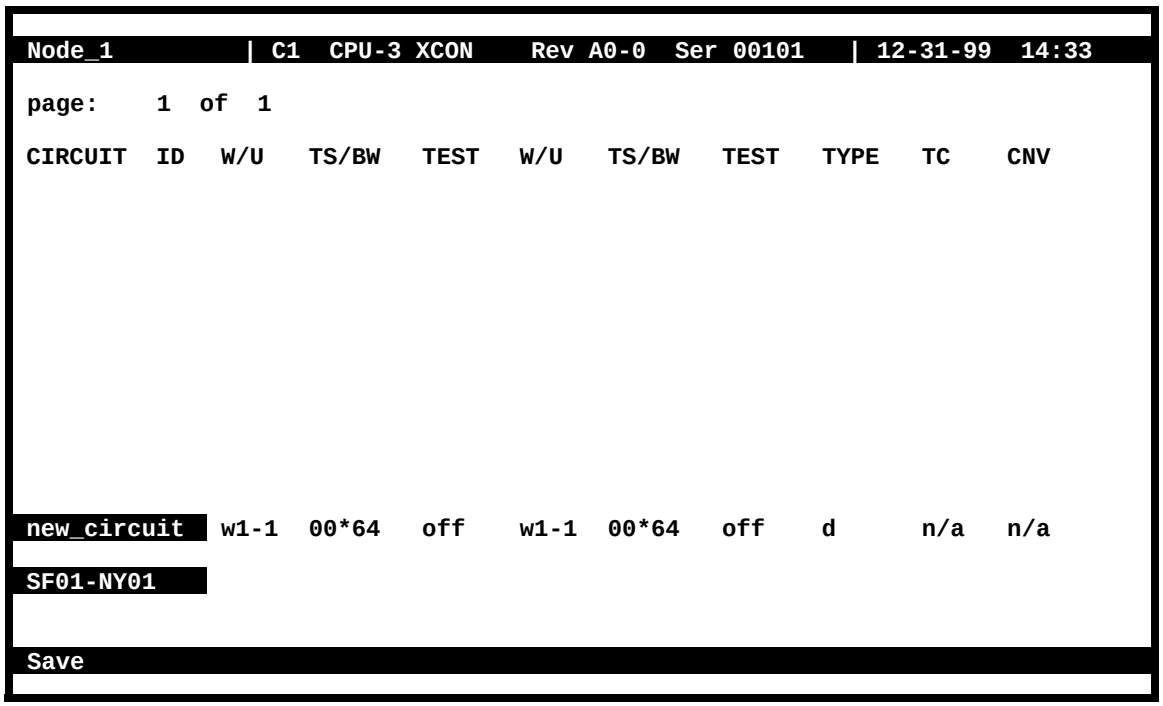


Figure 3-24. New Circuit Selection and ID Assignment

W/U

The first WAN Unit column is the T1/E1 link in which the pass-through connection begins (since these circuits are bi-directional, the concept of beginning or ending is used for illustrative purposes only). The options are all WAN cards and ports, and the identification uses the same convention (**w1-1, w1-2, etc**.) seen earlier. If a WAN card is not present in the W/U selected, an error message is generated. The example in Figure 3-25 shows **w1-1** (WAN 1, port 1) as the selected WAN card and port.

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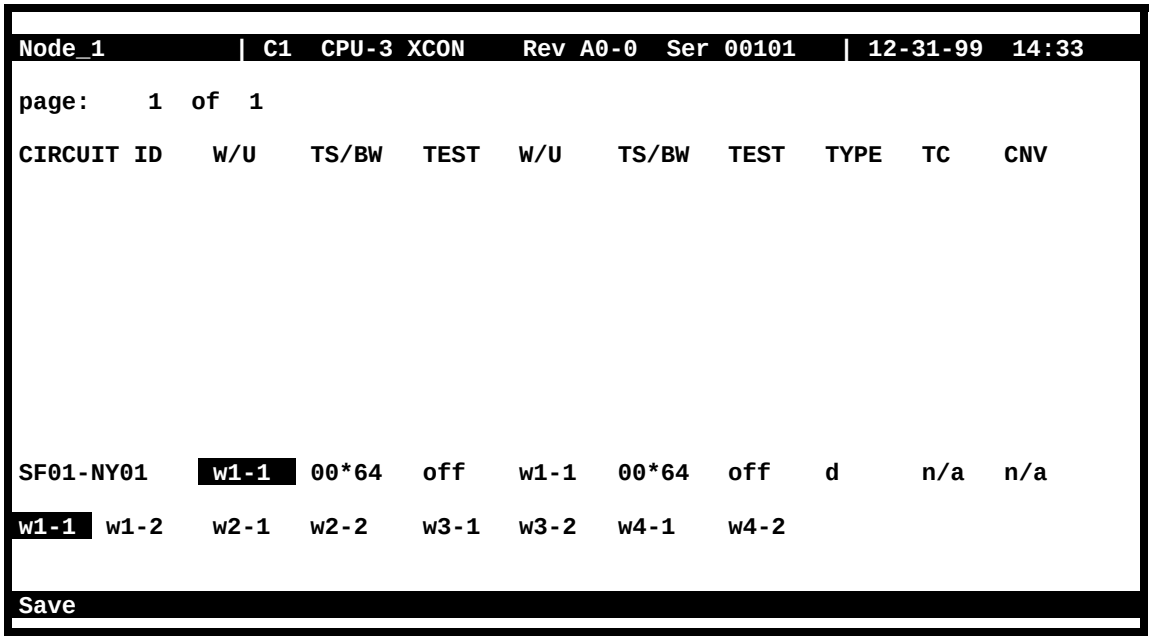


Figure 3-25. WAN Unit Options

TS/BW

The first Time Slot/Bandwidth column shows the different time slots of **w1-1** that will be assigned to this pass-through connection. Figure 3-26 shows the selection of time slots 8 to time slot 12 of **w1-1** assigned to the start of the connection. Any number of time slots from **1** to **24** is allowed for T1 transmission. Or, time slots **1** to **15** and **17** to **31** are allowed for E1 operations. *The bandwidth is automatically assigned.*

Make your selection by using the space bar and arrow keys. The arrow key moves from slot to slot, and the space bar toggles between selecting and deselecting a time slot.

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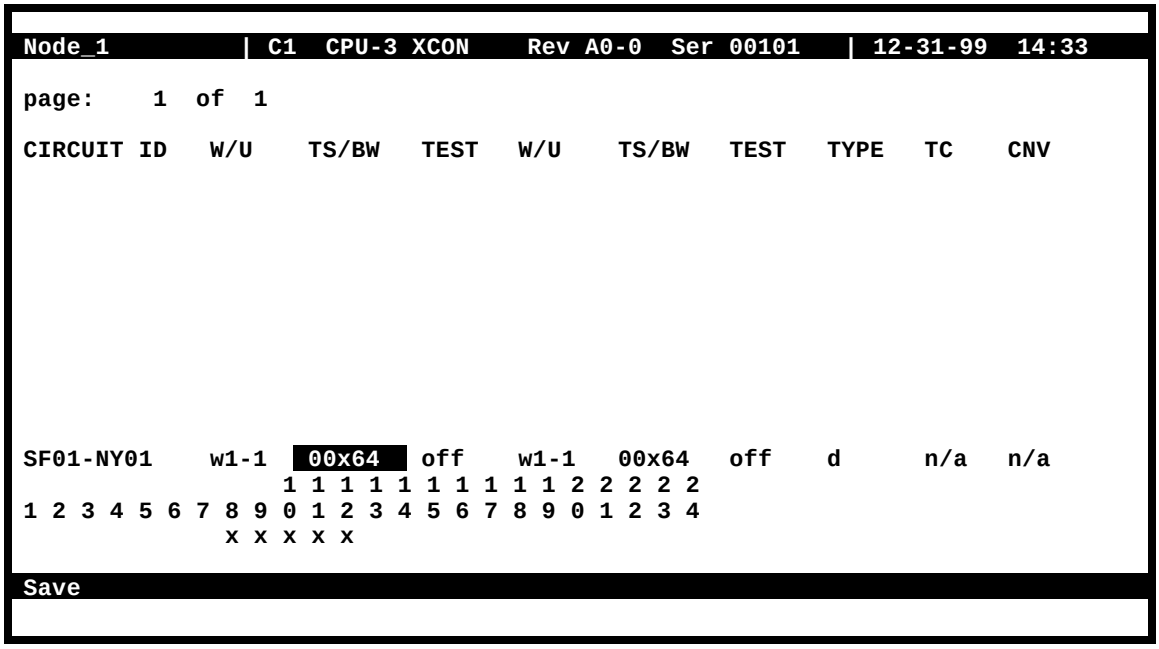


Figure 3-26. Time Slot and Bandwidth Options

TEST

The first Test column allows you to select the test pattern to be applied to this circuit in the direction of the first WAN link specified. Figure 3-26 shows the options, which you can select by highlighting the choice and pressing <Enter>. The choices are **off** (no testing); **all 0** (all zeros); **all 1** (all ones); **m_oos** (Multiplexer Out Of Sync); **1:1** ("one-to-one" pattern, where a 1 is followed by a zero); **1:7** ("one-to-seven" pattern, where a 1 is followed by seven zeros); **lpbk** (loopback); **300 Hz** (steady 300 Hz tone); **1KHz** (steady 1 kHz tone); and **3KHz** (steady 3 kHz tone).

When the circuit is saved, the system will send the selected pattern toward the first end of the circuit on each time slot, to facilitate testing. When circuit testing is finished, reset the Test field to the "**off**" position. The **lpbk** (loopback) option loops the circuit back toward the first WAN link specified.

If you have a voice cross-connect circuit (with or without signaling), you can access these capabilities from the WAN Cross-Connect Screen. See the review at the end of this section for more information.

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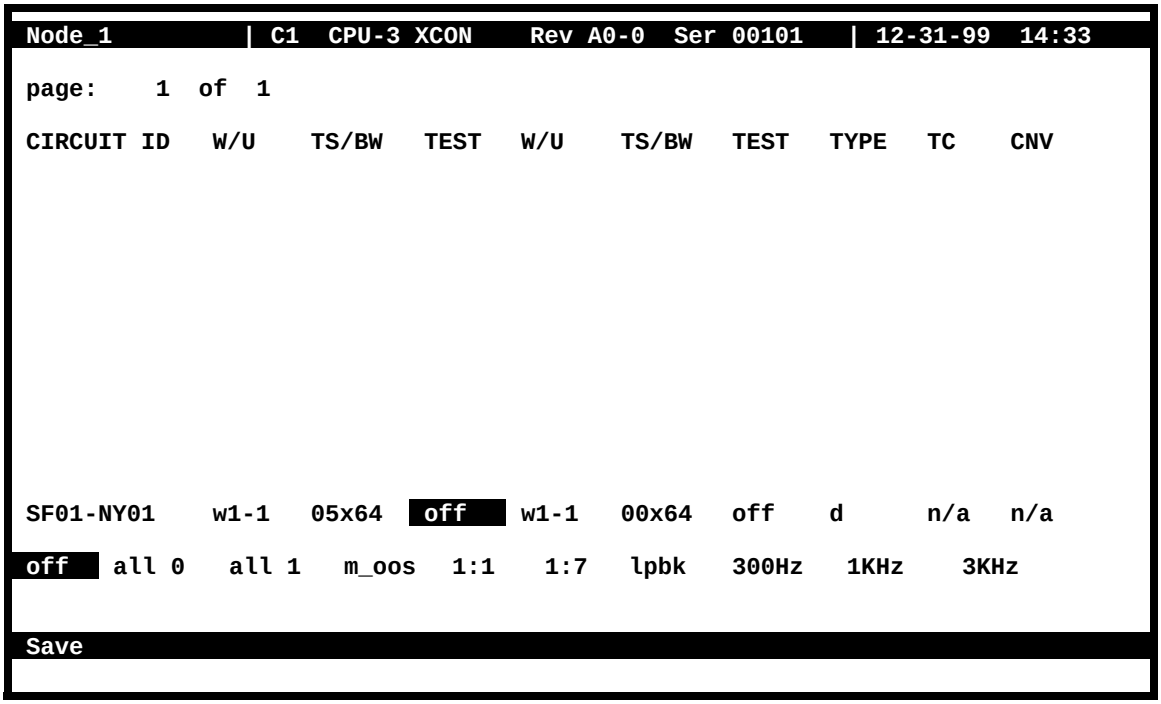


Figure 3-27. Test Options

W/U

The second WAN Unit column is the T1/E1 link in which the pass-through connection ends. The options are all of the WAN cards and ports. If a WAN card is not present in the W/U selected, an error message is generated. Figure 3-27 shows the selection of W 3-2.

TS/BW

The second Time Slot/Band Width column shows the different time slots from WAN 3-2 that will be assigned to this pass-through connection. Figure 3-27 shows the selection of 5 time slots from WAN 3-2 assigned to the end of the connection. Any number of time slots from **1-24** would be accepted for T1 operations and from **1-15 and 17-31** for E1 operations. The bandwidth is automatically assigned.

Make your selection with the space bar and arrow keys. The arrow key moves from slot to slot, and the space bar toggles between selecting and deselecting the time slot. *The number of DS0 time slots assigned to this half of the cross-connect circuit must equal the number assigned to the other. Otherwise, the system will reject the connections and generate an error message.*

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TEST

The second Test column lets you select the test pattern to be applied to this circuit toward the second WAN link specified. Figure 3-27 shows the option set to **off**. Like the previous Test column, the choices are **off** (no testing); **all 0** (all zeros); **all 1** (all ones); **m_oos** (Multiplexer Out Of Synchronization); **1:1** (a 1 followed by one zero); **1:7** (a zero is followed by a 1 and six more zeros); **lpbk** (loopback); **300 Hz** (steady 300 Hz tone); **1KHz** (steady 1 kHz tone); and **3KHz** (steady 3 kHz tone).

When the circuit is saved, the system will send the selected pattern toward the second end of the circuit on each time slot, to facilitate testing. When circuit testing is finished, reset the Test field to **off**. The Loopback (**lpbk**) option loops the circuit back toward the first WAN link specified.

Users dealing with a voice cross-connect circuit (with or without signaling) can access capabilities from the WAN cross-connect screen. See the review at the end of this section.

TYPE

The Type column selects the type of pass-through circuit, as shown in Figure 3-27. The choices are **v** (voice); **v&s** (voice with signaling), and **d** (data). Use v for a voice circuit that does not require trunk conditioning. Use **v&s** for a voice circuit with signaling. This option preserves A/B (robbed-bit) signaling on the selected time slots and provides trunk conditioning. Use **d** for data circuits, which also support trunk conditioning.

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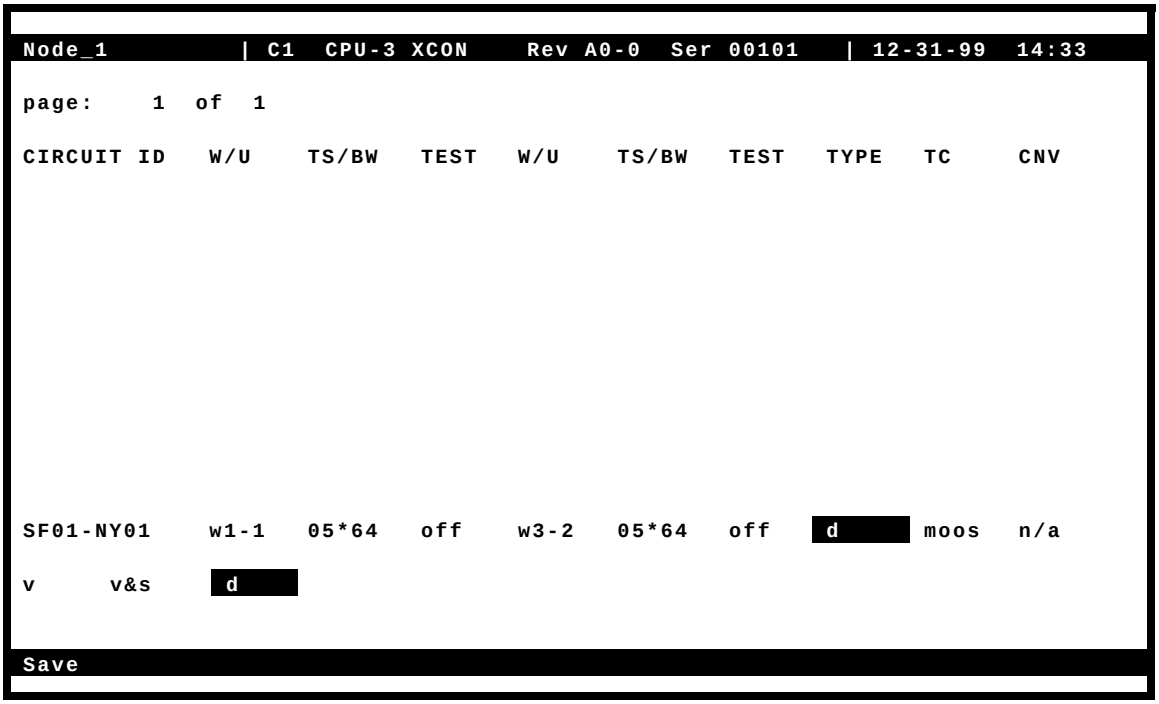


Figure 3-28. Cross-Connect Circuit Type Selection

TC

You can define the pattern to be transmitted on a cross-connected circuit if one of the circuit's two WAN links fails. This is known as Trunk Conditioning (TC), and the available selections depend on the Type column setting.

If the Type setting is **d** (data), no TC choice is available and the system automatically shows **moos**. An example of this is shown as Figure 3-28.

If the Type setting is **v&s** (voice with signaling), the TC choices are shown in Figure 3-29. They are as follows: **user** (user-defined bit pattern), **e&m** (trunk signaling), **fxsl** (foreign exchange station-loop-start), **fxsg** (foreign exchange station ground-start), **fxsd** (foreign exchange station-defined network), **plar** (private-line automatic ringdown), **dpo** (dial-pulse originating), **fxol** (foreign exchange office loop-start), **fxog** (foreign exchange office ground-start), **fxod** (foreign exchange office-defined network), **dpt** (dial-pulse terminating) and **mrd** (manual ringdown).

If you choose **user**, also enter a two-digit hexadecimal code for the bit pattern to be sent in each direction. Each digit can be from **0** to **9** or **a** to **f**. Figure 3-30 shows a typical signaling bit pattern entry screen.

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For **v** (voice), no TC choice is available, so the system always shows **n/a** (not applicable). This is shown as Figure 3-31.

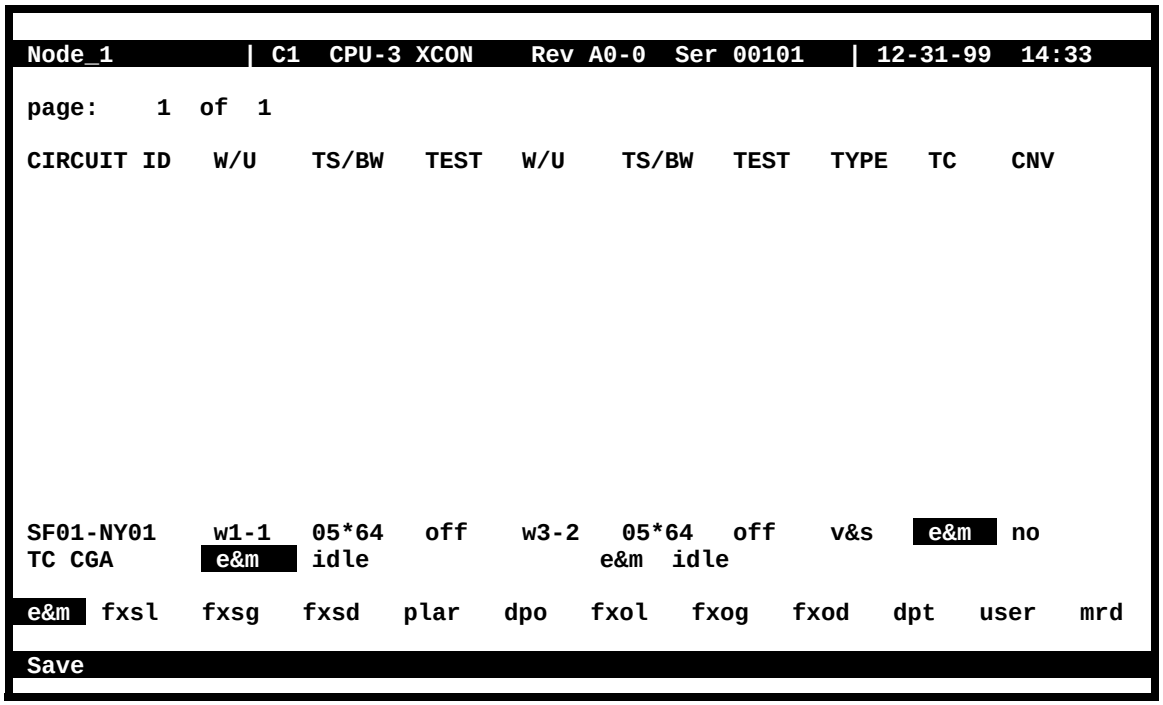


Figure 3-29. Trunk Conditioning Option Selection

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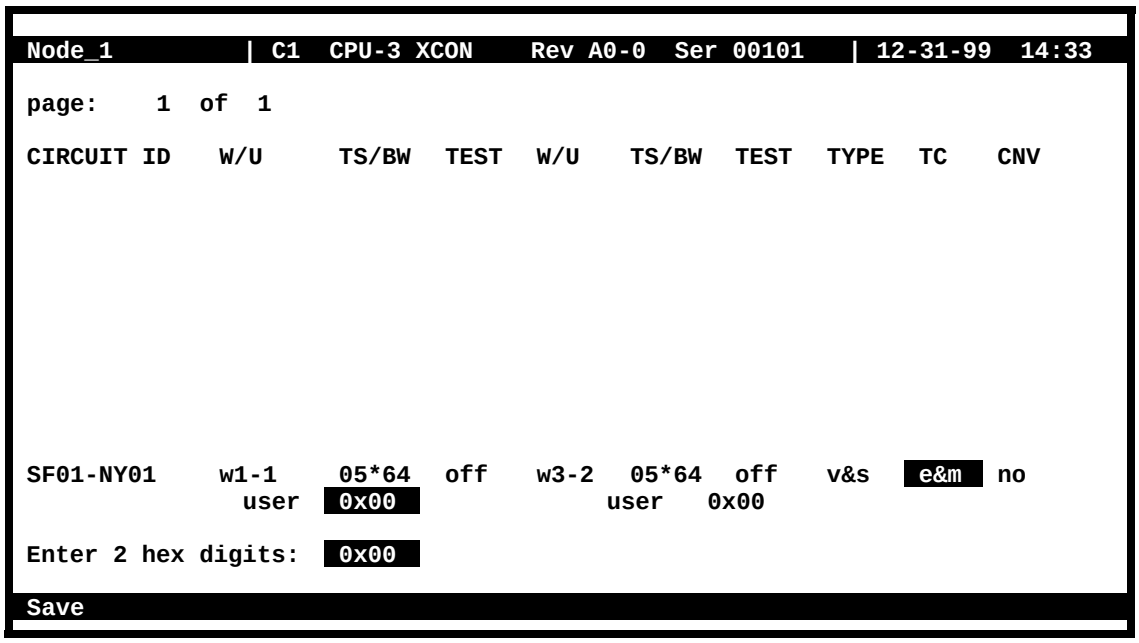


Figure 3-30. Signaling Bit Pattern Selection

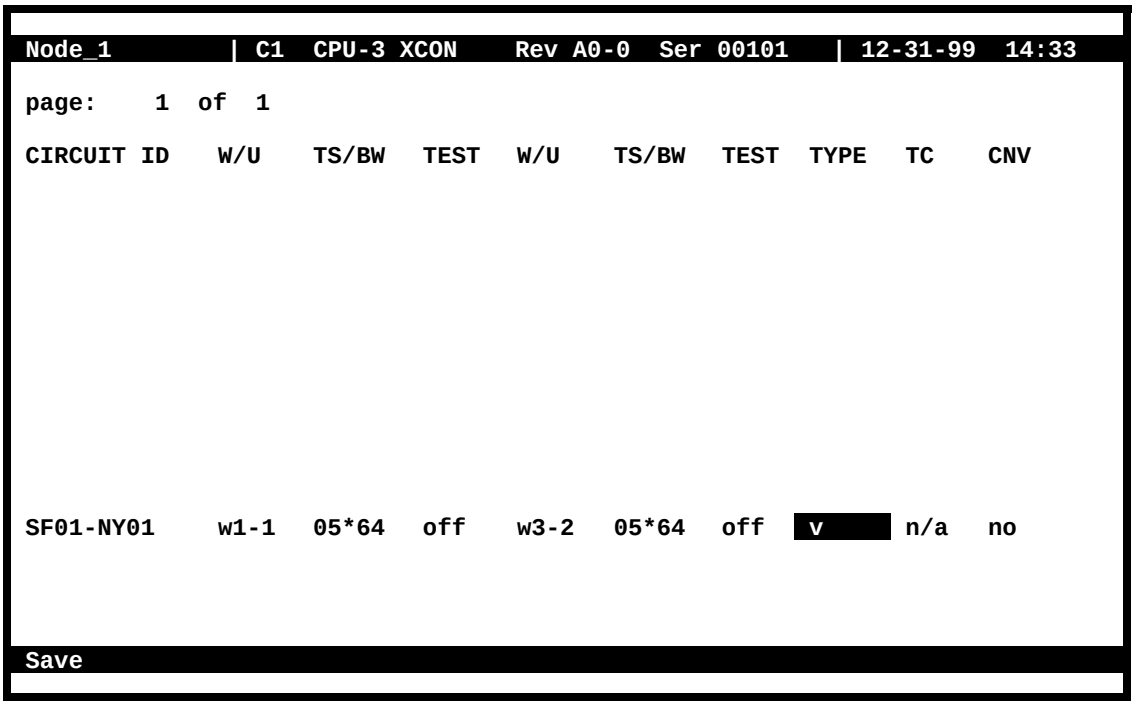


Figure 3-31. Voice Options Screen

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CNV

The Conversion (CNV) parameter allows you to request that PCM companding and signaling conversion be performed on this cross-connect circuit. Since these conversions only apply to voice circuits, if the TYPE selected is **d** (data), then the only acceptable value here is **n/a**. Similarly, if the TYPE selected is **v** (voice without signaling), the system will only allow users to request PCM companding conversion. If the TYPE is **v&s** (voice with signaling), then users can select any combination of companding and/or signaling conversion.

If the TYPE is **v** or **v&s**, the system will first ask users to "Select PCM CONV:" for defining the type of companding conversion users require (see Figure 3-32). The options are no companding conversion (**none**), convert the incoming **A-mu** (A-law signal to mu-law) and convert the incoming **mu-A** (mu-law signal to A-law).

If the TYPE is **v&s**, the system will prompt users to "Select SIG CONV:" for selecting the type of signaling conversion needed (see Figure 3-33). The option **none** (default signaling conversion) is where a bit pattern of "0000" will automatically be converted to "0001" in the T1-to-CEPT E1 direction.

The **ANSI-CCITT** setting will convert the incoming ANSI signaling to CCITT signaling. Conversely, the **CCITT-ANSI** setting will convert the incoming CCITT signaling to ANSI signaling. These two options are complementary (i.e., if either is selected in one direction, the other is automatically selected for the reverse direction).

The **ABCD-ABAB** setting will convert the incoming CEPT signaling to T1 signaling for an ESF or D4 cross-connect. The **ABCD-AB01** option will convert the incoming T1 signaling to CEPT signaling for an ESF or D4 cross-connection. These two options are complementary (if either one is selected in one direction, the other is automatically selected for the reverse direction).

Due to space limitations in the CNV column on the screen, the system will display a summary notation of the choices just made. The possible values are **no** (no conversion), **sig** (signaling is converted, but not the PCM), **pcm** (PCM is converted, but not the signaling) and **p&s** (both signaling and PCM are converted). Figure 3-34 shows those options.

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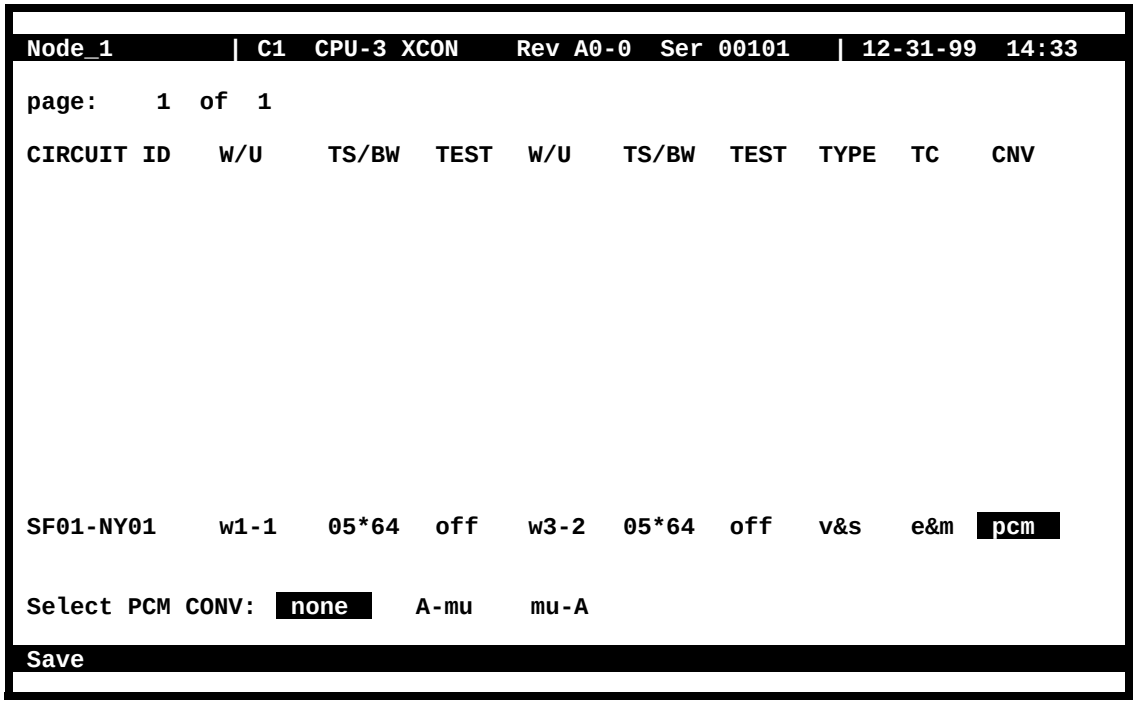


Figure 3-32. Selecting PCM Conversion

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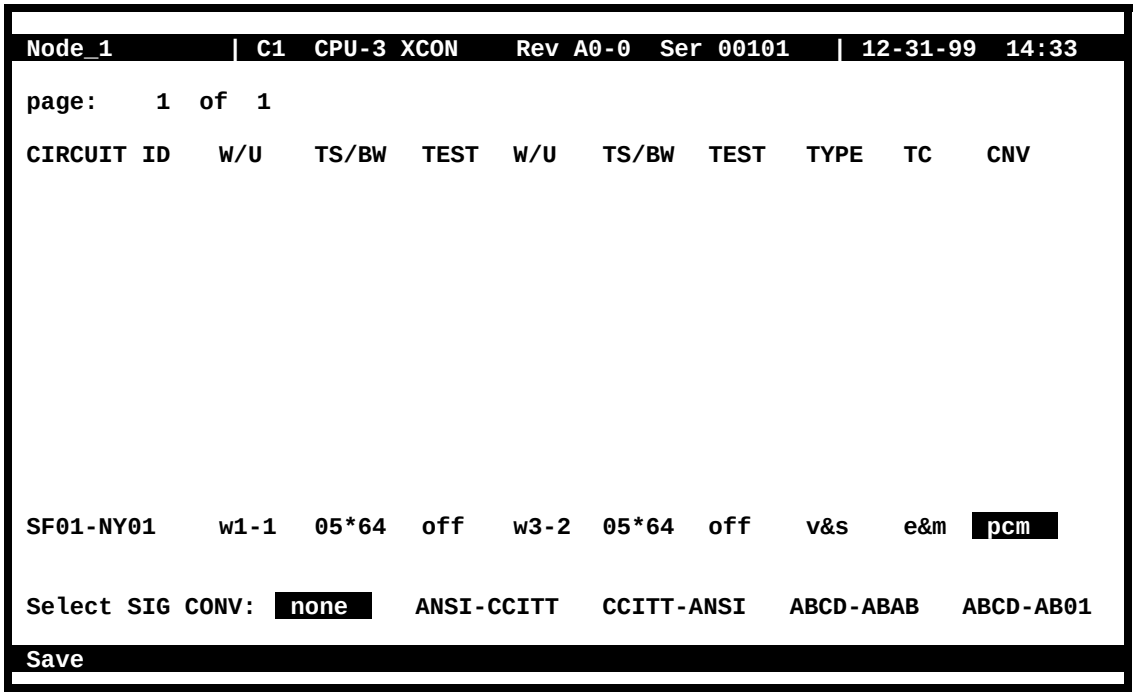


Figure 3-33. Selecting Signaling Conversion

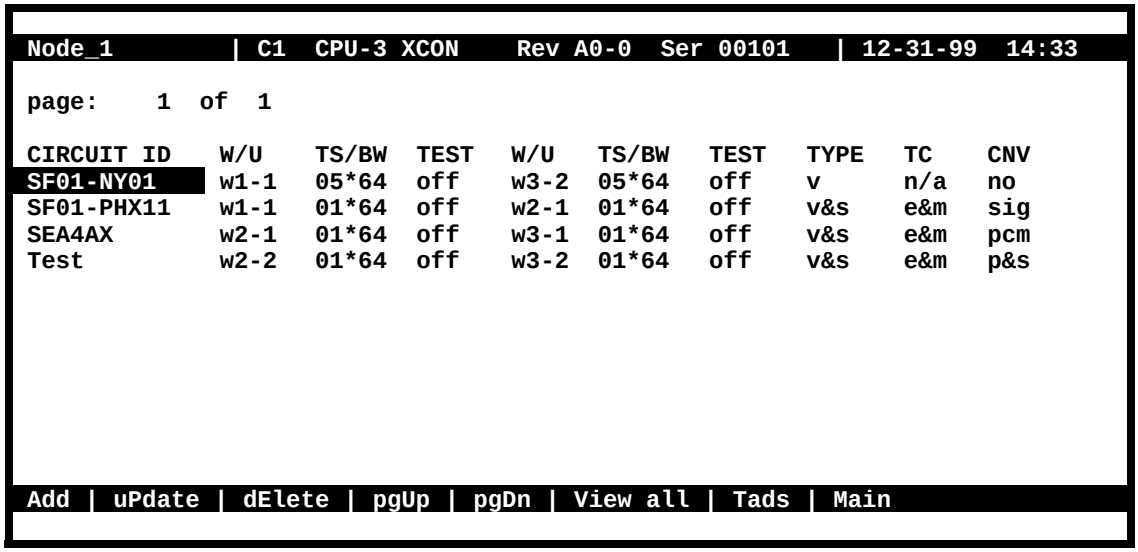


Figure 3-34. Typical Completed Circuits

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3.13 Cross-Connect Actions

Table 3-6 summarizes the actions you can perform from the CPU Cross-Connect Screen. These actions appear at the bottom highlighted line of the screen.

Table 3-6. CPU Cross-Connect Screen Actions

Action	Function
Add	Allows you to program additional pass-through cross-connects in the system. If mistakes are made during the add process, pressing the up arrow or down arrow key will terminate this operation.
uPdate	Iinitiated by pressing the "**p**" key. With this command, users can change any of the parameters of a pass-through connection. Use the arrow keys to highlight the area to be changed and close the transaction using the "**S**" (Save) command.
dElete	Initiated by pressing the "**e**" key. Use this command to delete existing pass-through connections. The system will prompt users to delete the circuit, and the "**y**" key must be pressed to complete the transaction.
pgUp	Initiated by pressing the "**u**" key. Since the system can handle many different cross-connect circuits, users may exceed a single screen. New pages will be added automatically to accommodate additional circuits. The page count feature at the top of the screen shows the current page and the total amount of cross-connect pages. Use this command to scroll up through the pages of cross-connect information.
pgDn	Initiated by pressing the "**d**" key. This action is similar to the pgUp command. Use this command to scroll down through the pages of cross-connect information.
View all	The View all action is initiated by pressing the "**v**" key. This action is used to access the Broadcast screen discussed in a later section.
Save	Once the pass-through connection is defined, pressing "**S**" (Save) will cause the circuit to be established and will update the WAN cards involved.

To delete a cross-connected circuit from the CPU Cross-Connect Screen, highlight the circuit name to be deleted, and press “**e**” to invoke the **dElete** command. Figure 3-35 shows the deletion process.

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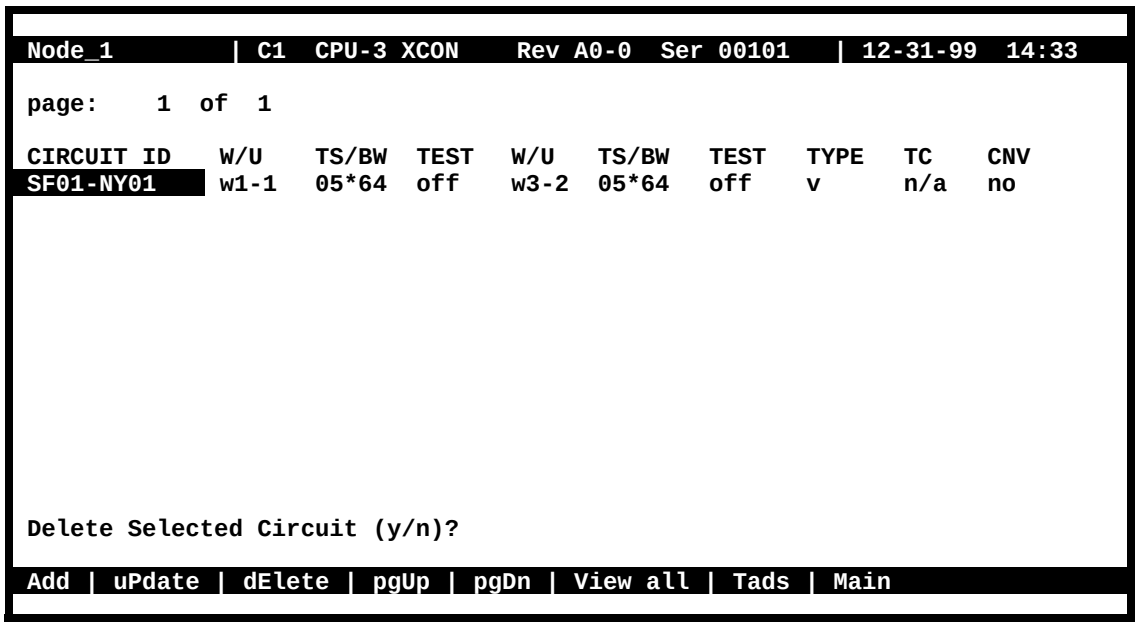


Figure 3-35. Delete Cross-Connection Screen

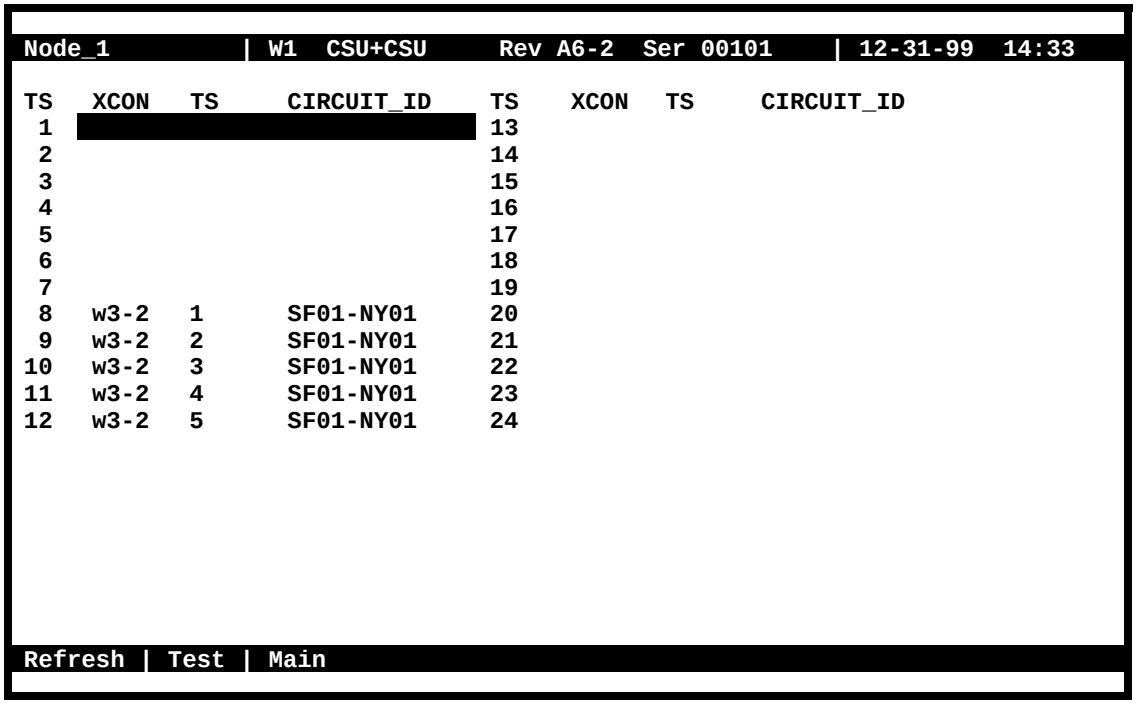


Figure 3-36. Updated WAN Card Screen

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Figure 3-36 shows the WAN card in TS (time slot) 8 through 12 being updated. However if the WANs are selected and deleted as shown in Figure 3-35 then the screen in Figure 3-36 will be blank for WAN TS 8 through 12.

3.14 Testing Voice Cross-Connects

Voice and data circuits differ in the way the test function is accessed. While you can set up test patterns on data circuits on the cross-connect screen from the System Main Screen, you must use a subscreen of the WAN Cross-Connect Card Screen for circuit testing. Figure 3-37 shows the error message that appears when you attempt to test voice circuits from the CPU Cross-Connect Screen.

```
Node_1            | C1  CPU-3 XCON    Rev A0-0  Ser 00101   | 12-31-99  14:33

page:    1  of  1

CIRCUIT ID      W/U  TS/BW   TEST   W/U   TS/BW   TEST   TYPE   TC    CNV
SF01-HSTN4C    w3-1  02*64   off    w2-2  02*64   off    v&s    e&m   p&s
MIFL42A-SF01   w2-1  01*64   off    w3-1  01*64   off    d      n/a   n/a
NY66-WDC18a    w2-1  01*64   off    w2-2  01*64   off    v&s    e&m   p&s









SF01-HSTN4C    w3-1  02*64   off    w2-2  02*64   off    v&s    e&m   p&s


Channel test is available from WAN XCON screen.  Press any key to continue. . .
Save
```

Figure 3-37. Typical Message on a CPU Cross-Connect Screen

Figure 3-38 shows the WAN Cross-Connect Screen for the voice circuit used in this example. Place the cursor over the selected circuit and press the "**t**" key to bring up the Test Screen shown in Figure 3-39. This screen now splits the circuit into two parts, with the location acting as the midpoint. The first column of test parameters will apply to that portion of the circuit on port w2-1, time slot 13. The second column of test parameters will apply to that portion of the circuit on port w2-2, time slot 13.

Table 3-7 lists the test parameters and their available and default values.

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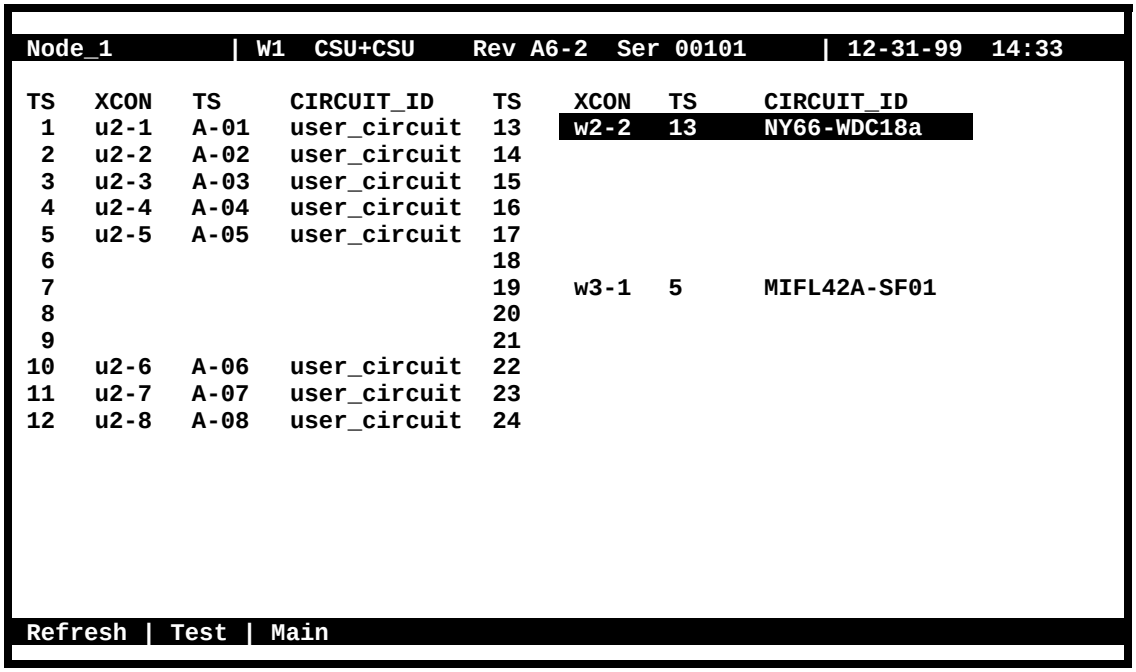


Figure 3-38. Highlighted Circuit on a WAN Cross-Connect Screen

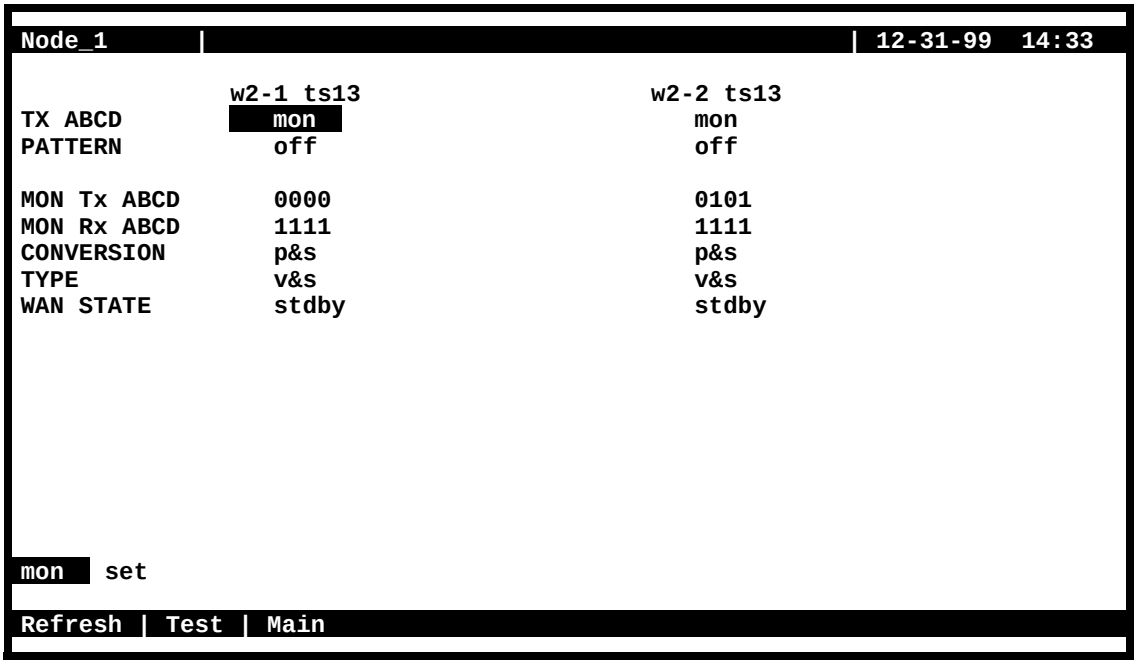


Figure 3-39. Typical Test Screen and ABCD Bit Options

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Table 3-7. WAN Cross-Connect Test Screen Options

Parameter	User Options	Default
Tx ABCD	mon set	mon
PATTERN	off all 0 all 1 m_oos 1:1 1:7 lpbk 300Hz 1KHz 3KHz	off
MON Tx ABCD	information only–no user options	
MON Rx ABCD	information only–no user options	
CONVERSION	information only–no user options	
TYPE	information only–no user options	
WAN STATE	information only–no user options	

Tx ABCD BITS

The Transmit ABCD bit parameter has two options: **mon** (allowing you to observe the bit pattern being sent on the transmit side of the line), and **set** (to choose a different pattern for testing that portion of the circuit). Choosing **set** brings up a small four-character window at the bottom of the screen, where you can type in a new pattern of ones and zeros.

Figure 3-40 shows a diagram of the test process. When Tx ABCD for w2-1 is set to **mon**, the w2-1 column reflects the ABCD bits being sent out on w2-1. This pattern should be identical to Rx ABCD on w2-2, unless the conversion table is used. When Tx ABCD for w2-1 is optioned to **set**, users supplies a bit pattern of four 1s and 0s for the new ABCD bits. The Rx ABCD stream from w2-2 is broken at circle #1, and the new pattern is inserted into the Tx ABCD stream. The same applies for **mon** and **set** for w2-2. The bitstream will be broken at circle 2.

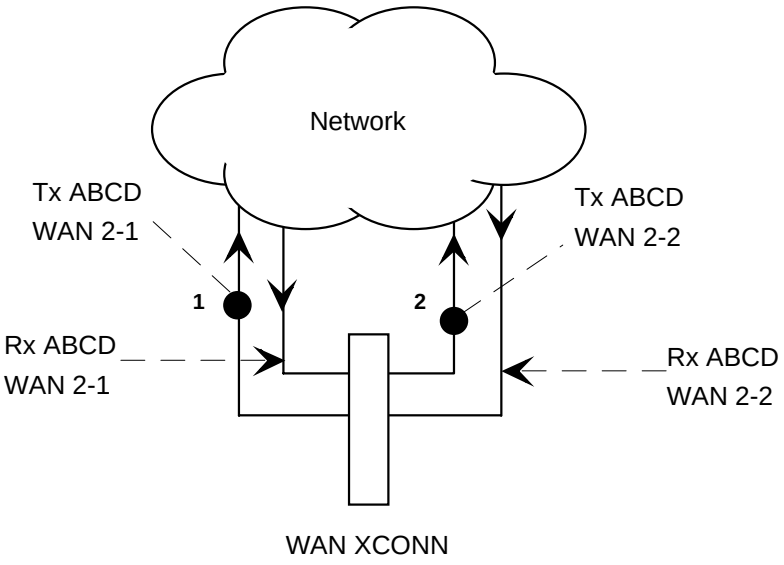


Figure 3-40. Voice Test Diagram

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PATTERN

The Pattern parameter allows you to choose a test pattern to be transmitted as PCM data on the selected side of the circuit. The options are **off**, **all 0** (zero), **all 1** (one), **m_oos** (multiplexer out of synchronization), **1:1** (a 1 followed by a zero and then another 1), **1:7** (a zero followed by a 1 and seven zeros, then another 1), **lpbk** (loopback), **300 Hz** (300 Hz tone), **1KHz** (1 kHz tone) and **3KHz** (3 kHz tone). Since Tx ABCD only changes signaling bits, this option allows you to choose the test pattern. You can send a different pattern toward either side of the circuit.

Mon Tx ABCD

The Monitor Transmit ABCD bit information field shows the ABCD bit pattern being transmitted on the outbound circuit. You can change it by using the **set** command. *This parameter is for information only.*

Mon Rx ABCD

The Monitor Receive ABCD bit information field allows observe the bit pattern being received on the inbound circuit. *This parameter is for information only; you cannot change it.*

CONVERSION

The Conversion information field shows users the conversion setting selected from the cross-connect screen. The possible values are **no** (no conversion), **sig** (signaling is converted, but not the PCM), **pcm** (PCM is converted, but not the signaling) and **p&s** (both signaling and PCM are converted). *This parameter is for information only; you cannot change it.*

TYPE

The Type information field show you the type of circuit (**v** for voice or **v&**s for voice and signaling).

WAN STATE

The WAN State information field shows the current status of the port. The possible values are **stdby**, **actv**, **test** (the user is actively controlling the circuit), **OOS** (WAN port is Out of Service), and **CGA** (WAN port has a CGA alarm). *This parameter is for information only; you cannot change it.*

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3.15 Using the Broadcast Option

One of the special features of WAN time slot assignment in cross-connect systems is the ability to copy a data signal and send it to multiple locations without disturbing the original circuit. This feature is called *broadcasting*, which means “multi-cast” (not to be confused with broadcast-quality video transmission).

For example, assume that a major company has a video lecture transmitted from the corporate headquarters in Denver to the sales office in San Francisco. The sales offices in Salt Lake City, Houston, and Phoenix would also like to view the lecture.

The master circuit (Denver to San Francisco) is a two-way circuit (i.e., both ends can send and receive data). The other ends of the broadcast circuits (the sales offices in Salt Lake City, Houston and Phoenix) will only be able to receive the output of the Denver end of the master circuit. That is, they will not be able to participate in the live discussion.

The following series of figures shows how the process works.

Figure 3-41 shows the Main Cross-Connect screen. In this example, T1 circuits connected at the Denver office go to San Francisco (**w1-1**), Houston (**w1-2**), Salt Lake City (**w2-**1), and Phoenix (**w2-2**). *The screen only shows the cross-connects made from WAN cards to WAN cards, not from user cards to WAN cards.*

```
Node_1          | C1  CPU-3 XCON    Rev A0-0  Ser 00101   | 12-31-99  14:33

page:    1  of  1

CIRCUIT ID    W/U    TS/BW  TEST   W/U    TS/BW  TEST   TYPE   TC    CNV
SF-SLC        w1-1   01*64  off    w2-1   01*64  off    v      n/a   no
HST-PHX       w1-2   01*64  off    w2-2   01*64  off    v      n/a   no

Add | uPdate | dElete | pgUp | pgDn | View all | Tads | Main
```

Figure 3-41. Typical Main Cross-Connect Screen

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Broadcast circuits can be initiated, updated, or deleted only from the broadcast screen.

To access the Broadcast option, press "**v**" (for **View all**) in the Main Cross-Connect Screen. The All Circuits Screen of Figure 3-42 appears. In addition to the WAN card-to-WAN card cross-connects, this screen also shows all user card-to-WAN card time slot assignments **for all WAN cards.**

Because this screen shows all WAN time slots that are either assigned to user cards or cross-connected to other time slots, it may be filled with data.

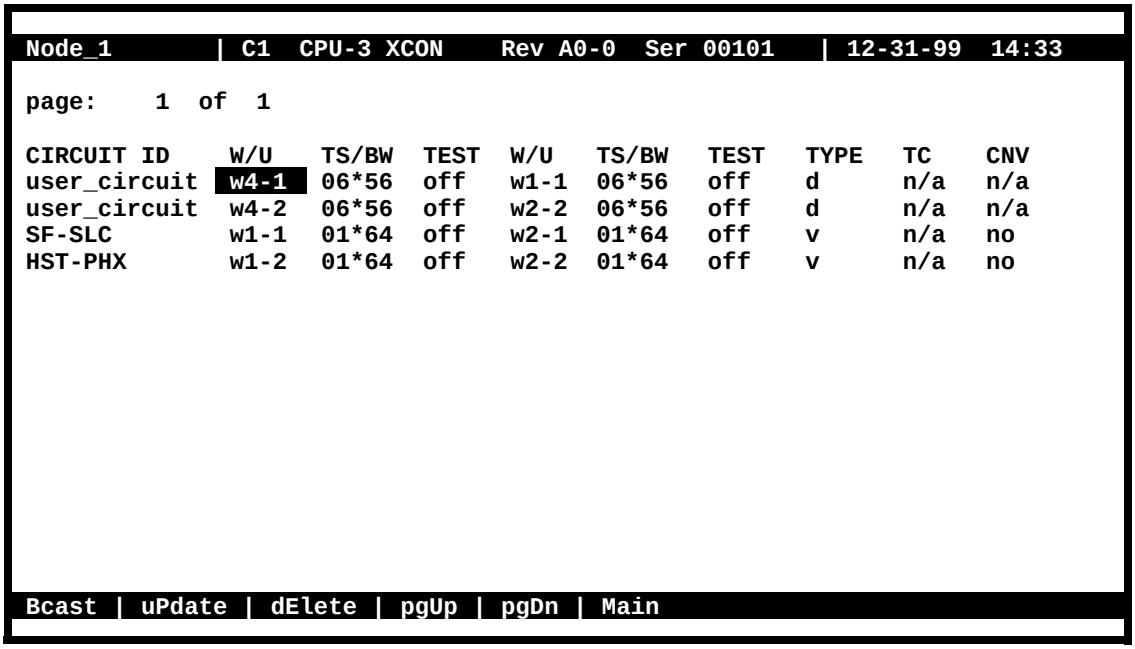


Figure 3-42. Typical All Circuits Screen

In addition to the two WAN-to-WAN cross-connects shown in Figure 3-41, an HSU circuit from slot U4-1 to the San Francisco T1 circuit (on WAN 1-1), and an HSU circuit from slot U4-2 to Phoenix (on WAN 2-2) are shown in Figure 3-42.

To select the broadcast option, place the cursor over the User card circuit that will be copied. In this case, it will be the Denver end of the Denver-to-San Francisco link on WAN 1-1. Then, press the "**b**" (**Bcast**) key from the actions at the bottom of the screen.

The screen of Figure 3-42 shows the dynamics of the first copy of that circuit. Press the <Enter> key to access and modify the connection options.

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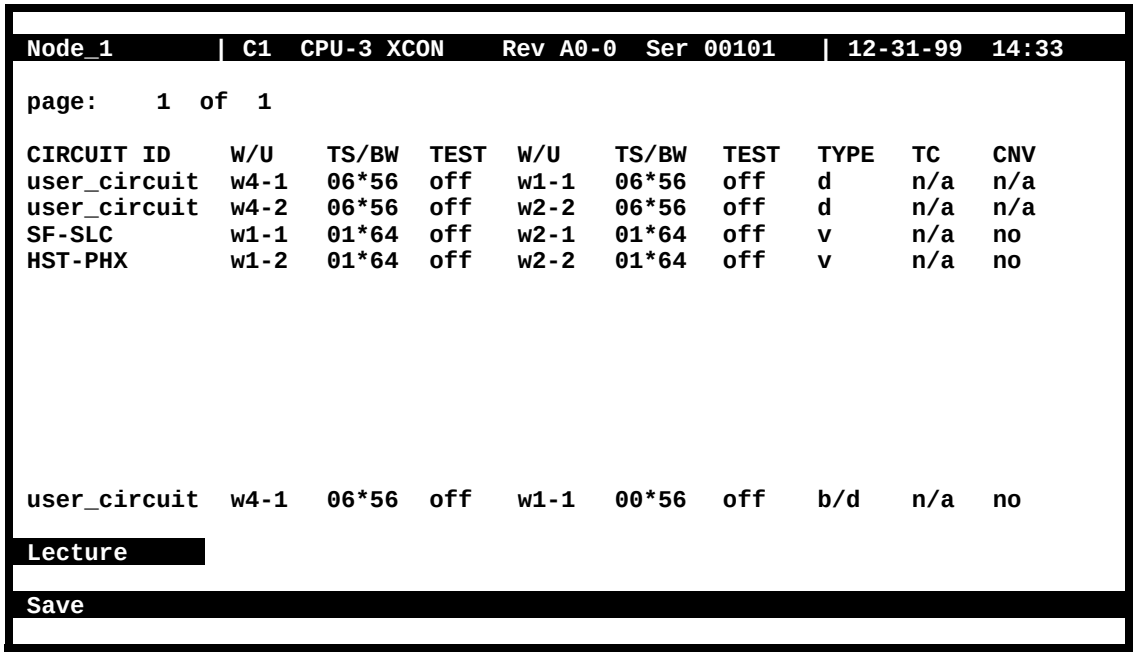


Figure 3-43. Typical Add Broadcast Screen

In this example, the broadcast circuit is named "Lecture" for easier identification later, when the circuit will be disconnected.

Figure 3-43 shows the selection of a second destination for the broadcast circuit. In that example, that destination is Salt Lake City, which is accessed through **w2-1**. The time slot selection is shown in Figure 3-43. Press "**s**" (**Save**) to save the parameters of the new circuit. Figure 3-46 shows the new circuit, whose type is **b/d** (broadcast/data).

Use similar actions to duplicate this circuit for the other destinations. Figure 3-44 shows the completed circuits.

To disconnect the circuits when the program is finished, highlight the circuit to be disconnected and press the "**e**" key. The screen shown in Figure 3-48 will appear. Then, select "**y**" to permanently delete the copied circuit while leaving the original circuit intact.

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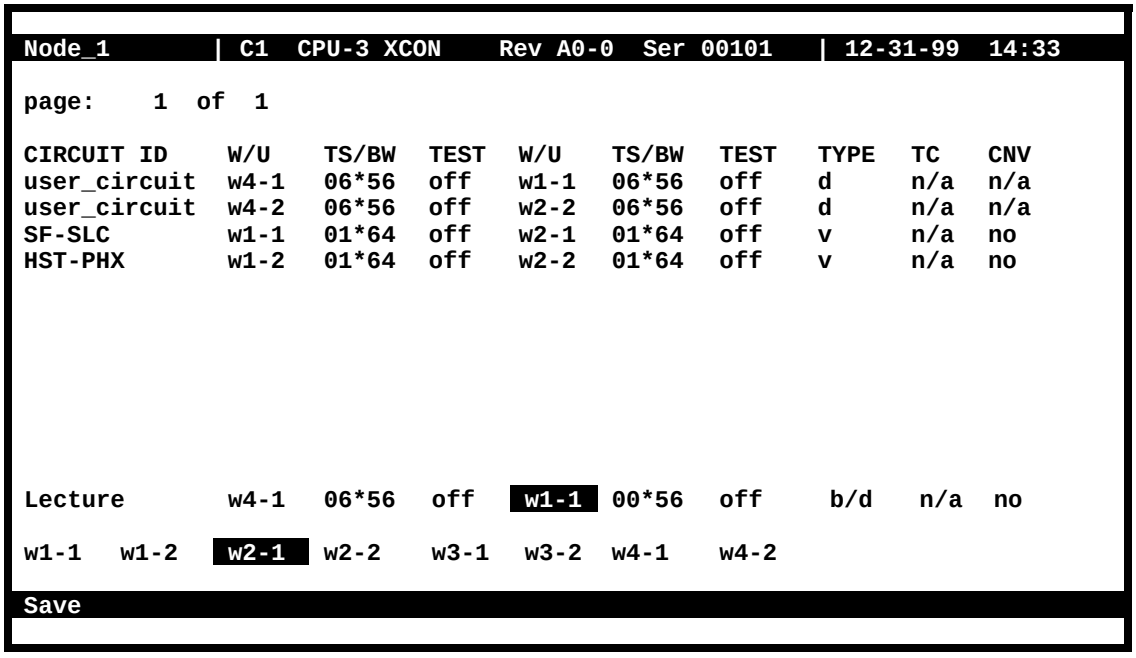


Figure 3-44. Typical "To" Destination Selection

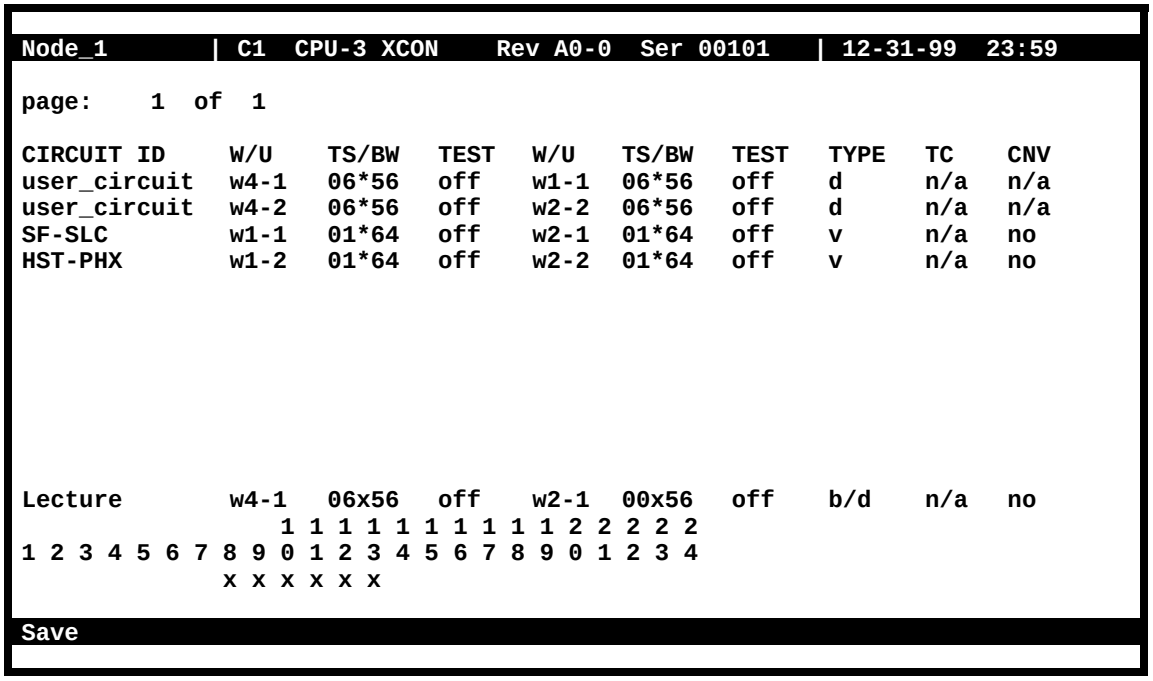


Figure 3-45. Typical Time Slot Selection

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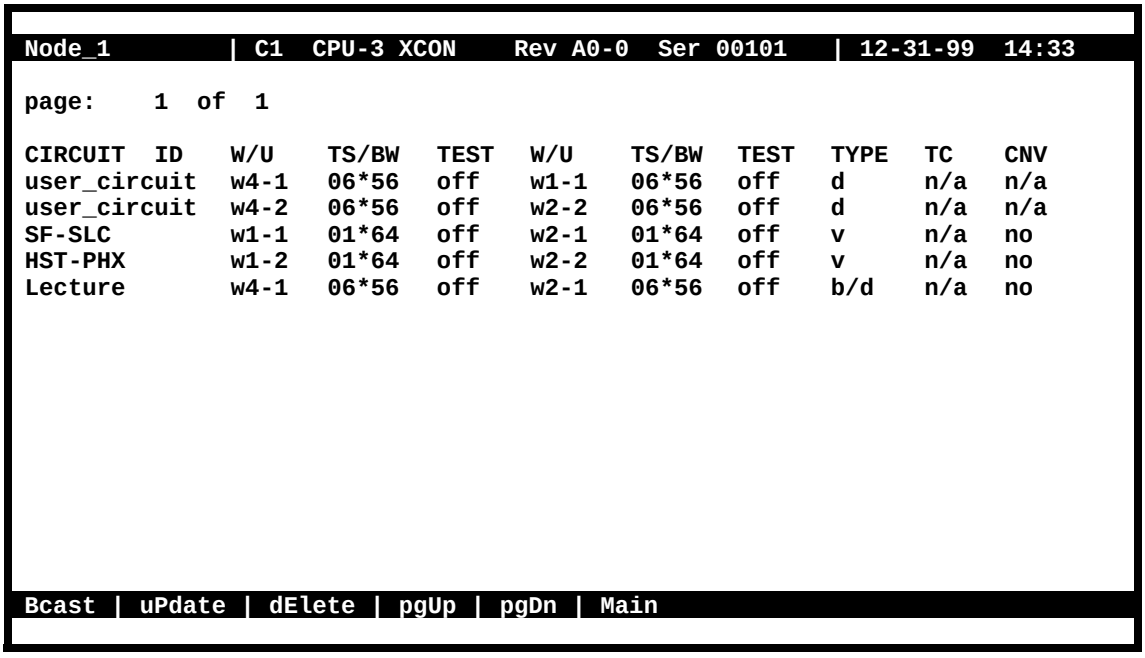


Figure 3-46. Typical Complete Broadcast Circuit

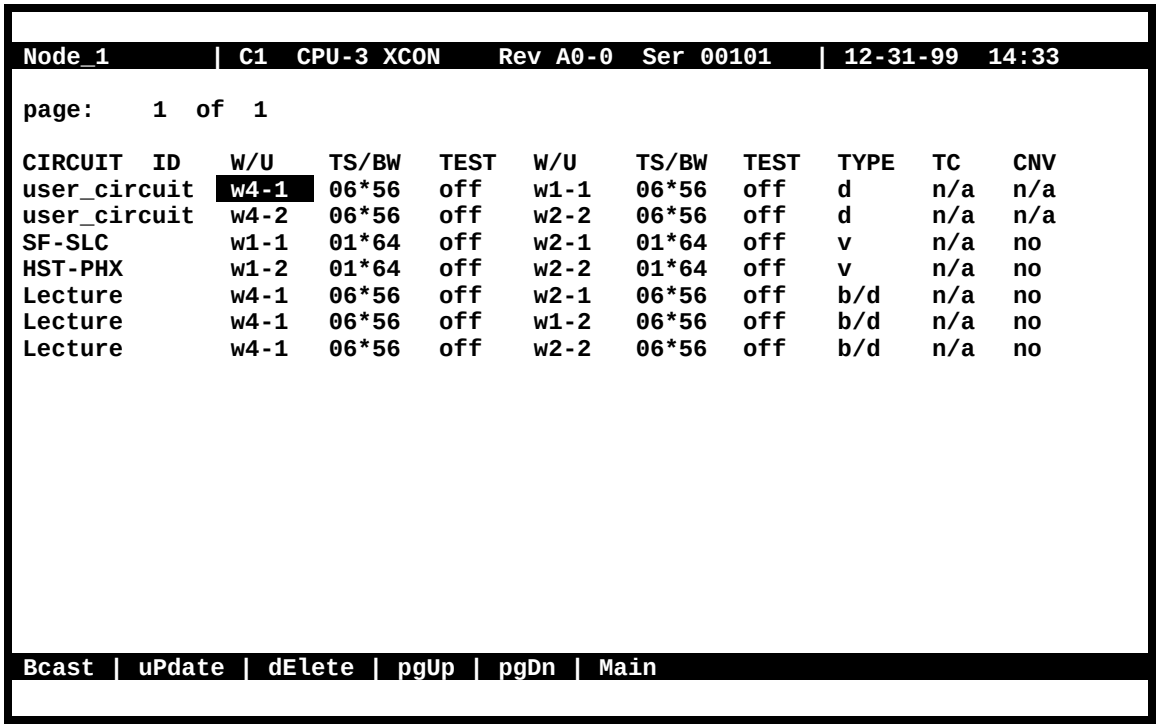


Figure 3-47. Three Broadcast Circuits

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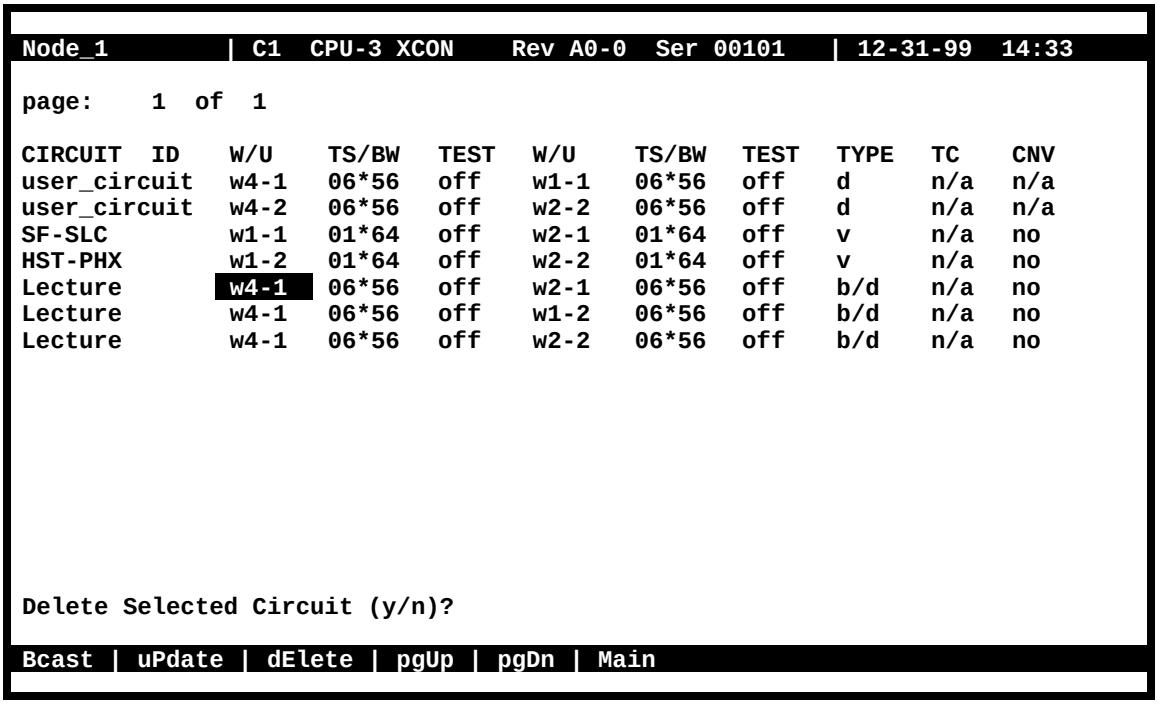


Figure 3-48. Typical Deleted Broadcast Circuit

3.15.1 WAN Link to WAN Link

Circuits from a WAN link to another WAN link can also be duplicated from the broadcast screen. Use the same procedure to establish multiple connections for WAN-to-WAN circuits.

In Figure 3-44, highlighting the WAN link circuit on slot w1-1 allows you to cross-connect duplicate information to any other WAN link.

3.15.2 Broadcast Screen Actions

Table 3-8 lists the actions you can perform in the Broadcast Screen. These actions appear on the bottom highlighted line of that screen.

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Table 3-8. Broadcast Screen Actions

Action	Function
Bcast	Bcast allows users to program additional broadcast cross-connects in the system. If mistakes are made during the add process, pressing the up arrow or down arrow key will terminate this operation.
uPdate	The uPdate action is initiated by pressing the "p" key. With this command, users can change any of the parameters of a broadcast connection. Use the arrow keys to highlight the area to be changed and close the transaction using the "s" (Save) command.
dElete	The dElete action is initiated by pressing the "e" key. Use this command to delete existing broadcast connections. The system will prompt users to delete the circuit, and the "y" key must be pressed to complete the transaction.
pgUp	The pgUp (Page Up) action is initiated by pressing the "u" key. Since the system can handle many different circuits, users may fill the screen allotment for data. New pages will be added automatically to accommodate additional circuits. The page count feature at the top of the screen shows users the current page and the total amount of pages of information. Use this command to scroll up through the pages of cross-connect information.
pgDn	The pgDn (Page Down) action is initiated by pressing the "d" key. This action is similar to the pgUp command. Use this command to scroll down through the pages of cross-connect information.
Main	Pressing "m" (Main) will return users to the cross-connect screen.

3.15.3 Test Access Digroups (TADS)

The Test Access Digroups (TADS) is a remote test access for data cross connects that pass through the system according to publication TR-TSY-00033, Issue #1, June 1986.

A test center can access the system and assign a non-intrusive testing circuit between the unit and the test center via another WAN link. For the purpose of this discussion on Test Access Digroups, the figures show a 64kbps data circuit between Fremont, CA. and Jacksonville, FL. Figure 3-49 shows the cross-connect screen with the data circuits connected.

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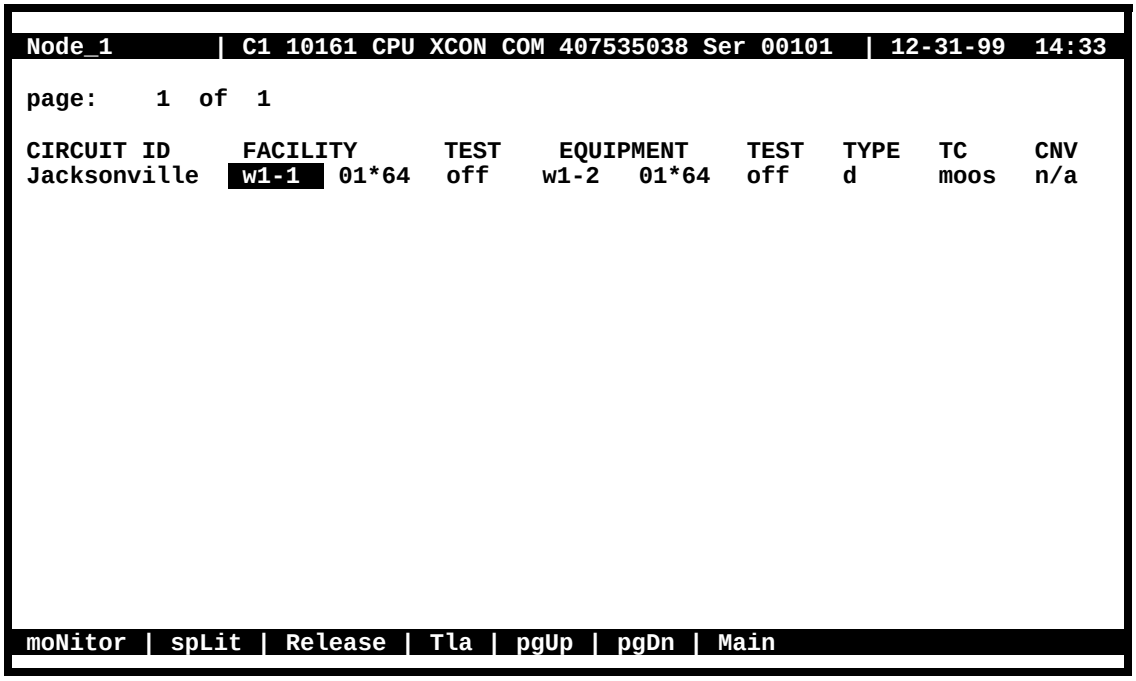


Figure 3-49. The TADS screen

In Figure 3-49, the data circuit called “Jacksonville” is connected on a single time slot between WAN1-1 and WAN1-2.

3.15.4 Monitor Circuit

With the monitor circuit, the data test center (by remote access) creates a “hitless” monitor connection (i.e.,one that can be created, maintained and dropped without affecting the information on the circuit being tested) between the data test center and the Node_1 Device.

Highlighting the desired circuit and pressing the “N” key, brings up the add monitor circuit screen shown in Figure 3-50.

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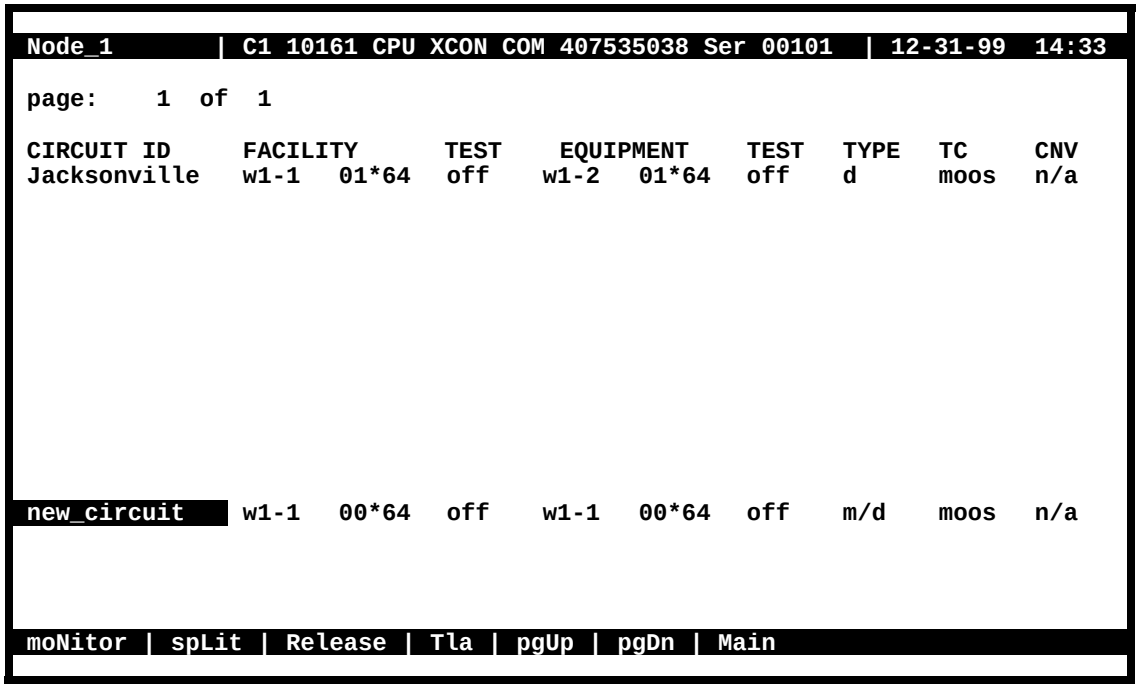


Figure 3-50. The Add Monitor Circuit Screen

Cros connect information is added in a similar fashion to the Add Broadcast screen mentioned previously. Figure 3-51 shows the completed monitor circuit.

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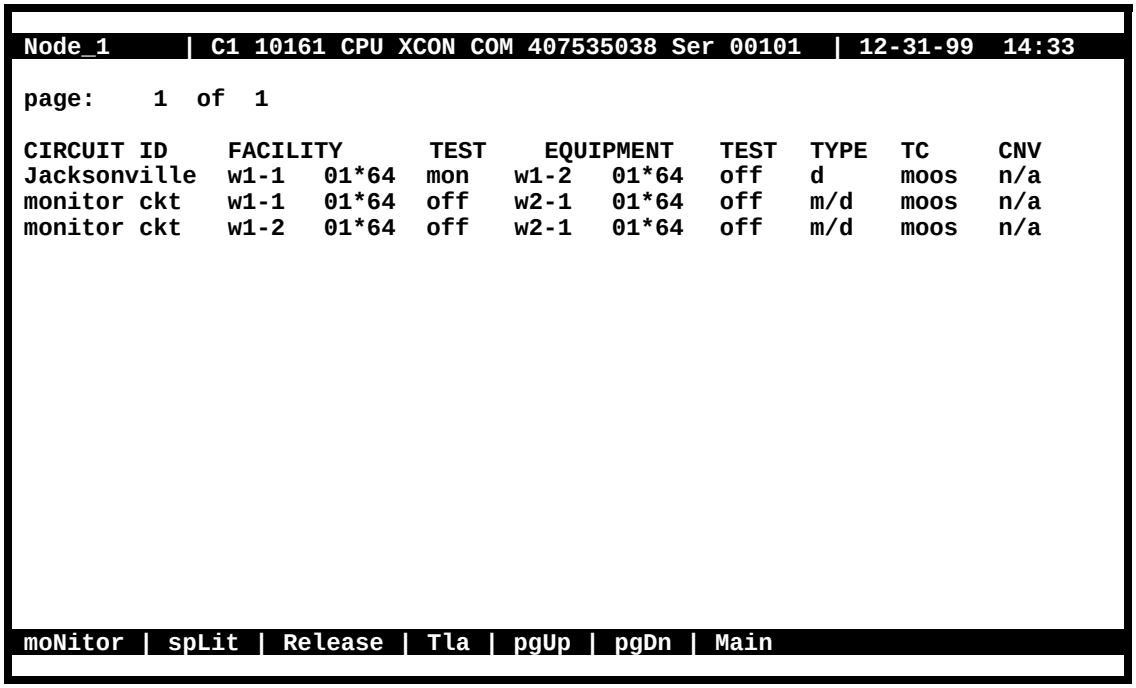


Figure 3-51. Completed Monitor Circuit

Figure 3-52 shows a diagram of how the Monitor circuit splits the original cross connect circuit for testing.

Notice how the test circuit uses two 64kbps WAN time slots, one for the transmit side and one for the receive side of the line.

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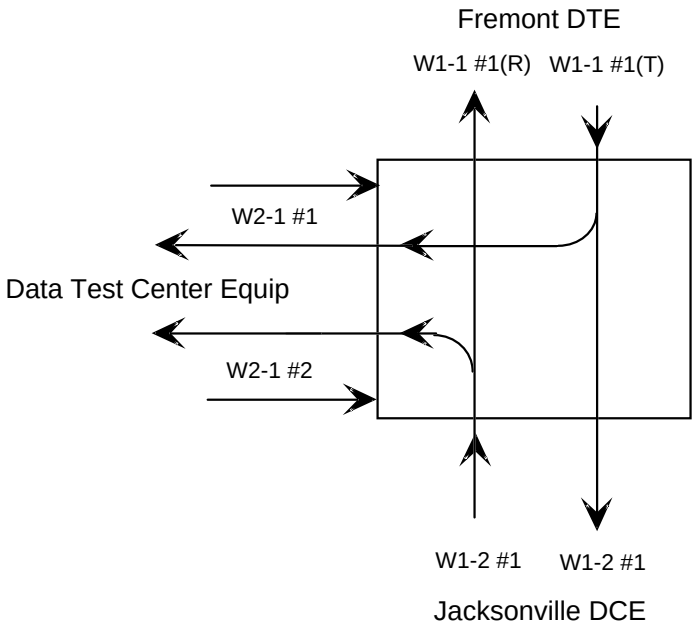


Figure 3-52. Monitor Circuit Diagram

3.15.5 Split Circuit

Pressing the “L” command from the Menu of Actions allows you to split the circuit through the data test center equipment. New circuit information is added in the same way as with the monitor circuit.

With the Split Circuit, the data test center splits the circuit and connects it to their equipment. Unlike the Monior test circuit, the Split test circuit is intrussive and all transmit and receive data must pass through the equipment at the data test center.

Figure 3-53 shows the TADS screen with a split circuit completed. It uses two 64kbps time slots (like the Monitor circuit). Figure 3-54 shows a diagram of the split test circuit.

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```
Node_1        | C1 10161 CPU XCON COM 407535038 Ser 00101  | 12-31-99  14:33

page:    1  of  1

CIRCUIT ID     FACILITY       TEST     EQUIPMENT    TEST   TYPE   TC     CNV
Jacksonville   w1-1   01*64   spl    w1-2   01*64   off    d      moos   n/a
split ckt      w1-1   01*64   off    w2-1   01*64   off    s/d    moos   n/a
split ckt      w1-2   01*64   off    w2-1   01*64   off    s/d    moos   n/a

moNitor | spLit | Release | Tla | pgUp | pgDn | Main
```

Figure 3-53. TADS Screen with Split Circuits

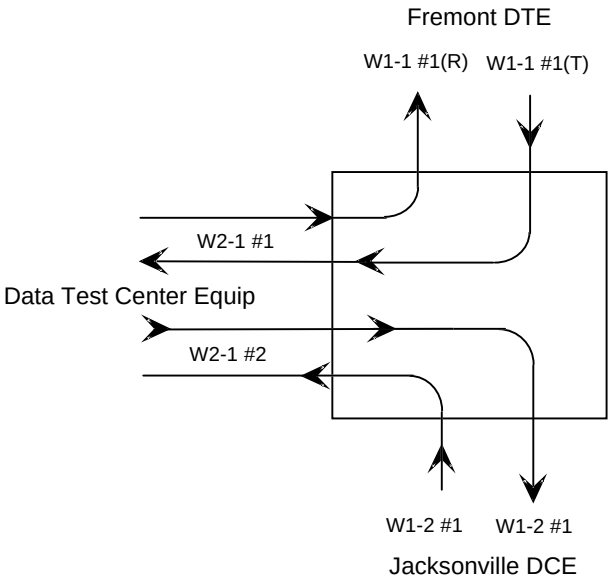


Figure 3-54. Split Circuit Diagram

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3.15.6 Release

Pressing the “R” command allows you to release the circuit from the data test equipment. The system will verify the action desired with a yes/no question.

With the Release Circuit, the Data Test Center removes the connection between the circuit being tested and restores the circuit to its preaccessed state.

Figure 3-55 shows the TADS screen with the release verification.

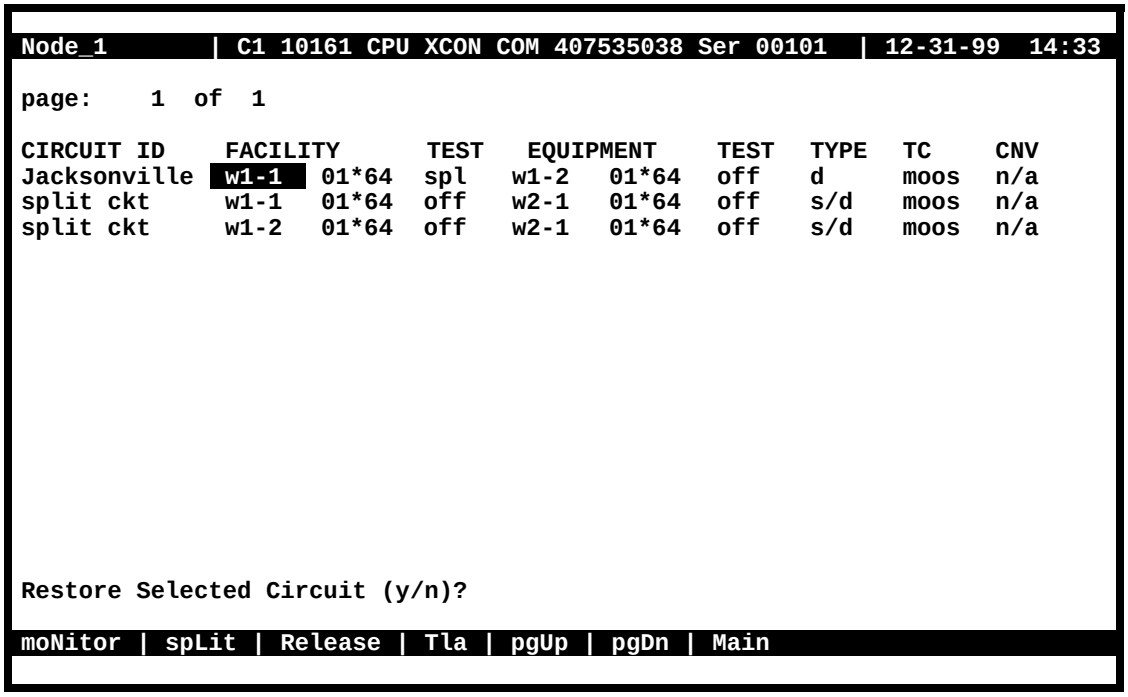


Figure 3-55. TADS Restore Circuit Screen

3.15.7 Terminate and Leave Access

The Terminate and Leave Access (TLA) circuit gives the data test center the capability to termiante one or both directions of transmission on a circuit by inserting an unassigned channel code (01111111) in the outgoing transmission path(s). The TLA feature is useful in circuit provisioning to turn circuits up and down remotely, and in testing multipoint circuits to isolate and remove noisy bridge legs from service.

Figure 3-56 shows the TLA screen with the choice of Monitor (**mon**) or Unassigned Channel Code (uca) to be applied to the highlighted circuit. (If TLA had been applied to a Split circuit, the choices would have been **spl** or **uca**.)

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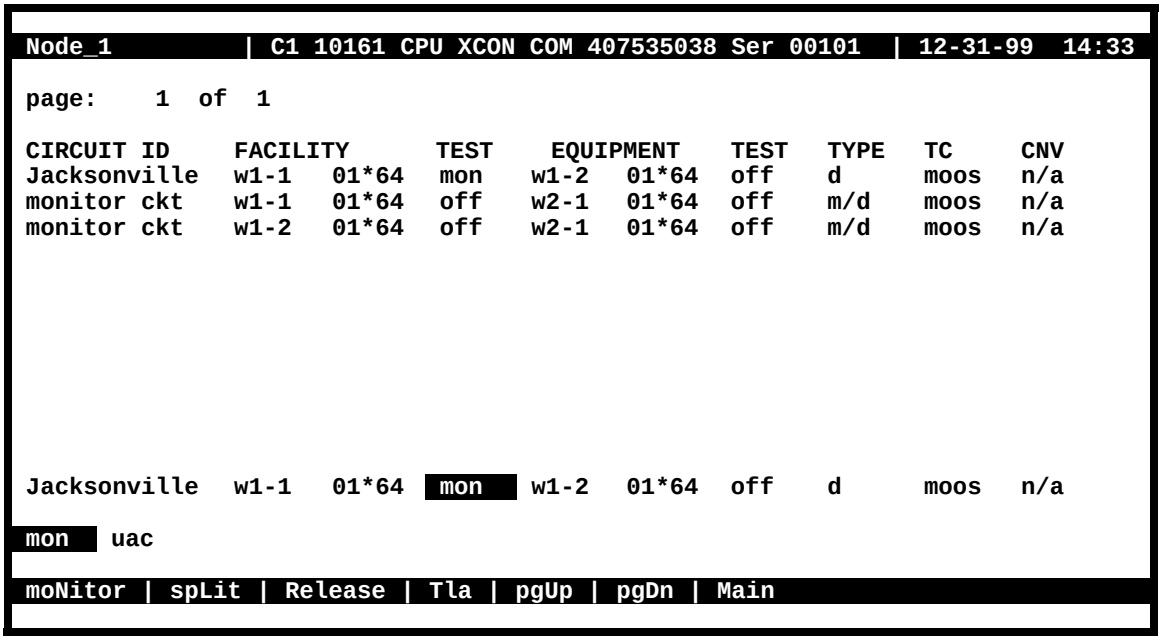


Figure 3-56. TLA Circuit State Screen

Table 3-9. TLA Circuit State Screen Menu of Actions

Action	Funtion
moNitor	The Monitor command allows the user to create a monitor circuit at the WAN interface. See section above.
spLit	The Monitor command allows the user to create a split circuit at the WAN interface. See section above.
Release	The Release command allows the user to release and restore a split circuit or a monitor circuit. See section above.
Tla	The Terminate and Leave Access (TLA) command is the capability to terminate one or both directions of transmission on a circuit. See section above.
pgUp	The pgUp) action is initiated by pressing the "u" key. Since the system can handle many different TADS circuits, you may fill the screen allotment for data. New pages will be added automatically to accommodate additional circuits. Use this command to scroll up through the pages of TADS information.
pgDn	The pgDn (Page Down) action is initiated by pressing the "d" key. This action is similar to the pgUp command. Use this command to scroll down through the pages of cross-connect information.
Main	Pressing "m" (Main) will return you to the cross-connect screen.

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3.16 Signaling and Companding (BCON)

User card ports may or may not have a signaling mode applied to them when assigned to a time slot. Typically, analog voice cards (i.e., E&M, FXO, FXS) will have their analog signaling information converted to digital signaling bits which are then inserted into the digital bitstream. Data card circuits (i.e., HSU, SRU, etc.), on the other hand, do not require the system to perform any signaling processing or conversion.

Unlike DS0s terminating on voice or data cards in the system that will have controlled signaling parameters, circuits that "pass through" your system must have signaling assigned to them by the user. This ensures that the WAN cards either maintain existing signaling patterns as in T1-T1 circuits or change and convert them for circuits going from a T1 to an E1 environment.

In Figure 3-57, time slots 1-8 and 13-18 are connected to user cards and therefore will have signaling automatically turned off or on by the system depending on the type of user ports that are assigned to them. Of the pass-through connections on the other time slots, you can either select signaling or no signaling depending the type of equipment or channel facility on which it is ultimately terminated. For voice circuits, you would probably want to enable signaling, and for data equipment, you would probably want to disable signaling (the default). Further, this screen allows you to request that signaling conversion and/or companding conversion be performed on pass-through circuits.

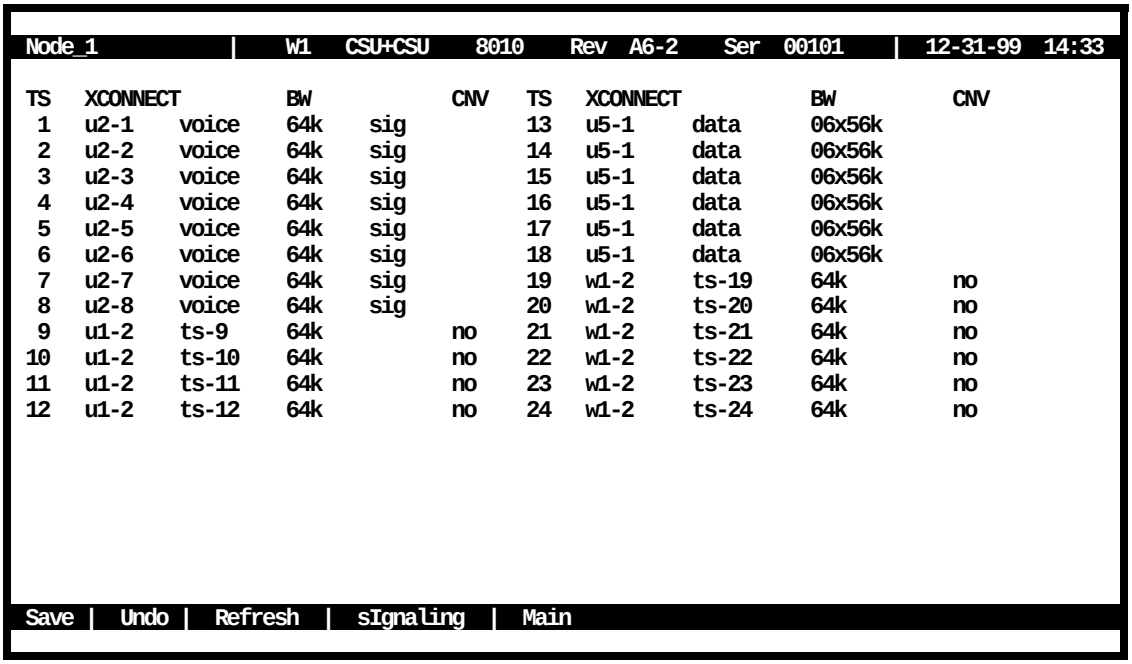


Figure 3-57. WAN Cross-Connect Screen

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To change the signaling and/or companding options of a voice circuit on a WAN card using the drop-and-insert mode, place the cursor over the time slot you wish to change and select I (sIgnaling) from the Menu of Actions. Table 3-10 shows the matrix of choices for the handling of signaling, signaling conversion and companding conversion.

Table 3-10. Signaling and Companding Options

Select Signaling	Select PCM CONV	Select SIG CONV	Select SIG TYPE
yes	none, A-mu, mu-A	none	(no choice)
		ANSI-CCITT, CCITT-ANSI, ABCD-ABAB, ABCD-AB01	e&m, fxs, plar, fxo
no	none, A-mu, mu-A	(no choice)	(no choice)

The first option is Select Signaling. The choices are either **yes** or **no**, depending upon the type of circuit passed through the system (voice or data). *Whichever choice is made, the system will then prompt you to select PCM companding conversion.* The choices for Select PCM CONV are **none**, **A-mu** (A-Law to Mu-Law, E1 to T1 conversion) and **mu-A** (Mu-Law to A-Law, T1 to E1 conversion).

On a normal data service, you would probably choose **no** and **none**. A voice circuit on a T1-T1 "pass through" might require signaling enabled but not converted, so the choices would be **yes** (to pass voice signaling through), and **none** (the PCM does not have to be converted), and **none** (the signaling does not have to be converted).

If, for instance, you have an international voice circuit passed through your system to a North American T1 circuit, you would probably need to have both signaling and PCM conversion converted. Choosing **yes** for Select Signaling will bring up your Select PCM CONV options, followed by a prompt to select the signaling conversion for this circuit.

The first option is default signaling conversion (**none**) where a bit pattern of "0000" will automatically be converted to "0001" in the T1 to CEPT direction.

The second option (**ANSI-CCITT**) will convert the incoming ANSI signaling to CCITT signaling. The third option (**CCITT-ANSI**) converts the incoming CCITT signaling to ANSI signaling. These two options are complementary (i.e. if either one is selected in one direction, the other is automatically selected for the reverse direction).

The fourth option (**ABCD-ABAB**) will convert the incoming CEPT signaling to T1 signaling for an ESF or D4 cross-connect. The fifth option (**ABCD-AB01**) will convert the incoming T1 signaling to CEPT signaling for a ESF or D4 cross-connect. These two options are complementary (i.e. if either one is selected in one direction, the other is automatically selected for the reverse direction).

If signaling conversion is enabled for that circuit, you will then be asked to Select SIG TYPE. The choices are **e&m**, **fxs**, **plar** and **fxo**. After this final choice, the screen updates the signaling and conversion information on that circuit.

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Figure 3-58 shows the WAN card cross-connect screen for a bus-connect system. Time slots 19-24 show all of the possible choices for pass through circuits. The values are **no** (signaling is not passed through and neither PCM nor SIG are converted), **pcm** (signaling is not passed through, PCM is converted, SIG is not converted), **sig-no** (signaling is passed through and there is no PCM or SIG conversion), **sig-sig** (signaling is passed through, PCM is not converted, SIG is converted), **sig-pcm** (signaling is passed through, PCM is converted, SIG is not converted) and **sig-p&s** (signaling is passed through, both PCM and SIG are converted).

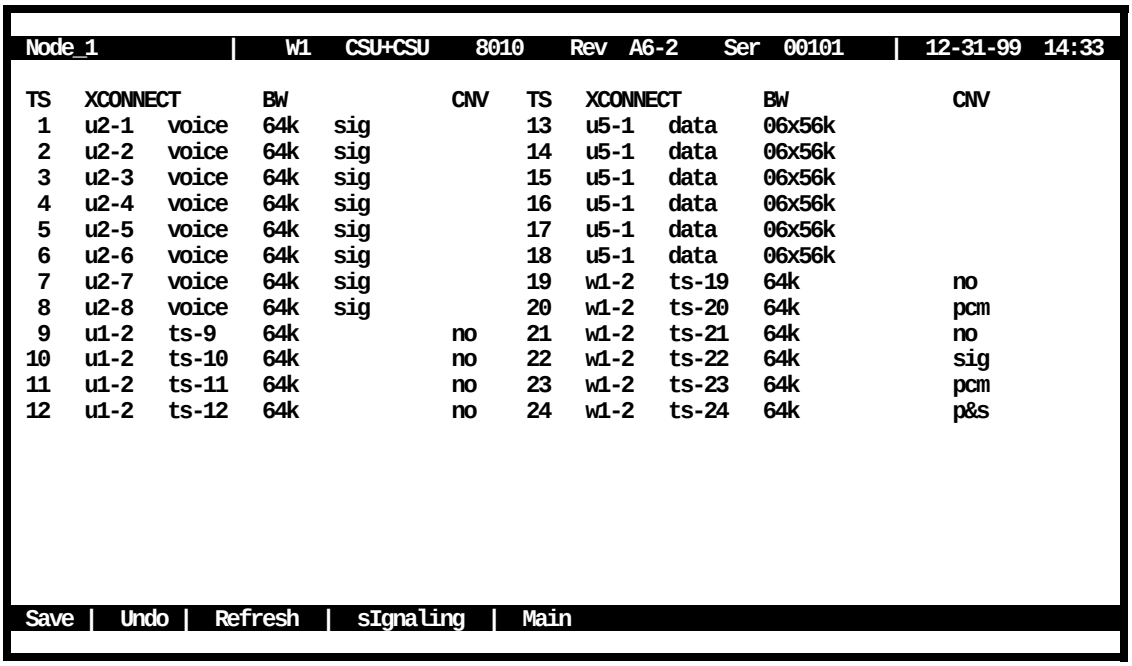


Figure 3-58. Signaling and Companding Options

3.17 Checking the Time Slot Map

Once you select and assign the time slots, you can view the list of DS0 connections (the time slot map) through the WAN card Cross-Connect Screen for cross-connect systems. You can see the results of your assignments in the time slot map as follows:

1. From the Main Screen, select the WAN card in slot W-1.
2. Type <**x**> to bring up the time slot screen (see Figure 3-59 for T1 operation).
3. Selecting <**m**> for Main will return users to the WAN card screen.
4. Selecting <**m**> for Main again will return users to the Main screen.

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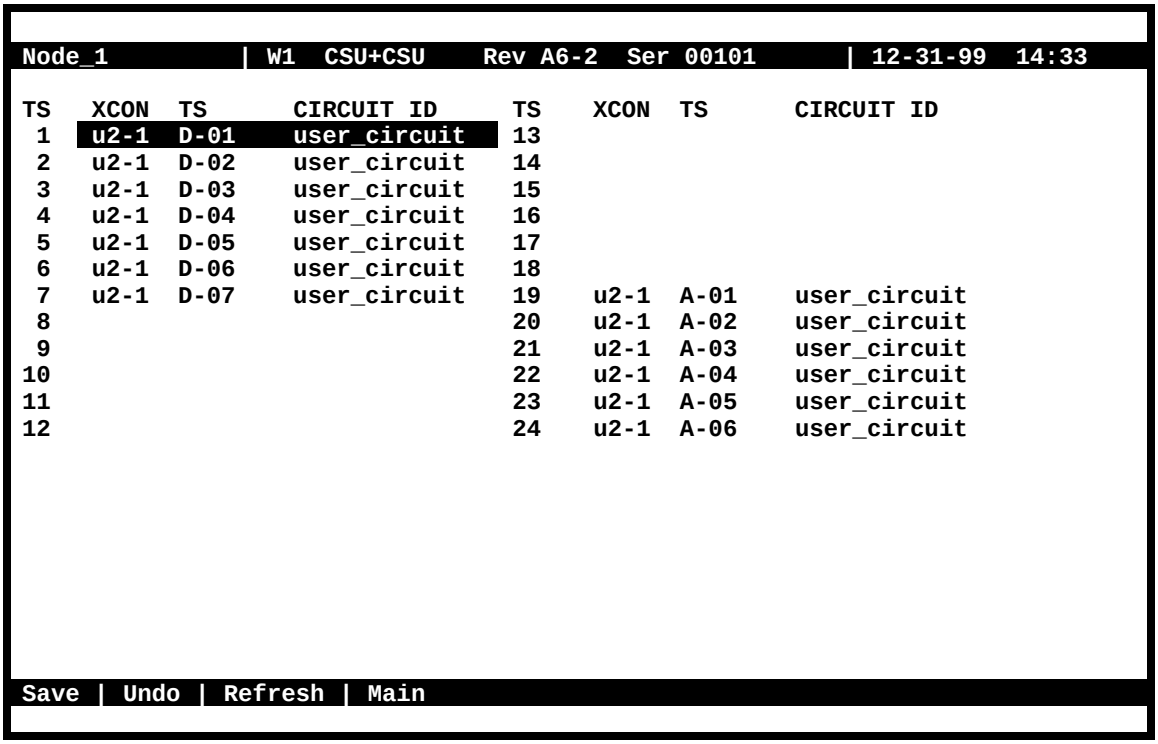


Figure 3-59. Typical Time Slot Screen for T1 Transmission

For E1 transmission (Figure 3-60), time slot 16 will not be available for assignment on either the HSU table or the voice card time slots. Like T1 operation in **d-i** mode, unspecified time slots are **automatically** assigned to corresponding slots on the other WAN port on the same card.

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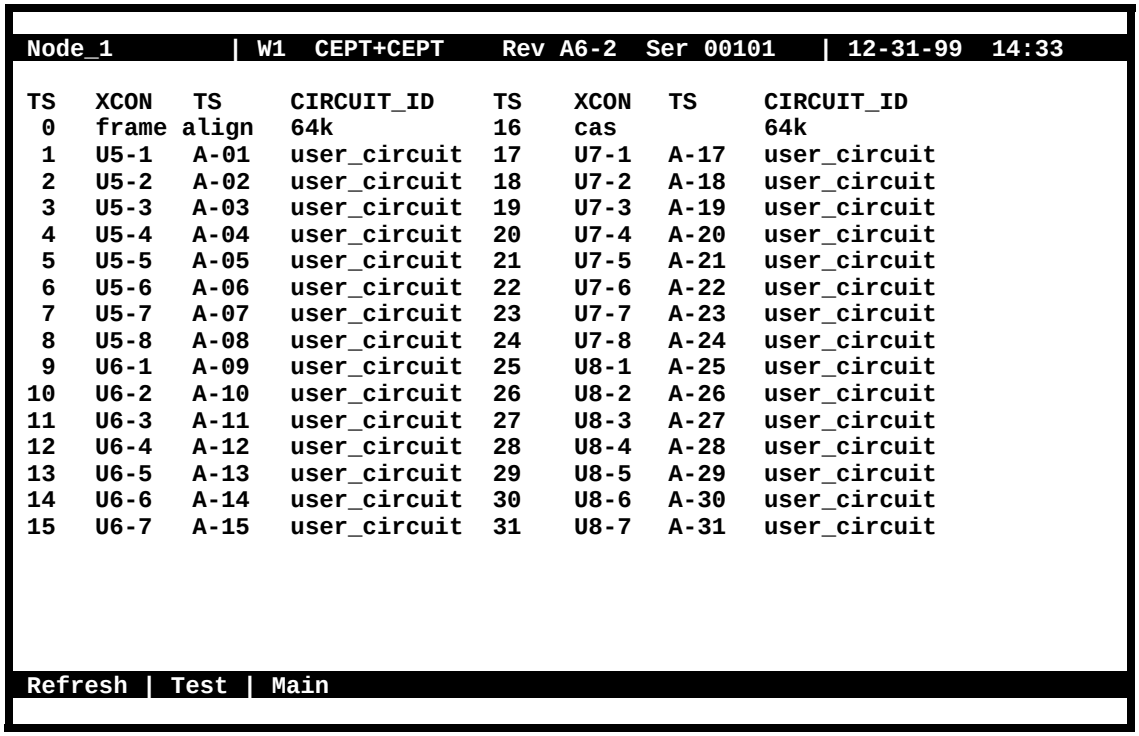


Figure 3-60. Typical Time Slot Screen in E1 Operation

3.18 Recording the Time Slot Configuration

After you set up their initial system configuration and define your time slot map, record this information on paper. Recording the initial configuration in a logical manner will help if you have a problem later.

Record the information in any way that makes sense to you. Also be sure to note the initial settings for each card in copies of the T1 or E1 operation tables provided in Table 3-11 and Table 3-12. Store all initial configuration information in a safe place where anyone needing to service the system can easily find it.

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Table 3-11. Time Slot Recording Form for T1 Operation

WAN Port No. _____ - _____

TS Number	Card Type	Port Number
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

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Table 3-12. Time Slot Recording Form for E1 Operation

WAN Port No. _____ - _____

TS Number	Card Type	Port Number
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		

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3.19 Redundant Operations

This section describes the redundancy features of the integrated access system, and provides instructions for configuring the system with redundant elements.

The integrated access system can be configured with redundant (backup) critical system elements. This feature switches operation from failed components to identical backup replacements, thereby reducing the likelihood of service disruptions.

The four areas of redundant operation are the power system, the CPU card, WAN card, and ADPCM cards. These are described below.

3.20 Power Supply Redundancy

Each power supply component is designed to switch to a backup if a primary unit fails. Also, the defective unit will create a system alarm upon failure, to alert an operator so that the necessary diagnostic and repair work can be initiated. The following power supply components can have redundancy:

- AC Power Supply
- DC Power Supply
- AC/DC Converter
- Ringing generator (master only; see below)

Upon failure, the LED on the AC-DC power converter will be turned off but **will not generate a system alarm** (unless the system is equipped with the ALR 4+3PF Card (External Alarm card).

If the master ringing generator fails, an alarm will be generated and the LED will turn off. If a slave (backup) ringing generator fails, the LED will turn off but no alarm will be generated by the system.

Figure 3-61 shows a System Main Screen with redundant power supplies, in which Power Supply 1 (PS1) has failed. The power supply failure is noted in the alarm message **PS1 OOS** in the upper right corner of the screen.

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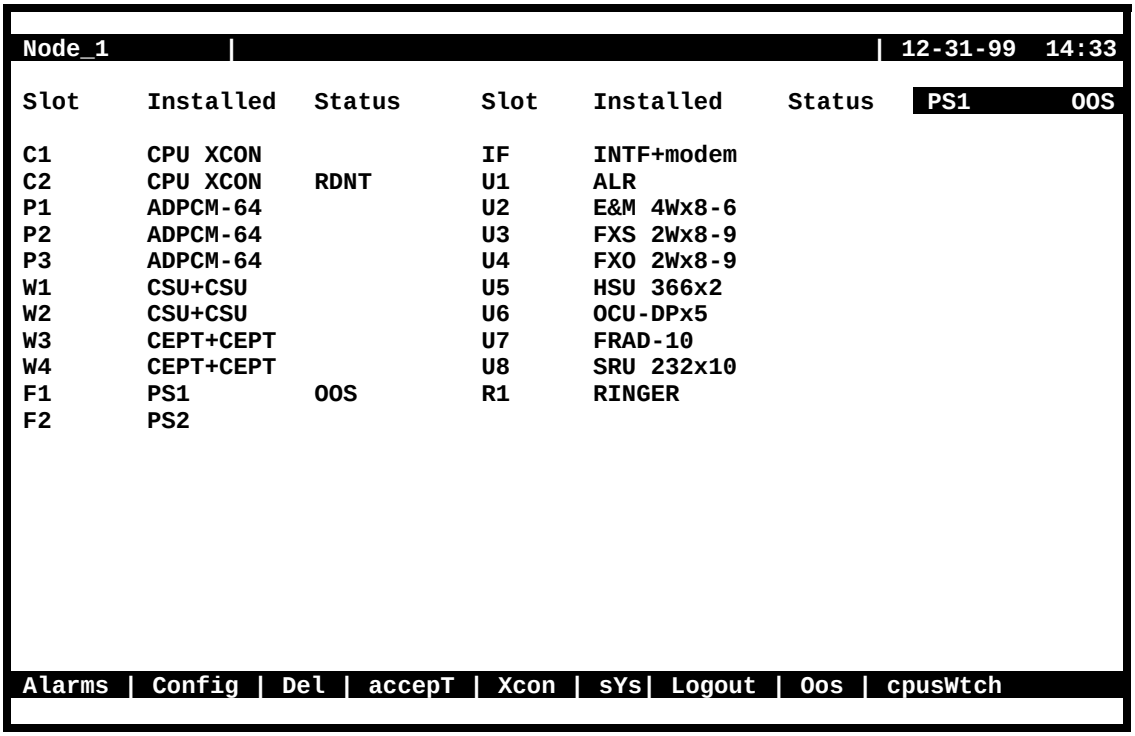


Figure 3-61. Typical Redundant-Power Supply System Main Screen

3.21 CPU Card Redundancy

CPU card redundancy is valuable because the CPU card is essential to system operation. CPU redundancy is supported in both cross-connect and enhanced bus-connect systems using two CPU-3 XCON (8801) or CPU-3 RCON (8804) models respectively. The CPU card in slot C2 will be the redundant card for the CPU RCON card in slot C1, but **only if they are both the same type.**

A switch from one CPU card to the other is triggered by any of the following:

- A software command issued by an operator
- Removal of the active CPU card from the system
- Failure or malfunction of the active CPU card

During a CPU redundancy switch over, disruptions to voice and data traffic are momentary and traffic will recover automatically.

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Figure 3-61 shows a System Main Screen with redundant CPU cards. The card in slot C1 is active, and the card in slot C2 is redundant. To switch operation to the redundant CPU card, press "**w**" to invoke the **cpusWtch** command from the bottom highlighted line of this screen. The system prompts you with a yes/no confirmation prompt, as shown.

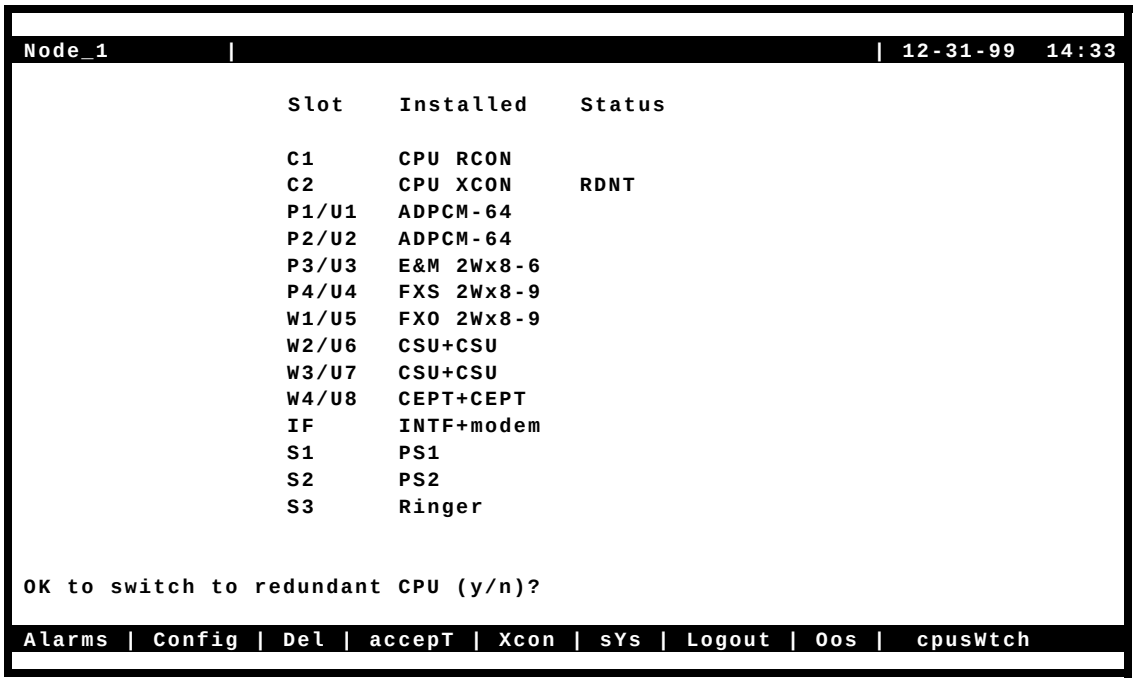


Figure 3-62. Manually Switching to a Redundant CPU

At the prompt, press "**y**". The CPU card in slot C2 is now active, and the CPU card in C1 is redundant (**RDNT** status), as shown in Figure 3-63. These states remain in effect on both cards until you manually switch back to the CPU card in slot C1.

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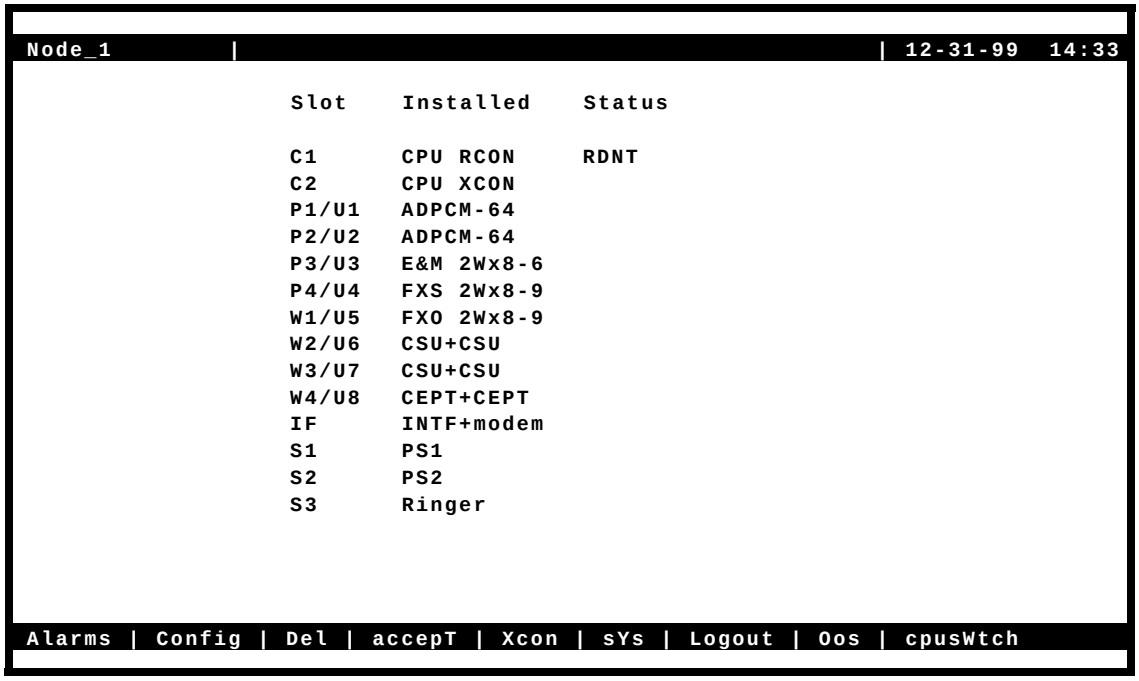


Figure 3-63. Typical System with CPU Switchover Completed

3.22 WAN Card Redundancy

Both T1 and E1 WAN redundancy are supported in enhanced bus-connect systems (Model 8804 CPU RCON) and in cross-connect systems (Model 8801 CPU XCON). It is not supported in the standard bus-connect systems (Model 8800 CPU BCON). WAN redundancy switching can be caused by one of the following:

- A software command issued by the operator
- Removal of the active WAN card from the system
- Failure of the active WAN port or card
- CGA alarm declaration on the active WAN port or card

During a WAN redundancy switch, voice and data traffic are momentarily disrupted, and transmission then recovers automatically.

3.22.1 Enhanced Bus-Connect WAN Redundancy

In enhanced bus-connect systems, a single or dual WAN card that is installed in slot W2 automatically becomes the redundant mate of the WAN card in slot W1. Similarly, a WAN card in slot W4 automatically becomes the redundant mate of the WAN card in slot W1.

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Similary, a WAN card in slot W4 automatically becomes the redundant mate of the WAN card in slot W3. This is known as 1x1 redundancy and a “Y-adapter” (Model 1239) is required to bring the outputs of each pair of WAN ports onto the same facility. The “master” WAN card and its redundant mate must be equipped with the smae mix of DSX, CSU or CEPT modules and those must be placed in the same positions on both cards. If an imcompatible WAN card is installed in a redundant slot, then the system will “reject” that card. If a Dual WAN is used in “termiante” mode, only the failed WAN port will switch to its redundant mate. If the Dual WAN card is programmed for “drop and insert” mode, both ports will switch even if only one has failed.

Figure 3-64 shows a typical System Main Screen with redundant WAN cards. The redundant card slot W4; backs up the WAN cards in slots W1, W2 and W3, respectively. During normal system operation (no switch in progress), the Status of each T1 or E1 port on a WAN card is “**a**” for an active WAN card, or “**r”** for a redundant card.

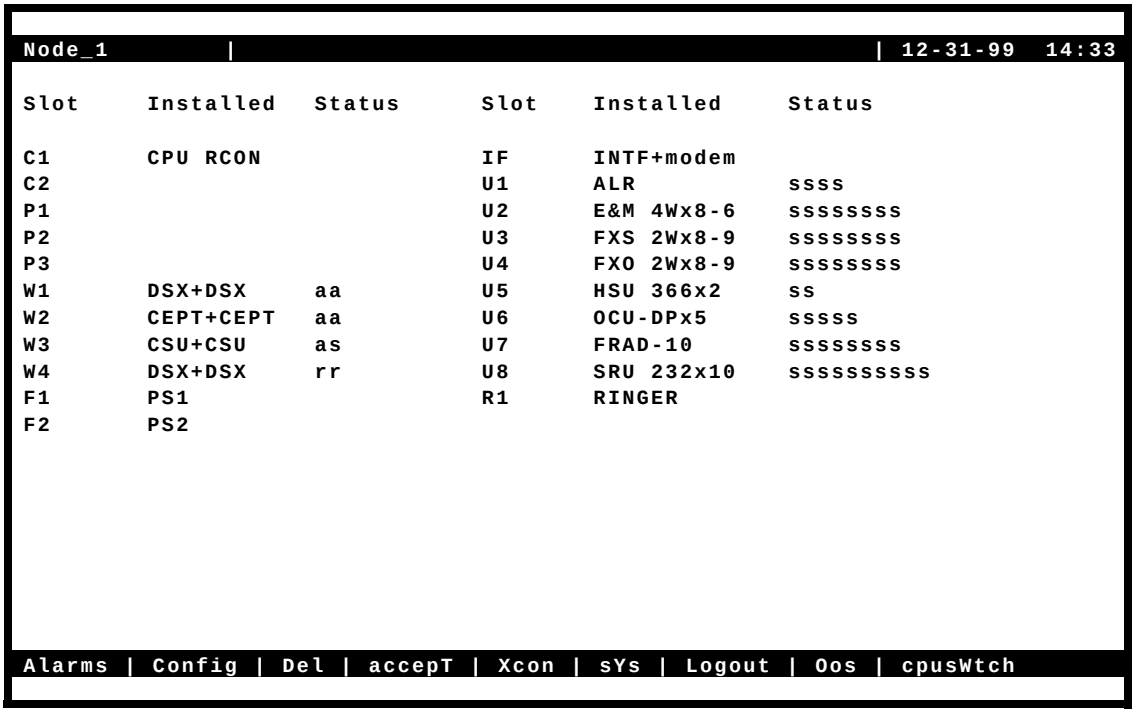


Figure 3-64. Typical RCON System with Redundant WAN Cards

Figure 3-65 shows the System Main Screen after the switch to the redundant WAN card is completed on the selected port. In this case, a switch was made from port 1 of the WAN card in slot W1 to port 1 of the redundant WAN card in slot W2. However, port 2 of the card in slot W1 was not switched. Therefore, the Status of the two ports on slot W1 is **ra** (1 = redundant, 2 = active), and the Status of the two ports on slot W2 is **ar** (1 = active, 2 = redundant).

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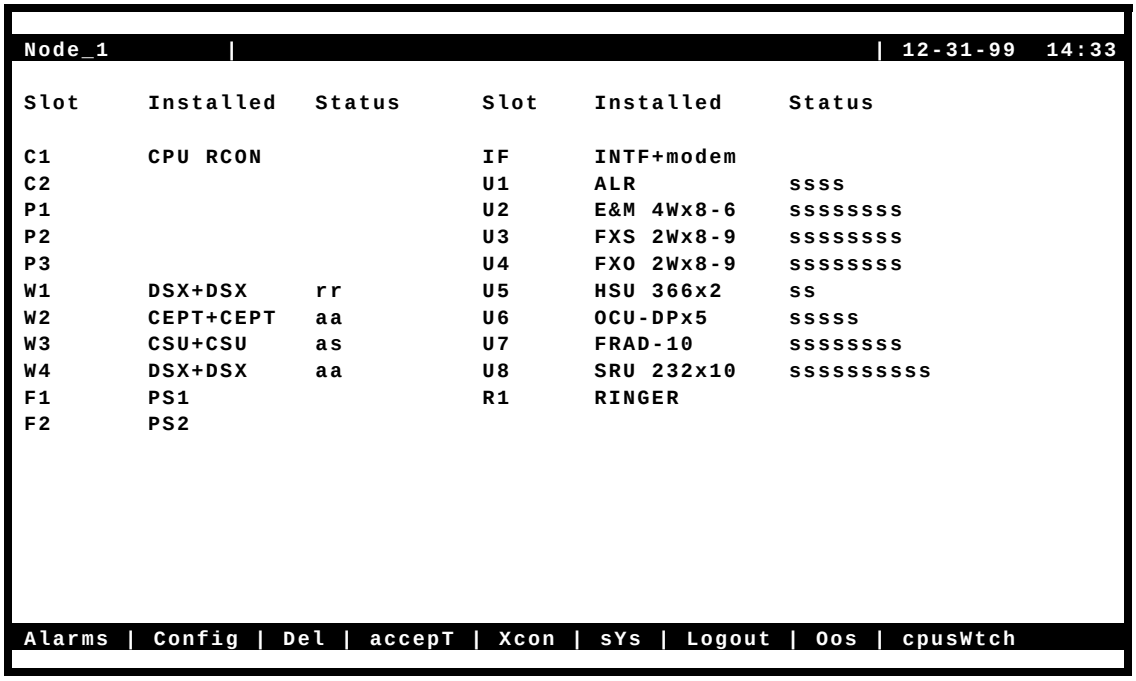


Figure 3-65. Typical WAN Port Redundancy Switch in CPU RCON System

3.22.2 Cross-Connect WAN Card Redundancy Switching

In cross-connect systems, WAN redundancy requires a WAN-R DUAL card in slot W4 (as marked on its faceplate ejector). This card becomes a redundant card for the WAN cards in slots W1 through W3 if it is equipped with matching DSX/CEPT, CSU, or HDSL modules, and if those modules are installed in the same positions on both WAN cards. This protection scheme is known as 1-in-N redundancy. When a switch occurs, a relay on the WAN-R card switches the output of that card to the corresponding pins on the WAN connector of the Interface card.

The following restrictions apply to cross-connect WAN redundancy:

You must install the WAN-R card in slot W4 for redundancy. If you install it in slot W1, W2 or W3, it will work only as a standard WAN card with two ports.

If the plug-in modules on the WAN-R card do not match those on a card in slot W1, W2, or W3, the WAN-R card will not behave as a backup for that active WAN card. The system will not reject the card, but it will not switch even if the active WAN card fails.

If a standard WAN card is in slot W4, the system does not support WAN redundancy.

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In cross-connect systems, switching always occur on both ports of a WAN card. Therefore, both ports of all active WAN cards must have the same plug-in modules as the redundant-card ports.

Figure 3-66 shows a System Main Screen for a cross-connect system with WAN card redundancy. In this example, the CSU ports of the WAN cards in slots W1, W2, and W3 are backed up by the CSU ports of the WAN card in slot W4. The redundant WAN card in slot W4 takes over for the first active WAN card that fails.

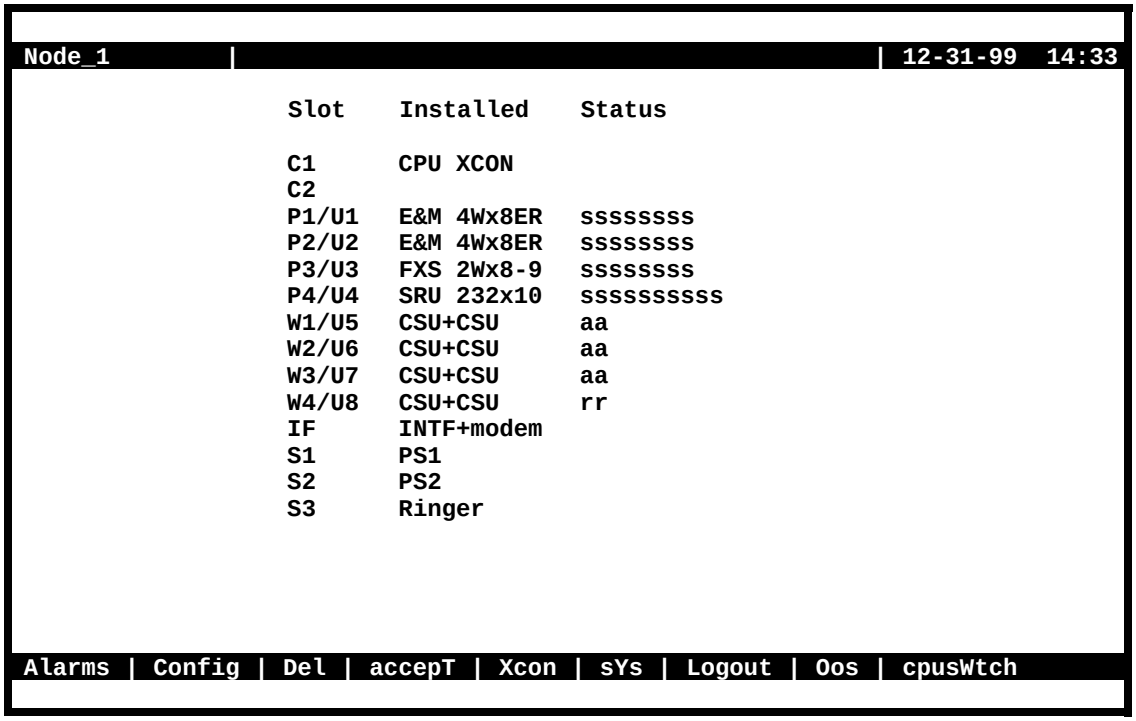


Figure 3-66. Typical Cross-Connect System with WAN Card Redundancy

Figure 3-66 shows a WAN Card Main Screen for the card in slot W1 with port 1-1 selected. To force a switch, press "**w**" (**sWitch** command), then press "**y**" to complete the switch. The traffic on the WAN card in slot W1 will be switched to the WAN-R card in slot W4. The Main System Screen (see Figure 3-67) now shows both ports of the card in slot W4 as active port (Status = **aa**) and the ports on the card in slot W1 as redundant (Status = **rr**).

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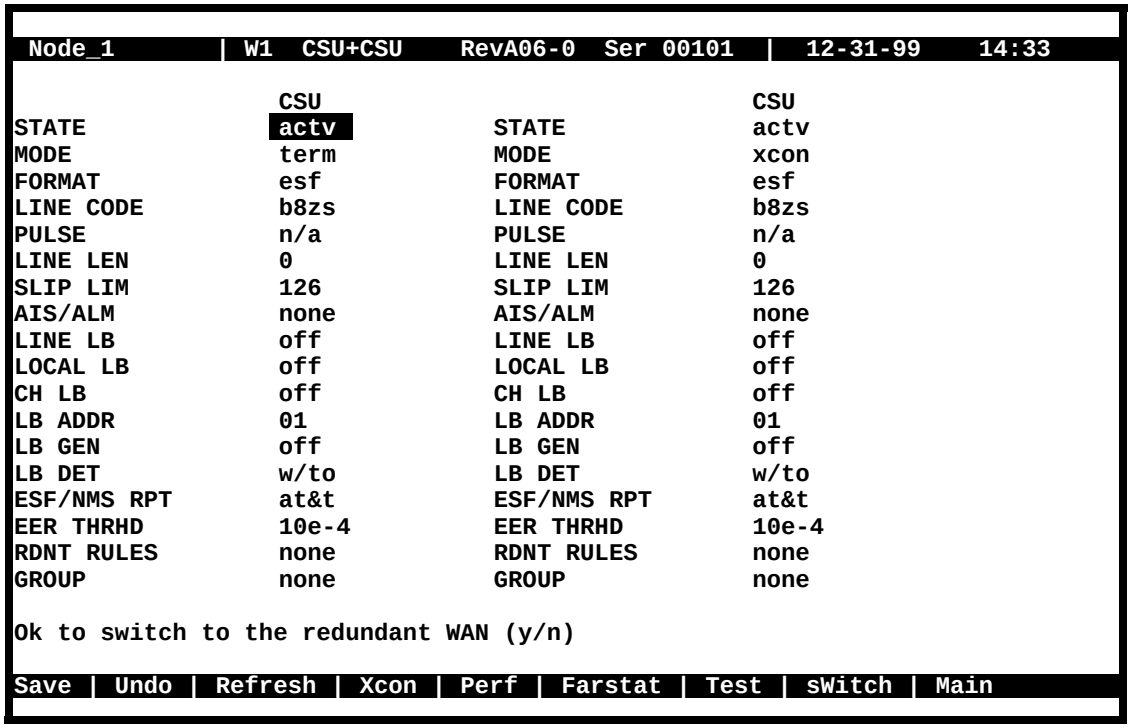


Figure 3-67. Switching to a Redundant Cross-Connect WAN Card

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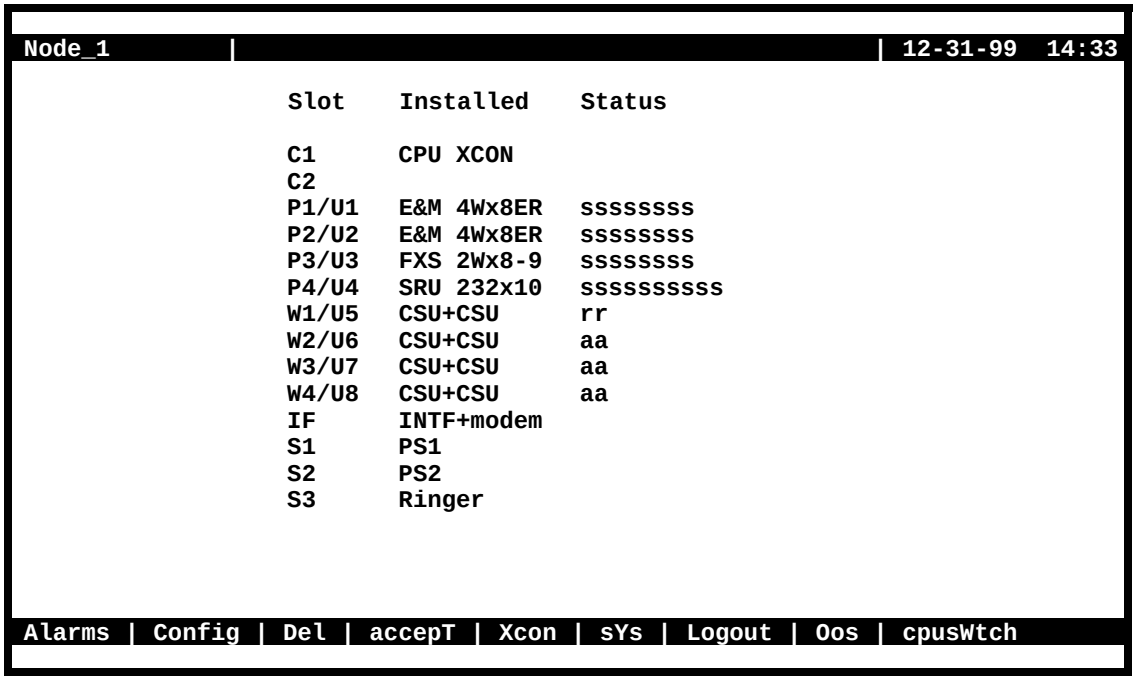


Figure 3-68. Typical Cross-Connect WAN Card Redundancy Switch in Progress

3.23 ADPCM Card Redundancy

The integrated access system can also have ADPCM cards, which use voice compression technology to effectively increase the digital voice transmission capabilities of voice cards (E&M, FXS, or FXO) or WAN links. See Server Card Reference Guide for more information on the ADPCM card.

Each system can have up three ADPCM cards in slots P1 through P3, depending on slot availability. In systems with two or three ADPCM cards, any of those cards can be selected as the redundant (backup) card. There are no restrictions on chassis slot order.

Figure 3-69 shows a system with three ADPCM cards. The ADPCM card in slot P1 is highlighted. Pressing <Enter> will bring up the ADPCM Main Screen shown in Figure 3-70.

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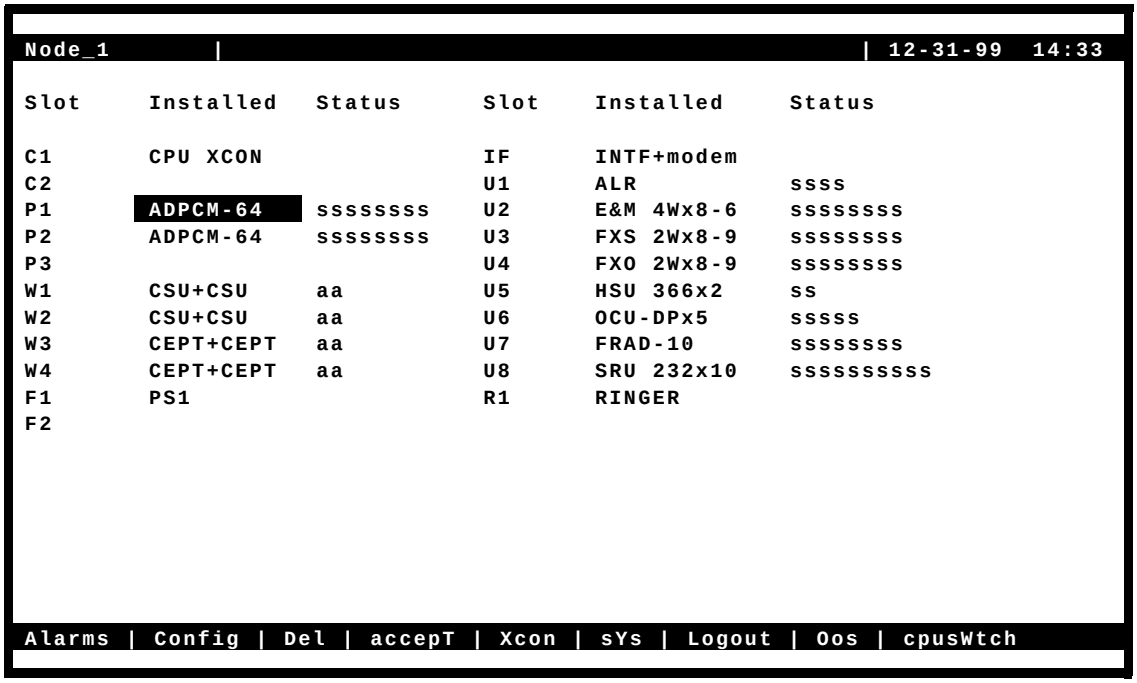


Figure 3-69. Typical System with Redundant ADPCM Cards

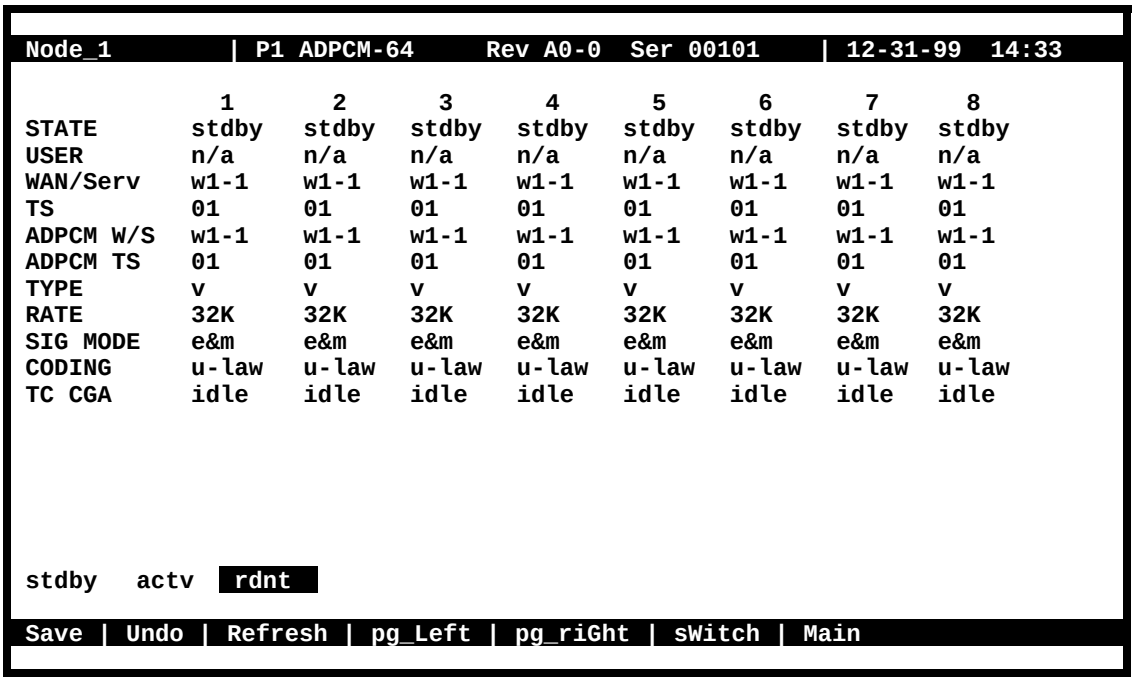


Figure 3-70. Typical ADPCM Card Main Screen

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To choose a redundant ADPCM card for the system, proceed as follows:

1. Go to the System Main Screen (if you are not already there).

2. Select the desired ADPCM card from the System Main Screen, and press <Enter> to go to the Main Screen of that card. Figure 3-70 shows the card in slot P1 is chosen.

3. Highlight the STATE parameter of any ADPCM port on the card, and press the <Enter> key. This changes the STATE setting to **rdnt**. The entire ADPCM card now becomes the redundant ADPCM card for the system.

The System Main Screen now looks like Figure 3-71. The status of all ADPCM ports of the card in slot P1 is "**r**".

```
Node_1          |                                          | 12-31-99  14:33

Slot     Installed   Status      Slot    Installed     Status

C1       CPU XCON                IF      INTF+modem
C2                               U1      ALR           ssss
P1       ADPCM-64    rrrrrrrr    U2      E&M 4Wx8-6    ssssssss
P2       ADPCM-64    ssssssss    U3      FXS 2Wx8-9    ssssssss
P3       ADPCM-64    ssssssss    U4      FXO 2Wx8-9    ssssssss
W1       CSU+CSU     aa          U5      HSU 366x2     ss
W2       CSU+CSU     aa          U6      OCU-DPx5      sssss
W3       CEPT+CEPT   aa          U7      FRAD-10       ssssssss
W4       CEPT+CEPT   aa          U8      SRU 232x10    sssssssss
F1       PS1                     R1      RINGER
F2

Alarms | Config | Del | accepT | Xcon | sYs | Logout | Oos | cpusWtch
```

Figure 3-71. Typical ADPCM Card Redundancy Switch in Progress

If the card in slot P2 or P3 fails, the entire voice compression network will switch to the redundant card in slot P1. When the Out of Service condition is repaired, the ADPCM card in the slot that previously failed becomes the redundant card for the system.

The system does not require any ADPCM cards to be redundant. All three slots (P1 to P3) can be used for normal traffic on ADPCM voice networks.

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Chapter 4
CPU Card

4.1 Introduction

4.2 CPU-3 XCON (880120 / 880121 / 880022 / 880160)

The CPU-3 XCON card controls the integrated access system. It performs the following functions:

- Initializes the system upon power-up, and runs a self-test on all cards plugged into the chassis at that time.
- Polls all cards in the system every second to determine their operating status.
- Processes all incoming operator commands and displays the responses in a series of operator interface screens for each card in the system. The operator interface system (local VT-100 terminal, remote computer, or network management system) connects to the Interface card, which sends these commands to the CPU card for processing. The Interface card is described in Chapter 5 of this manual.
- Includes circuitry that allows you to cross-connect DS0 time slots between T1 and E1 lines connected to the system WAN cards. Refer to the DS0 time slot assignment operations.
- Includes a test pattern generator for T1 and E1 line test purposes.
- Performs master-slave CPU arbitration. In a system with redundant CPU cards, the two CPU cards communicate their status to each other. If the master CPU card fails, the redundant card takes over and becomes the master.

4.2.1 Card Jumper/Switch Settings

This card does not have any on-board jumpers. The CPU-3 XCON Card has no jumper or switch settings.

4.2.1.1 Card External Connectors and Pinouts

This card does not have any external connectors.

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4.2.1.2 Installing the Card

Install the CPU-3 card into slot C1 of the system chassis. If your system will use redundant CPU cards, also install another identical card into slot C2. The card in slot C1 will be the master, and the card in slot C2 will be the slave.

4.3 CPU Card User Screens and Settings

The CPU card has several user interface screens for card configuration and network status viewing purposes. These screens are described in the remainder of this chapter.

4.3.1 Main Screen

Figure 1shows the CPU Card Main Screen. You must configure the CPU card after logging into the system for the first time. To view this screen, highlight the desired CPU card in the System Main Screen and press <Enter>.

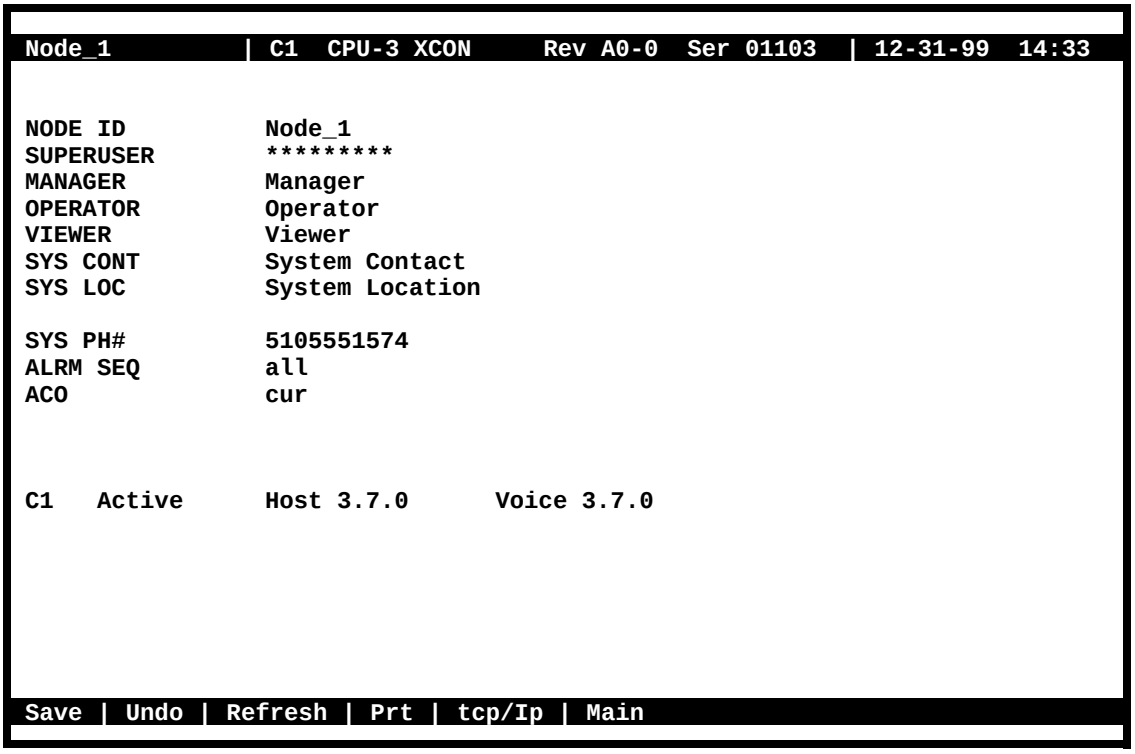


Figure 4-1. CPU Card Main Screen

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The CPU card has numerous settings that you must configure. The System Main Screen displays the status of each CPU card (active or redundant), the type of card installed, and the voice and host software versions currently installed on that card. The settings are described in the next few sections of this chapter.

The bottom highlighted line of the above screen shows a series of actions you can perform in this menu. To perform an action, press the letter key associated with the capital letter of the desired action. For example, to save your card option settings after making them, press "**s**" to invoke the **Save** command. Table 4-1 lists and describes these actions.

Table 4-1. CPU Card Main Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e. performance and test data).
Prt	Allows the user to print alarms to a remote device through the modem and/or the DB-9 computer port on the Interface Card. Refer to the "Printing Alarms Remotely" section later in this chapter.
tcp/Ip	Allows the system to communicate with a Network Management System via SNMP or TELNET. Information can be transmitted locally via the DB-9 connector on the Interface card or over a WAN link (either DS0 or FDL) to the NMS. This card records statistics for a variety of network functions. Refer to the "TCP/IP Network Management" section later in this chapter.
Main	Returns you to the System Main Screen. If you made changes to any card settings but did not save them yet, you will be prompted to save or lose those changes before exiting.

4.3.1.1 Changing Your Passwords

You may want to change your system access passwords frequently, in order to maintain optimum security on your network. The best passwords are at least 6 and no more than 12 characters long, are not found in a dictionary, and contain both letters and numbers. Because the system is case-sensitive for password entries, you can mix upper-case and lower-case letters to provide more possible passwords.

The system provides three editable passwords. Each represents a different level of access that allows an operator to perform certain tasks on the system after logging in.

To change a password, first log into the system under the **Manager** access level password, then choose the CPU card from the System Main Screen. Then, in the CPU Card Main Screen (1Figure 4-1), highlight the password you want to change, press the <Enter> key, type the new password over the current one, and press <Enter> again. Finally, make sure the new password appears as you want (remember that passwords are case-sensitive), and save your changes.

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SUPERUSER

The "Superuser" password level is reserved for use only by factory personnel. You cannot edit this password.

MANAGER, OPERATOR, AND VIEWER

The other three passwords are called "Manager," "Operator" and "Viewer.” Each password can have up to 14 characters (letters and numbers only). All three passwords are case-sensitive.

4.3.1.2 Other CPU Card Settings

You also must set the additional card parameters described below in the CPU Card Main Screen. Most of these are user-defined alphanumeric entries. To make new entries in these fields, first press <Enter> to highlight the current entry in the lower left of the screen. Then, type the new data on the keyboard. If you make a mistake, press either the backspace or <Delete> key to back up the cursor and erase the incorrect characters. Then, retype the correct characters. Finally, press <Enter> again to store the new entry in the field.

NODE ID

In this field, enter a 14-character node name for the integrated access system. This entry must be unique for each system in your network. It can have alphanumeric characters and spaces.

SYS CONT

In this field, enter the name of a person to contact for questions about the integrated access system. This field can have up to 23 alphanumeric characters, including spaces. For convenience, use the system administrator’s name in this field.

SYS LOC

In this field, specify the location of the integrated access system. This field can have up to 23 alphanumeric characters, including spaces.

SYS PH#

Type the phone number of the integrated access system in this field. This phone number is used by a remote operator to access the system for a VT-100 session, via either ISDN D-channel dialing or a remote terminal system. You can enter up to 10 numeric characters in this field. However, do not include any dashes in this entry.

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ALRM SEQ

The Alarm Sequence setting establishes how the sequence number for alarms is generated. Set this option to **all** if you want any alarm generated by the system to be assigned a sequence number. Or, set this field to **report** if you want only the alarms set to **report** to have sequence numbers.

ACO

The Alarm Cutoff (ACO) option reports a status to you based on the **latch** (condition held) or **cur** (current condition) setting.

4.3.2 Printing Alarms Remotely

Integrated access systems are typically placed in unattended locations (equipment closets, etc.). If nobody is present to detect alarms that might occur, a system administrators has no way of knowing whether or not the system is working properly.

The basic solution to this network management problem is the Print Alarm feature. Each system unit can be programmed to call a predetermined telephone number at specific intervals and report the presence of selected system alarms. Alarms are chosen to print remotely by selecting the **Report** option in the alarm filters.

You can use either an external modem or the internal modem (2.4 kbps) on many of the Interface cards to send system alarms to a remote logging device, such as a printer or personal computer. If using the internal modem, the remote device should be connected to a V.22bis 2.4 kbps asynchronous modem set to auto-answer mode, eight data bits, one stop bit, and no parity. When the modem is connected to the remote logging device answers, the system sends the alarm messages as a string of ASCII characters formatted with carriage returns and line feeds, then hangs up the call. More information on this process can be found later in this chapter.

A network administrator can also call the phone number associated with the system modem and initiate a two-way, interactive VT100 session with the system to determine the nature of the problem and dispatch technicians if necessary.

Another Network Management solution is the TCP/IP feature discussed later in this chapter. Note that **if the TCP/IP network management system is active, the Print Alarm feature will not operate.**

Using the TCP/IP feature automatically converts alarm messages into SNMP traps for forwarding to downstream NMS equipment.

Figure 4-2 shows the CPU Print Alarm Screen. To get to this screen, press "**p**" in the CPU Card Main Screen to choose the **Prt** command

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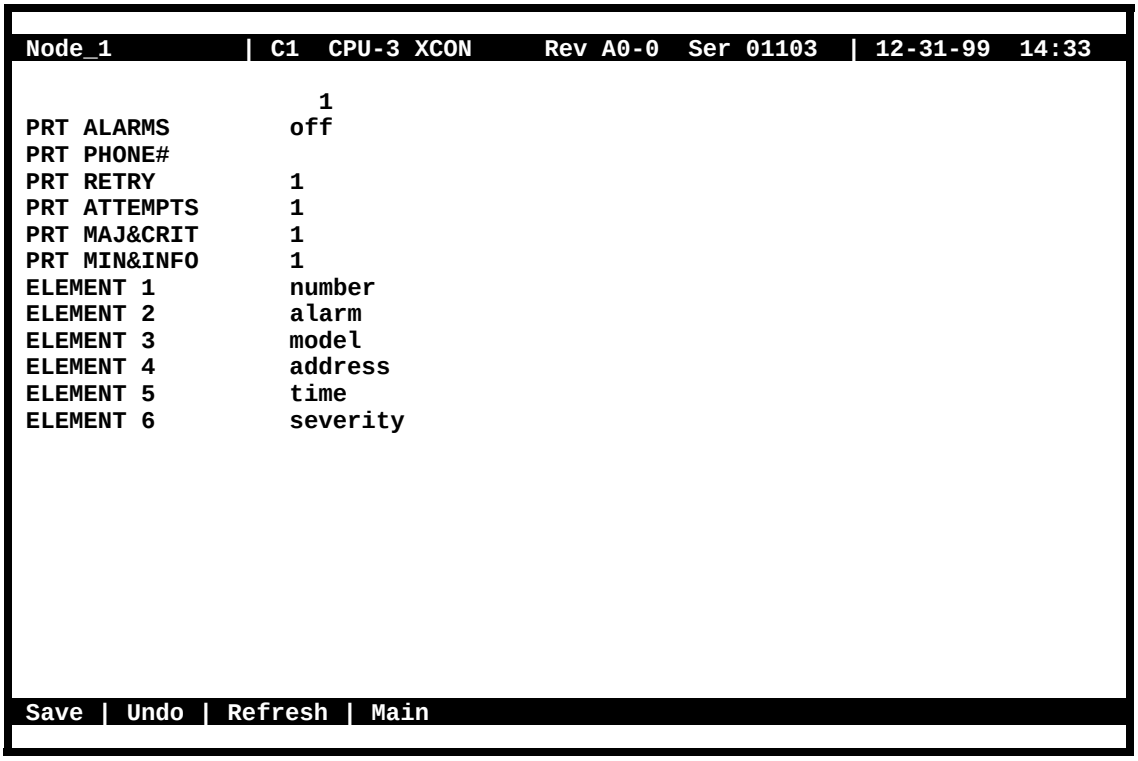


Figure 4-2. Typical CPU Print Alarm Screen

Table 4-2 lists the operations that can be performed from the Print Alarm Screen above. These appear on the highlighted line at the bottom of the screen.

Table 4-2. Print Alarm Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Used on Monitoring Screens to update statistics, and on other screens to redraw them.
Main	Returns to the CPU Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 4-3 summarizes the option settings for the CPU Print Alarm Screen. These settings are also described in the following paragraphs.

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Table 4-3. Print Alarm Screen Options and Defaults

Parameter	User Options	Notes	Default
PRT ALARMS	off direct modem	1	off
PRT Phone#	telephone number (up to 14 numbers)		
PRT RETRY	1 to 60		1
PRT ATTEMPTS	1 to 99		1
PRT MAJ&CRIT	1 to 500		1
PRT MIN&INFO	1 to 32000		1
ELEMENT 1	alarm number model address time severity empty	2	number
ELEMENT 2	alarm number model address time severity empty	2	alarm
ELEMENT 3	alarm number model address time severity empty	2	model
ELEMENT 4	alarm number model address time severity empty	2	address
ELEMENT 5	alarm number model address time severity empty	2	time
ELEMENT 6	alarm number model address time severity empty	2	severity

Notes:

1. The Print Alarms option must be **off** if TCP/IP is **on**.

2. The choice of “empty” will eliminate that element from the NMS report.

PRT ALARMS

The Print Alarms option allows you to choose a remote device for alarm condition reporting. The system uses the modem (if present) on the Interface card to call a remote device or Network Management System. The system sends the alarm information for all alarm filters set to **Report**.

Set the Print Alarms setting to **off** to disable all external alarm-generated messages. Choose **direct** to send all alarms reported since the last report cycle to a local device through the DB-9 computer port of the Interface card. The **modem** setting sends all alarms reported since the last report cycle to a remote dial-up device through the modem port.

The remote device may be any asynchronous ASCII device that can accept lines of text up to 80 characters long. It must support XON/XOFF flow control and be capable of attaching to an asynchronous dial-up modem. Figure 4-3 3shows an OOS alarm reported to a remote device.

The remote device’s modem must be compatible with CCITT V.22bis and support connections at 2.4 kbps. Set the remote modem for auto-answer mode. **Both the remote device and modem should be set for 8 data bits, 1 stop bit and no parity.**

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PRT PHONE#

The Print Phone Number field shows the number the modem dials to report alarms to the remote device. This number can be up to 14 digits long.

PRT RETRY

The Print Retry field specifies the amount of time the system will wait between attempts to redial the remote device. The retry interval can be from **1** to **60** minutes.

PRT ATTEMPTS

The Print Attempts field is the maximum number of times the system will try to contact the remote device before giving up. The number of attempts can be from **1** to **99**.

PRT, MAJ&CRIT

The Print Major field specifies the maximum amount of time the system will wait from the occurrence of a major alarm until it places a call to the external device to report it. This interval cycle can be from **1** to **500** seconds. All alarm reports designated as **Major** will be reported at that time. For example, if you specify an interval cycle of 5 minutes (300 seconds), every major alarm occurring during that interval will be reported at the end of that cycle.

The Print Major and Critical interval cycle starts from the most recent of:

1. The end of the last Major alarm cycle (if no alarms occur).

2. When parameters are saved using the Save command from the Menu of Actions.

3. 40 seconds after the last alarm message is reported.

PRT MIN&INFO

The Print Minor field is the maximum time the system will wait from the occurrence of a minor alarm until it places a call to the remote device to report it. This interval cycle can be from **1** to **32,000** seconds. All alarm reports designated as **Minor** will be reported at that time. For example, if you specify an interval cycle of 60 minutes (3600 seconds), every minor alarm that occurs during that interval will be reported at the end of that cycle.

The Print Minor interval cycle starts from the most recent of any of the following:

1. The end of the last Minor alarm cycle (if no alarms occur).

2. When parameters are saved via the **Save** command from the Menu of Actions.

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3. Forty (40) seconds after the last alarm message is reported.

When the specified interval cycle for major or minor alarms is reached, the system will send a list of the accumulated alarms sorted by the elements below. To avoid congestion, alarm reporting is limited at the remote device or Network Management System to the first 40 lines of non-reported alarms. The system will then wait 40 seconds and send the next 40 lines, and continue sending in that fashion (i.e., send 40 lines, wait 40 seconds) until it finishes the entire list of non-reported alarms. The next interval cycle starts 40 seconds after the last alarm message is reported.

ELEMENT 1-6

The Element 1 through Element 6 fields show the six alarm configuration elements (**alarm**, **model**, **address**, **time**, **severity**, **number**, and **empty**). These elements can be arranged in any user-defined order. For instance, one user may want the order of the alarm configuration to be severity, time, model, address, alarm, and number, while another user could want the sequence to be model, time, alarm, address severity, and number. Use the six Element fields to order these variables as required.

Figure 4-3 shows a typical remote printout of alarms reported by an integrated access server. In this example, the Node Name (NO) is "Node_1," the Acknowledgment Number (AK) is 7, the Alarm Number (NU) is 38. This is an Out of Service alarm (AL = OOS); it was reported by a Model (ML) 8840 Card in chassis slot P2 (UN = P2). The alarm began on 3/20/96 at 14:44:12 (2:44 p.m.) and ended on 3/20/96 at 16:12:16 (4:12 p.m.). The Severity level of this alarm is Critical (SV = C).

```
NO=Node_1, AK=7,
NU=00038, AL=OOS, ML=8840, UN=P2, ON=03-20-96 14:44:12,
OF=03-20-96 16:12:16, SV=C
END
```

Figure 4-3. Typical Alarm Printout

4.4 TCP/IP Network Management

This section presents another type of Network Management System (NMS) for diagnosing and reporting trouble at unsupervised locations. The SNMP alarm traps and TELNET configuration can transmit over this path. Both formats can use the 4 kbps FDL (Facility Data Link) of an ESF-framed T1 link, the SA4 on an E1 link, a full DS0 on an T1 linkor and E1 link, or the computer port of the Interface card via the SLIP plus PPP protocol.

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If you do not understand the NMS concepts of IP addressing, SNMP, SLIP or PPP, TELNET, and Ping, please consult with your network administrator before attempting to install or repair components presented in this section.

If you have a small number of remote units to manage, one of the Network Management System options is to use a B7R (Bit-7 Redundant) card at the NMS site. Up to eight remote system units send alarm information on the FDL/SA4 of a T1/E1 link to either a DACSII™ or eight individual DS0s, and multiplex the contents into a single 38.4 kbps asynchronous circuit via the SLIP protocol. This data is used by a communication server or terminal server for routing to a Local Area Network.

If the FDL is used to transmit and receive information, a DACSII or DACSII ISX (3.0 or higher) is used to convert the FDL/IP information to a full DS0 time slot. On a point-to-point circuit, a DACSII™ is not needed. See Figure 4-4.

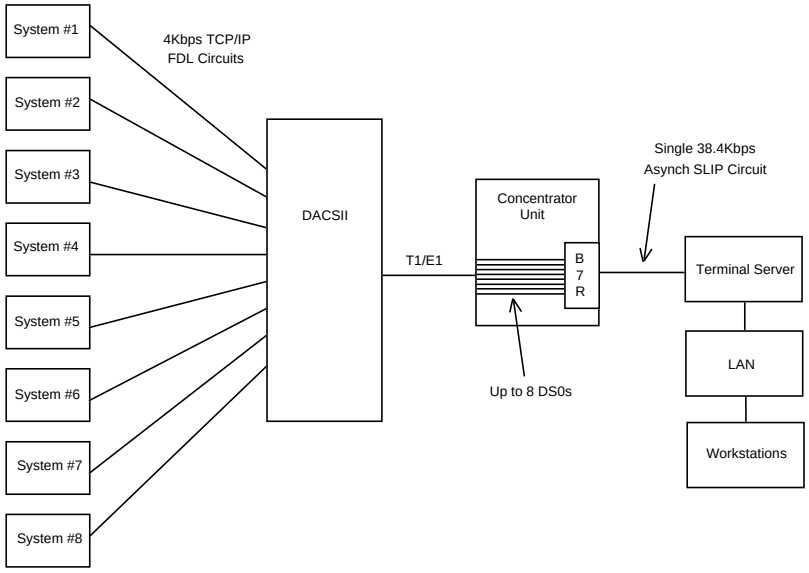


Figure 4-4. Typical TCP/IP Network Management System

Using IP addresses, you can communicate directly with the affected system, diagnose the problem, and dispatch a technician if necessary.

Figure 4-5 shows the TCP/IP Screen. To go to this screen, press "**i**" in the CPU Card Main Screen to choose the **tcp/Ip** command. Table 4-4 summarizes the actions that can be performed from this screen, and Table 4-5 lists the TCP/IP Screen parameters and options.

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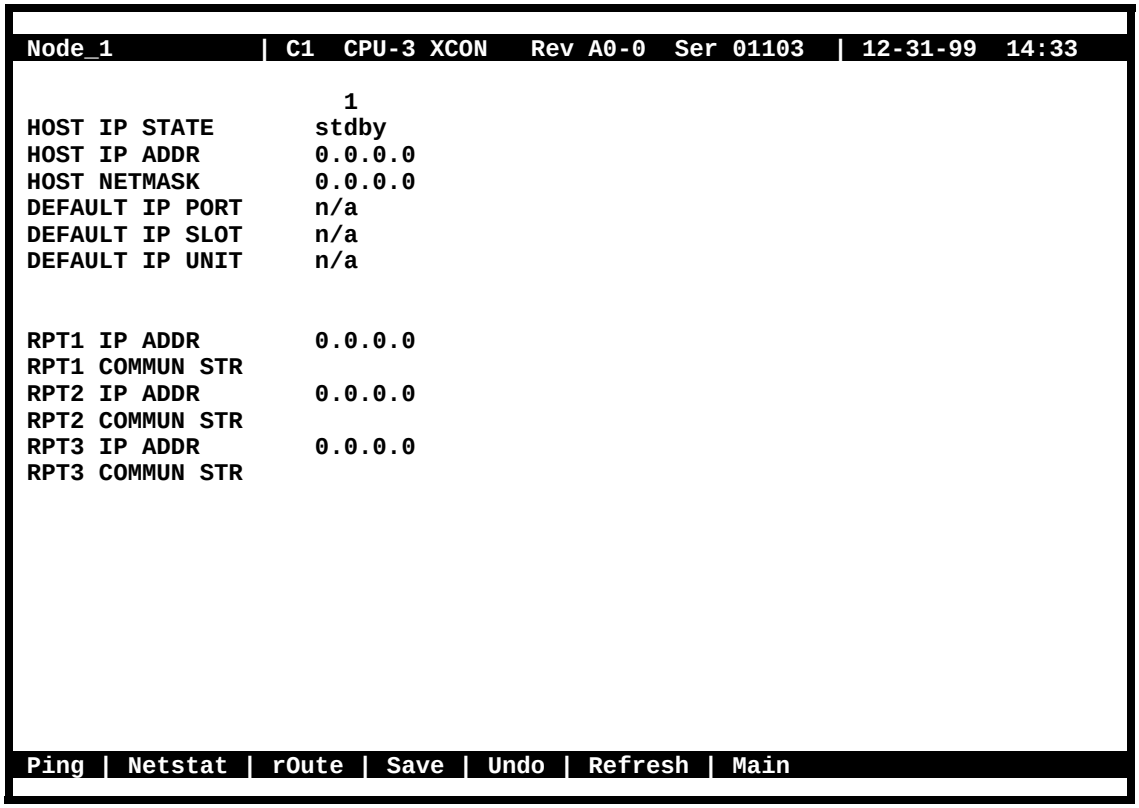


Figure 4-5. Typical TCP/IP Screen

Table 4-4. TCP/IP Screen Actions

Action	Function
Ping	Test to see if the connected device responds to an echo request message. After entering the IP address of the host device, the status line will display, "Testing . . ." The next message will tell if the host is alive or down.
Netstat	Displays the Network Statistics. See below.
rOute	Shows the Routing screen. See the “Routing” section below.
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Used on Testing and Monitoring screens to update statistics, and on other screens to redraw the screen.
Main	Returns to the CPU card main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

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Table 4-5. TCP/IP Screen Parameters and Options

Parameter	User Options	Notes	Default
HOST IP STATE	stdby actv		stdby
HOST IP ADDR	IP address		0.0.0.0
HOST NETMASK	IP address		0.0.0.0
DEFAULT IP PORT	off n/a local wan serv	1	n/aoff
DEFAULT IP SLOT	n/a	1	n/a
DEFAULT IP UNIT	n/a	1	n/a
RPT1 IP ADDR	IP address		0.0.0.0
RPT1 COMMUN STR			blank
RPT2 IP ADDR	IP address		0.0.0.0
RPT2 COMMUN STR			blank
RPT3 IP ADDR	IP address		0.0.0.0
RPT3 COMMUN STR			blank

Notes:

1. The user options depend upon the selection in the Default IP Port selection. All user options are explained below.

HOST IP STATE

This parameter determines whether TCP/IP is active or inactive. The HOST IP STATE defaults to **stdby** (standby) prior to configuration. You must set it to **actv** (active) to enable TCP/IP.

HOST ID ADDR

The Host IP Address is the IP address for this specific system unit. If the B7R card is used for this NMS, the Port IP address must be the same as the one entered in the **ADDR** field of that card.

HOST NETMASK

The Host Netmask is used to indicate how much of the IP address is used for host addressing and how much is used for network addressing.

If the B7R card is used for this NMS, the CPU netmask address must be the same as the one entered in the **NETMASK** field of that card.

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DEFAULT IP PORT

The Default IP Port setting tells the CPU card where IP packets will be sent or received. The options are **off** (to disable Network Management System), **local** (information will be sent over the DB-9 computer serial port to NMS equipment), **wan** (information will be sent over the WAN FDL/SA4 or a DS0 [chosen on the WAN card main screen with ESF/NMS RPT option]) or **serv** (information will be sent over WAN DS0s through the Ethernet connection to NMS equipment).

If this parameter is set to **local**, **wan** or **serv,** the Print Alarms feature (mentioned in the previous section) must be set to **off**. If **local** is chosen for this setting, the internal modem will not operate.

DEFAULT IP SLOT

The Default IP Slot options are determined by the choice of Default IP Port. If **off** or **local** is selected for that parameter, this option will show **n/a**. If **wan** is selected, the options for this parameter will show **W1-W4** (the WAN card slot that transmits and receives NMS information). If **serv** is chosen, the options for this parameter will show **P1-P3** (the server card slot that transmits and receives NMS information).

DEFAULT IP UNIT

The Default IP Unit options are determined by the choice of Default IP Port. If **off** or **local** is selected for that parameter, this option will show **n/a**. If **wan** is selected above, the options for this parameter will be **1-2** (corresponding with the WAN port).

RPT1 IP ADDR

The RPT1 IP Address is the IP address of the first Network Management System host running a SNMP trap server.

RPT1 COMMUN STR

The RPT1 Community String holds the community string for the first NMS host running a SNMP trap server. The community string provides additional security by rejecting messages that do not contain the correct string. *There must be some entry in this field to enable RPT1*.

RPT2 IP ADDR

The RPT2 IP Address is the IP address of the second Network Management System host running a SNMP trap server.

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RPT2 COMMUN STR

The RPT2 Community String holds the community string for the second NMS host running a SNMP trap server. The community string provides additional security by rejecting messages that do not contain the correct string. *There must be some entry in this field to enable RPT2.*

RPT3 IP ADDR

The RPT3 IP Address is the IP address of the third Network Management System host running an SNMP trap server.

RPT3 COMMUN STR

The RPT3 Community String holds the community string for the third NMS host running a SNMP trap server. The community string provides additional security by rejecting messages that do not contain the correct string. *There must be an entry in this field to enable RPT3.*

4.4.1 Network Statistics Screens

The Network Statistics Screens provide maintenance and diagnostic information for the different protocols supported by this equipment. The system starts accumulating statistics when the TCP/IP Port is changed from **off** to **local** or **wan**, and it continues to store information until it is turned off.

Figure 4-6 shows the first of four Network Statistics Screens, and Figure 4-7 through Figure 4-9 show the other three screens. To go to the first screen, press "**n**" in the TCP/IP Screen to choose **Netstat** from the bottom line of that screen. Table 4-6 lists the actions that can be taken from the Network Statistics Screens, and the following paragraphs describe the parameters in each screen.

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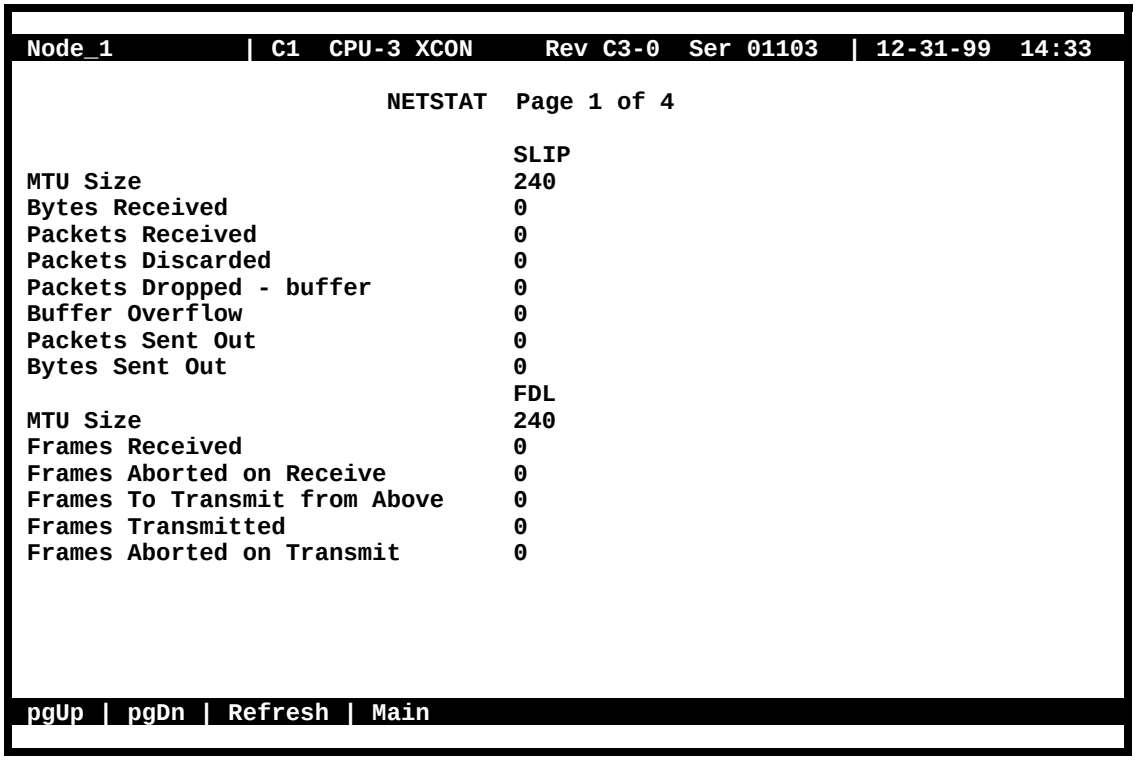


Figure 4-6. Typical Network Statistics Screen, Page 1

To move from one screen (page) to another, press "**d**" (**pgDn**) or "**u**" (**pgUp**). Pressing "**d**" goes to the next-highest page number. If you are on Page 4 when you press "**d**", you will warp around to Page 1. Pressing "**u**" goes to the next-lowest page number. If you are on Page 1 when you press "**u**", you will wrap around to Page 4.

Table 4-6. Network Statistics Screen Actions

Action	Function
pgUp	Scrolls backward through network statistics, one page at a time. If you are on the first screen (Page 1), automatically "wraps around" back to the fourth screen (Page 4).
pgDn	Scrolls forward through network statistics, one page at a time. If you are on Page 4, automatically "wraps around" back to Page 1.
Refresh	Since the system does not update statistics automatically, the Refresh command must be used to update information in statistics fields.
Main	Returns to the TCP/IP Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

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4.4.1.1 SLIP Parameters

The Serial Line Interface Protocol (SLIP) parameters appear in the first Network Statistics Screen (Figure 4-7). These are described below.

MTU Size

The MTU (Maximum Transmission Unit) Size field shows the largest number of user-data (e.g., the largest size packet) that can be sent in a single frame. The MTU for this system is 240 bytes.

Bytes Received

The Bytes Received field shows the number of bytes received by the local system from the network host.

Packets Received

The Packets Received field shows the number of packets (unit of bytes, roughly similar to an IP datagram) received by the local system from the network host.

Packets Discarded

The Packets Discarded field shows the number of packets sent by the network host that were discarded by the local system. Packets are discarded because they either exceed the MTU or are not complete.

Packets Dropped - Buffer

The Packets Dropped - Buffer field shows the number of incoming packets that were dropped because there was not enough free memory to buffer them.

Buffer Overflow

The Buffer Overflow field shows the occurrences of buffer overflow at the local system.

Packets Sent Out

The Packets Sent Out field shows the number of packets transmitted by the local system to the network host.

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Bytes Sent Out

The Bytes Sent Out field shows the number of bytes transmitted to the network host by the local system.

4.4.1.2 FDL Parameters

The FDL parameters also appear in the first Network Statistics Screen (Figure 4-65). They are described below.

MTU Size

The MTU (Maximum Transmission Unit) Size field shows the largest number of bytes that can be sent in a single frame. The default MTU is 240 bytes.

Frames Received

The Frames Received field shows the number of frames received by the local system from the network host.

Frames Aborted on Receive

The Frames Aborted on Receive field shows the number of frames that were aborted when received by the local system from the network host. Frames are aborted because they either exceed the MTU or are not complete.

Frames to Transmit from Above

The Frames to Transmit from Above field shows the number of frames that were sent by the local system to the TCP layer of the network host.

Frames Transmitted

The Frames Transmitted field shows the number of frames sent from the local system to the network host.

Frames Aborted on Transmit

The Frames Aborted on Transmit field shows the number of frames aborted when transmitted by the local system to the network host. Frames are aborted because they either exceed the MTU or are not complete.

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4.4.1.3 IP Parameters

The IP parameters appear in the second Network Statistics Screen (Figure 4-7). These are described below.

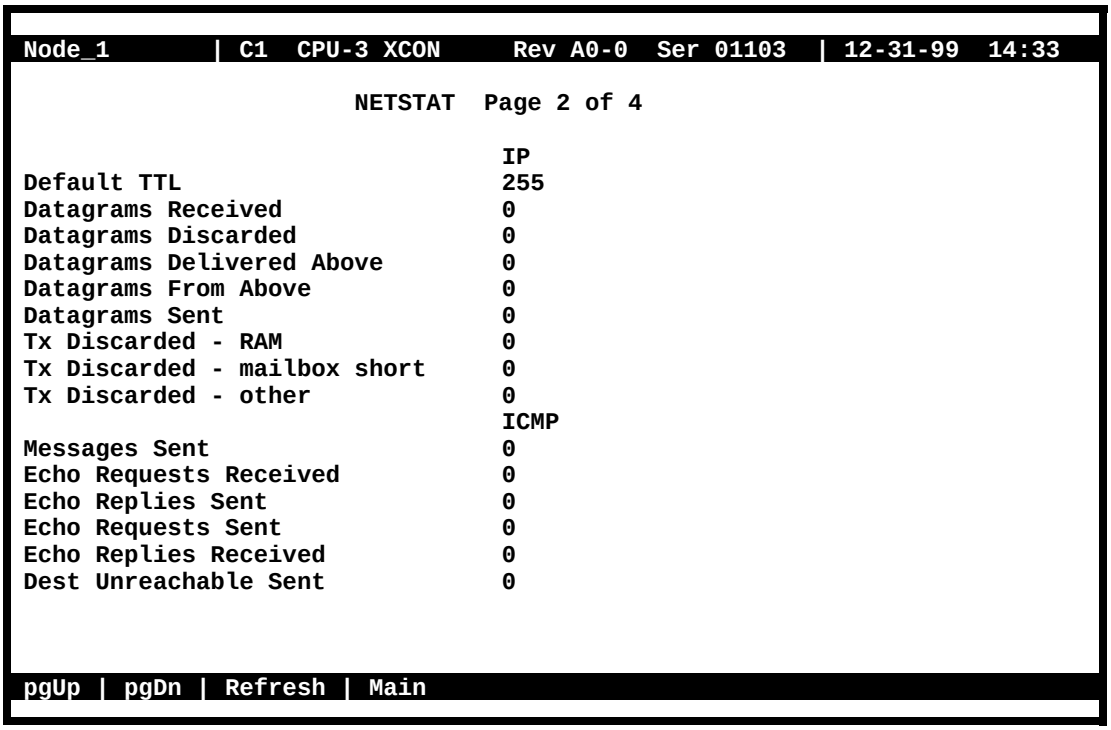


Figure 4-7. Typical Network Statistics Screen, Page 2

Default TTL

The Default TTL field shows the Time To Live for information packets from transmission to delivery. The TTL for this system is 255 seconds.

Datagrams Received

The Datagrams Received field shows the number of IP datagrams (packets) received by the local system from the network host.

Datagrams Discarded

The Datagrams Discarded field shows the number of datagrams that were discarded by the local system.

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Datagrams Delivered Above

The Datagrams Delivered Above field shows the number of datagrams sent to the TCP layer of the network host to the local system.

Datagrams From Above

The Datagrams From Above field shows the number of information or traps sent by the local system to the UDP or TCP layer of the network host.

Datagrams Sent

The Datagrams Sent field shows the total number of datagrams sent by the local system to the network host.

TX Discarded - RAM

The TX Discarded - RAM field shows the total number of datagrams sent by the local system that were discarded due to lack of free RAM memory.

TX Discarded - Mailbox Short

The TX Discarded - mailbox short field shows the total number of datagrams aborted by the local system because of a mail subsystem overflow.

TX Discarded - Other

The TX Discarded - other field shows the total number of datagrams discarded due to other causes.

4.4.1.4 ICMP Parameters

The ICMP parameters also appear in the second Network Statistics Screen (Figure 4-7). They are described below.

Messages Sent

The Messages Sent field shows the number of ICMP messages sent by the local system to the network host.

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Echo Requests Received

The Echo Requests Received field shows the number of "ping" message requests received by local system by the network host. This figure is part of the total messages received.

Echo Replies Sent

The Echo Replies Sent field shows the number of "ping" message requests transmitted to the network host. This figure is part of the total messages sent.

Echo Requests Sent

The Echo Requests Sent field shows the number of "ping" requests sent to the network host by the local system. This figure is part of the total messages sent.

Echo Replies Received

The Echo Replies Received field shows the number of "ping" message replies received by the local system. This figure is part of the total messages received.

Destination Unreachable Sent

The Destination Unreachable Sent field shows the number of ICMP messages that were discarded upon receipt by the network host because they were improperly addressed.

4.4.1.5 TCP State Parameters

The TCP state parameters appear in the third Network Statistics Screen (Figure 4-8). They are described below.

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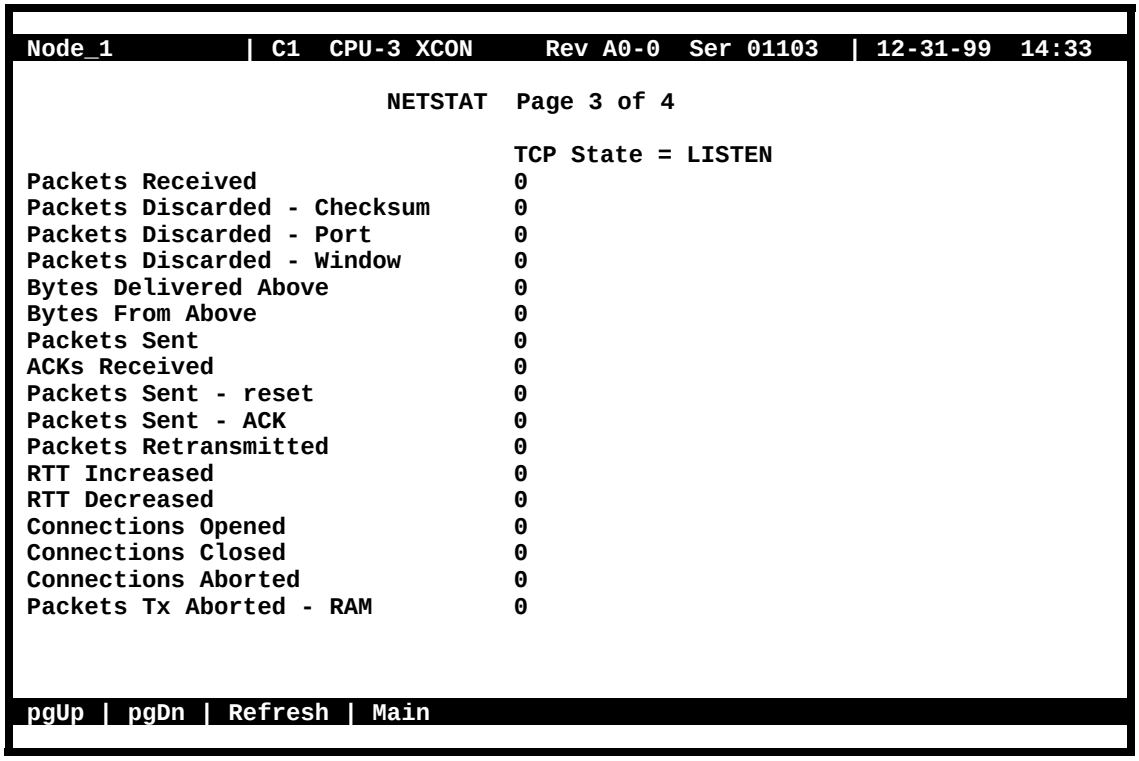


Figure 4-8. Typical Network Statistics Screen, Page 3

Packets Received

The Packets Received field shows the number of TCP packets received by the local system from the network host.

Packets Discarded - Checksum

The Packets Discarded - Checksum field shows the number of TCP packets that were discarded by the local system because the checksum failed.

Packets Discarded - Port

The Packets Discarded - Port field shows the number of TCP packets that were discarded by the local system because the port assignment was incorrect.

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Packets Discarded - Window

The Packets Discarded - Window field shows the number of TCP packets that were discarded by the local system because the window data was incorrect.

Bytes Delivered Above

The Bytes Delivered Above field shows the number of information or traps sent from TCP layer of the network host to the local system.

Bytes From Above

The Bytes From Above field shows the number of information or traps sent to the TCP layer of the network host from the local system.

Packets Sent

The Packets Sent field shows the total number of TCP packets that were transmitted to the network host by the local system.

ACKs Received

The ACKS Received field shows the total number of acknowledgments that were received by the local system from the network host.

Packets Sent - reset

The Packets Sent - reset field shows the total number of TCP packets that were transmitted by the network host to the local system.

Packets Sent- ACK

The Packets Sent - ACK field shows the total number of TCP acknowledgment packets that were transmitted by the network host to the local system.

Packets Retransmitted

The Packets Retransmitted field shows the total number of TCP packets that were retransmitted by the local system to the network host.

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RTT Increased

The RTT Increased field shows the number of times the retransmission time-out was increased because the system was busy.

RTT Decreased

The RTT Decreased field shows the number of times the retransmission time-out was decreased because the system was not busy.

Connections Opened

The Connections Opened field shows the total number of connections that were opened by the local system to the network host.

Connections Closed

The Connections Closed field shows the total number of connections that were closed by the local system to the network host.

Connections Aborted

The Connections Aborted field shows the number of times the connection was aborted because either the number of consecutive retransmissions was equal to 10 or retransmission time-out was equal to 15 minutes.

Packets TX Aborted - RAM

The Packets TX Aborted - RAM field shows the total number of packets sent by the local system which were aborted because of the lack of free RAM memory.

4.4.1.6 UDP Parameters

The UDP parameters appear in the fourth Network Statistics Screen (Figure 4-9). They are described below.

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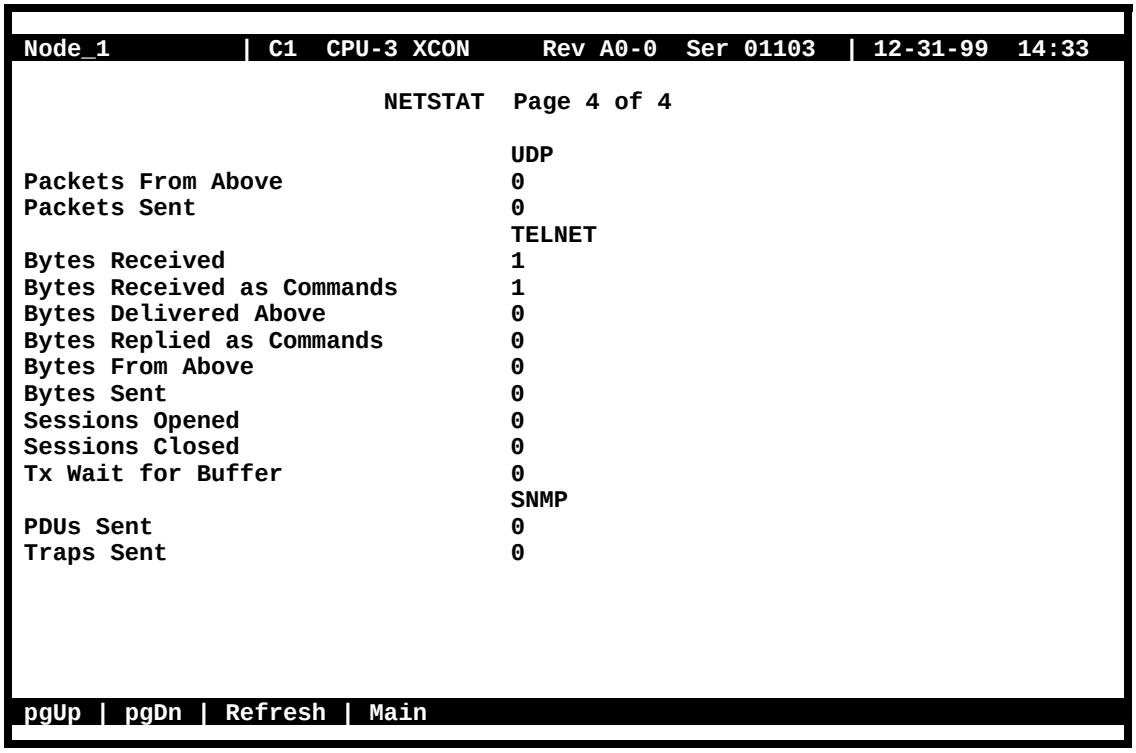


Figure 4-9. Typical Network Statistics Screen, Page 4

Packets From Above

The Packets From Above field shows the number of UDP packets sent by the local system to the network host.

Packets Sent

The Packets Sent field shows the number of UDP packets transmitted from the local system to the network host.

4.4.1.7 TELNET Parameters

The TELNET parameters also appear in the fourth Network Statistics Screen (Figure 4-9). They are described below.

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Bytes Received

The Bytes Received field shows the total number of bytes that were received by the local system from the network host.

Bytes Receive as Commands

The Bytes Received as Commands field shows the total number of bytes that were received as commands by the local network from the network host.

Bytes Delivered Above

The Bytes Delivered Above field shows the total number of bytes that were transmitted by the network host to the local system.

Bytes Replied as Commands

The Bytes Replied as Commands field shows the total number of bytes that were transmitted as commands by the local system to the network host.

Bytes From Above

The Bytes From Above field shows the total number of bytes that were received by the network host from the local system.

Bytes Sent

The Bytes Sent field shows the total number of bytes that were transmitted by the local system to the network host.

Sessions Opened

The Sessions Opened field shows the total number of sessions that were opened by the local system with the network host.

Sessions Closed

The Sessions Closed field shows the total number of sessions that were closed by the local system with the network host.

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TX Wait for Buffer

The TX Wait for Buffer field shows the total number of transmissions that were delayed by the local system for free memory in the buffer.

4.4.1.8 SNMP Parameters

The TELNET parameters also appear in the fourth Network Statistics Screen (Figure 4-98). They are described below.

PDUs Sent

The PDUs Sent field shows the number of Protocol Data Units sent from the local system. A Protocol Data Unit is a data object exchanged by protocol drivers, usually containing both protocol control information and user data.

Traps Sent

The Traps Sent field shows the total number of SNMP traps that were transmitted by the local system to the network host.

4.5 IP Packet Routing

The integrated access system supports multipoint routing of Internet Protocol (IP) packets to a local Network Management System over the computer port, a remote NMS over the B7R card, time slot 24 of a D4-framed T1 link, or the Facility Data Link (FDL) of an ESF-framed T1 link. For E1 links, the routing information is sent on the B7R card via time slot 31 or the SA4 (national) bit.

To use an entire DS0 time slot (either 24 or 31) for remote NMS routing, no action needs to be taken. To use a B7R card, FDL, or SA4, you must make an additional selection on the associated WAN card. For T1 links, the selection is made via the ESF/NMS RP parameter. For E1 links, it is made via the COM/NMS RP parameter. Refer to WAN Card and B7R Card Chapters for further information.

All packets arriving on any of the optional paths or the local port will be treated by the IP stack as follows:

- If the packet's destination address matches that system's address, the packet is processed locally.
- If the address is not the same, the unit will search the routing table to find a remote address that matches the destination of the packet.

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- If a match is not found for the packet, it is routed to the interface specified in the DEF DEST field. If the default destination matches the interface the packet arrived from, the packet is dropped.

Figure 4-10 shows a typical routing arrangement. Although 24 units are used in this example, the number of remote units is unlimited except for bandwidth and link-down considerations.

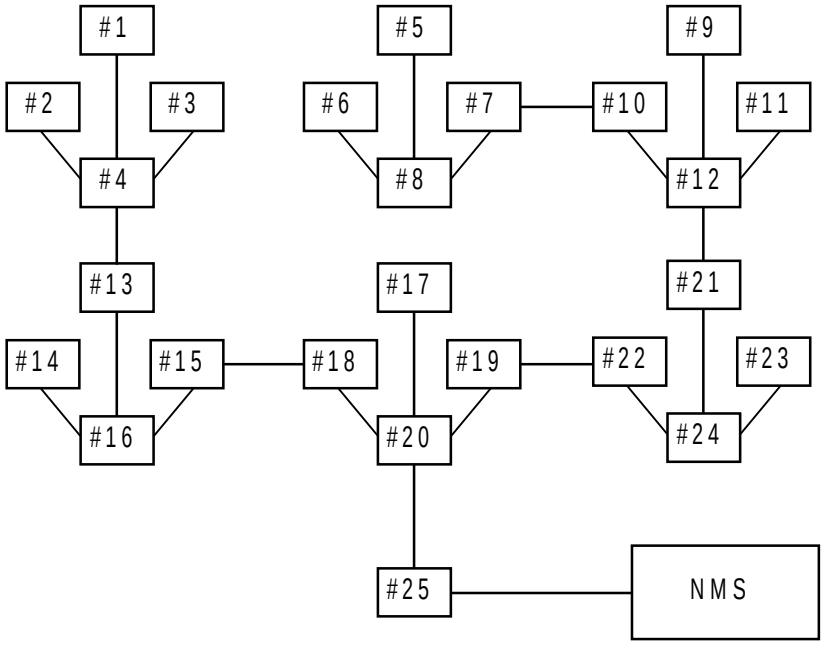


Figure 4-10. Typical Routing Diagram

In Figure 4-10, 24 system units transmit alarm information to an IP routing system unit (System 25) via the optional paths of separate WAN links. The network administrator assigns IP addresses for each system on the TCP/IP screen of each system's Interface card (PORT IP ADDR). System 20 is connected by any of the optional paths to System 25, which supports NMS equipment (the communications server) with either a local SLIP connection directly from the CPU card or any optional path of a T1 or E1 WAN link. In this example, all alarms received by any of the system units will be forwarded to system 25 over a single WAN link.

Each of the 24 reporting units use System 25's IP address as the RPT1 IP ADDR on the TCP/IP screen of its interface card. First, routing is initiated by the **off/on** command for each sub-unit.

The local port is included to be able to transmit the IP packets generated by the routing unit to the same destination. In most cases, the DEF DEST of all units controlled by this router will be the same place (either the local port or optional WAN paths to a distant location).

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The Routing screen column headings are associated with the incoming WAN link associated with the IP location of the remote systems. For example, if you expect incoming information from system 1 on WAN 1-1, you assign the IP address for system 1 IP NET for WAN 1-1.

Figure 4-11 shows the Routing Screen, and Table 4-7 lists the actions that can be performed from that screen. Table 4-8 summarizes the available option settings and defaults for that screen.

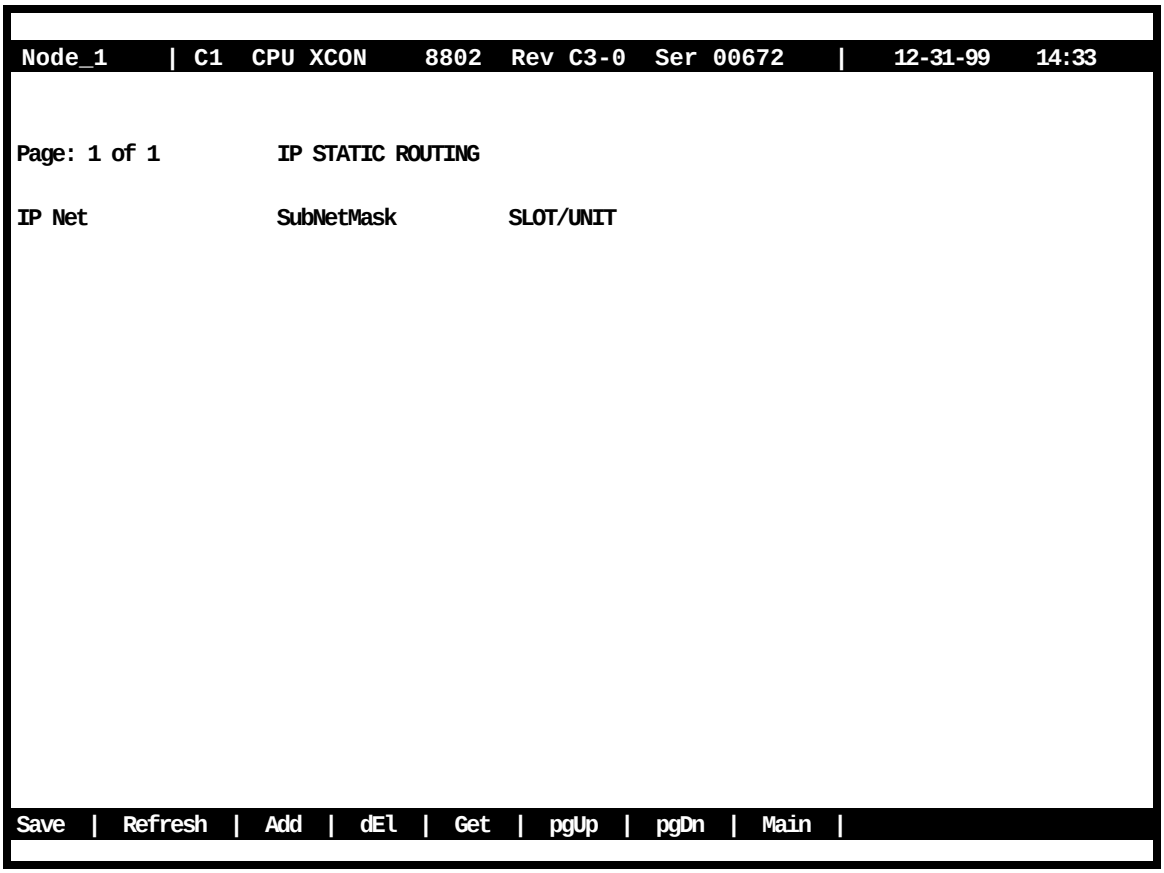


Figure 4-11. Typical IP Routing Screen

Table 4-7. Routing Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Used on Testing and Monitoring screens to update statistics and on other screens to redraw the screen.
Main	Returns to the CPU card main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

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Table 4-8. Settings for Routing Parameters

Parameter	User Options	Default
IP NET	a valid IP address	0.0.0.0
SUBNETMASK	a valid SubNetMask address	0.0.0.0
SLOT/UNIT	wan: W1-1 through W2-4 serv: P1-P3 user: not supported local: COMPT	w1-1

IP NET

The IP Net field shows the IP address of a device located on this system unit. This must be a valid IP address.

SUBNETMASK

The Remote Netmask field shows the Netmask of a device located remotely from this system. Any valid Netmask is acceptable. The remote netmask information is the same as that placed on the remote unit's TCP/IP screen.

SLOT/UNIT

The Default Destination specifies where a route packets received from a remote device and the routing device to downstream NMS equipment (either the optional paths of a WAN link or the local SLIP port).

Table 4-9. Routing Screen Actions

Action	Function
Save	Saves changes to settings.
Refresh	Used on Testing and Monitoring screens to update statistics and on other screens to redraw the screen.
Add	Open the data entry screen to add a route
dEl	Delete a route
Get	Get information on routing destinations
PgUp	Go to a previous page of routing paths
PdDn	Go to the next page of routing paths
Main	Returns to the CPU card main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

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Adding Routes

In the Routing Screen, type **a** (**Add**) to present a data entry screen. A data line appears near the bottom of the screen for the three address parameters of Table 4-8. Use the right/left arrow keys to scroll to the desired field. Press <Enter> to present the corresponding data entry field (Figure 4-12). Type in the correct address parameters, up to three digits (0-255) in each segment of the address, using the right arrow key to move to the next segment. Press <Enter> again to move the entered address into the data line. Use the left/right arrow keys to move on to the SubNet Mask and repeat the process. The Slot/Unit field offers the entry categories shown in Figure 4-13. Scroll to the desired category and press <Enter> to present one of the choices shown in Table 4-10. Scroll to the desired value and press <Enter>. When valid address and destination parameters have been added, type **s** to save the address. The system will not save an invalid address. To exit the Add screen without saving press the up or down arrow keys.

Delete a Route

In the Routing Screen, scroll to the route to be deleted. With the route highlighted, press **e** to delete.

Get Information

To obtain addressing information, press **g** for Get. The system displays the destination variables wan, serv, user, and local across the bottom of the screen. Use the left/right arrow keys to scroll to the desired destination and press <Enter> to select. The choices available under each of these options are then displayed. Now highlight the desired option and press <Enter> again to initiate the search. The system responds:

```
Sending RIP Request. Please wait ...
 Press any key to cancel
```

After the system send RIP request, the IP Static Routing screen will return, displaying valid IP Net (address), SubNetMask, and Slot/Unit information.

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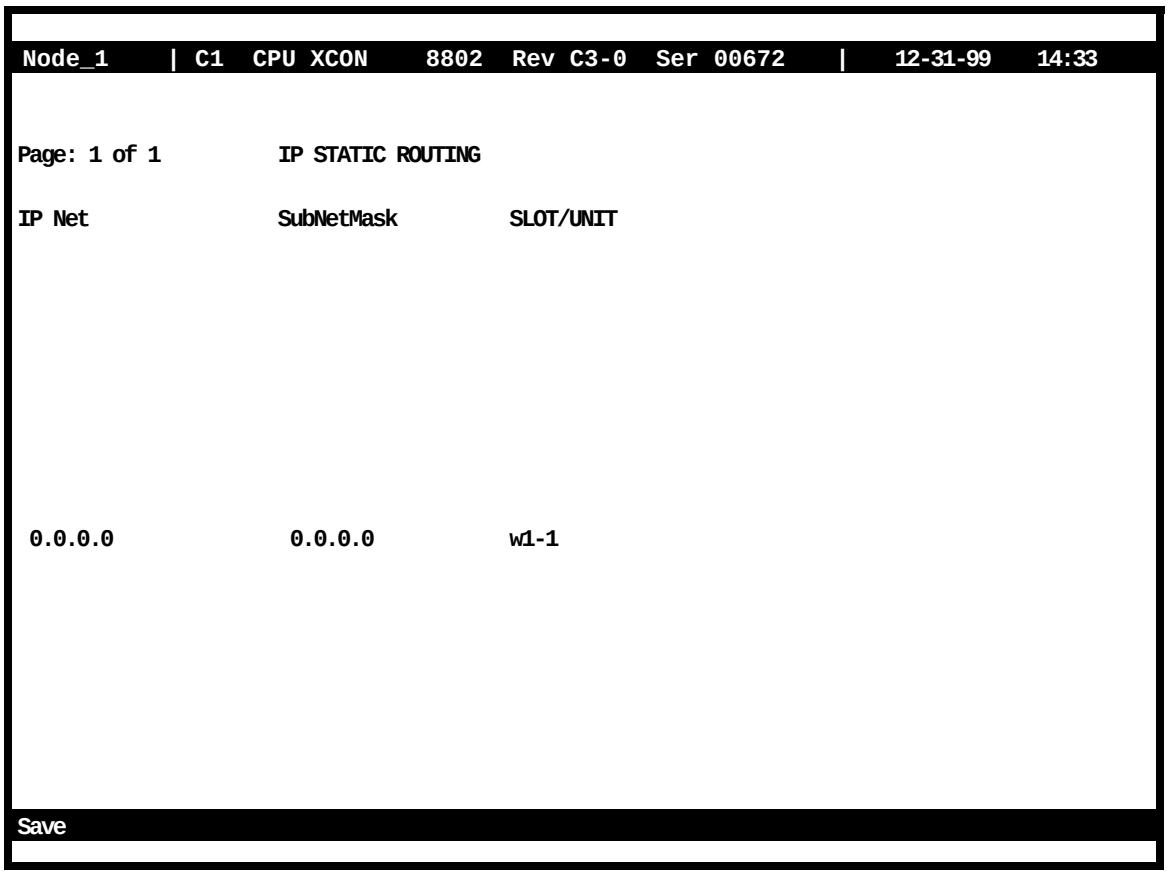


Figure 4-12. Routing Address Entry Screen

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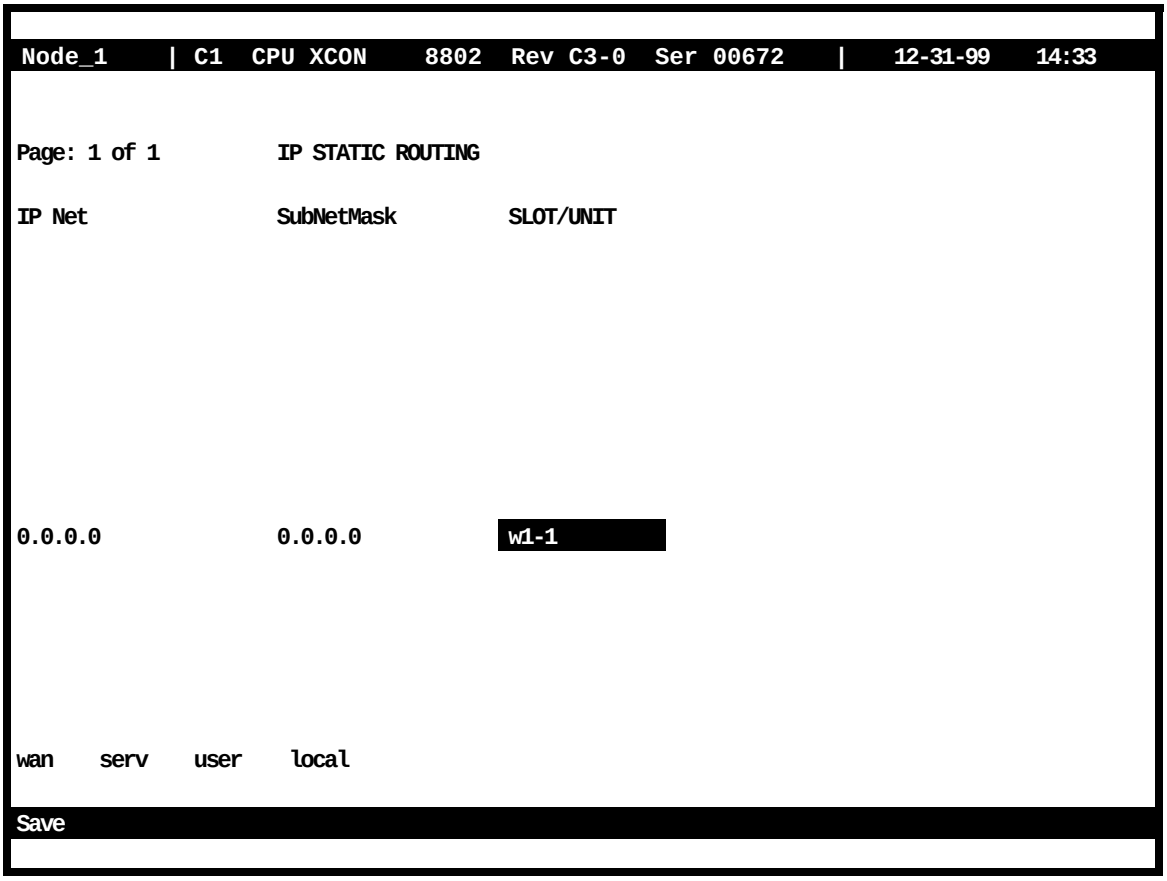


Figure 4-13. Slot/Unit Options Screen

Table 4-10. Slot/Unit Options

Slot/Unit Options	Description	Default
WAN	w1-1 through w4-2	w1-1
SERV	P1 through P3	P1
USER	not supported	n/a
LOCAL		

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4.6 CPU-3 BCON (880020 / 880021 / 880022 / 880060)

The CPU-3 BCON is the base model CPU Card. It supports up to two T1 or E1 WAN ports (on one WAN Card). The CPU- BCON requires that you install the WAN card in slot W1 and that all channels be assigned to time slots on links w1-1 and w1-2. A system that uses an CPU-3 BCON card is said to operate in “standard bus-connect” mode. *The CPU-BCON does not support redundant operations.*

4.7 CPU-3 RCON (880420 / 880421 / 880422 / 880460)

The CPU-3 RCON card supports two T1 or E1 WAN links in slot w1-1 and w1-2 with a redundant card (similarly configured) in slot w2. It supports another two T1 or E1 WAN link in slot w3-1 and w3-2 with a redundant card (similarly configured) in slot w4. If the T1/E1 link in w1-1 fails for any reason, the system will automatically switch to the similarly configured card in slot w2-1 (w1-2 would switch to w2-2 in the same way).

Slot w3 can support either a Single or a Dual T1/E1 WAN card. If the T1/E1 link in w3-1 fails for any reason, the system will automatically switch to the similary configured card in slot w4-1 (w3-2 would switch to w4-2 in the same way).



Note: *WAN ports in slot W3 can operate only in “terminate” mode and can only support 8202, 8213 or 8215 HSU card ports and OCU-DP ports from an 8247 5 or 10-port OCU-DP card. No other voice or data ports can be assigned to the WAN card in slot w3 in this mode.*

A system that uses an CPU-3 RCON card is said to operate in “enhanced bus-connect” mode. Two Models (CPU-3 RCON) can be installed in slots C1 and C2 to achieve CPU redundancy. The 8804 also supports 1x1 WAN redundancy. See the System Operations section of this manual for Redundant Operations.

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4.8 CPU Card Error Messages

Refer to Appendix B in the System Reference Guide for further information on Error Messages regarding this card.

4.9 CPU Card Troubleshooting

On power-up, the CPU card performs a self-test. This is the only diagnostic available for the CPU. A “healthy” active CPU will have a green LED lit on the front panel. A “healthy” redundant CPU will flash between green and amber LEDs.

The indications that a CPU is not on-line are:

- Continuous amber alarm LED on front panel AFTER the system has been registered during initial installation. (Prior to registration, the amber LED is an indication that registration needs to occur before the system can be fully operational.
- Inability to communicate with the system by any means (VT-100 Term, Telnet, etc.).

Because the CPU and Interface card work together to support a system, follow this general sequence:

1. Verify that the CPU card's US/EUR jumper (HD1) is correctly set to match the US/EUR jumper on the chassis.

2. Verify that both CPUs in a redundant system are of the same firmware revision.

3. In a dual CPU system, first replace the CPU. If the problem continues, replace the Interface Card.



Note: *Removal of an active CPU or Interface card will cause a service disruption on the entire system.*

4. If the CPU card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

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Chapter 5
Interface Card

5.1 Introduction

This chapter provides specific installation, configuration, and troubleshooting information for the Interface Cards of the integrated access system. These cards are labeled as the INF+M T1E1*8, INF+M T1E1*8, INF T1*2, INF T1*2, INF T1*2, INF T1*2, INF+M T1*2, INF+M T1*2and INF E1*2 cards. All Interface cards must be installed in the IF slot on all chassis.

5.2 Interface Card Descriptions

5.2.1 INF+M T1E1*8 Card Description (892020 / 892060)

The INF+M T1E1*8 card has communications, control and network interface ports. It features an internal modem that facilitate remote communication with the system unit. The INF+M T1E1*8 has a DB9-male serial port for network management and two RJ48 jacks that connect to the node port for alarm notification and VT-100 control terminal port. Additionally, an RJ11 jack is available for the modem port. The INF+M T1E1*8 supports eight T1 or E1 WAN links.

5.2.1.1 Card Jumper/Switch Settings

The INF+M T1E1*8 card does not have any on-board jumpers or switches.

5.2.1.2 Card External Connector and Pinouts

Figure 5-1 shows the INF+M T1E1*8 card front panel, which has several jacks. Table 5-1 summarizes the functions of the individual ports.

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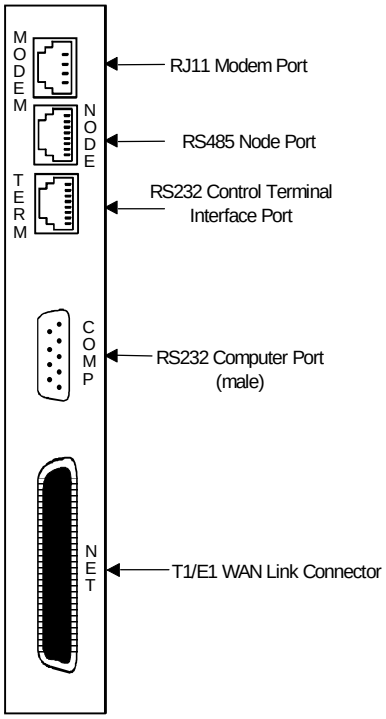


Figure 5-1. INF+M T1E1*8 Card Jacks

Table 5-1. INF+M T1E1*8 Card Ports and Functions

Interface Port (Jack)	Function
Modem Port (MODEM)	Connects the internal modem to a phone line.
RS-485 Node Port (NODE)	Provides relay contacts to report alarms.
RS-232 Control Terminal Port (TERM)	Connects the system to a VT100-compatible terminal.
RS-232 Computer Port (COMP)	Connects a local device for reporting or printing alarms.
T1/E1 WAN Link (NET)	Connects the system to the external T1/E1 networks.

5.2.2 Installing the INF+M T1E1*8 Card (892020 / 892060)

Install the INF+M T1E1*8 card into the IF slot of the system chassis. Each system can have only one INF+M T1E1*8 card.

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5.2.3 Using the Modem Port

The internal modem of the INF+M T1E1*8 card is an asynchronous, ITU-T V.22bis modem. It allows remote access to the terminal interface and automatic reporting of alarm messages to a remote device. Table 5-2 lists the specifications of the modem.

Table 5-2. Modem Specifications

Parameter	Rating
Compatibility	ITU-T V.22 bis
Modulation	16-point QAM
Line Interface	2-wire, 600 ohms
Approval	FCC Part 68
Equalization	Receive: automatic adaptive Transmit: fixed compromise
Receiver Sensitivity	ON to OFF threshold: -45 dBm OFF to ON threshold: -48 dBm
Dialing Mode	DTMF
Speed	2400 bps, asynchronous
Code Set	8-bit data, one stop bit, no parity
Ringer Equivalence	0.2 A
Transmit Level	-9.5 dBm

Connect the MODEM jack to a phone line, using a modular telephone cord. This is an RJ-11 jack; it uses only pins 3 (Tip) and 4 (Ring). Figure 5-2 shows the jack pin orientation.

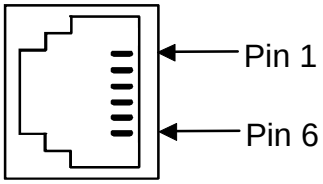


Figure 5-2. MODEM Jack

The modem automatically answers incoming calls. A remote operator can press the <Enter> key to display the log-in screen. After entering a valid password, that operator has complete access to the user interface.

To disconnect, the remote operator logs off and then hangs up. The modem automatically resets and waits for the next call.

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5.2.4 Logging On Remotely

Normall a local network operator uses a VT-100 terminal to directly access the terminal interface. But where central control or service access is required, the internal modem provides an access method to the terminal interface from a remote location. The modem automatically answers any incoming calls. The modem communicates at 2.4kbps using 8 data bits, one stop bit and no parity.

To initiate a call, the remote operator dials in using a VT-100 compatible terminal. The remote operator can press the <Enter> key to display the log-on screen. After entering a valid password, the remote operator has complete access to the terminal interface.

To disconnect, the remote operator logs off and hangs up the line. The modem automatically resests and waits for another call.

If an operator is logged on to the system with a local terminal when a modem call is received, he will automatically be logged off the system and will not be able to restore local access until the modem connections is broken.

5.2.5 INF T1E1*8 Card Description (892120 / 892160)

The INF T1E1*8 card has **no modem** for remote access or alarm printing. All other fittings and functions are the same.

5.2.5.1 Card Jumper/Switch Settings

The INF T1E1*8 card does not have any on-board jumpers or switches.

5.2.5.2 Card External Connector and Pinouts

Figure 5-3 shows the INF T1E1*8 card front panel, which has several ports.

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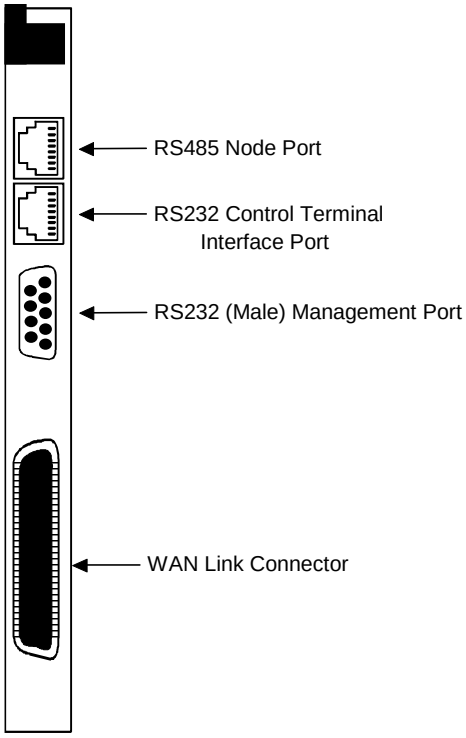


Figure 5-3. INF T1E1*8 Interface Card Ports

Table 5-3. INF T1E1*8 Card Ports and Functions

Interface Port (Jack)	Function
RS-485 Node Port (NODE)	Provides relay contacts to report alarms.
RS-232 Control Terminal Port (TERM)	Connects the system to a VT100-compatible terminal.
RS-232 Computer Port (COMP)	Connects a local device for reporting or printing alarms.
T1/E1 WAN Link (NET)	Connects the system to the external T1/E1 networks.

5.2.6 Installing the INF T1E1*8 Card (892120 / 892160)

Install the INF T1E1*8 card into the IF slot of the system chassis. Each system can have only one INF T1E1*8 card.

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5.2.7 INF T1*2 Card Description (892520 / 892560)

The INF T1*2 interface card uses RJ48 jacks to termiante two (2) T1's and Bantam connectors to terminate two T1 WAN links and an RS232 control terminal interface port or balanced 120 ohm E1. The computer port, modem port and node port are not available on this interface card. The interface card connectors are arranged as shown in Figure 5-4.

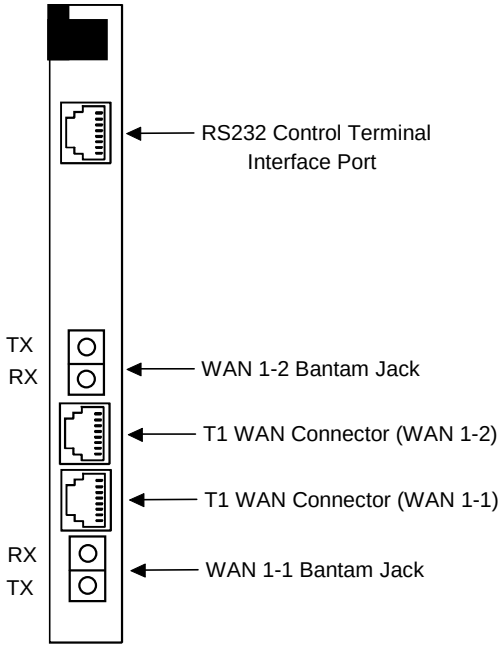


Figure 5-4. INF T1*2 Interface Card Ports

5.2.8 INF+M T1*2 Card Description (892620 / 892660)

The INF+M T1*2 Interface card is similar to the INF T1*2 Interface card with the addition of the computer port, node port and modem port. The interface card connectors are arranged as shown in Figure 5-5.

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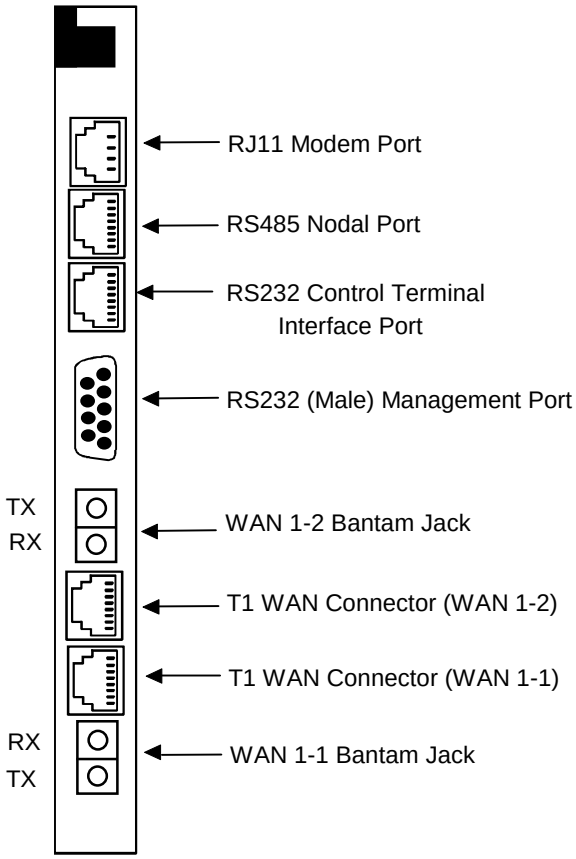


Figure 5-5. INF+M T1*2 Interface Card Port

5.2.9 INF E1*2 Card Description (892760)

The INF E1*2 Interface Card uses BNC connectors to terminate two E1 WAN links, a DB9 computer port, an RJ48 control terminal interface prot and an RJ48 node port. The interface card connectors are arranged as shown in Figure 5-6.

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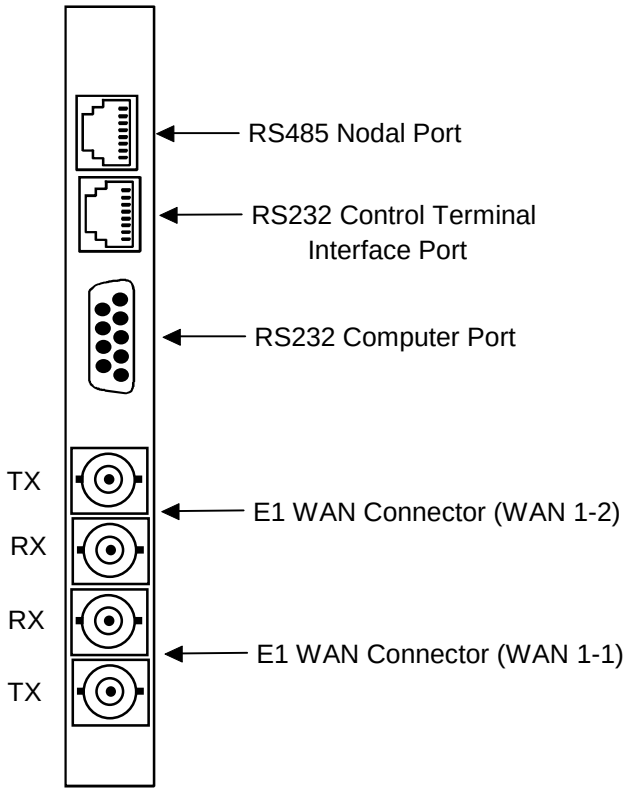


Figure 5-6. INF E1*2 Interface Card Port

5.3 Interface Card Ports and Functionality

The Interface card controls many critical functions in the system. It provides interfaces to external control devices, termiantes all T1 and E1 WAN links, and holds the nonvolatile RAM and the internal modem. Table 5-4 lists the interface ports and functions. Figure 5-7 shows the component layout and labels the ports.

Table 5-4. Interface Ports and Functions

Interface Ports	Function
Modem	Connects the internal modem to a phone line.
Node	Provides contacts to report ACO alarms
Control Terminal	Connects the system to a VT-100 compatible terminal.
Computer	Connects a local device for printing alarms; or to NMS.
T1/E1 WAN link	Connects the system to T1 and E1 lines.

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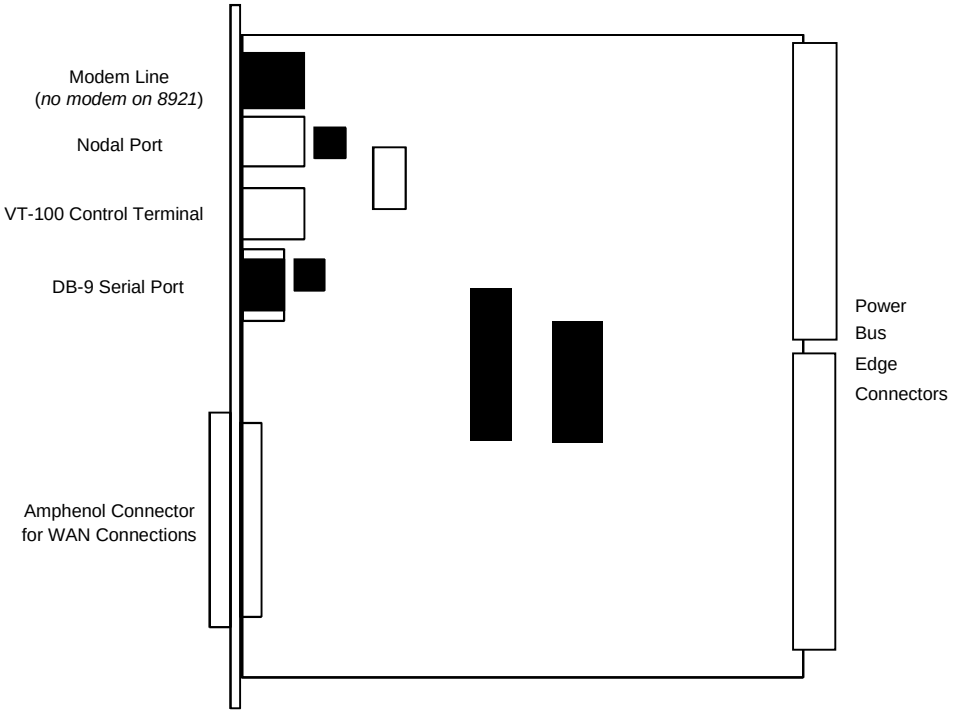


Figure 5-7. Component Layout for the INF+M T1E1*8 and INF T1E1*8 Interface Card

5.4 Using the Node Port

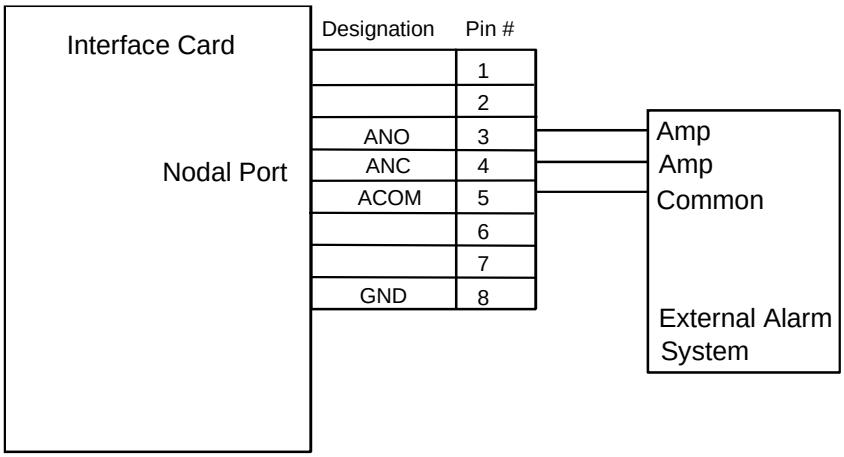
The Node Port allows the system to report ACO (Alarm Cutoff) alarms to an external system to alert the operator to critical situations. Using the ACO function, keeps the alarm active until manually cleared from the terminal.

The node port uses an Rj48 connector. Pins 3, 4, and 5 form an RS485 compatible c-contact closure that can be used to report ACO alarms to an external system. Pins 1, 2, 6 and 7 are reserved for future use. Pin 8 is ground.

Connection of the ACO alarm interface to an external alarm device (such as a buzzer or light) alerts you to problems with the system. Figure 5-8 shows a possible configuration connecting a unit to a generic external alarm system. The nominal input is 5V and the short-circuit current is 250mA.

The alarm interface is activated by the ACO setting. This will activate the device when a designated alarm occurs.

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ANO = Open to ACOM on Alarm

ANC = Closed to ACOM on Alarm

Figure 5-8. Node Port ACO Alarm Interface

Table 5-5. INF Card NODE Jack Pinouts

RJ-48 Pin	Designation	Function
1	---	not used
2	---	not used
3	ANC	Alarm on OpenCondition
4	ANO	Alarm on Closed Condition
5	ACOM	Alarm Common Lead (Source)
6	---	not used
7	---	not used
8	GND	Chassis Ground

5.5 Interface Card User Screens and Settings

5.5.1 Main Screen

Figure 5-9 shows the Interface Card Main Screen. You must use this screen to define two timing sources for the card, and then go to other screens for additional setup and information viewing instructions. To go to the Interface Card Main Screen, highlight that card in the System Main Screen and press <Enter>.

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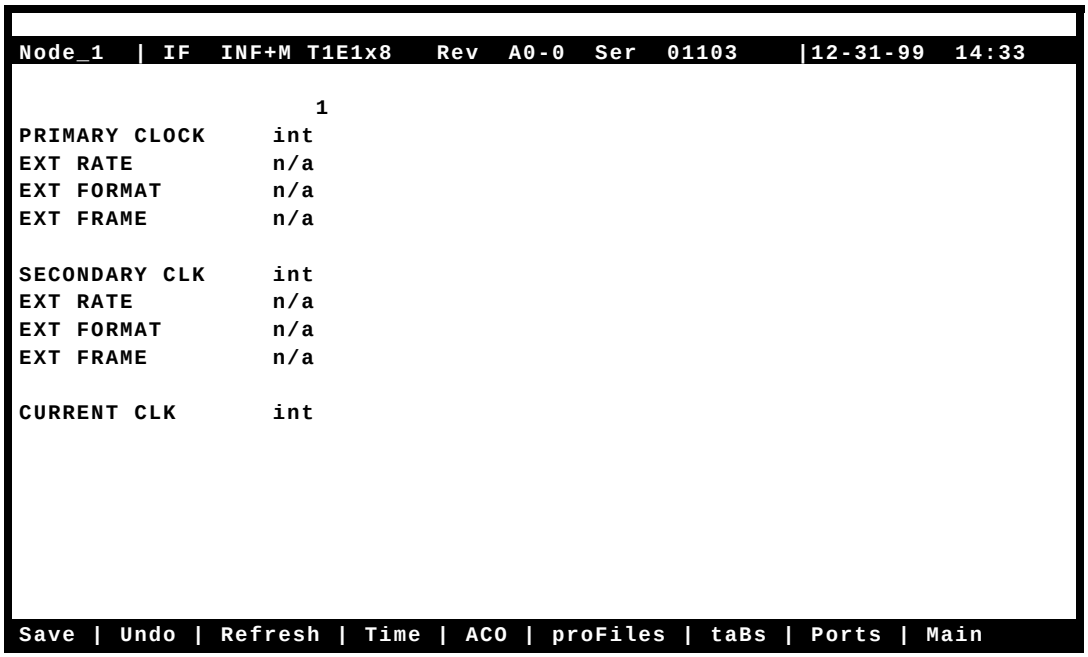


Figure 5-9. Typical Interface Card Main Screen

The bottom line of this screen shows numerous actions that you can perform from the screen. To perform an action, simply press the associated capital letter on your keyboard. For example, to save your option settings, press "**s**" (for **Save**). Table 5-6 lists the available actions.

Table 5-6. Interface Card Main Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Used to redraw the screen.
Time	Sets the system time and date. See the "Setting the System Date and Time" section later in this chapter.
ACO	ACO alarm.
proFiles	Profiles function inoperable with this release.
taBs	Signaling conversion tables for ABCD bits from ANSI to ITU-T for voice circuits.
Ports	Allows you to configure each Interface card port for operation. See the "Ports Screen" section later in this chapter.
Main	Returns to the Main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

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5.5.1.1 Setting the System Date and Time

To set the current date and time for the integrated access system, first press "**t**" in the Interface Card Main Screen to choose the **Time** action from the bottom line of that screen. The current date and time now appear in the lower left of the screen, in the format MM-DD-YY HH-MM. The **MM** field (month) is highlighted.

Use the up-arrow and down-arrow keys to set the current month (**01** to **12**, as required). Also move to each remaining field with the right-arrow and left-arrow keys, and select the current day (**DD**) and year (**YY**), and the current hour (**HH**) and minute (**MM**). The current time of day is displayed in 24-hour continuous format, where HH is **00** to **11** for a.m. and **12** to **23** for p.m.

When you finish setting these fields, press <Enter> and then press "**y**" to confirm that you want to save the changes. The system will subsequently stamp the current date and time on all alarm messages it reports.

5.5.1.2 Selecting the System Timing Clocks

Table 5-7 lists the Interface Card Main Screen configuration options, along with the possible and default values. In this screen, you must specify a primary and secondary timing source (clock) for the integrated access system. These settings are described in the following paragraphs.

Table 5-7. Interface Card Setting Options and Defaults

Parameter	User Options	Default
PRIMARY CLOCK	int serv(P1-P3) wan(w1-1 to w4-2) user(U1-U8)	int
EXT RATE	n/a	n/a
EXT FORMAT	n/a	n/a
EXT FRAME	n/a	n/a
SECONDARY CLK	int serv(P1-P3) wan(w1-1 to w4-2) user(U1-U8	int
EXT RATE	n/a	n/a
EXT FORMAT	n/a	n/a
EXT FRAME	n/a	n/a
CURRENT CLK	cannot edit this field	---

PRIMARY CLOCK

The primary clock provides all internal timing for the system. You can select a network clock source, the system's internal crystal oscillator.

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A network clock is the best Primary Clock source. To select this source, set the Primary Clock field to **wan**, and then specify the WAN link to which the clock source is connected (for example, **w1-1** for T1 or E1 link 1 on the WAN card in chassis slot W1). The WAN clock source will be either 1.544 or 2.048 Mbps (T1 or E1 link). This clock must be accurate to within ±50 parts per million (50 x 10^{-6}).

Select **int** to have the system generate a clock from its own internal crystal oscillator. The stability of this Stratum 4 clock is ±25 parts per million (25 x 10^{-6}). If you use the system's internal crystal oscillator as a clock source, all other devices attached to the network should also derive their timing from it.

Select **serv** to use a primary clock derived from an ADPCM server card in the system. If yo uchoose this seeting, also specify the associated card slot (**P1, P2, or P3**). If you select a slot that contains any other type of server card, the message CARD CANNOT BE SELECTED appears.

Select **user** for a primary clock from a BRI card in the system. If you select **user**, also specify the chassis slot location of the desired card (**U1 to U8**), followed by the card prot from which the clock will be provided (**u1-1 through u8-8**) as required. If you select a chassis slot that contains any other type of user card, the message CARD CANNOT BE SELECTED appears.

SECONDARY CLOCK

If the Primary Clock signal fails, the system automatically switches to an operator-defined Secondary Clock source. The secondary clock source may be a different WAN link, server, user card, or external source, or it can be the system's internal crystal oscillator. Although a secondary clock source is not required for system operation, you should always provide one for the system.

CURRENT CLK

The Current Clock field shows the primary or secondary clock now in operation. You cannot edit this field.



Note: *Jumper positions will affect the available choices.*

5.5.2 Signaling Conversion Table Screen

Signaling conversion is required when cross-connecting a T1 (ANSI) voice circuit to E1 (ITU-T). This process translates the sequences of the ABCD signaling bits to allow proper signaling between the two carrier types.

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You can set up signaling conversion for all types of voice circuits from the Signaling Conversion Table Screen, which is shown in Figure 5-10. To go to that screen, press "**b**" in the Interface Card Main Screen (**taBs** command).

You can accept the default bit pattern changes, or you can set a different ABCD signaling bit pattern and insert it in the table. Each voice circuit type is represented by two columns that correspond to ITU-T to ANSI conversion (C->A) and ANSI to ITU-T (A->C) conversion.

```
 Node_1  | IF  INF+M T1E1x8    Rev A0-0  Ser 01103 | 12-31-99  14:33

                  E&M       FXS/FXSC     FXO/FXOC       PLAR
ABCD          C->A  A->C  C->A  A->C  C->A  A->C  C->A  A->C
0000          0000  1101  0101  0101  0101  0101  1111  0101
0001          0000  1101  0101  0101  0101  0101  1111  0101
0010          0000  1101  0101  1101  0101  1101  1111  1101
0011          0000  1101  0101  1101  0101  1101  1111  1101
0100          0000  1101  0101  1101  0101  1101  1111  1101
0101          1111  1101  0000  1101  1111  1101  0000  1101
0110          0000  1101  0101  1101  0101  1101  1111  1101
0111          0000  1101  0101  1101  0101  1101  1111  1101
1000          0000  1101  0101  1101  0101  1101  1111  1101
1001          0000  1101  0101  0101  0101  1101  1111  1101
1010          0000  1101  0101  0101  0101  1101  1111  1101
1011          0000  1101  0101  1101  0101  1101  1111  1101
1100          0000  1101  0101  1101  0101  1101  1111  1101
1101          0000  0101  0101  0101  0101  1101  1111  1101
1110          0000  1101  0101  1101  0101  1101  1111  1101
1111          0000  0101  0101  0101  0101  1101  1111  1101

Enter Conv. bits: 0000

Save  |  Undo  |  Refresh  |   Default   |  Main
```

Figure 5-10. Signaling Conversion Table Screen

For example, an E&M circuit in the "0101" state (shown in the far-left ABCD column of the screen) will send **0101** as the ABCD bits from the ITU-T end of the circuit. The ANSI end will receive and convert those bits to **1111**. In the opposite direction, the signaling bit sequence will be sent as **1111** from the ANSI end and converted to **0101** at the ITU-T end. However, you can manually override the received ABCD bit pattern at either end.

The E&M portion of the Signaling Conversion Table Screen is also used for FXSDN, FXODN, PLAR-D3, DPO, and DPT signaling. The FXS/FXSC portion is used for FXO-to-FXS signaling, and the FXO/FXOC portion is used for FXS-to-FXO signaling. The PLAR portion is used for PLAR-D4 to PLAR and MRD.

Table 5-8 lists the actions you can perform from the Signaling Conversion Table Screen. These actions appear in the bottom highlighted line of the screen.

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Table 5-8. Signaling Conversion Table Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Redraws the current screen.
Default	Returns column to default settings, one column at a time. You must save your changes after using this command.
Main	Returns to the Interface Card Main Screen. If changes are made to settings and not saved, your changes will be lost.

5.5.3 Remote Terminal System (RTS)

The Remote Terminal System (RTS) is a special application for users using microwave transmission. Using communication software, a user can log into a number of different systems from a single control station (PC, MAC, Sun, or HP Workstation) to download alarm information, change card settings, and perform maintenance.

Systems are connected from the Interface card's COM port to a wireless control network through the RS232 input on one of the four service channels on the wireless network. The Control Station (PC) is connected to pin #2 out and #3 in. Each of the integrated access controllers is connected to RS232 pin #2 in and pin #3 out.

The actual number of the systems that can be connected together is determined by the amount of different numbers that can fit in the "SYS PH#" field in the CPU submenu. The CPU submenu is accessed by selecting a CPU through the user interface and pressing the <ENTER> key.

5.5.3.1 Identification

Each system has a unique identification number on the integrated access controller network (phone number). The unique identification number is used to determine which Controller can be accessed remotely on a serial line. The identification number for each console needs to be entered in the "SYS PH#" field in the CPU submenu. No two systems can have the same number in the "SYS PH#" on the same network. If that field is the same on more than one integrated access controller, race conditions will occur. Therefore each console on a single network must have an individual number in the "SYS PH#" field.

The identification numbers for the integrated access controllers cannot be entered through a control station. This safeguard is provided to ensure a reliable connection between a control station and an integrated access controller. Attempts to change an identification number of a system remotely will be denied.

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5.5.3.2 Network Priorities

All integrated access controllers on the wireless network have equal priorities. Because of this equality, no Controller can interrupt a remote session between another Controller and a control station. This is why the control station always initiates all communication on the RTS network.

5.5.3.3 Intra-Network Communications

Integrated access controllers cannot communicate with each other. Communication on the network is only between the control station and a single Controller. Since the communications on the network of integrated access controllers is always initiated by the control station, the Controller systems cannot communicate with each other. Figure 5-11 shows a diagram of three RTS units.

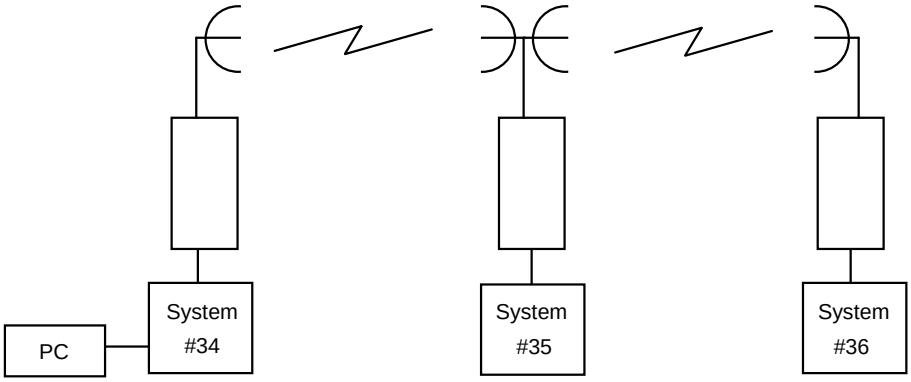


Figure 5-11. Typical RTS Configuration

The PC associated with integrated access controller #34 can engage any of the two other units by using “AT” commands from the communications software used. If a local VT-100 is active at any of the remote locations, the user will be logged off and the master PC will control the system unit. When the master PC logs off, the local user will be able to log into the unit again. Connections at all units are done through the DB9 computer port.

5.5.3.4 Terminal Security

No user may log into any integrated access controller on the network without knowing the individual password of each system.

Table 5-9 list the “AT” commands and the associated function. All “AT” commands are followed by pressing the <ENTER> key.

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Table 5-9. "AT" Commands Used by RTS

AT Command	Function
ATDTxxx	Establish a user interface connection.
ATDTxxxR	Establish an alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display all alarms that are being reported by the system that have not yet been displayed.)
ATDTxxxC	Establish a current alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display all active alarms that are being reported by the system.)
ATDTxxxH	Establish a historical alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display the alarm history reported by the system.)
ATDTxxxCH	Establish a current and historical alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display the current alarms and alarm history reported by the system.)
+++	Disconnects a remote session.
"L" (letter L)	Disconnects a remote session.
xxx indicates the phone number on the CPU card of the desired system unit.	

5.5.4 Ports Screen

You also must configure each of the Interface card's user interface ports. This is done from the Ports Screen, which is shown in Figure 5-12. To go to this screen, press "**p**" in the Interface Card Main Screen (**Ports** command).

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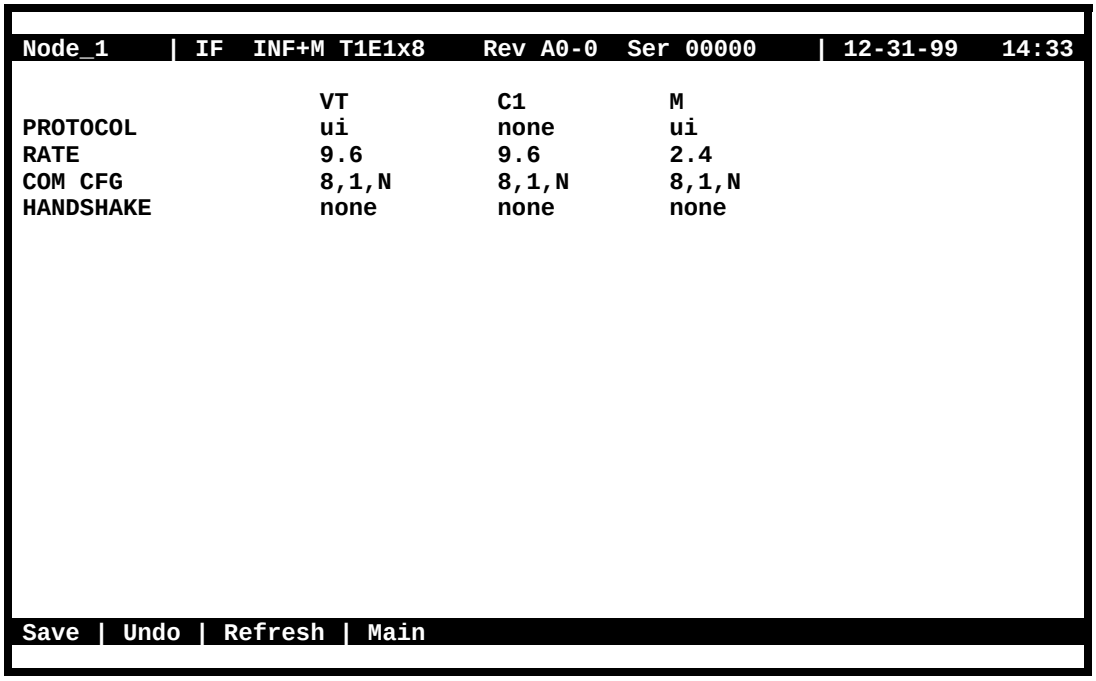


Figure 5-12. Typical Ports Screen (INTF+M)

This screen shows the Protocol, Rate, Communications, and Handshaking control settings for each port. The VT column lists the current settings for a VT100-compatible terminal connected to the TERM modular jack on the Interface card faceplate. The C1 column is for an external computer connection to the COMP (or COM1) DB-9 plug on the card. The M column is for a modem connection from an INF+M card to a remote facility via a phone line.

The screen settings are described in the following paragraphs.

Note: *There are two scenarios in Figure 5-12. The Typical INTF+M Ports Screen shown above displays (VT - VT100 terminal, C1 - COM1, and M-Modem). However, if INTF+E isn't used the screen will display (VT, C1, and C2 - COM2).*

PROTOCOL

For the VT-100 terminal port, the Protocol setting is always **ui** (user interface).

For the computer (C1) port, choose **ui**, **pr** (Printer), **slip** (Serial Line Interface Protocol), or **ppp** (Point-to-Point Protocol).

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For the modem port, choose **ui**, **ui-pr**, or **none**.

RATE

The transmission rate for the VT **(9.6** kbps**)** and C1 ports when selecting PPPcan be **19.2** kbps. The rate for the M port is always **2.4** kbps. You cannot change these settings.

COM CFG

The Communication Configuration settings are always 8 data bits, one stop bit, and no parity (**8,1,N**) for all three ports. You cannot change these settings on any port.

HANDSHAKE

The Handshaking setting is always **none** for all three ports. You cannot change these settings on any port.

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5.6 Interface Card Error Messages

Refer to Appendix B in the System Reference Guide for further information on Error Messages regarding this card.

5.7 Interface Card Troubleshooting

5.7.1 User Interface Problems

The Interface card provides the connections from the integrated access system to the external control terminals and/or other network management systems. This card may be faulty if you are connected to the system but receive no responses to your commands. However, the problem in this case also may be with the 8803 CPU Card.

First, check the cabling connections from the Interface card to the appropriate external device. Refer to the “Interface Card Description” section at the beginning of this chapter for more information on the card faceplate jacks and signal connections. If possible, substitute a known good cable for the one you suspect is faulty.

If the cable connection is good, unplug the CPU card from the system chassis and then plug it back in to restart the CPU and system. (The problem may have been a momentary system “freeze”.) Then, log into the system again and repeat the command (or series of commands) that initially caused the problem. If the problem continues, replace the Interface card with an identical new card.



Note: *Note that removal of the Interface card will cause a service disruption on all T1 and E1 WAN links of the system.*

If the problem persists with the new Interface card, the CPU card is probably faulty.

If the Interface card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

5.7.2 Alarm Reporting Problems

The Interface card also provides a relay contact closure to an external alarm annunciation (or other alarm reporting device at the system site) when an alarm is declared. The card may be faulty if an alarm is declared but not indicated on the external alarm reporting system. Check the wiring from the Interface card NODE port to the alarm system. If the wiring is good, replace the Interface card.

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Note that removal of the Interface card will cause a service disruption on all T1 and E1 WAN links of the system.

5.7.3 WAN Transmission Problems

A faulty Interface card could cause T1 and E1 WAN service disruptions, since this card also provides the WAN connections. Electrically, the Interface card resides between the WAN cards and the T1/E1 network. If all T1 and E1 links are down (as evidenced by system alarms in progress), first check the cable from the WAN jack of the Interface card to the network. If the cable connection is good, replace the Interface card.

Note that removal of the Interface card will cause a service disruption on all T1 and E1 WAN links of the system.

If the problem is with only one T1 or E1 WAN link, refer to the WAN Chapter in this manual and troubleshoot that link and its associated WAN card. Use the loopbacks provided in the WAN card user interface screens in conjunction with the built-in test patterns you can apply from the integrated access system. These test functions allow you to isolate the problem to the local or far (remote) end. You can then check the interconnect cabling from the Interface card to that link, and sequentially replace the WAN and/or Interface card, one by one, until the trouble clears.

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Chapter 6
WAN Card

6.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the Wide-Area Network (WAN) Cards. These include the WAN SINGLE, WAN DUAL, WAN-U DUAL, WAN-R DUAL and WAN-2P ESF LPBK Cards. These designations are marked on the faceplate ejectors of the associated cards. Throughout the remainder of this chapter, these cards are referred to as the WAN SINGLE, WAN DUAL, WAN-U, and WAN-R cards, respectively.

This chapter also provides similar information for the DSX/CEPT, CSU, and HDSL plug-in modules used with the WAN cards.

The WAN cards manage the flow of data through the integrated access system network. They terminate T1 and/or E1 lines and generate or receive network timing clocks. They also cross-connect DS0 time slots, to pass data through the system from one T1 or E1 line to another.

The DSX/CEPT and CSU Modules are used to connect to T1 facilities, which operate at 1.544 Mbps. The CEPT function of the DSX/CEPT module is used internationally for connection to a 2.048 Mbps E1 network. The HDSL module provides an high-speed digital subscriber line (HDSL) E1 interface.

All WAN cards equipped with CSU or DSX/CEPT modules also act as the "near end" termination points for the Subscriber Loop Carrier (SLC-96) facilities defined in Bellcore publication TR-TSY-000008, Issue 2, August 1987.

6.2 WAN Card Descriptions

6.2.1 WAN SINGLE Card Description (800060)

The WAN SINGLE card connects to a single T1 or E1 line. It has one port for a T1 DSX, T1 CSU, or CEPT E1 interface.

6.2.1.1 Card Jumper/Switch Settings

The WAN SINGLE card does not have any jumpers or switches on its motherboard.

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6.2.1.2 Card External Connectors and Signal Pinouts

The WAN SINGLE card does not have any external connectors on its faceplate.

6.2.2 WAN DUAL Card Description (801020 / 801021)

The WAN DUAL card connects to two T1 or E1 lines, or to one of each type. It works with only one DSX/CEPT or CSU plug-in module if the WAN port without either module remains in the standby state. **However, a CGA-Red alarm will be generated for that port.**

6.2.2.1 Card Jumper/Switch Settings

The WAN Dual card does not have any jumpers or switches on its motherboard.

6.2.2.2 Card External Connectors and Signal Pinouts

The WAN Dual does not have any external connectors on its faceplate.

6.2.3 WAN-U Card Description (801120 / 801160)

The WAN-U card is a dual-port card that provides HDSL 2.048 Mbps service when used with HDSL plug-in modules. **The HDSL module works only on this WAN card, and the DSX/CEPT and CSU modules do not work on this card.**

6.2.3.1 6.A.2.3.i Card Jumper/Switch Settings

The WAN-U card does not have any jumpers or switches on its motherboard.

6.2.3.2 6.A.2.3.ii Card External Connectors and Signal Pinouts

The WAN-U card does not have any external connectors on its faceplate.

6.2.4 WAN-R Card Description (801420 / 801460)

The WAN-R card is a dual-T1/E1 card with relays for use in CPU XCON systems with redundant WAN cards. When placed in slot W4 of a chassis, this card acts as a redundant (backup) card for up to three standard WAN cards in slots W1, W2, and W3. This arrangement is known as 1-in-N redundancy, where N is the number of working (primary) WAN cards supported. If a working WAN card fails, the relay on the WAN-R card in slot W4 will switch its output to the correct pins on the WAN connector of the associated Interface card in the system. If the WAN-R card is placed in any other chassis slot, it works like a regular WAN DUAL card.

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6.2.4.1 Card Jumper/Switch Settings

The WAN-R card does not have any jumpers or switches on its motherboard.

6.2.4.2 Card External Connectors and Signal Pinouts

The WAN-R card does not have any external connectors on its faceplate.

6.2.5 WAN Card with ESF Loopback Description (801560)

The WAN card with ESF Loopback is able to detect ESF data link codewords for line and payload, activate and deactivate commands. A minimum reception of 10 continuous command patterns by each channel is required to trigger the loopback detection process, and the performing of the command. Since all 8 channels (4 WAN cards) are processed by one processor on the CPU card, simultaneous detection on more than one channel requires more than 10 repetitions. *The WAN ESF Loopback Card (801560) can only be used in a T1 environment.*

6.2.5.1 Card Jumper/Switch Settings

The WAN card with ESF Loopback does not have any jumpers or switches on its motherboard.

6.2.5.2 Card External Connectors ande Signal Pinouts

The WAN card with ESF Loopback does not have any external connectors on its faceplate.

6.2.6 DSX/CEPT Module Description (811)

The DSX/CEPT module supports either the T1 DSX or E1 CEPT mode. It mounts on the WAN SINGLE, WAN DUAL, and WAN-R cards. Jumper settings are provided on the module to select either DSX or CEPT operation.

6.2.6.1 Module Jumper Settings

After installing the DSX/CEPT modules, set their jumpers for either DSX (T1) or CEPT (E1) operation. These jumpers are factory-set for DSX. To convert a module to CEPT, reset the jumpers as described below. The actual jumper locations will depend on which module version you have.

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6.2.6.2 Module Installation

For DSX or CEPT operation, you must install one of these modules on the associated WAN card before inserting those cards into the system chassis. Figure 6-1 shows the locations of the DSX/CEPT modules on a WAN card. One module is required per WAN port. If your system has a T1 link (DSX) and an E1 link (CEPT), you will need two DSX/CEPT modules.

First, install a DSX/CEPT module in the slot reserved for WAN port 1-1. Insert the pins for TX into socket JP10 on the WAN card (see Figure 6-1), while also inserting the pins for RX in JP9 and the 24-pin end connector pins in JP6. Then, for a WAN DUAL card, install another DSX/CEPT module in the WAN port 1-2 location, and plug that module into JP13, JP14, and JP15.

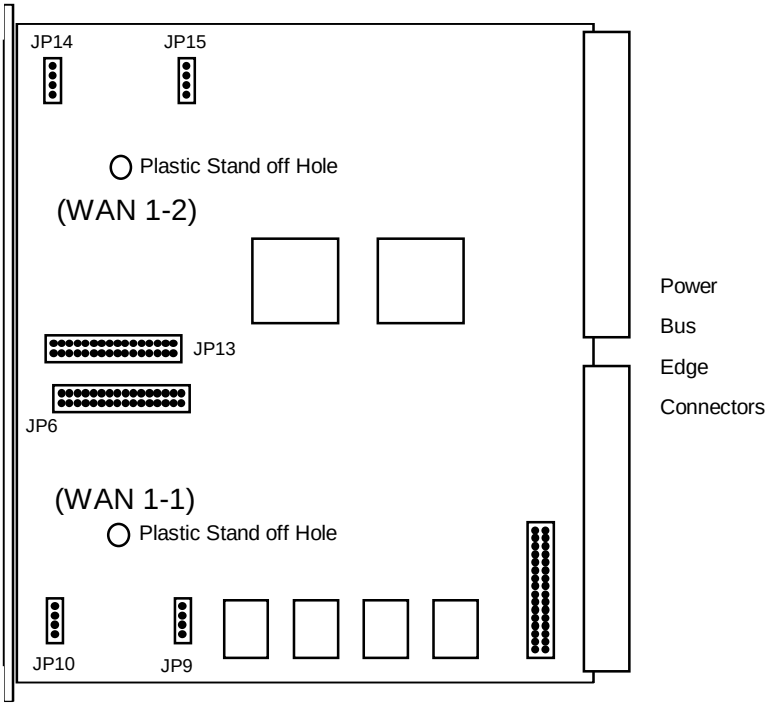


Figure 6-1. Installing DSX/CEPT Modules

6.2.6.3 Revision F Module

The DSX/CEPT Revision F module is shown in Figure 6-2 through Figure 6-7. There are two different types of modules (see illustrations below). These modules may be optioned for T1, 120-ohm balanced E1, or 75-ohm unbalanced E1. The jumper option configuration is shown on the card itself. The jumpers shown here are set for 75-ohm unbalanced E1 operation.

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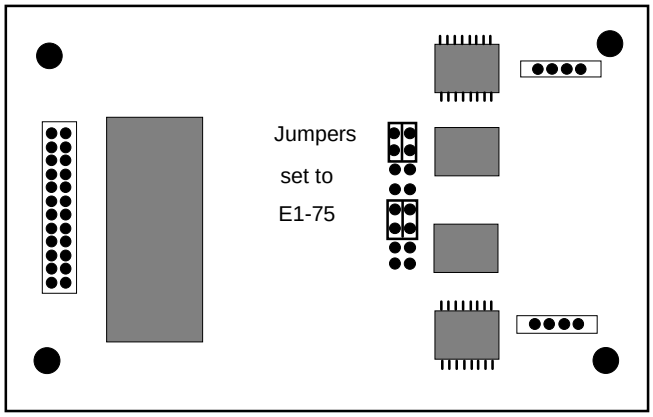


Figure 6-2. DSX/CEPT Module Jumpers (E1 75 Ohm)

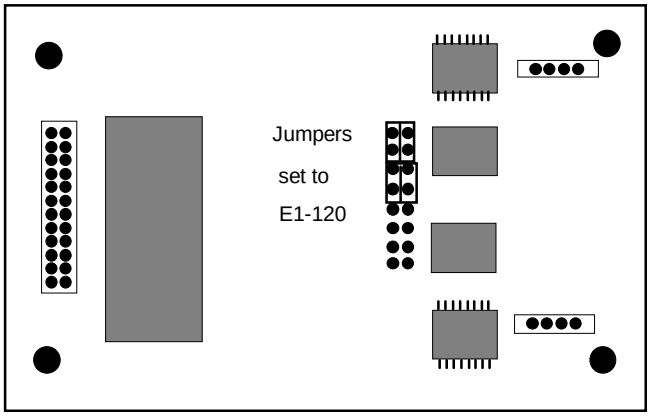


Figure 6-3. DSX/CEPT Module Jumpers (E1 120 Ohm)

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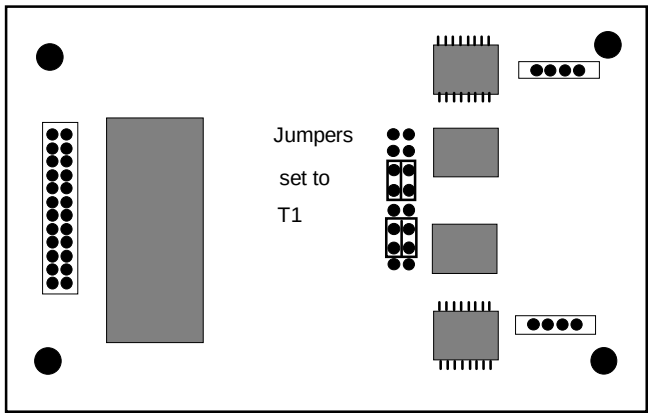


Figure 6-4. DSX/CEPT Module Jumpers (T1)

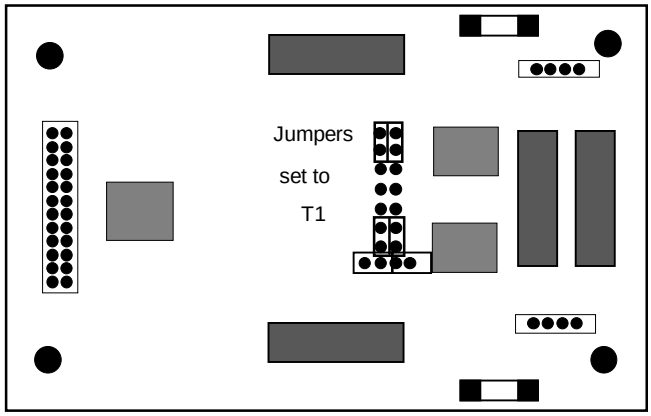


Figure 6-5. DSX/CEPT Module Jumpers (T1)

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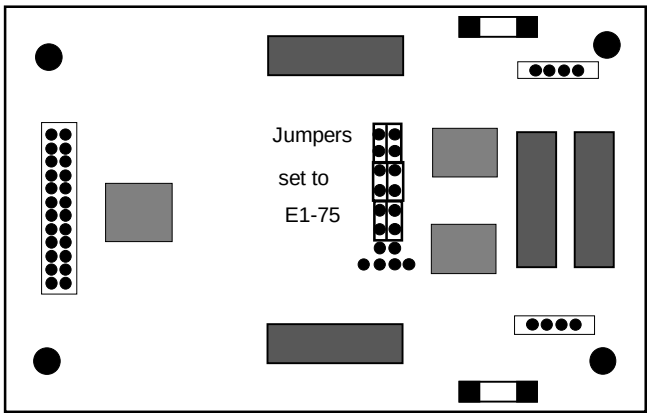


Figure 6-6. DSX/CEPT Module Jumpers (E1 75 Ohm)

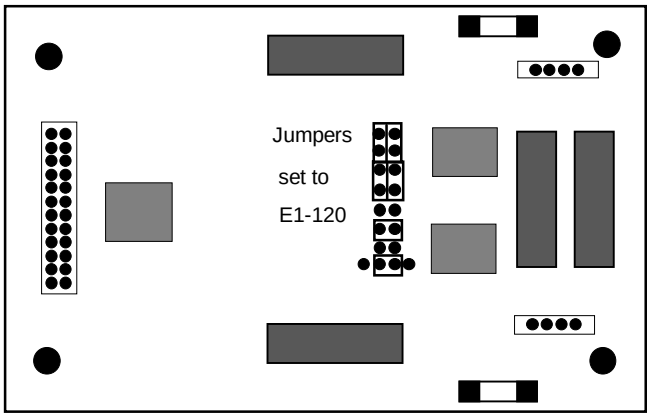


Figure 6-7. DSX/CEPT Module Jumpers (E1 120 Ohms)

6.2.6.4 Revision E1+ Module

The DSX/CEPT Revision E1+ module (Figure 6-8 and Figure 6-9) provides jumper settings for impedance compensation. These modules support either T1 or E1 operation, with either 75 ohms or 120 ohms for an E1 interface. To configure this module, change the jumper positions on the pins according to Figure 6-8 through Figure 6-12. The module is shipped for T1 DSX operation, as shown in Figure 6-10.

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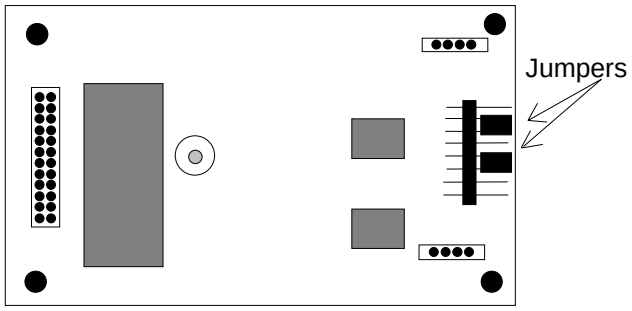


Figure 6-8. DSX/CEPT Revision E+ Module Jumpers

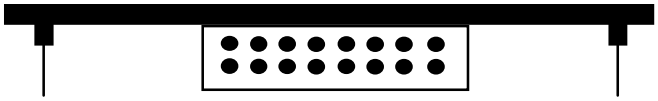


Figure 6-9. Module End View

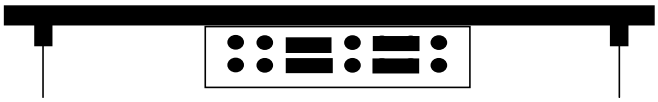


Figure 6-10. DSX T1 Operation Jumper Settings



Figure 6-11. 75-Ohm E1 Jumper Settings

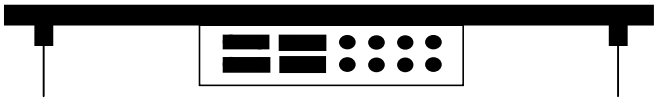


Figure 6-12. 120-Ohm E1 Jumper Settings

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6.2.6.5 Revision A1 Through D1 Modules

The DSX/CEPT Revision A1 through D1 modules (Figure 6-13 and Figure 6-17) provide jumper settings for impedance compensation. These modules support T1, 75-ohm E1, or 120-ohm E1 operation. To configure this module, set the jumper positions on the pins according to Figure 6-15 through Figure 6-17. The module is shipped for T1 DSX operation, as shown in Figure 6-15.

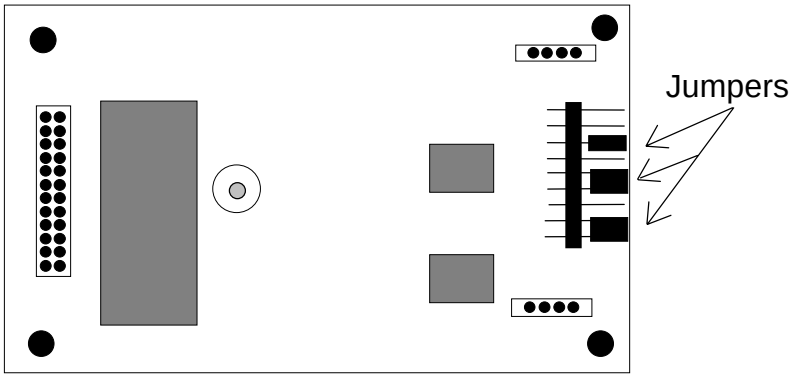


Figure 6-13. DSX/CEPT Revision A1 to D1 Module Jumpers

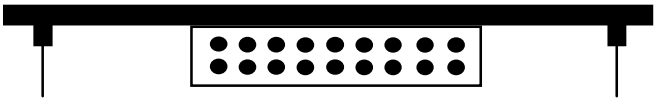


Figure 6-14. Module End View

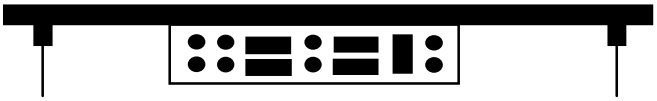


Figure 6-15. T1 DSX Jumper Settings

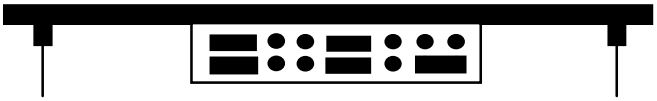


Figure 6-16. 75-Ohm E1 Jumper Settings

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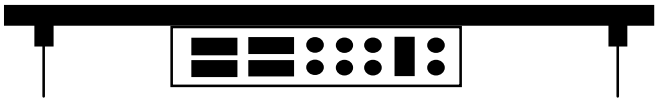


Figure 6-17. 120-Ohm E1 Jumper Settings

When installing the 811 CSU/DSX module on the 8000 WAN or 8010 WAN, there are situations in which the plastic standoffs do not allow the module to seat correctly on the WAN board (see Figure 6-18).

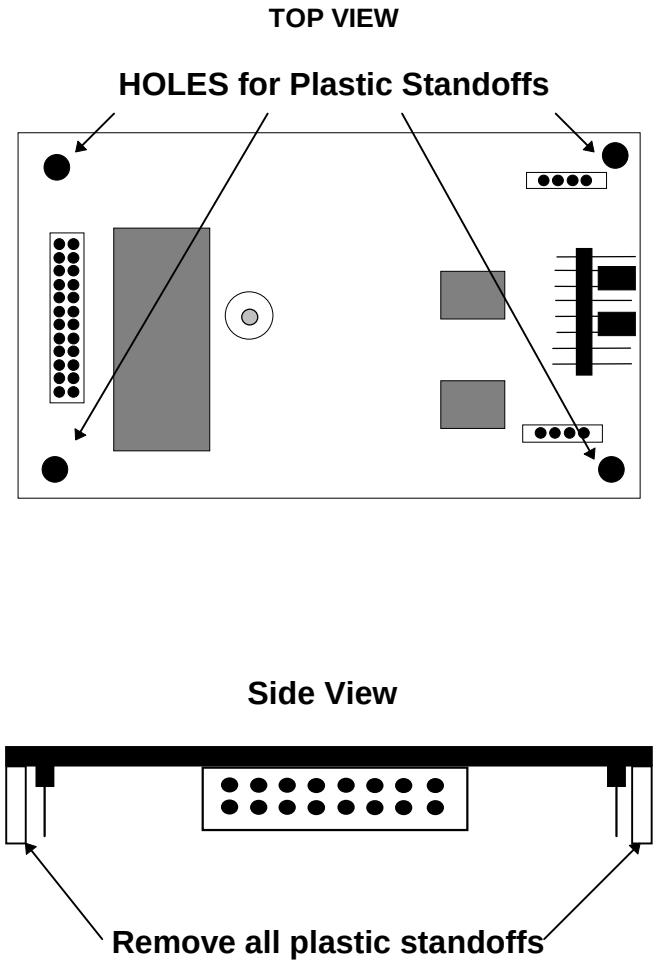


Figure 6-18. Removal of Plastic Standoffs - 811 WAN Module

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When assembling and installing the module on the WAN card, **it is our advice that the plastic standoffs be removed to eliminate the possibility of errors on the associated T1 or E1 lines.** For this reason, the plastic standoffs are no longer being supplied by the manufacturer for new WAN modules.

6.2.6.6 Setting Jumpers for Balanced or Unbalanced E1 Operation

You can configure CEPT E1 links for either 120-ohm balanced or 75-ohm unbalanced operation by setting the jumpers on the DSX/CEPT module as previously described, setting them or the E1 Interface Adapter Panel, or setting both of these units. Refer to Table 6-1 for information on which revisions of the DSX/CEPT module have jumpers. The adapter panel is a replacement for the cover on the front-loading chassis with power supplies on the side. Figure 6-19 shows the jacks and jumpers on this panel.

Table 6-1. Balanced/Unbalanced E1 Link Jumper Compatibility

Module Type	Rev. A	Rev. B	Rev. C	Rev. D	Rev. E	Rev. F
811	Yes	Yes	n/a	Yes	No	No
81120	No	No	n/a	n/a	n/a	n/a

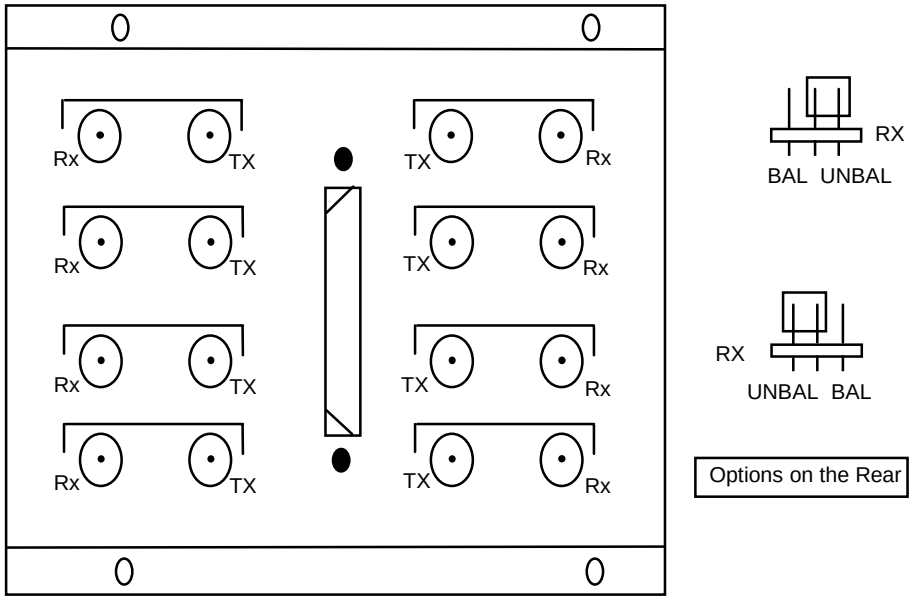


Figure 6-19. E1 Interface Adapter Panel

For 120-ohm balanced E1 operation, set the jumpers on the adapter panel as shown. **Both** DSX/CEPT Modules should be set for balanced operation prior to installation.

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For 75-ohm unbalanced E1, set the adapter panel jumpers to UNBAL **in one location only**, and set them to BAL in all other cases. When multiple DSX/CEPT modules with jumpers are installed, the unbalanced jumper should be set on the module closest to the E1 line.

When the adapter panel is present, it is considered the unit closest to the E1 line. The corresponding jumpers on the rear of the panel are set to UNBAL while all other module jumpers are set to BAL.

6.2.7 CSU Module Description (812)

The CSU module is required for Channel Service Unit (CSU) operation on a T1 line. This module mounts on the WAN SINGLE, WAN DUAL, and WAN-R cards, as shown in Figure 6-1.

6.2.7.1 Module Installation

Install the CSU module on the associated WAN card by plugging its connector pins into the mating sockets of the WAN card, as shown in Figure 6-1. For a WAN DUAL or WAN-R card, you can install two modules.

6.2.7.2 Module Jumper/Switch Settings

The CSU module does not have any jumpers or switches.

6.2.8 HDSL Module Description (820)

The HDSL module is required for 2.048Mbps operation using HDSL. It can be used only on the WAN-U card.

6.2.8.1 Module Installation

Install the HDSL module on the WAN-U card by plugging its connector pins into the mating sockets of that card, in a fashion similar to that shown in Figure 6-1. You can install up to two HDSL modules on the WAN-U card.

6.2.8.2 Module Jumper/Switch Settings

The HDSL module does not have any jumpers or switches.

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6.2.9 Installing the WAN Cards

After installing the proper modules on the WAN cards, insert the WAN cards into the system chassis. Each system can have up to four WAN cards, which go into slots W1 through W4.

For a system with redundant WAN cards, always insert a WAN-R card into slot W4. If you install the WAN-R card into any other WAN card slot, it will work as a regular WAN card (not as a redundant card). Also make sure that the WAN-R card has the same types of modules installed on it as the associated primary WAN cards, and that those modules are installed in the same positions (ports 1 and 2), as shown in Figure 6-1

6.3 WAN Card User Screens and Settings

6.3.1 T1 CSU and DSX Settings

The DSX/CEPT and CSU Modules for T1 operation have identical configuration parameters, which you must set on, the WAN Card Main Screen. To go to that screen, select the desired WAN card on the System Main Screen, then press <Enter>. Figure 6-20 shows a typical WAN Card Main Screen for T1 CSU or DSX operation.

```
Node_1        | W1 CSU+DSX     Rev A6-2  Ser 00101    | 12-31-99  14:33

                CSU                                    DSX
STATE           stdby          STATE                   stdby
MODE            xcon           MODE                    xcon
FORMAT          esf            FORMAT                  esf
LINE CODE       b8zs           LINE CODE               b8zs
PULSE           n/a            PULSE                   n/a
LINE LEN        133            LINE LEN                133
SLIP LIM        126            SLIP LIM                126
AIS/ALM         none           AIS/ALM                 none
LINE LB         off            LINE LB                 off
LOCAL LB        off            LOCAL LB                off
CH LB           off            CH LB                   off
LB ADDR         01             LB ADDR                 01
LB GEN          off            LB GEN                  off
LB DET          w/to           LB DET                  w/to
ESF/NMS RP      at&t           ESF/NMS RP              at&t
EER THRHD       10e-4          EER THRHD               10e-4
RDNT RULES      n/a            RDNT RULES              n/a
GROUP           none           GROUP                   none

Save | Undo | Refresh | Xcon | Perf | Farstat | Test | sWitch | pArs | Main
```

Figure 6-20. WAN Card Main Screen for T1 CSU or DSX

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The headers of all WAN card screens show the types of modules installed on those cards. The above example shows a WAN DUAL card with a CSU module on port 1 and a DSX/CEPT module configured for T1 DSX operation on port 2. This card is installed in WAN card slot W1 of the system. Its screen header designation is therefore **W1 CSU+DSX**.

The DSX/CEPT and HDSL modules also have identical parameters. These are described in the next section of this chapter.

Table 6-2 lists several actions you can perform from the WAN Card Main Screen. These actions appear in the bottom-highlighted line of the screen. To perform an action, simply press the key corresponding to the capital letter of the desired action. For example, to save your parameter settings, press "**s"** to invoke the **Save** commands.

Table 6-2. Main Screen Actions

Action	Function
Save	Saves changes to settings
Undo	Returns all settings to the last saved state.
Refresh	Updates certain time-related information fields that are not automatically updated (e.g., performance and test data).
Xcon	Shows the cross-connect map for each WAN port.
Perf	Brings up the Performance Data Screen for the near-end system. See the Performance Data section of this chapter.
Farstat	Brings up the performance data for the far-end system. See the Far-End Data section of this chapter.
Test	Initiates and monitors testing of all WAN card ports. Refer to the Test section of this chpater.
sWitch	Allows you to switch WAN port operation to the redundant (WAN-R) card.
pArs	PARS feature protects the traffic of a failed T1/E1 transmission line in a ring network.
Main	Returns to the System Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 6-3 lists the CSU/DSX settings on the screen, along with their possible and default values. For information about cross-connects and for the DS0 time slot map used to connect your WAN to voice and data user cards.

In addition to the Local and Line Loopbacks described below, a single or dual WAN card with a CSU Module will recognize and respond to industry-standard T1 loop-up and loop-down codes generated and applied from the network or a remote device. However, the WAN card will ignore those codes if it has a DSX/CEPT Module.

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Table 6-3. T1 CSU and DSX Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
MODE	term d-i xcon	1	xcon
FORMAT	d4 esf slc96 slcd4		esf
LINE CODE	ami b8zs	2	b8zs
PULSE	n/a trnsp z15s		n/a
LINE LEN	0 7.5 15.0	3	0
SLIP LIM	126 138		126
AIS/ALM	none tcodr	4	none
LINE LB	off on		off
LOCAL LB	off on		off
CH LB	off clr		off
LB ADDR	01-24		01
LB GEN	off llb plb nlb		off
LB DET	w/to off on		w/to
ESF/NMS RP	none at&t ansi both c-fdl c-b7r e-fdl	5	at&t
EER THRHD	10e-4 thru 10e-9 none		10e-4
RDNT RULES	n/a none OOS CGA	6	none
GROUP	none 1 2 3 4	7	none

Notes:

1. Valid options for Bus Connect systems are **term** and **d-i**. The only valid option for Cross-Connect systems is **xcon**.

2. These options are valid only if you have a CSU and the Line Code is **ami**. If you have a CSU and the Line Code is **b8zs**, then this setting will default to **n/a**. If you have a DSX module, then this setting will always default to **n/a**.

3. These options are valid only if you have a CSU. If you have a DSX module, then the possible options are **0** (default), **133, 266, 399, 533, 655**, and **csu**.

4. The settings for AIS/ALM vary greatly by the settings of other parameters.

5. If the format is d4 or slc96, the only option to appear will be **none**.

6. If there is no redundant WAN card in the appropriate slot the only option that will appear is **n/a**.

7. Selection of GROUP is a two-step process. After identifying the group number (1-4), the user must select the secondary group (A, B, or C). At which point TC ODR will then become available.

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STATE

In the standby state, the WAN port is electrically disconnected from the network. Set this field to **stdby** (standby) while configuring WAN links, and then change it to **actv** (active) when starting normal operations. If the WAN is in loopback due to a command from a remote device, the loopback will be dropped if you switch to **stdby**.

MODE

In bus-connect systems, WAN cards have two possible modes of operation, Terminal and Drop-and-Insert. Terminal (**term**) mode is for channel bank applications. All time slots must connect to a port on a user card or remain unconnected. Drop-and-Insert (**d-i**) mode automatically connects all time slots on WAN link #1 to the corresponding time slots on WAN link #2 of the same card. You can assign any or all of the time slots to voice and data ports by overriding the automatic setup. See the System Operations chapter for more information about using these two modes, and about time slot maps in general. In cross-connect systems, the Mode automatically defaults to (**xcon**).

FORMAT

The Format setting specifies the framing to be used on the WAN link so that it matches the framing used by the T1 carrier. Set the Format parameter based on the type of framing the T1 carrier requires. If you are using an external Channel Service Unit (CSU), the framing format must match that of the CSU. The options are **d4** (normal superframe), **esf** (extended superframe), **slc96** (subscriber loop carrier) and **slcd4** (subscriber loop carrier - D4).

Table 6-4 lists the DS0 time slots and their corresponding SLC® assignments, based on Bellcore TR-TSY-000008.

LINE CODE

The Line Code setting matches the coding used by the T1 interface to that used by the T1 network. Set the Line Code to the type of coding used. If you are connected to an external CSU, the line coding must match that of the CSU. The options are **ami** and **b8zs**.

PULSE

CSU modules with the Line Code configured for **ami** mode requires the WAN system or the attached customer equipment ensure pulse density (also known as ones density). In **z15s** mode, the system will monitor the outbound data stream and will place a “1” in the 16th bit position whenever it detects fifteen consecutive zeros. Obviously, this can lead to data corruption. In the transparent mode (**trnsp**), the system will pass all incoming data (the DTE

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must provide 1s density). If the Line Code parameter for the CSU is **b8zs**, the Pulse option will default to **trnsp**. If the WAN link is equipped with a DSX plug-in module, this option will automatically default to **n/a**.

LINE LEN

The Line Length setting adjusts the T1 power level to compensate for the distance the signal must travel before it reaches the first T1 line repeater or other device. For a DSX interface, the options are **133**, **266**, **399**, **533**, and **655** feet. Or, choose **csu** to connect the DSX module to the equipment side of a collocated external CSU.

SLIP LIM

The Slip Limit defines how many bits of wander the WAN port will tolerate before forcing a frame slip. The options are **126** bits and **138** bits, which correspond to an older and a more recent version of the specification, respectively.

Table 6-4. DS0-to-SLC-96 Time Slot Conversion

Time Slot	SLC Channel Number			
	Shelf A	Shelf B	Shelf C*	Shelf D*
1	1	25	49	73
2	13	37	61	85
3	2	26	50	74
4	14	38	62	86
5	3	27	51	75
6	15	39	63	87
7	4	28	52	76
8	16	40	64	88
9	5	29	53	77
10	17	41	65	89
11	6	30	54	78
12	18	42	66	90
13	7	31	55	79
14	19	43	67	91
15	8	32	56	80
16	20	44	68	92
17	9	33	57	81
18	21	45	69	93
19	10	34	58	82
20	22	46	70	94
21	11	35	59	83
22	23	47	71	95
23	12	36	60	84
24	24	48	72	96
* Shelves C and D not supported in this release				

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AIS/ALM

The AIS/ALM (Alarm Indication Signal/Alarm) setting allows you to specify the type of "keep-alive" signal the system will generate on one T1/E1 link if the other one fails. The AIS/ALM setting depends on the framing Format selected for this WAN card. Table 6-5 shows the AIS/ALM settings for cross-connect systems.

Table 6-5. AIS/ALM Settings

System	Framing Format	AIS/ALM
Bus Connect/RB Connect	D4	none
	ESF	none, frm, unfrm
	SLC-96	note, orb13, orb16
Cross-Connect	D4	none, tcodr
	ESF	none, frm, unfrm
	SLC-96	note, orb13, orb16

In Bus Connect and Redundant Bus Connect systems, the only option available for D4 framing is **none** (no AIS signal is to be generated). The options for ESF framing are **none**, **frm** for a framed alarm signal and **unfrm** for an unframed alarm signal. The options for SLC-96 framing are **note** (network office terminating equipment), **orb16** (Office Repeater Bay -16 frames) and **orb13** (Office Repeater Bay - 13 frames).

In a cross-connect system, the options available for D4 or ESF framing are **none** (no AIS signal is generated) and **tcodr** (transcoder operations). You can choose **tcodr** only after selecting the Group option described later in this section. The options for SLC-96 framing are **note** (network office terminating equipment), **orb16** (Office Repeater Bay–16 frames), and **orb13** (Office Repeater Bay–13 frames). The AIS/ALM option for the SLCD4 format defaults to **n/a**.

LINE LB

The Line Loopback setting loops the T1/E1 line back toward the network, as shown in Figure 6-21. This loopback also continues sending the incoming data toward the CPE. Choosing **on** allows you to test the end-to-end T1/E1 circuit path from the far end. Choosing **off** disables the loopback and restores the normal signal path in both directions. If the WAN is in loopback due to a remote device, the loopback will be dropped if you choose **on**.

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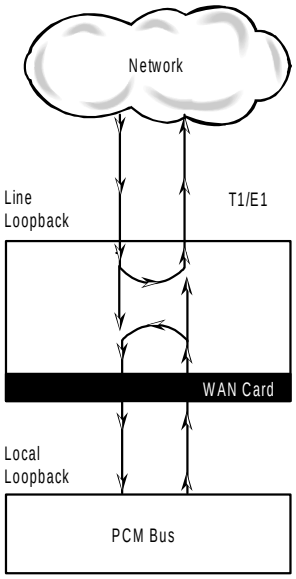


Figure 6-21. Line and Local Loopbacks

LOCAL LB

The Local Loopback setting allows you to loop the full T1/E1 line back toward the CPE, as shown in Figure 6-21. This loopback also continues sending CPE data toward the network. Choosing **on** allows you to test the local system. Choosing **off** disables the loopback and restores the normal signal path in both directions. If the WAN is in loopback due to a command from a remote device, the loopback will be dropped if you choose **on**.

CH LB

The Channel Loopback setting allows you to loop the data in an individual DS0 time slot on the WAN link toward the CPE (see Figure 6-22). However, you cannot use this feature to loop multiple time slots or any portions of them. Refer to the user card chapters for other loopback options that may allow you to loop part of a time slot or multiple time slots.

The loopback setting can be **off** or **clr** (clear). Clear means the entire 64 kbps clear-channel time slot will be looped back, but without the Robbed-Bit Signaling data that may normally be embedded in the time slot. If the WAN is in loopback due to a command from a remote device, the loopback will be dropped if you choose **clr**.

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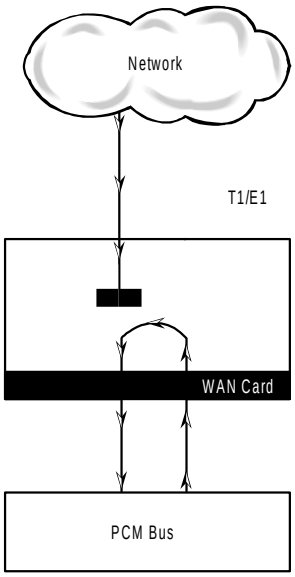


Figure 6-22. DS0 Time Slot Loopback

LB ADDR

The Loopback Address setting, when used in conjunction with the Channel Loopback setting, specifies which time slot will be looped back. Only one time slot may be looped back at a time for each T1 link. The options for T1 lines are **1** to **24**. For E1 lines, the options are **1** to **31**.

LB GEN

The Loopback Generate setting generates outband diagnostic codes that are sent to the remote equipment. These codes are ANSI T1.403 compatible with T1 networks, and allow you to command a latching loopback at remote DS1 equipment. The options are **off**, **llb** (Line Loopback), **plb** (Payload Loopback), and **nlb** (Network Loopback). The **plb** setting is a loopback of the entire signal except the framing bits.

Selecting **off** generates a loopback deactivate command corresponding to the last activation command generated. e.g. if you send a **plb** command and then send an **off** command, the **off** command would be payload deactivate. Note that the actual transmission of the command happens after you press '**s**' for **Save**. If you have already sent one of the loopback activation commands, it is recommand that you send an **off** command before sending another loopback activation command. e.g. this set of selections **plb, off, llb, off** transmits the following commands: payload activate, payload deactivate, line activate, and line deactivate.

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LB DET

This option allows the card to detect DS1 channel, and ANSI T1.403 (8015 WAN only) loopbacks. When set to off, no T1 loopbacks can be detected. When set to on, T1 loopbacks will be detected and maintained until a loop down is detected. The with/time-out (w/to) is the same as on except that if no loop down is detected after 10 minutes, the loopback will self-termiante.

Currently WAN card with ESF Loopback is the only card that detects ANSI T1.403 loopback commands. The other WAN cards will only respond to “in-band” loopback codes. If the WAN is a loopback due to a command from a remote device, the loopback will be dropped if you switch to **off**.

ESF/NMS RP

This setting specifies the format in which performance statistics for the T1 link will be gathered and stored in the system. In ESF mode, these performance statistics are accessible to the carrier over the Facilities Data Link (FDL) as well as through the user interface. The options are **none**, **at&t**, **ansi**, **c-fdl, c-b7r** and **e-fdl.** The **at&t** option requires the statistics be gathered in accordance with AT&T Publication 54016 whereas the **ansi** option requires the ANSI T1.403 specification be used. Performance statistics are also available for D4 formatted T1 lines. See the “T1 Performance Monitoring” section later in this chapter for more detailed information on this topic.

The choice of **c-fdl** disables telco-side capability to access performance-monitoring information. The **c-fdl** option sends and receives network management information over the facility data link. The **c-b7r** option sends and receives the same information over time slot 24 on the T1 WAN link highlighted. The **e-fdl** option sends and receives T1 ESF-encapsulated network management information over the FDL.

EER THRHD

The Excessive Error Rate Threshold selects the error rate, which an alarm is declared. This setting interacts with the EER setting in the Alarm Filters of the system. The options are **10e-4** through **10e-9**, or **none**.

RDNT RULES

The selection of Redundancy Rules will define the method of determining what event will trigger a WAN port to switch to its redundant mate. The options are **none**, **OOS,** and **CGA**.

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GROUP

The Group setting identifies a method of link-fail alarm propagation from upstream trunks to downstream tributaries when the system is configured for alarm transcoding.

The selection of a group is a two-step process. After identifying the group number (**1** to **4**), select the secondary group (**A** [child group], **B** [child group] or **C** [parent group]).

Figure 6-23 shows two system units with "parent-child" groupings. The child groups are designated as "A" and "B." The parent groups are designated "C". Using WAN Groups

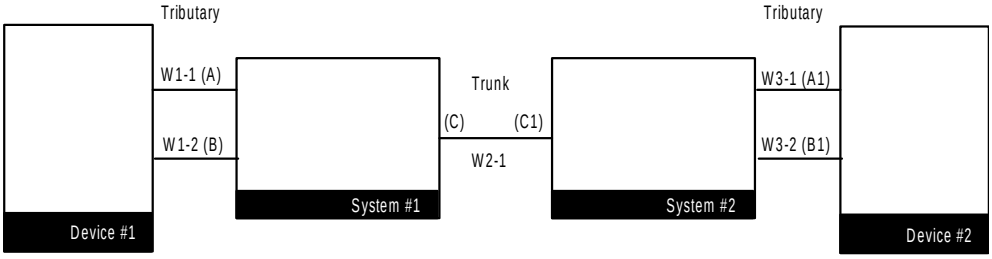


Figure 6-23. Using WAN Groups

The WAN links between the Device and the System Unit (A, B, A1, and B1) are called *tributaries*. The WAN link between the two SYS Units (C and C1) is referred to as a *trunk*.

In the normal condition (no WAN groups selected), a failure on any of the tributaries supplying Device 1 would be reported at SYS 1 and Device 1 only. A failure of the trunk from C to C1 would be reported at SYS 1 and 2 only.

When Groups are created at both system units, a trunk failure (C to C1) will inform all of the associated tributaries (A and B, A1 and B1) of that condition.

When groups are used in conjunction with the Network Management option (mentioned earlier) and the AIS/ALM is set to **tcodr**, a failure of any of the tributaries will propagate the failure through the trunk to the associated tributary at the other end (A to A1 or B to B1).

The following notification procedure is followed:

1. A Loss of Signal, Loss of Frame, Error Rate Exceeded, or AIS failure of the transmit leg of W1-1(A) occurs between Device 1 and SYS 1.

2. SYS 1 detects the failure on the receive leg and declares an alarm for W1-1(A).

3. SYS 1 sets the A Bit (Yellow Alarm) in the transmit leg of W1-1(A). Device 1 detects this condition and knows not to use W1-1(A).

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4. SYS 1(C) sends an alarm message to SYS 2 (C1), telling it that W1-1(A) is either in a CGA_RED or AIS alarm.

5. SYS 2 sets the transmit leg of W3-1(A1) into AIS (CGA_RED). Device 2 detects this condition and knows not to use W3-1(A1).

When the original failure is corrected, the alarm is also cleared for downstream tributaries.

6.3.2 E1 CEPT and HDSL Settings

Figure 6-24 shows the WAN Card Main Screen for E1 operation. This example shows a WAN-U card with two HDSL modules in system chassis slot W1.

```
Node_1       | W1  H_E1+H_E1    Rev A6-2  Ser 00101   | 12-31-99  14:33

                 H_E1                                    H_E1
STATE            stdby          STATE                    stdby
MODE             xcon           MODE                     xcon
FRAME            crc            FRAME                    crc
TS16             cas            TS16                     cas
EVEN BIT         norm           EVEN BIT                 norm
AIS/ALM          none           AIS/ALM                  none
LINE LB          off            LINE LB                  off
LOCAL LB         off            LOCAL LB                 off
CH LB            on             CH LB                    on
LB ADDR          01             LB ADDR                  01
LB GEN           off            LB GEN                   off
COM/NMS RP       none           COM/NMS RP               none
EER THRHD        10e-4          EER THRHD                10e-4
RDNT RULES       n/a            RDNT RULES               n/a
GROUP            none           GROUP                    none

Save | Undo | Refresh | Xcon | Perf | Farstat | Test | sWitch | Hdsl | Main
```

Figure 6-24. WAN Card Main Screen for E1 CEPT or HDSL

The WAN-U card only accepts HDSL modules. The other WAN cards only accept CSU or DSX/CEPT modules, which are described in the previous section.

The only difference between Main Screens for CEPT and HDSL operation is the addition of the **Hdsl** action on the bottom line of the screen.

Table 6-6 summarizes the actions you can perform from this screen, and Table 6-7 lists the CEPT/HDSL settings controlled on the screen along with their possible and default values.

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Table 6-6. CEPT/HDSL Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., performance and test data).
Xcon	Shows the time slot cross-connect map for each WAN port.
Perf	Brings up the Performance Data Screen. See the Performance Data section of this chapter.
Farstat	Shows the far-end network register data.
Test	Initiates and monitors testing of all WAN card ports. Refer to the Test section of this chapter.
sWitch	Allows you to switch WAN port operations to the redundant (WAN-R) card.
Hdsl	Brings up the HDSL Screen described later in this chapter. This command is shown only for a WAN-U card.
Main	Returns to the System Main Screen. If changes are made to settings and not saved, you will be prompted to save or abandon your changes.

Table 6-7. CEPT/HDSL Screen Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
MODE	xcon		xcon
FRAME	crc d-frm		crc
TS16	cas ccs nos		cas
EVEN BIT	norm inv		norm
AIS/ALM	none tcodr	1	none
LINE LB	off on		off
LOCAL LB	off on		off
CH LB	off clr		off
LB ADDR	01-31 (user-selectable)	2	01
LB GEN	off llb plb nlb		off
COM/NMS RP	none c-sa4 c-br7 e-sa4 (c-fdl)	3	none
EER THRHD	10e-4 through 10e-9 none		10e-4
RDNT RULES	n/a none OOS CGA	4	none
GROUP	none 1 2 3 4	5	none

Notes:

1. AIS/ALM will show **none** until the GROUP is selected.

2. The up and down arrow keys are used to scroll through the loopback address values.

3. The Farstat registers will not work properly for E1 operations unless the **c-sa4** option is selected for the COM/NMS RP parameter.

4. If there is no redundant WAN card in the appropriate slot, the only option that will appear is **n/a**.

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5. Selection of GROUP is a two-step process. After identifying the group number (1-4), the user must select the secondary group (A, B or C).

STATE

In the standby state, the WAN port is electrically disconnected from the external network. Set State setting to **stdby** (standby) when setting up your WAN links, then changes it to **actv** (active) when starting normal operations.

MODE

In cross-connect systems, Mode automatically defaults to **xcon**.

FRAME

The Frame setting toggles the frame type from **crc** (Cyclic Redundancy Check, 4th level) to **d-frm** (Double Frame).

TS 16

The TS 16 setting changes the signaling usage of slot 16 for **cas** (Channel Associated Signaling), **ccs** (Common Channel Signaling) or **nos** (No Signaling). In the first two options, time slot 16 is used to carry signaling information for all channels on the E1. If **nos** is selected, then time slot 16 becomes available for user data.

EVEN BIT

Setting the Even Bit parameter for **inv** will cause the system to invert every even bit in every DS0 time slot. This setting should only be used if the entire E1 stream is composed of PCM voice, to ensure minimum-ones density.

AIS/ALM

The AIS/ALM (Alarm Indication Signal/Alarm) setting, allows the user to specify the type of “keep-alive” signal that the system will generate on one E1 should the other fail. After GROUP is selected, the two options for this setting are **none** and **tcodr** (for transcoder operations).

LINE LB

The Line Loopback setting controls looping of the full E1 line back to the network. When **on**, this setting allows end-to-end testing of the line.

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LOCAL LB

The Loopback setting controls looping of the full E1 line back to the PCM bus. The options are **off** and **on**. When **on**, this setting allows testing of local equipment. The system generates a "Keep Alive–Type 1" pattern on the E1 line.

CH LB

The Channel Loopback setting allows you to place individual DS0 channels in loopback toward the PCM bus. A channel loopback loops a single DS0 channel and cannot be used to loop multiple DS0s or a portion of a DS0. Refer to user cards for other loopback options, which may allow you to loop part of a channel or multiple channels. The options are **on** and **off**.

LB ADDR

The Loopback Address setting, in conjunction with the Channel Loopback setting, specifies which channel is to be looped back. Only one channel may be looped back at any one time for each E1 link. The valid selections for E1 lines are **1-31**. Do not loop time slot 16 unless the E1 interface is in no signaling (**nos**) mode.

LB GEN

The Loopback Generate setting generates out-band diagnostic codes that are sent to the remote equipment. These codes are compatible with DDS networks and allow you to command a latching loopback at remote DDS equipment. The options are **off**, **llb** (Line Loopback), **plb** (Payload Loopback) and **nlb** (Network Loopback).

Selecting **off** generates a loopback deactivate command corresponding to the last activation command generated. e.g. if you send a **plb** command and then send an **off** command, the **off** command would be payload deactivate. Note that the actual transmission of the command happens after you press '**s**' for **Save**. If you have already sent one of the loopback activation commands, it is recommand that you send an **off** command before sending another loopback activation command. e.g. this set of selections **plb, off, llb, off** transmits the following commands: payload activate, payload deactivate, line activate, and line deactivate.

COM/NMS RP

The Communications/Network Management System Report setting tells the system where to send TCP/IP packets from the NMS configuration selected on the Interface card. The options are **none** (no NMS), **c-sa4** (use SA4 channel for NMS information), **c-b7r** (send NMS information to a B7R card on time slot 31), and e-sa4 (send NMS information in a proprietary ESF format via the SA4 channel to a NTU).

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EER THRHD

The Excessive Error Rate Threshold selects the error rate, which an alarm is declared. This setting interacts with the EER setting in the Alarm Filters of your system. The options are **10e-4** through **10e-9,** or **none**.

RDNT RULES

The selection of Redundancy Rules will define the method of determining what event will trigger a WAN port to switch to its redundant mate. The options are **none**, **OOS,** or **CGA**. If there is no redundant WAN card in the appropriate slot, the only option that will appear is **n/a**.

GROUP

The Group setting identifies a method of link-fail alarm propagation from upstream trunks to downstream tributaries. Selection of group is a two-step process. After identifying the group number (1-4), the user must select the secondary group (A [child group], B [child group], or C [parent group]). The group setting is normally used for transcoder applications. See the groups diagram and discussion earlier in this chapter.

6.3.3 Cross-Connect (XCON)

The Cross-Connect (Xcon) command in the Main WAN screen allows you to view the Cross-Connections that have been set up in the system. Highlight the WANs on the card and press the **x** (Xcon) to select Cross-Connect. Either an E1 screen (Figure 6-25) or a T1 screen (Figure 6-26) will appear, depending upon the WAN highlighted. This is a display-only screen. Time slot and cross-connect configuration are discussed in the System Operations chapter of this manual.

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```
Node_1        | W2  CSU+CEPT   8010  Rev A6-2  Ser 11132    | 12-31-99  14:33


TS   XCON     TS        CIRCUIT_ID     TS    XCON   TS    CIRCUIT_ID
 0   frame    align     64k            16    cas          64k
 1   u5-1     A-01      user_circuit   17    u7-1   A-17  user_circuit
 2   u5-2     A-02      user_circuit   18    u7-2   A-18  user_circuit
 3   u5-3     A-03      user_circuit   19    u7-3   A-19  user_circuit
 4   u5-4     A-04      user_circuit   20    u7-4   A-20  user_circuit
 5   u5-5     A-05      user_circuit   21    u7-5   A-21  user_circuit
 6   u5-6     A-06      user_circuit   22    u7-6   A-22  user_circuit
 7   u5-7     A-07      user_circuit   23    u7-7   A-23  user_circuit
 8   u5-8     A-08      user_circuit   24    u7-8   A-24  user_circuit
 9   u6-1     A-09      user_circuit   25    u8-1   A-25  user_circuit
10   u6-2     A-10      user_circuit   26    u8-2   A-26  user_circuit
11   u6-3     A-11      user_circuit   27    u8-3   A-27  user_circuit
12   u6-4     A-12      user_circuit   28    u8-4   A-28  user_circuit
13   u6-5     A-13      user_circuit   29    u8-5   A-29  user_circuit
14   u6-6     A-14      user_circuit   30    u8-6   A-30  user_circuit
15   u6-7     A-15      user_circuit   31    u8-7   A=31  user_circuit




Refresh | Test | Main
```

Figure 6-25. E1 Cross-Connect Screen (display only)

```
Node_1        | W2  CSU+CEPT   8010  Rev A6-2  Ser 11132    | 12-31-99  14:33


TS   XCON     TS        CIRCUIT_ID     TS    XCON   TS    CIRCUIT_ID
 1                                     13
 2                                     14
 3                                     15
 4                                     16
 5                                     17
 6                                     18
 7                                     19
 8                                     20
 9                                     21
10                                     22
11                                     23
12                                     24


Refresh | Test | Main
```

Figure 6-26. T1 Cross-Connect Screen (display only)

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6.3.4 Performance Data

All WAN cards gather performance data. The performance data for a T1 or E1 line is viewed by typing "**p**" in the WAN Card Main Screen, to invoke the **Perf** command. Performance data is accumulated for 15-minute increments that include the current period and the previous 96 periods (24 hours), which are accessed via the **pgUp** and **pgDn** commands of the Main Screen.

In the T1 environment, an error is defined as any CRC-6, Controlled Slip, or Out of Frame (OOF) error for **ESF** framing, and any Bipolar Violation (BPV), Controlled Slip, or OOF error for the D4 format. In an E1 environment, an error is defined as any CRC-4 error, Controlled Slip, or OOF error.

Figure 6-27 shows a typical T1 Performance Data Screen. The E1 screen is similar except for the actions on its bottom line, where **uSerregs** and **Networkregs** commands are not provided. The performance statistics are gathered and displayed in 15-minute intervals. Lines in each of the columns represent periods when no seconds have accumulated.

In the AT&T mode, two sets of registers accumulate performance data for T1 WAN links. The user registers and network registers are driven by the same errored events. However, they can be cleared separately. You can view both the user and network registers, but you can only clear the user registers. The network only has access to the network registers, and can only clear those registers. The ANSI and E1 WAN links have only one set of registers.

```
Node_1          | W1  CSU+DSX     Rev A6-2  Ser 00101    | 12-31-99  14:33

Unit 1  PERFORMANCE  USER REGISTERS  Sec. 167 of 900

                  UAS   SES   BES    LOFC   SLIP   DM    STATUS
CUR               0   0       0      0      0      0     . . T . . .
01                0   0       0      0      0      0     . . T . . .
02                0   0       0      0      0      0     . . T . . .
03                0   0       0      0      0      0     . . T . . .
04                0   0       0      0      0      0     . . T . . .
05                0   0       0      0      0      0     . . T . . .
06                0   0       0      0      0      0     . . T . . .
07                0   0       0      0      0      0     . . T . . .
08                0   0       0      0      0      0     . . T . . .
09                0   0       0      0      0      0     . . T . . .
10                0   0       0      0      0      0     . . T . . .
11                0   0       0      0      0      0     . . T . . .
12                0   0       0      0      0      0     . . T . . .
TOTAL             0   0       0      0      0      0     . . T . . .


STATUS:   Y=YEL   N=NOS   T=Test   L=LOS   O=OOS   B=BPV   E=ERR


Refresh | pgUp | pgDn | uSerregs | Networkregs | Clearregs | Main
```

Figure 6-27. Typical Performance Data Screen

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Table 6-8 lists the actions available from the Performance Data Screen.

Table 6-8. Performance Data Screen Actions

Action	Function
Refresh	Because statistics are not calculated in real time, the Refresh command must be used to update the screen with new information.
pgUp	Pages through the performance statistics for the current 15 minute period and periods 96-1.
pgDn	Pages through the performance statistics for the current 15 minute period and periods 1-96.
uSerregs	Allows you to view the User Registers. Not shown for E1 operations because it is the only set of registers for that mode.
Networkregs	Allows you to view the Network Registers. When you are viewing the network registers, the Clear Registers option disappears. (This action is not available in D4 mode or E1 operations.)
Clearregs	Clears the User Registers. Network statistics remain the same.
Main	Returns to the WAN Card Main Screen.

ES

An Errored Second (ES) is a second with one or more CRC-6 (ESF), BPV (D4/D-Frame), or CRC-4 (E1) errors, one or more Out-Of-Frame (OOF) errors, or one or more Controlled Slips.

UAS

An Unavailable Second (UAS) is any second during which service is unavailable. An unavailable signal state is declared after ten consecutive Severely Errored Seconds (SESs) are logged. An unavailable state is cleared after ten consecutive non-Severely Errored Seconds are logged. Unavailable Seconds are also accumulated if the card has an out-of-service (OOS) condition.

SES

A Severely Errored Second (SES) is any second with 320 or more CRC-6 (T1 ESF), BPV (T1 D4/D-frame), or CRC-4 (E1) errors. Or, an SES can be any second with one or more Out-Of-Frame (OOF) errors.

BES

A Bursty Errored Second (BES) is any second with more than one and fewer than 320 CRC-6 (ESF), BPV (D4/D-frame), or CRC-4 (E1) errors.

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LOFC

The Loss of Frame Count (LOFC) is the number of times a Loss Of Frame (LOF) is declared. An LOF is declared after 2.5 seconds of a continuous Loss Of Synchronization (LOS) or Out-Of-Frame (OOF) condition. The LOF is cleared after no more than 15 consecutive seconds without another LOS or OOF.

SLIP

A Slipped Second is any second that contains one or more Controlled Slips. A Controlled Slip is the deletion or replication of a T1 or E1 frame by the receiving equipment.

DM

A Degraded Minute (DM) is any minute during the reporting period that has an error rate greater than 10^{-6} as described in ITU-T G.821. The count for this field is from 1 to 15, rather than 1 to 900 for the other fields.

STATUS

If one of the described errors occurs during any of the 15-minute intervals, the status column for that period would display the code for that error. The codes are displayed at the bottom of the screen. The values are **Y** (Yellow Alarm received), **N** (No Signal), **T** (Test Mode - line loopback, local loopback, payload loopback, or standby), **L** (Loss of Synchronization – 2 out of 4 frame bits in error), **O** (Out of Service), **B** (Bipolar Violation), and **E** (Excessive Error Rate).

6.3.5 Far-End Performance Data

The Far-End Performance Data Screen is similar to the Performance Data Screen. The same statistics are collected in a slightly different manner. Figure 6-28 shows a typical display of far-end network register data in the AT&T mode. To view the far-end performance data, press "**f**" (**Farstat** command) in the WAN Card Main Screen.

When **Farstat** is selected in the T1 AT&T mode, an FDL message is sent to the far end, requesting the network register data from there. This data is displayed on the local terminal. There will be a slight time delay in the data display.

When **Farstat** is selected in the ANSI T1.403 mode, the far end generates one-second performance reports and sends them to the local system, where they are then stored.

To view E1 far-end statistics, you must select **c-sa4** as the COM/NMS RP setting.

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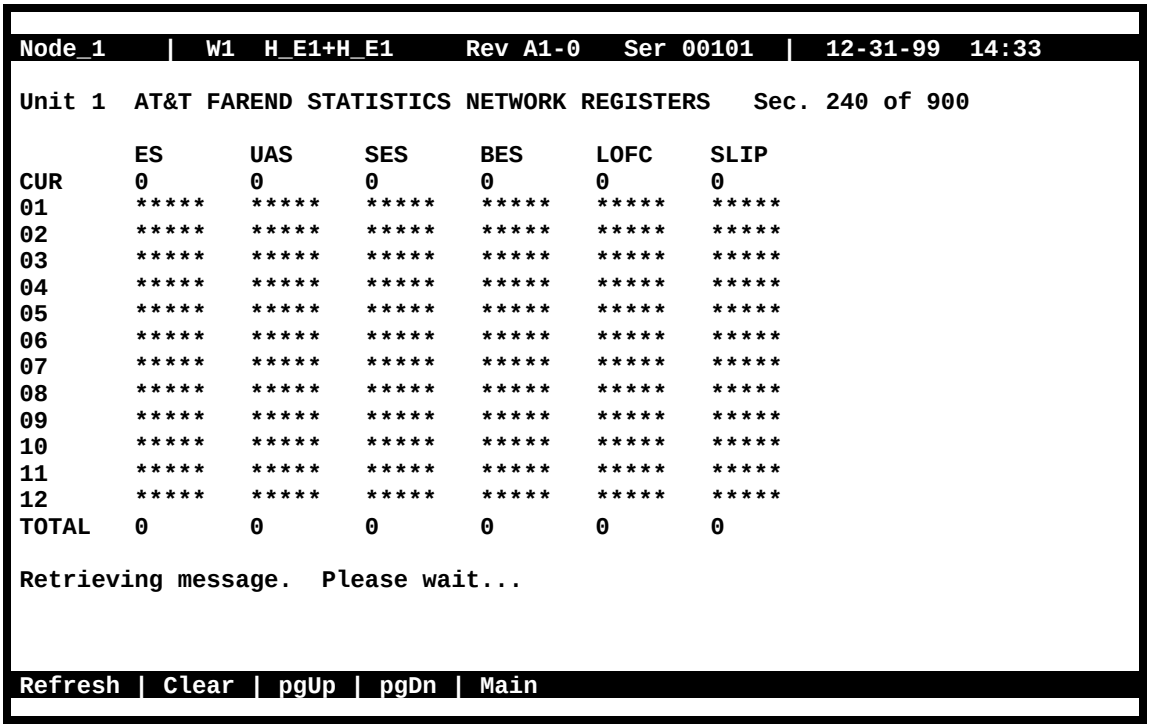


Figure 6-28. Typical Far-End Performance Data Screen

Press "**c**" (**Clear** command) from the bottom line of this screen to send a FDL message to the far end and also clear the local display. The following message will now appear:

"**Ok to clear performance (y/n) ?"**

Press "**y**" to clear the statistics, or "**n**" to leave the screen contents intact. To view the far-end information again, press "**r**" (restore) to send an FDL message and refresh the screen. Table 6-9 lists the actions available from the above screen.

Table 6-9. Far-End Performance Data Screen Actions

Action	Function
Refresh	Because data is not calculated in real time, the Refresh command must be used to update the screen with new information.
Clear	Clears the Far-End Network Registers display on the local terminal.
PgUp	Pages through the performance statistics for the current 15-minute period and periods 96-1.
PgDn	Pages through the performance statistics for the current 15-minute period and periods 1-96.
Main	Returns to the WAN Card Main Screen.

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ES

An Errored Second (ES) is a second with one or more CRC-6 (ESF) or BPV (D4/D-Frame) errors, one or more OOFs, or one or more Controlled Slips.

UAS

An Unavailable Second (UAS) is any second during which service is unavailable. An unavailable signal state is declared after ten consecutive Severely Errored Seconds (SESs) are logged. An unavailable state is cleared after ten consecutive non-Severely Errored Seconds are logged. Unavailable Seconds are also accumulated if the card has an out-of-service (OOS) condition.

SES

A Severely Errored Second (SES) is any second with 320 or more CRC-6 (ESF) or BPV (D4/D-Frame) errors, or one or more OOF errors.

BES

A Bursty Errored Second (BES) is any second with more than one and fewer than 320 CRC-6 (ESF) or BPV (D4/D-Frame) errors.

LOFC

The Loss of Frame Count (LOFC) is the accumulation of the number of times a Loss Of Frame (LOF) is declared. An LOF is declared after 2.5 seconds of continuous Loss Of Synchronization (LOS) or OOF condition. An LOF is cleared after no more than fifteen consecutive seconds without an LOS or OOF condition.

SLIP

A Slipped Second is any second containing one or more Controlled Slips. A Controlled Slip is the deletion or replication of a DS1 frame by the receiving equipment.

6.3.6 Test Screen

Pressing "**t**" (**Test** command) in the WAN Card Main Screen brings up the screen shown in Figure 6-29. From this screen, you can create test situations between WAN cards or between a single WAN card and data test equipment at a remote site. Table 6-10 lists the actions you can perform from the bottom line of this screen. Table 6-11 lists the settings controlled on this screen along with their possible values.

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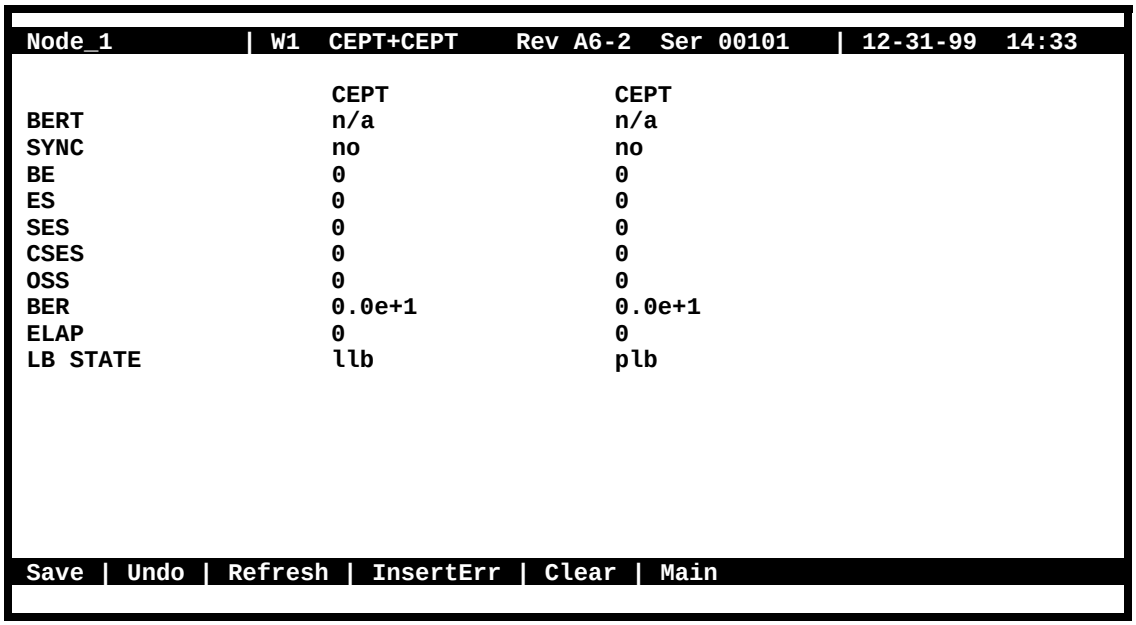


Figure 6-29. Typical WAN Card Test Screen

Table 6-10. Test Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., performance and test data).
Insert Err	Allows you to manually insert a single bit error into the data signal. This does not cause a CRC error.
Clear	Clears the Test Screen and resets all counters to zero.
Main	Returns to the WAN Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or abandon those changes.

Table 6-11. WAN Card Test Screen Options

Parameter	User Options	Notes	Default
BERT	off mark space 1:1 1:7 3:24 qrss lp-up lp-dn	1	off
SYNC	information only–no user options		
BE	information only–no user options		
ES	information only–no user options		
SES	information only–no user options		
CSES	information only–no user options		
OSS	information only–no user options		
BER	information only–no user options		
ELAP	information only–no user options		
LB STATE	information only–no user options		

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Notes:

1. The **lp-up** (loop-up) and **lp-dn** (loop down) codes are not supported for CEPT or HDSL WANs. Turning any of these tests on or off will cause a temporary interruption of data transmission on the DS0 time slots as well as on the FDL bit of the corresponding port.

BERT

The Bit Error Rate Tester (BERT) sends a data pattern and measures the bit error rate (BER) on the selected WAN port. The patterns that can be selected are **off**, **mark** (all ones), **space** (all zeros), **1:1** (0101), **1:7** (0100 0000), **3:24** (this pattern requires 3 bytes to display), **qrss** (quasi-random signal source), **lp-up** (which sends a T1 loop-up code to the remote end) and **lp-dn** (which sends a loop-down code to the remote end). The last two options are not available for WAN cards with CEPT or HDSL modules.

SYNC

The Synchronization (SYNC) field tells you if the integrated BERT has achieved synchronization either with itself via a remote loopback or with the remote test equipment. Since this is an information-only field, there are no user-selectable parameters.

BE

The Bit Error (BE) field shows the total number of bit errors logged. Since this is an information-only field, there are no user-selectable parameters.

ES

The Errored Seconds (ES) field shows the total number of seconds in which any errors were detected. Since this is an information-only field, there are no user-selectable parameters.

SES

The Severely Errored Seconds (SES) field shows the total number of seconds in which the bit error rate exceeded one bit per thousand (1×10^{-3}). Since this is an information-only field, there are no user-selectable parameters.

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CSES

The Consecutive Severely Errored Seconds (CSES) field is triggered by the occurrence of ten consecutive Severely Errored Seconds. Once triggered, the CSES field will increment (by one) for each elapsed second until the system logs ten consecutive non-Severely Errored Seconds. Since this is an information-only field, there are no user-selectable parameters.

OSS

The Out of Synchronization Seconds (OSS) field shows the number of seconds that the WAN BERT has been out of synchronization. Since this is an information-only field, there are no user-selectable parameters.

BER

The Bit Error Rate (BER) field shows the rate at which errors are being logged. The system calculates BER by dividing the number of bit errors (BE) by the total number of bits transmitted during the test. Since this is an information-only field, there are no user-selectable parameters.

ELAP

The Elapsed time setting shows the running tally of the total number of seconds during the test. Since this is an information-only field, there are no user-selectable parameters.

LB STATE

The Loopback State setting changes when a WAN unit is both present and operational. This includes loopbacks caused by commands from remote devices as well as loopbacks caused by local settings. The field will show **plb** (payload loopback) when the entire signal, *excluding the framing bit*, is looped back. The field will show **llb** (line loopback) when the entire signal is looped back. The field will show **loclb** for local loopback and **ch lb** for channel loopback. It will show **none** if the WAN port is not in loopback.

6.3.7 HDSL Screen

Figure 6-30 displays the HDSL Screen for the WAN-U card. To go to this screen, press "**h**" (**Hdsl** command) in the WAN Card Main Screen. Table 6-12 lists the actions on the bottom line of this screen, and Table 6-13 shows the screen options and defaults.

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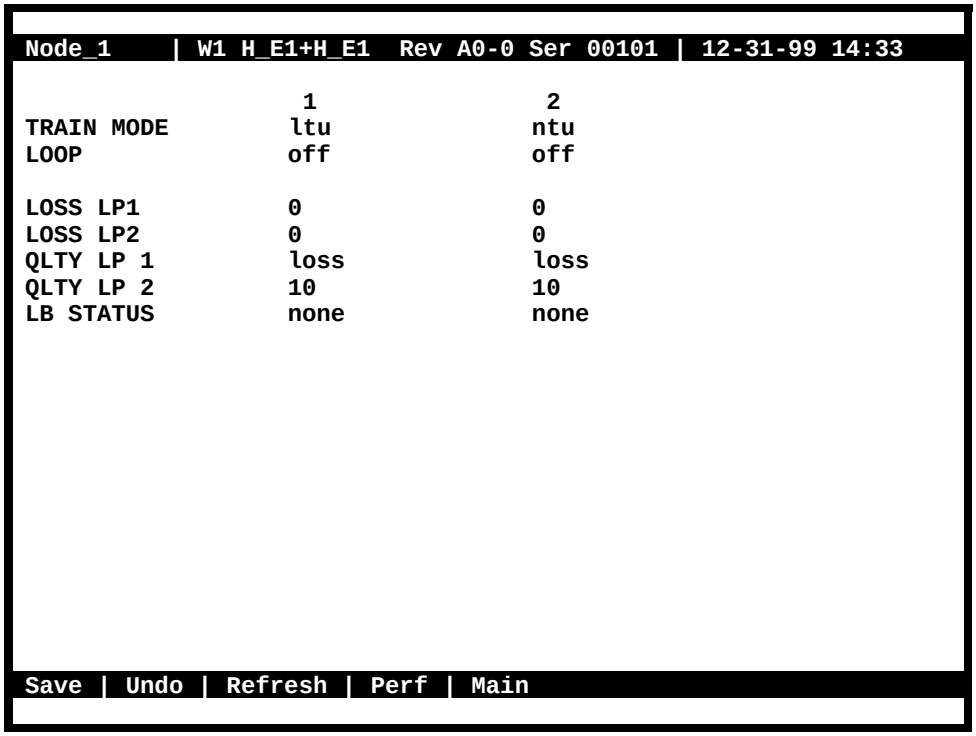


Figure 6-30. Typical HDSL Screen

Table 6-12. HDSL Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Redraws the screen.
Perf	Brings up the HDSL Performance Data Screen **(refer to HDSL section)**
Main	Returns to the **WAN C**ard **Main S**creen.

Table 6-13. HDSL Screen Options and Defaults

Parameter	User Options	Notes	Default
TRAIN MODE	ltu ntu		ltu
LOOP	off r-loc r-net		off
LOSS LP 1	no user input		display only
LOSS LP 2	no user input		display only
QLTY LP 1	no user input		display only
QLTY LP 2	no user input		display only
LP STATUS	no user input		display only

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TRAIN MODE

This parameter determines the master/slave relationship between the units. The setting for the central office master unit is **ltu** (default). Remote slave units should be set to **ntu**.

LOOP

This parameter sets loopbacks on the remote unit. Selecting **r-loc** will cause the remote link to loop back to the PCM buses of the remote unit. Selecting **r-net** will cause the remote link to loop back to the network. The default is **off**.

LOSS LP1

This number indicates the loss in loop 1 within ±2 dB.

LOSS LP2

This number indicates the loss in loop 2 within ±2 dB.

QLTY LP1

This parameter indicates the measure of signal quality correlated to noise margin in loop 1. Possible readouts are **loss** (no sync), or a number from **1** to **10**, where 10 is the best signal.

QLTY LP2

This parameter indicates the measure of signal quality correlated to noise margin in loop 2. Possible readouts are **loss** (no sync), or a number from **1** to **10**, where 10 is the best signal.

6.3.8 HDSL Performance Data

Figure 6-31 shows the HDSL Performance Data Screen for the WAN-U card. The screen will display statistics for either Unit 1 (HDSL module 1) or Unit 2 (HDSL module 2), depending on which one you choose in the HDSL Screen.

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```
Node_1   | W1 H_E1+H_E1        Rev A0-0 Ser 00101              12-31-99 14:33

Unit 1  HDSL Performance (15 Min Interval)  *Local*
          LOOP 1                          LOOP 2
          ES        SES       UAS       ES        SES       UAS       STATUS
CUR       0         0         0         0         0         0         T..T..
01        0         0         0         0         0         0         ......
02        0         0         0         0         0         0         ......
03        0         0         0         0         0         0         ......
04        0         0         0         0         0         0         ......
05        0         0         0         0         0         0         ......
06        0         0         0         0         0         0         ......
07        0         0         0         0         0         0         ......
08        0         0         0         0         0         0         ......
09        0         0         0         0         0         0         ......
10        0         0         0         0         0         0         ......
11        0         0         0         0         0         0         ......
12        0         0         0         0         0         0         ......
TOTAL     0         0         0         0         0         0         ......

STATUS: L=LOS R=REVERSED T=TEST


Refresh | Clearregs | 24 Hr | 15 mIn | rEmote | Local | pgUp | pgDn | Main
```

Figure 6-31. Typical HDSL Performance Data Screen (local 15-minute interval)

Figure 6-31 shows the number of Errored Seconds (ES), Severely Errored Seconds (SES), and Unavailable Seconds (UAS) in loops 1 and 2 (local or remote), in either 15-minute or 24-hour increments. This allows for four different possible displays:

- 15-minute intervals, Local Loop (default)
- 15-minute intervals, Remote Loop
- 24-hour intervals, Local Loop
- 24-hour intervals, Remote Loop

You can alternate between screens by selecting from the actions at the bottom of the screen. When 15-minute intervals are active, pressing "**h**" (**24 Hr**) changes the display to 24-hour intervals (see Figure 6-32). Pressing "**i**" (**15 mIn**) in the 24-hour interval mode will go back to a 15-minute interval display. Similarly, press "**e**" (**rEmote**) in the Local screen to go to the Remote screen, and press "**l**" (**Local**) in the Remote screen to return to the Local screen.

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```
Node_1   | W1  H_E1+H_E1      Rev A0-0 Ser 00101   |     12-31-99 14:33

Unit 1  HDSL Performance (24 Hour Interval)  *Remote*
          LOOP 1                          LOOP 2
          ES         SES        UAS       ES         SES        UAS      STATUS
CUR       0          0          0         0          0          0        T..T..
01        0          0          0         0          0          0        ......
02        0          0          0         0          0          0        ......
03        0          0          0         0          0          0        ......
04        0          0          0         0          0          0        ......
05        0          0          0         0          0          0        ......
06        0          0          0         0          0          0        ......
07        0          0          0         0          0          0        ......
TOTAL     0          0          0         0          0          0        ......




STATUS: L=LOS R=REVERSED T=TEST

Refresh | Clearregs | 24 Hr | 15 mIn | rEmote | Local | pgUp | pgDn | Main
```

Figure 6-32. Typical HDSL Performance Data Screen (remote 24-hour interval)

The only difference between the 15-minute and 24-hour screens is the historical time periods on the left side of the screen. In 24-hour intervals, seven historical times appear, as shown in Figure 6-32. This corresponds to the activity over the past seven 24-hour monitoring periods, thereby providing one week of historical data. These fields will be blank if monitoring has just begun.

In 15-minute intervals, 12 historical time periods are shown on the left side of the screen (Figure 6-31). By pressing "**d**" (**pgDn**) in that screen, you can view historical time periods 13 through 24. Press "**d**" again to display historical time periods 25 through 32. These periods record the activity for the past thirty-two 15-minute periods, thus providing eight hours of historical data.

Table 6-14 lists the actions available from the HDSL Performance Data Screens. The register options are described below.

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Table 6-14. HDSL Performance Data Screen Actions

Action	Function
Refresh	Redraws the screen and updates information.
Clearregs	Clears the user registers and starts over.
24 Hr	Toggles to 24-hour interval monitoring.
15 mIn	Toggles to 15-minute interval monitoring.
REmote	Toggles to remote loop monitoring.
Local	Toggles to local loop monitoring.
PgUp	Scrolls up through historical intervals (n/a for 24 hour intervals).
pgDn	Scrolls down through historical intervals.
Main	Returns to the WAN Card Main Screen.

ES

An Errored Second (ES) is a second with one or more CRC-6 (ESF), BPV (D4/D-frame), or CRC-4 (E1) errors, **OR** one or more OOFs, **OR** one or more Controlled Slips.

SES

A Severely Errored Second (SES) is any second with 320 or more CRC-6 (ESF), BPV (D4/D-Frame), CRC-4 (E1) errors, or one or more OOFs.

UAS

An Unavailable Second (UAS) is any second during which service is unavailable. An unavailable signal state is declared after ten consecutive Severely Errored Seconds (SESs) are logged. An unavailable state is cleared after ten consecutive non-Severely Errored Seconds are logged. Unavailable Seconds are also accumulated if the card has an out-of-service (OOS) condition.

6.4 PARS Screen

Figure 6-33 displays the PARS Screen for the WAN card. To go to this screen, press "**A**" (**PARS** command) in the WAN Card Main Screen. PARS feature is to protect the traffic of a failed T1/E1 transmission line in a ring network. If a T1/E1 line fails then PARS will provide protection to rerouting the traffic on that line. This means that all 24 time slots (totaling to the DS1 rate) or 30 time slots (totaling to the E1 rate) will be completely protected.

The traffic rerouting takes affect in less than 300 milliseconds and no network administration control is involved. This will not effect the voice circuits but the data circuits will be affected.

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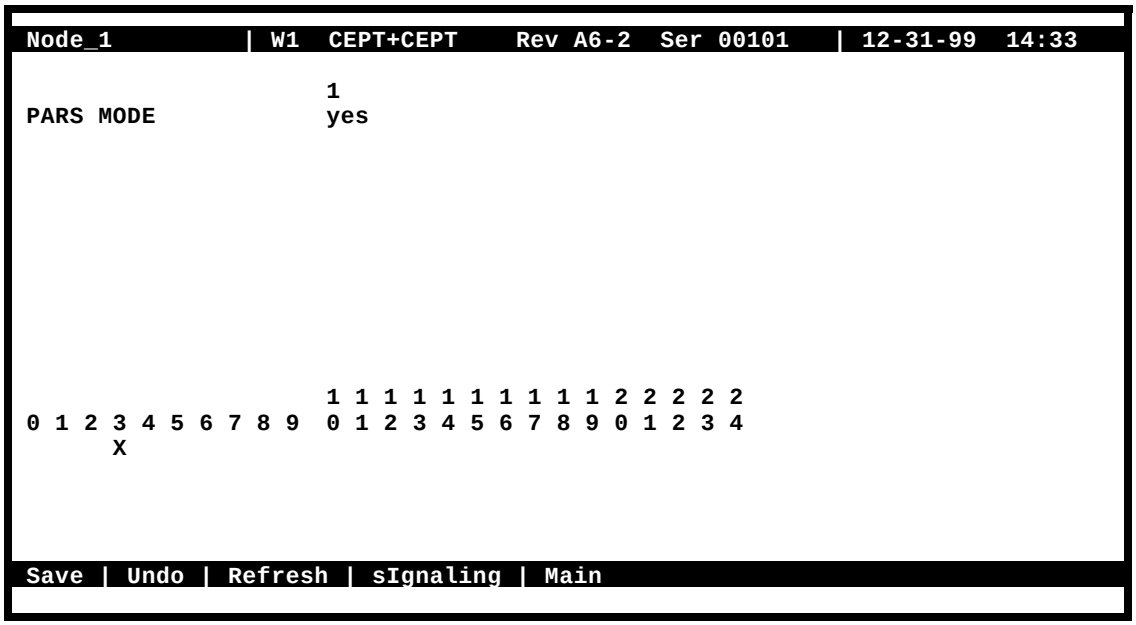


Figure 6-33. Typical T1 WAN PARS Screen

Table 6-15. T1 WAN PARS Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., performance and test data).
sIgnaling	Allows signaling for voice cards to be specified via a time slot map.
Main	Returns to the WAN Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or abandon those changes.

Table 6-16. WAN Card Test Screen Options

Parameter	User Options	Notes	Default
PARS MODE	yes no		no

PARS must be made aware of the time slot(s) used by Voice cards terminated on a WAN. This applies whether the WAN is a T1 or E1. The “sIgnaling” menu option is used to do this. In Figure 6-33, PARS has been chosen from the WAN screen menu and then signaling has been displayed. Time slot #3 has been selected to show that it is in use by the Voice card terminated on this WAN.

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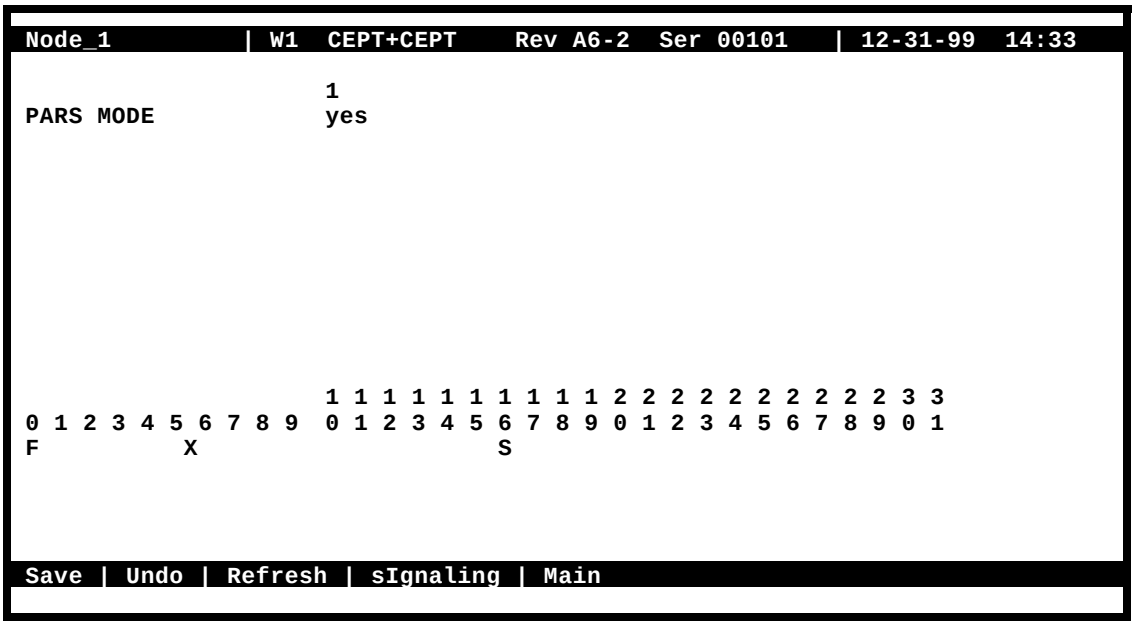


Figure 6-34. Typical E1 WAN PARS Screen

Figure 6-34 shows an E1 WAN PARS screen. For E1 WANs, signaling is always carried on time slot #16 as indicated by the “S”. Time slot #5 has been selected using the “sIgnaling” option to show that it is in use by the Voice card termianted on this WAN.

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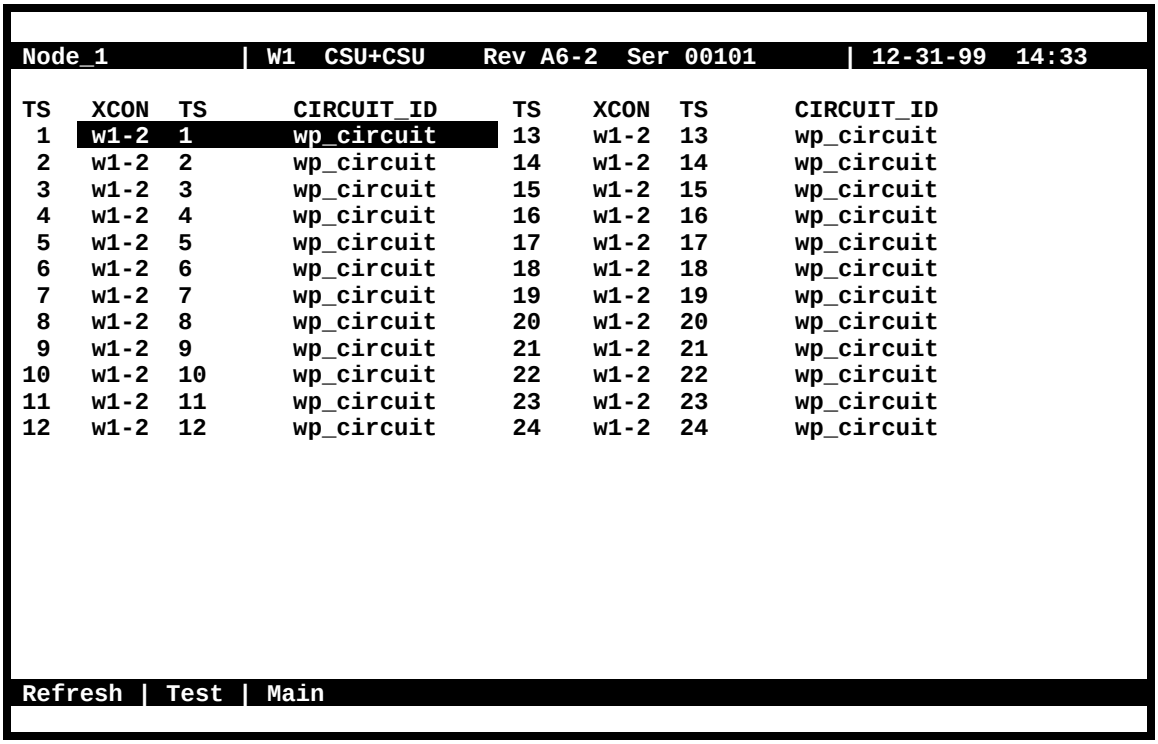


Figure 6-35. WAN Cross-Connect Screen

Figure 6-35 shows the WAN Cross-connect screen after PARS MODE has been selected. It monitors the cross-connects between all time slots of the current WAN. The first column shows time slots on the current WAN. These time slots are cross-connected to the WAN and time slot listed in the second and third columns respectively.

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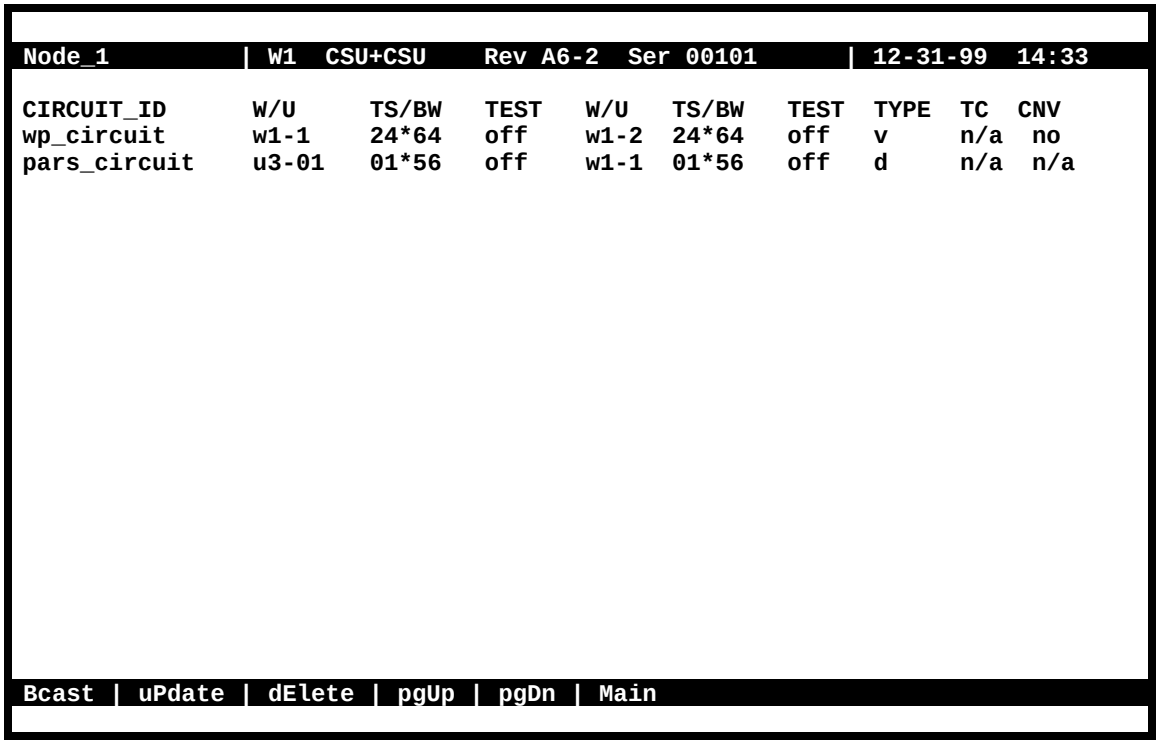


Figure 6-36. System (Main) Cross-Connect Screen in PARS MODE

Figure 6-36 shows the System (Main) cross-connect screen after PARS MODE has been selected. This screen shows the result of the “View all” menu selection. The pars_circuit W/U field indicates that port #1 of a user card in slot U3 is termianted on WAN 1-1. The TS/BW column indicates that a single time slot on this port has been allocated. (To dtermine which time slot, see the time slot tabe on the user card screen). The pars_circuit TYPE field will vary with the user card type (voice or data). For example, terminating the FXS card would cause “v&s” to be displayed in this column while the HSU card would show “d”.

6.4.1 Implementation of PARS

There are certain rules and guidelines to follow when PARS is implemented.

1. WAN should be empty (no cross-connects) in order to turn PARS ON or Off.

2. As soon as PARS is selected on WAN #n, Wn-1 becomes primary and Wn-2 becomes secondary.

3. All primary time slots will be cross-connected to the secondary WAN.

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4. Once a primary WAN is assigned to PARS mode, the secondary WAN will be assigned to APRS by the system and will not be available to the user. Nothing can be terminated on a secondary WAN after PARS MODE is selected.

5. Physcial connections are always made from the secondary WAN to the primary WAN of the adjacent node.

6. User cards will be terminated normally on the primary WAN.

7. Upon termination on the primary WAN, user cards will actually be split so that they are terminated on RX of aone WAN and TX of the other.

8. WAN will work as usual until CGA-RED or CGA-YELLOW is detected. The TX and RX of empty time slots will be cross-connected to themselves. User cards will be cross-connected to the WAN with the unbroken link and their split termination between the two WANs will be removed.

6.4.2 Ring Network Traffic Flow

Figure 6-37 below, shows Ring Network Traffic Flow under normal conditions. The traffic flow in the ring is as follows:

Note: *IAD is an example for any type of integrated access sytem used in the field*

- IAD 1 traffic to IAD 3 goes through IAD 2
- IAD 1 traffic to IAD 4 goes through IAD 2, and IAD 3
- IAD 1 traffic to IAD 5 goes through IAD 2, IAD3, and IAD 4
- and so on for traffic flow from IAD 2, IAD 3, IAD 4, and IAD5

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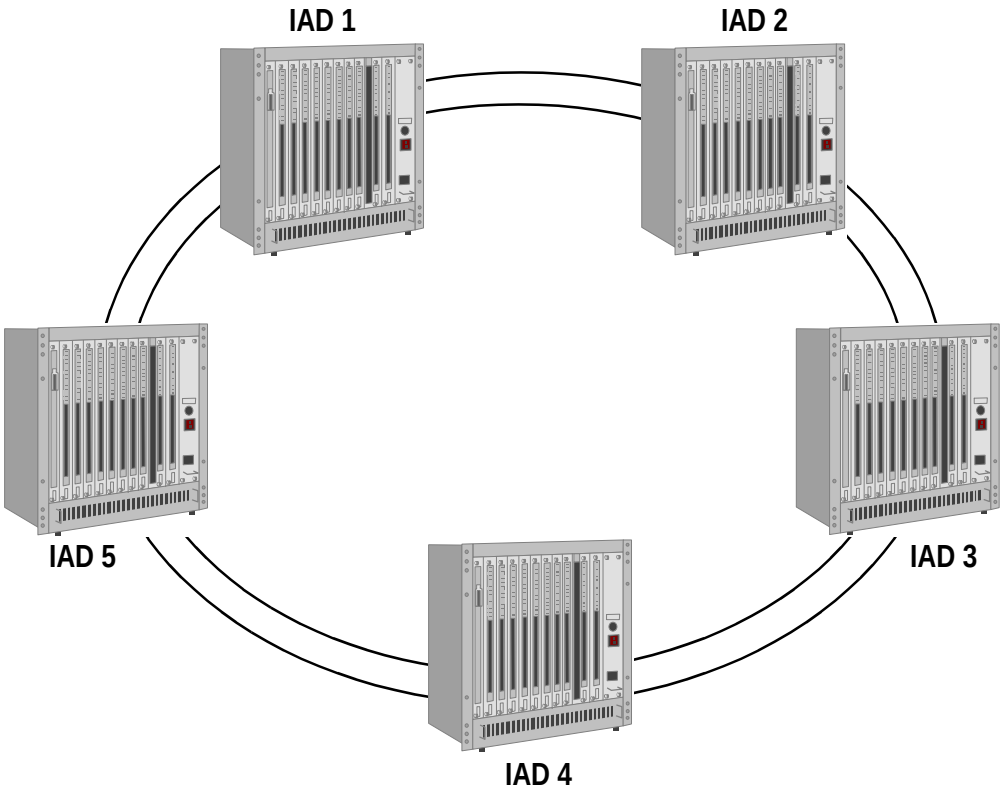


Figure 6-37. Ring Network Traffic Flow

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6.4.3 One Link is Lost

If the link from IAD 1 to IAD 2 fails, then the traffic is rerouted as illustrated in Figure 6-38.

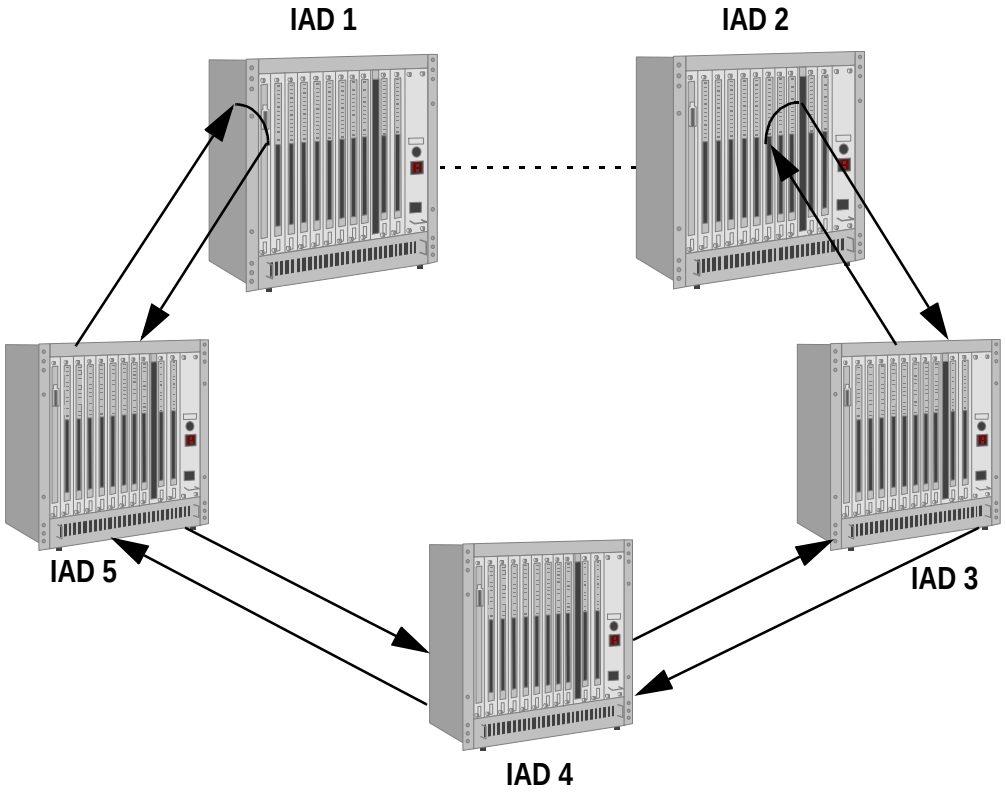


Figure 6-38. Traffic Flow when One Link is Lost

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6.4.4 Two Links are Lost, One IAD is Isolated from the Ring

If the link from IAD 1 to IAD 2, and the link from IAD 2 to IAD 3 fial, then the traffic is rerouted as illustrated in Figure 6-39.

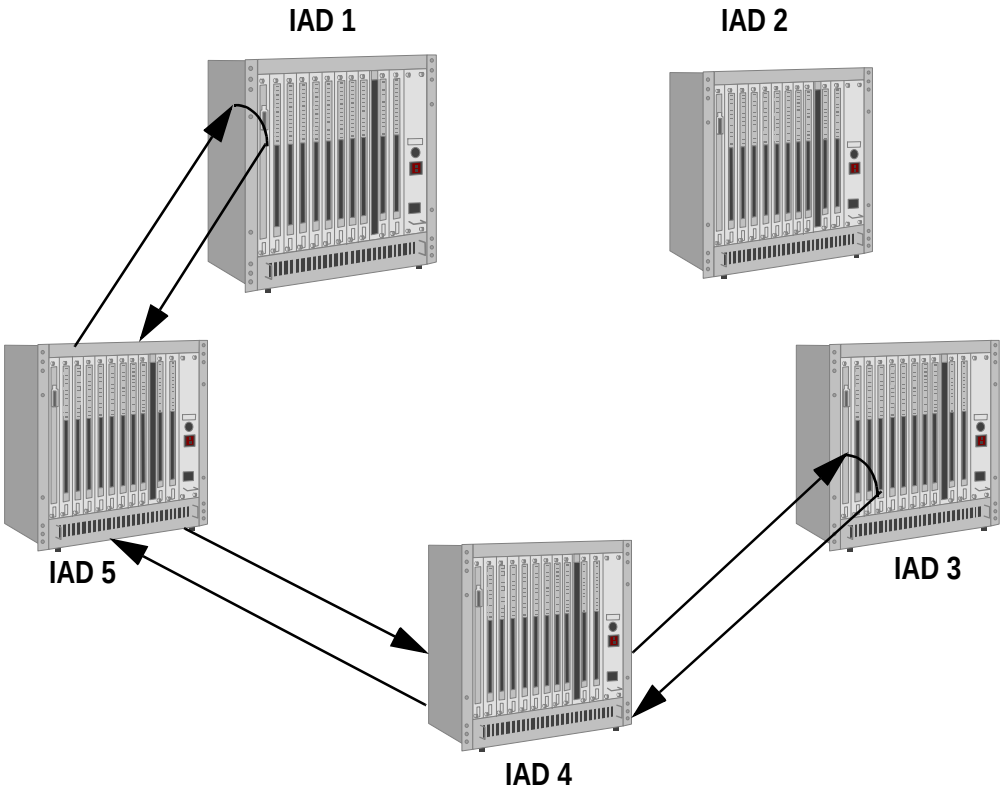


Figure 6-39. Traffic Flow when two Links are Lost (One IAD is Isolated)

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6.4.5 Two Links are Lost, Two IADs are Separated from the Ring

If the link from IAD 1 to IAD 2, and the link from IAD 4 and IAD 5 fail, then the traffic is rerouted as illustrated in Figure 6-40.

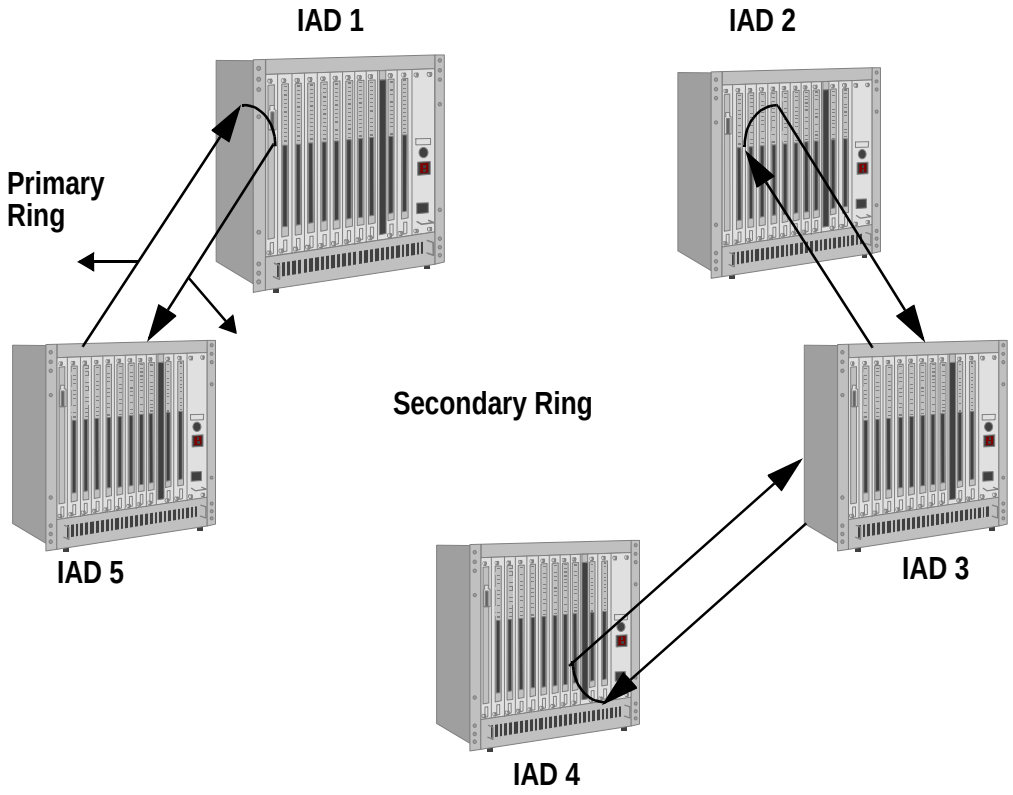


Figure 6-40. Traffic Flow when two connected IADs are separated from the Ring

6.4.6 Integrated Access Device Functionality

In order to offer PARS feature, the integrated access device will perform the following functions:

The integrated access device will provide a receive side and transmit side option to voice and data Channels and WAN time slots. It will defferentiate between transmit side and receive side of each time slot/channel (voice or data). This is done internally and is not visible to the user.

The integrated access device will designate the received side of a link either active or inactive and the transmit side of a link active or inactive. This is done internally and is not visible to the user.

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6.4.7 Normal Operation - No Link Failure

Any of the WAN lines in a cross-connect integrated access device can be assigned to PARS mode. Once a WAN (W1-1 for example) is assigned to PARS mode, the other WAN of that card (i.e. W1-2) will be assigned to PARS by the system and will not be available to the user. The user assigned WAN will become primary and the system assigned WAN will become the secondary. The WAN line time slots must be unassigned (and free prior to PARS mode configuration). Otherwise, the system will not accept the PARS mode. When W1-1 is assigned to PARS mode, the system will cross-connect all its time slots to the W1-2 time slots. This is illustrated in Figure 6-41. Figure 6-42 show user card termination in PARS mode.

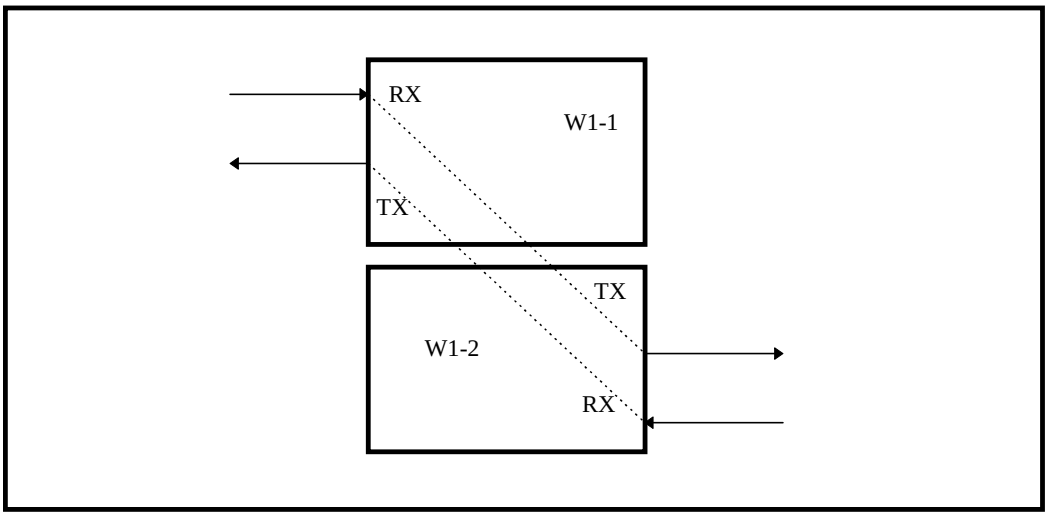


Figure 6-41. PARS Time slot Cross-connection between Primary and Secondary WANs

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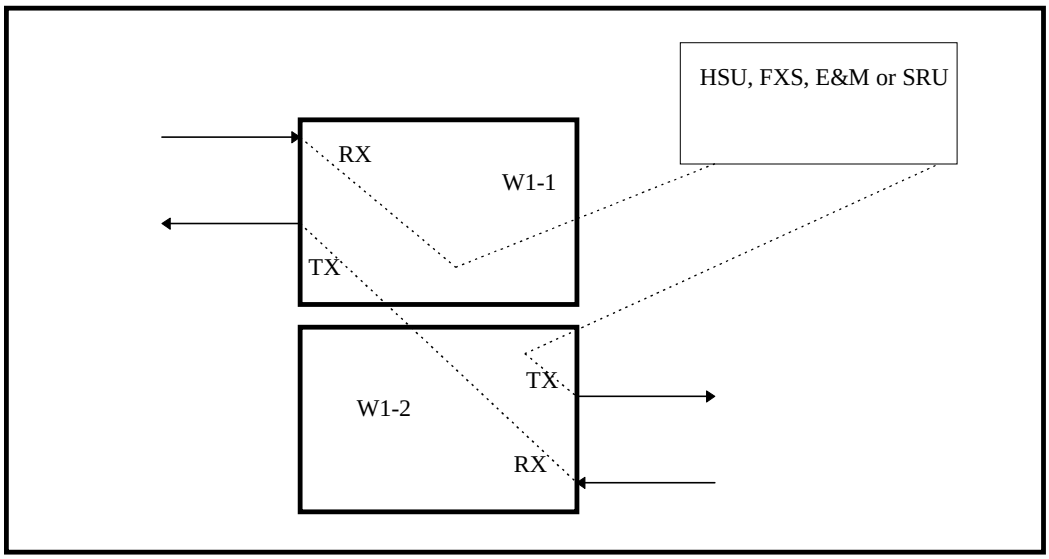


Figure 6-42. User card Termination on PARS WAN

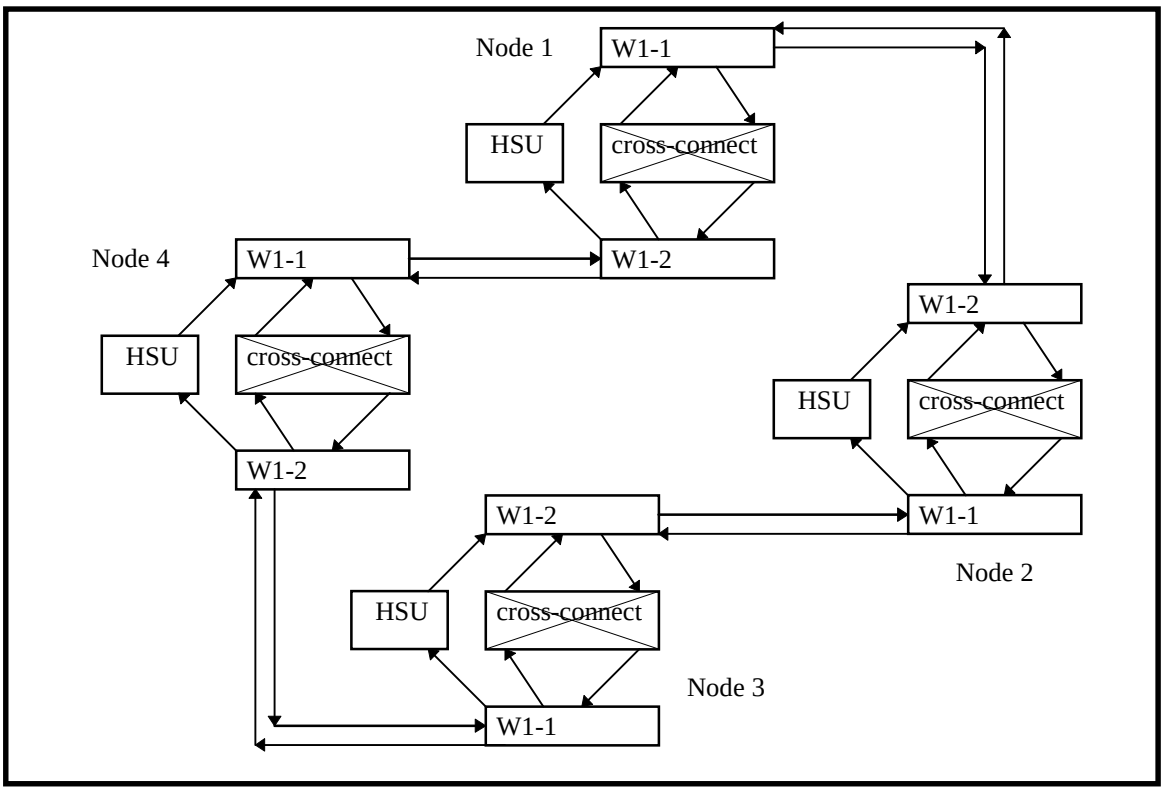


Figure 6-43. PARS Normal Operation Mode using four IAD Nodes

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A four node configuration operating in PARS mode is illustrated in Figure 6-43. In this configuration one user port per node is used for the purpose of illustration. In node one the transmit of all 24 time slots of W1-1 are cross-connected to the receive of all 24 time slots of W1-2. The receive of 23 time slots of W1-1 are cross-connected to the transmit of 23 time slots of W1-2. The HSU transmit is connected to the receive of one of the W1-1 time slot and its receive is connected to the transmit of the corresponding time slot of W1-2. Similar connections are made in the rest of the nodes.

6.4.8 Line Protection - Link Failure

When links fail, the ring will break. The integrated access device will stop delivering traffic to the broken links and will reroute the traffic through the ring and loop them before the broken lines.

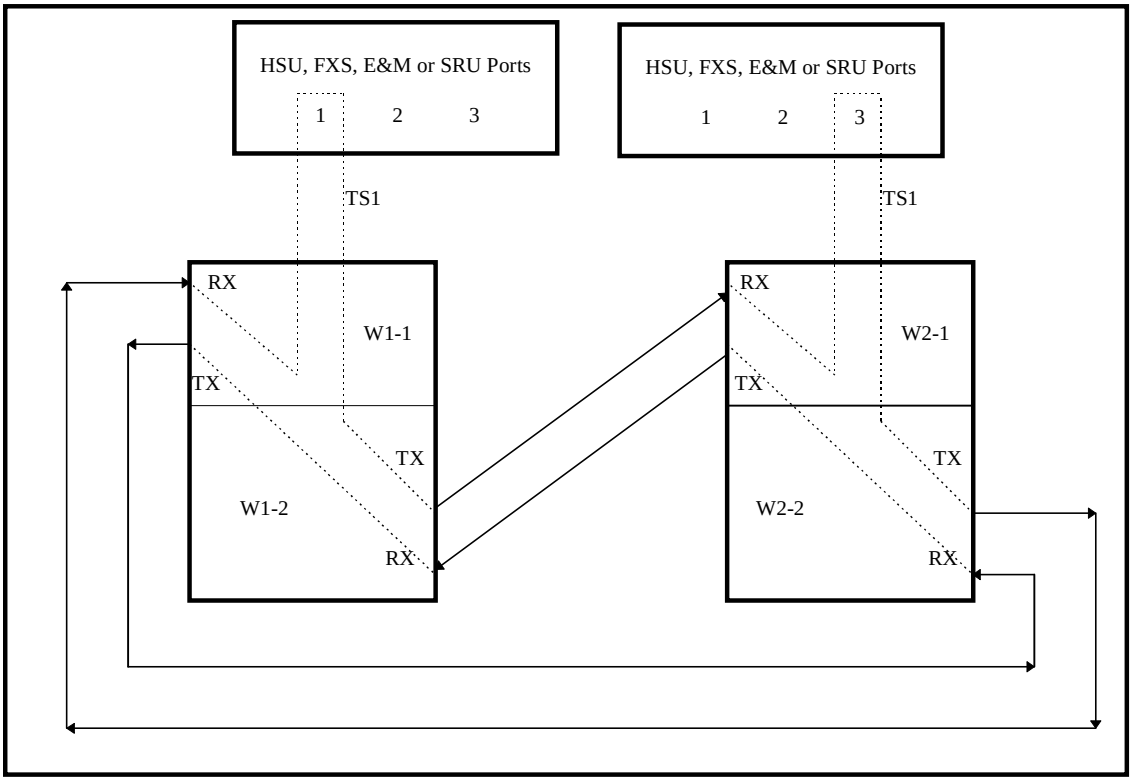


Figure 6-44. PARS Normal Operation Mode (two nodes)

Figure 6-44 shows details of PARS mode for two nodes. Primary WANs are cross-connected to secondary. User cards appear to be terminated normally on the primary WAN. They are actually split between RX of the primary and TX of the secondary, as shown. Note that the physical connections between nodes are shown from the secondary WAN of one node to the primary WAN of the adjacent node.

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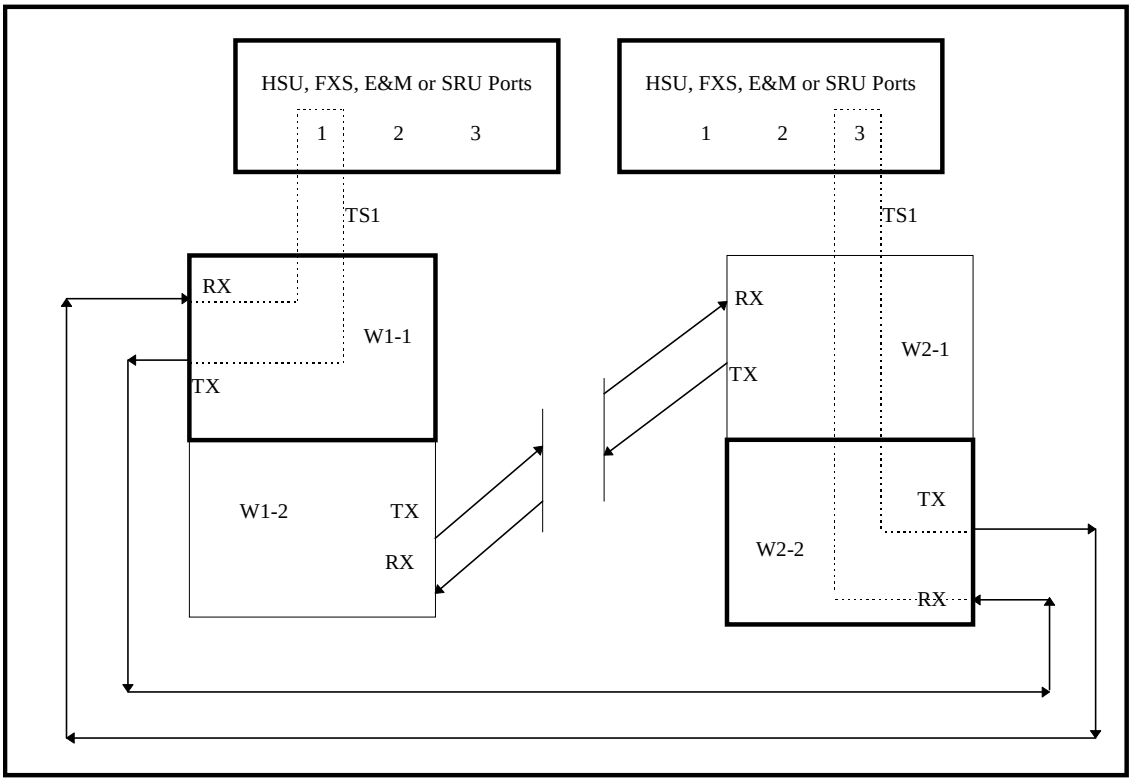


Figure 6-45. PARS Rerouting (two nodes)

Figure 6-45 shows detail of PARS mode for two nodes with the link between adjacent nodes broken. Time slots have been rerouted and any User card terminated on the failed WAN has been assigned to the WAN with the unbroken link. Note that on WAN card number 2 a User card was terminated on the primary WAN (acutally split) and is rerouted to the secondary WAN after the primary received an alarm. Data is transmitted around the ring in the “opposite” direction in order to reach the destination node.

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6.5 WAN Card Error Messages

Refer to Appendix B in the System Reference Guide for further information on Error Messages regarding this card.

6.6 WAN Card Troubleshooting

The WAN card (or a T1 or E1 port on it) may be faulty if a CGA-Red alarm is in progress on either port of the card. This alarm occurs if the incoming network signal is lost, or if the WAN port is out of frame with that signal. To isolate the trouble, proceed as follows:

1. See if similar alarms are also present on any other T1/E1 lines and WAN cards in the system. If so, the trouble may be with the Interface card, which connects the T1 and E1 signals from the WAN cards to the external network. If the trouble is only on one T1 or E1 line connected to the WAN card, continue with step 2.

2. Perform a local T1 or E1 signal loopback toward the CPE, and see if the CGA alarm clears after about 10 to 30 seconds. If it does, the WAN card is good; go to step 3. Otherwise, go to step 4.

3. Check the local network equipment receiver, cabling to the Interface card at the local system, and the far-end system or network transmitter.

4. Replace the WAN card with an identical WAN card. Be sure to install the same types of plug-in modules on the new WAN card before plugging it in.

5. If the WAN card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

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Appendix A
System Specifications

A.1 FCC Requirements

Table A-1. FCC Registration Information - Part 1

Reg. Status	MTS/WATS Interfaces	Model #	Ringer Equiv. Number	SOC	Network USOC	Canadian Jacks
M	02LS2	FXO 2W*8-6	0.4B (ac), 0.0 (dc)	-----	RJ11X	CA11X
M	02GS-2	FXO 2W*8-6	0.4B (ac), 0.0 (dc)	-----	RJ11X	CA11X
Reg.	02LS2	INF+M T1E1	0.8B (ac), 0.0 (dc)	-----	RJ11X	CA11X

Table A-2. FCC Registration Information - Part 2

Reg.	Analog PL Interfaces	Model #	SOC	Network USOC	Canadian Jacks
Reg.	0L13C	FXS 2W*8-6	9.0F	RJ21X	CA21A
Reg.	02LR2	FXS 2W*8-6	9.0F	RJ21X	CA21A
Reg.	TL11M	FXS 2W*8-6	9.0F	RJ2EX	CA2EA
Reg.	TL12M	FXS 2W*8-6	9.0F	RJ21FX	CA2FA
Reg.	TL11E	E&M 2W*8, E&M 4W*8	9.0F	RJ2EX	CA2EA
Reg.	TL12E	E&M 2W*8, E&M 4W*8	9.0F	RJ2FX	CA2FA
Reg.	TL31M	E&M 2W*8, E&M 4W*8	9.0F	RJ2GX	CA2GA
Reg.	TL32M	E&M 2W*8, E&M 4W*8	9.0F	RJ2HX	CA2HA
Reg.	TL31E	E&M 2W*8, E&M 4W*8	9.0F	RJ2GX	CA2GA
Reg.	TL32E	E&M 2W*8, E&M 4W*8	9.0F	RJ2HX	CA8HA

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Table A-3. FCC Registration Information - Part 3

Reg.	Digital Interfaces	Model #	SOC	Network USOC	Canadian Jacks
Reg.	04DU9-BN	WAN SINGLE, WAN DUAL*	6.0Y	RJ48	CA81A
Reg.	04DU9-DN	WAN SINGLE, WAN DUAL*	6.0Y	RJ48	CA81A
Reg.	04DU9-1KN	WAN SINGLE, WAN DUAL*	6.0Y	RJ48	CA81A
Reg.	04DU9-1SN	WAN SINGLE, WAN DUAL*	6.0Y	RJ48	CA81A
Reg.	04DU9-1ZN	WAN SINGLE, WAN DUAL*	6.0Y	RJ48	CA81A
Reg.	04DU9-BN	WAN SINGLE, WAN DUAL**	6.0P	N/A	---
Reg.	04DU9-DN	WAN SINGLE, WAN DUAL**	6.0P	N/A	---
Reg.	04DU9-1KN	WAN SINGLE, WAN DUAL**	6.0P	N/A	---
Reg.	04DU9-1SN	WAN SINGLE, WAN DUAL**	6.0P	N/A	---
M	04DU5-24	OCU-DPx2	6.0F	RJ48	CA81A
M	04DU5-48	OCU-DPx2	6.0F	RJ48	CA81A
M	04DU5-56	OCU-DPx2	6.0F	RJ48	CA81A
M	04DU5-96	OCU-DPx2	6.0F	RJ48	CA81A
* with CSU module ** with DSX module					

A.2 UK Requirements

Table A-4. Minimum Creepage and Clearance Parameters.

Clearance (mm)	Creepage (mm)	Voltage Used or Generated By Host or Other Cards
2.0	2.4 (3.8)	Up to 50Vrms or VDC
2.6	3.0 (4.8)	Up to 125Vrms or VDC
4.0	5.0 (8.0)	Up to 250Vrms or VDC
4.0	6.4 (10.0)	Up to 300Vrms or VDC
For a host or other expansion card fitted in the host, using or generating voltages *greater* than 300V (rms or DC), advice from a competent telecommunications safety engineer must be obtained before installation of the relevant equipment.		Above 300Vrms or VDC

A.3 System Requirements

Table A-5. System Electrical and Environmental Requirements for (front loading chassis power supply on side, / power supply on top, and two-sided chassis).

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Table A-5. System Electrical and Environmental Requirements

Parameter	Requirement
AC Power	100 to 240 VAC, 50 to 60 Hz
DC Power (-48 VDC)	-42 to -56 VDC
DC Power (+24 VDC)	+20 to +28 VDC
Power consumption	125 Watts (typical), 500 Watts (maximum)
Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-20°C to 80°C (-4°F to +176°F)
Humidity	0% to 95% relative humidity, noncondensing

Table A-6 lists the cards that require pre-installation setup. The cards are listed according to the names marked on their faceplate ejectors.

Table A-6. Cards Requiring Pre-Installation Setup

Card	Model	Jumpers or Switches	Options
WAN: CSU Module	812	JP1-3	
WAN: DSX/CEPT Module	811	JP1-4	T1/E1, 75 Ohm / 120 Ohm
WAN: HDSL Plug-in	820		
Interface Card	8927	JP2-4	Balanced / Unbalanced Operation
Alarm Card	8401	JP1-4	Active / Passive
Alarm Card	8403	JP1-4	Active / Passive
E&M Card	8108		
E&M Card	8115	SW1-4	GND / BAT Options
E&M Card	8118	SW-14	GND / BAT Options
E&M Card	8119	SW1-4	GND / BAT Options
FXS Card	8124	SW1-4	GND /BAT Options
FXS Card	8128		
FXO Card	8134	P1-8: JP1,2	MRD Option
FXO Card	8135	P1-8: JP1,2	MRD Option
FXS Coin Card	8149		
FXO Coin Card	8159		
HSU Card	8202	P1, 2 Switch	RS530/V.35 IF Option
HSU Card	8203	JP2	
HSU Card	8212		
HSU Card	8214	JP1-JP2	
HSU Card	8215	P1-4 Switch	RS530/V.35 IF Option
SRU Card	8220	JP2, JP3, JP9	
OCU-DP	8249	JP3-JP4	
OCU-DP	8248	JP1-JP7	
OCU-DP	8247	JP1-JP7	
OCU-DP	8246	JP1	
OCU-DP	845		
DS0-DP Card	8254	JP1, JP3	
FRAD Card	8231	JP1, JP2, JP9	
B7R Card	8228		
ADPCM Card	8871		
BRI-U Card	8260	JP1, JP2, JP9, JP101-JP602	
BRI-U Card	8261	JP101-JP801 JP102-JP802	LT/NT Option 7.5/15 ma sealing current
BRI-ST Card	8262	JP1, JP2, JP5, JP6, JP101-JP804	

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Table A-7. Card Current Measurements

Card Name and Description	1 (mA) @ +5V Stndby	Active	1 (mA) @ +5V Stndby	Active	1 (mA) @ +5V Stndby	Active	1 (mA) @ +5V Stndby	Active
DCC	N/A	84	N/A	0	N/A	0	N/A	0
Relay	0	16	0	0	0	131	0	0
OCU-DP Port Activator Card	578	768	0	0	4	118	0	0
WAN, Single, CSU	218	246	0	0	0	24	0	0
WAN, Single, DSX, T1	219	235	0	0	0	24	0	0
WAN, Single, CEPT E1-75 Ohms	209	226	0	0	0	24	0	0
WAN, Single, CEPT E1-120 Ohms	207	224	0	0	0	24	0	0
WAN, Dual, CSU	287	340	0	0	0	48	0	0
WAN, Dual, DSX T1	252	286	0	0	0	48	0	0
WAN, Dual, CEPT E1-75 Ohms	360	393	0	0	0	48	0	0
WAN, Dual, CEPT E1-120 Ohms	358	391	0	0	0	48	0	0
WAN, HDSL	960	940	78	78	0	50	0	0
WAN w/Redundancy Relays	223	274	0	0	0	178	0	0
E&M, 8 Channels	73	84	72	70	17	104	16	16
E&M, 8 Channels, Extended TLP	73	84	72	70	17	104	16	16
FXS, 4 Channels, 600 Ohms	37	45	35	34	20	65	15	15
FXS, 8 Channels, 600 Ohms	77	96	76	73	23	112	17	17
FXO, 8 Channels, 600 Ohms	89	99	77	75	16	105	15	15
FXS Coin, 6 Channels, 600 Ohms	59	80	57	57	69	140	15	15
FXO Coin, 8 Channels, 600 Ohms	96	107	62	62	16	110	16	19
HSU, RS-530, 2 Ports	348	376	7	6	0	0	0	0
HSU, RS-530 or X.21, 2 Ports	230	344	16	20	7	13	0	0
HSU, V.35, 2 Ports	248	362	107	239	0	0	0	0
HSU, RS-530/366, 2 Ports	350	428	13	12	0	0	0	0
HSU, V.25bis, 4 Ports	565	621	10	11	0	0	0	0
SRU, 10 Ports	157	168	0	0	89	138	145	106
B7R, Bit-7 Redundant	121	135	0	0	9	9	20	21
FRAD	136	136	0	0	3	23	3	23
OCU-DP, 10 Ports	645	928	0	0	7	8	0	0
OCU-DP, 5 Ports	364	450	0	0	4	69	0	0
OCU-DP, 2 Ports	182	203	0	0	6	44	0	0
DS0-DP, 4 Ports	183	259	0	0	2	2	0	0
BRI, U-Interface	168	643	0	0	4	4	0	0
BRI, U-Interface	145	667	0	0	6	6	0	0
BRI, S-Interface	97	152	0	0	6	6	0	0
Alarm	0	5	0	0	0	45	0	0
External Alarm, Enhanced	0	4	0	0	12	47	0	0
28-Port Alarm Card	30	36	0	0	12	300	18	165
CPU, Universal	N/A	240	0	0	N/A	8	N/A	8
ADPCM Resource	550	585	0	0	0	0	0	0
Interface with External Sync	N/A	-	-	-	-	-	-	-
Interface with Modem	N/A	136	N/A	0	N/A	11	N/A	0
Interface	N/A	80	N/A	0	N/A	25	N/A	8

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A.4 Power Requirements

Table A-8. Power Supply Options Compatibility

Power Sources	AC Power Supply	-48V Power Supply	-48V Converters	Ringing Gen.	+24V Power Supply	External -48 VDC Power	External Ringing Generator
AC Power Supply	---	yes	yes	yes	yes	yes	yes
-48V Power Supply	yes	---	no	yes	no	yes	yes
-48V Converters	yes	no	---	yes	no	no	yes
Ringing Gen.	yes	yes	yes	---	no	yes	no
+24V Power Supply	yes	no	no	no	---	no	yes
External -48 VDC Power	yes	yes	no	yes	no	---	yes
External Ringing Generator	yes	yes	yes	no	yes	yes	---

Note: *The 100V and 105V Ringing Generators cannot be mixed in a single chassis.*

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Table A-9. Replacement Fuses for the External Talk Battery Supply

Manufacturer	Part Number
Little Fuse	218.005
Bussman	GDC-5

Table A-10. AC Power Supply Specifications

Parameter	Rating
Output Power, Continuous	50 Watts
Output Power, Peak (60 seconds)	70 Watts (10% duty cycle)
Input Current (maximum)	1.7A at 120 VAC, 60Hz full-rated output load
Source Input Current (maximum)	3A
Inrush Surge Current	Maximum 3.7A peak at 240 VAC cold-start
Input Frequency	47 to 63 Hz
Efficiency	65%, minimum

Table A-11. DC Power Supply Specifications

Parameter	-48V Unit Rating	+24V Unit Rating
Output Power	50 Watts, continuous	50 Watts, continuous
Input Power	-40 to -60 VDC	+18 to 35VDC
Source Input Current (max.)	3A	5A

.

Table A-12. -48V Converter Specifications

Parameter	100W Unit Rating	300W Unit Rating
Output Power	100 Watts maximum	300 Watts maximum
Output Voltage	-48 VDC	-48 VDC
Output Current	2.0A	6.0A
Input Voltage	100 to 264 VAC	100 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Efficiency	80%	80%

Note: *There are two different types of 100W -48V Converters. One with full range and one limited.*

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Table A-13. +24 VDC Power Supply Specifications

Parameter	Rating
Input Power	+24V
Output Power, Continuous	50 Watts maximum
Input Voltage	+18 to 35VDC
Efficiency	83%

Table A-14. Ringing Generator Specifications

Parameter	105V Unit Rating	100V Unit Rating
Input Power	44 to 56 VDC	45 to 56 VDC
Input Current	70 mA no load, 350 mA full load	---
Efficiency	60%	60%
Output Power, Continuous	10 Watts	15 Watts
Output Voltage	105 VAC	100 VAC
Output Current	100 mA	150 mA
Output Frequency	20 Hz	20 Hz
Distortion	<3%	<3%
Approvals	UL, CSA	UL, CSA

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A.5 Alarm Filter Requirements

Table A-15. Alarm and Filter Descriptions

Filter	Alarm	Meaning
OOS	Out of Service	The card, power supply, or ringing generator is faulty, or it was removed from the system.
NOS	No Signal	Incoming WAN signal is lost.
LOS	Loss of Frame	Frame alignment is lost.
YEL	Yellow Alarm	The system has received a Yellow Alarm signal from a remote device. Usually received when the device loses WAN signal or synchronization.
AIS	Alarm Indication Signal	The system has received a Blue Alarm signal (all-ones) from a remote device. Usually received when the remote or intermediate device has a major failure.
CGA_RED	Carrier Group Alarm–Red	The incoming WAN signal has a serious problem and CGA trunk conditioning is in progress. After receiving a RED alarm (NOS or LOS) for 2-3 seconds, the system initiates the appropriate trunk conditioning sequence (see voice cards for information about the TC_CGA setting) and sends a Yellow Alarm to the remote device. If the system is in drop/insert mode, it also sends an AIS signal to the downstream equipment.
CGA_YEL	Carrier Group Alarm–Yellow	The system has initiated trunk conditioning in response to a Yellow Alarm from a remote device. After 2 to 3 seconds, the system initiates the appropriate CGA trunk conditioning sequence for information about the TC_CGA setting on voice cards).
EER	Excessive Error Rate	The error rate measured by the system has exceeded the threshold set on the WAN card.
SENSOR	Alarm Card Sensor	The Alarm Card sensor has received an alarm indication from an attached device.
DCHAN	D-channel out of service	If the network-side D-channel loses contact with the user side, an alarm message will be generated. The alarm message will show the slot and D-channel numbers where the problem exists.
SWITCH	Switch to redundant card	The primary card has failed and the system has switched to the redundant card.
UCA	User card or port alarm	One or more active ports on a user card are not working properly. Voice cards will show an alarm for excessive signaling transitions, and data cards will show an alarm for exceeding the data error threshold.
RESET	System reset	The system has been reset by either a loss of power or a system software upgrade.
ACO	Alarm Cutoff	The ACO option forces you to manually clear certain alarms. Without this option, self-correcting alarms might not be noticed. When the ACO option is set to either Report or Log and the modifier is set to Major, alarms will report normally but they will also generate an ACO alarm. If the modifier is set to Minor, it will not generate the ACO alarm. If the filter is set to Ignore, no alarms will be generated.
SYNC	Clock Sync Alarm	The SYNC alarm is generated when either the primary or secondary external clock source is lost. This alarm is in addition to the condition that lost the clock source (CGA-RED or OOS).
EER-3	Excessive Error Rate (10e-3)	While using transcoder operations for E1 that involve downstream tributaries, setting EER-3 to "report" will cause an alarm to appear on the local system when E1 transmission errors exceed 10e-3 (1 in 1000). The local EER-3 alarm will identify the affected WAN link (e.g., W1-1) and take it out of service. Simultaneously, the downstream tributary will receive an AIS alarm to warn them of the condition.
PLC_OOF	DS3 PLCP Out of Frame	Physical Layer Convergence Protocol is Out of Frame.
PLC_LOF	DS3 PLCP Loss of Frame	Physical Layer Convergence Protocol has lost framing.
PLC_Yel	DS3 PLCP Yellow alarm	Physical Layer Convergence Protocol is reporting a yellow alarm.

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A.6 Physical Specifications and Power Consumption

Table A-16. Physical Specifications and Power Consumption

Item		Height		Width		Depth		Weight		Power	
Common Equipment	**Model**	**inches**	**cm**	**inches**	**cm**	**inches**	**cm**	**lb**	**Kg**	**Watt**	**BTU/hr**
System Unit	8916	9.0	22.9	17	43.2	9.13	23.2	8.5	3.96	--	--
System Unit	8918	9.0	22.9	17	43.2	15.38	39.0	11.0	5.0	--	--
System Unit	8919	9.0	22.9	17	43.2	9.13	23.2	11.0	5.0	--	--
AC Power Supply	8901	5.62	14.3	2.13	5.4	8.13	20.6	1.67	.76	--	--
-48VDC Power Supply	8902	5.62	14.3	3	7.6	8.13	20.6	1.75	.80	--	--
AC/DC Converter	8903	5.62	14.3	2.75	7.0	8.13	20.6	2.0	.91	--	--
Power Converter-100W	8905	5.62	14.3	2.75	7.0	8.13	20.6	2.0	.91		
Ringing Generator	8906	5.62	14.3	1.38	3.5	6.0	15.2	1.5	.68	--	--
24VDC Power Supply	8907	5.62	14.3	3	7.6	8.13	20.6	1.75	.80	--	--
Power Converter - 300W	8908	5.62	14.3	2.68	6.80	8.13	20.6	3.00	1.36	--	--
CPU Card 3.X	8800	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	1.4	4.78
CPU Card 3.X	8801	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	1	3.41
CPU Card 3.X	8804	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	1.4	4.78
Interface Card	8920	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	0.6	2.05
Interface Card	8921	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	0.6	2.05
Interface Card	8922	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	.85	2.90
Interface Card	8923	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	.85	2.90
Interface Card	8924	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	.85	2.90
Interface Card	8925	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	0.15	0.51
Interface Card	8926	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	0.2	0.68
Interface Card	8927	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	0.18	0.62
Network Cards											
WAN Card	8000	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	1.1	3.75
WAN Card	8010	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	1.5	5.12
WAN Card (HDSL)	8011	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	3.1	10.49
WAN Card	8014	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	2	6.83
WAN Card (ESF Loopback)	8015	8.0	20.3	.94	2.4	7.5	19.0	.75	.32	--	--
CSU Module	812	3.69	9.37	2.13	5.4	.38	.95	.062	.028	0.25	0.85
DSX/CEPT Module	811	3.63	9.22	2.06	5.2	.50	1.27	.062	.028	0.45	1.54
HDSL Plug-in	820	3.69	9.37	3.65	9.2	.50	1.27	.75	.32	3.1	10.49
Voice Cards											
E&M Card	8108	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	3.4	11.61
E&M Card	8115	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	1.75	5.97
E&M Card (2713 Hz)	8117	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	3.4	11.61
E&M Card	8118	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	3.4	11.61
E&M Card	8119	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	3.5	11.94
FXS Card	8124	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	4.85	16.54
FXS Card	8125	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	4.85	16.54
FXS Card	8128	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	9.7	33.12
FXS Card	8129	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	9.7	33.12
FXS Coin Card	8149	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	9.7	33.12
FXO Card	8134	8.0	20.3	.94	2.4	7.5	19.0	1.25	.57	3.5	11.94
FXO Card	8135	8.0	20.3	.94	2.4	7.5	19.0	1.25	.57	3.5	11.94

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FXO Card	8138	8.0	20.3	.94	2.4	7.5	19.0	1.25	.57	7	23.9
FXO Card	8139	8.0	20.3	.94	2.4	7.5	19.0	1.25	.57	7	23.9
FXO Coin Card	8159	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	9.7	33.12
Data Cards											
HSU Card	8202	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	3.4	11.61
HSU Card	8203	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	2.6	8.94
HSU Card	8212	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	2.5	8.54
HSU Card	8213	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	3.0	10.23
HSU Card	8214	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	2.5	8.54
HSU Card	8215	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	3.5	11.94
SRU Card	8220	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	4.6	15.7
B7R Card	8228	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	4.6	15.7
FRAD Card	8231	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	2.5	8.54
OCU-DP - 5 Port	8241	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	10.00	30.65
OCU-DP 10-Port	8246	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	4.74	16.16
OCU-DP	8249	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	2.4	8.2
DS0-DP Card	8254	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	3.1	10.58
BRI-U Card	8260	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	6.3	21.48
BRI-U Card	8261	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	6.3	21.48
BRI-ST Card	8262	8.0	20.3	.94	2.4	7.5	19.0	1.0	.45	6.3	21.48
Alarm Cards											
Alarm Card	8401	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	0.4	1.37
Alarm Card	8402	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	.58	1.98
Alarm Card	8403	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	5.76	19.64
Server Cards											
ADPCM Card	8871	8.0	20.3	.94	2.4	7.5	19.0	.5	.23	6.1	20.80

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A.7 Part Number / Acronym Table

The following table details the part number of each card or peripheral listed in this guide.

Product Name/Acronym	Premisys Product #	Product Name/Acronym	Premisys Product #
WAN CARDS		**DATA CARDS**	
WAN SINGLE	800060	HSU 530/35	820220
WAN DUAL	801020 / 801021	HSU 530/35	820260
WAN-U DUAL	801120	HSU-T V11	820320
WAN-U DUAL	801160	HSU 35	821220
WAN-AH DUAL	801130	HSU-AD 530/35	821360
WAN-R DUAL	801420	HSU-T 35	821420
WAN-R DUAL	801460	HSU-T 530/35	821460
WAN-2P ESF LPBK	801560	HSU 530/35	821520 / 821521
VOICE CARDS		SRU 232*10	822020
E&M 2W*8	810860	SRU 232*10	822060
E&M 4W*8 ER	811860	FRAD 232*10	823120
E&M 4W*8	811920	FRAD 232*10	823160
E&M 4W*8	811960	OCU-DPx10	824660
E&M 2713 Hz	811760	OCU-DPx5	824720
FXS 2W*4-6	812520	OCU-DPx2	824960
FXS 2W*4-6	812560	DS0-DPx4	825460
FXS 2W*8-6	812920	BRI U*8	826020
FXS 2W*8-6	812960	BRI U*8	826060
FXO 2W*8-6	813960	BRI-SC U*8	826120
FXS-C 2W*8-6	814960	BRI-SC U*8	826160
FXO-C 2W*8-6	815960	BRI-ST*8	826220
SERVER CARDS		BRI-ST*8	826260
ADPCM 64 (S 60)	887160	B7R	008228
MISCELLANEOUS CARDS / OTHER		**CPU & INTERFACE CARDS**	
DSP 8	830020	CPU-3 BCON	880020/880021/880022
DSP 8	830060	CPU-3 BCON	880060
ALR 4+4	840120	CPU-3 XCON	880120/880121/880122
ALR 4+4	840160	CPU-3 XCON	880160
ALR 4+3PF	840220	CPU-3 RCON	880420/880421/880422
ALR 4+3PF	840260	CPU-3 RCON	880460
ALR 28+14	840320	INF+M T1E1*8	892020
ALR 28+14	840360	INF+M T1E1*8	892060
		INF T1E1*8	892120
		INF T1E1*8	892160
		INF T1*2	892520
		INF T1*2	892560
		INF+M T1*2	892620
		INF+M T1*2	892660
		INF E1*2	892760

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Appendix B
Error Messages

B.1 Introduction

This chapter lists the integrated access system error messages. One of these messages may appear at the bottom of the screen when you enter a command, indicating that the system did not perform the requested action. This condition may have been caused by an operator error, absence of a card in the system, or other condition. If an error message appears, take the appropriate corrective action. For convenience, the system error messages are listed alphabetically.

‘0000’ invalid for E, reverted to original.

The sequence 0000 is not a valid ABCD signaling sequence on E1 links. Choose a different ABCD sequence for E1 signaling conversion to/from T1 format.

A name must be assigned to Circuit ID field.

You must enter a name for the circuit before attempting this operation. Go to the Circuit ID field, type the desired name, and save it.

ADPCM card is not installed or rdnt.

An ADPCM card is not present in the system, or you chose a redundant ADPCM card for data compression. Install an ADPCM card, or selected a non-redundant card.

ADPCM doesn’t support WAN switch.

WAN redundancy is not available if ADPCM card is used in the system.

Alarm Card can’t be active with dialing.

An External Alarm card cannot be used when HSU cards are programmed for ISDN dialing. Remove this card.

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All available PVCs are already taken.

The number of PVCs available on the FRAD Card Main Screen has been exceeded by the number of PVCs assigned on the PVC Screen. Assign a number of PVCs on the PVC Screen that is lower than the quantity chosen in the Main Screen.

All blank prt repot.

You chose the empty option setting for all four elements of the Print Alarm on the Interface Card. This combination of settings is invalid and cannot be saved. Choose the proper option settings for these elements.

ASYNC/5 databits must have 2 stop or parity.

You have assigned an SRU card port to an asynchronous circuit with 5 data bits, one stop bit, and no parity. This is an invalid combination of option settings. Either choose two (2) stop bits, or enable parity on that port.

BCH is not supported in XCON.

You cannot use BCH error correction on an OCU-DP card in systems with cross-connect WAN cards.

Both WAN's cannot be in test mode.

You cannot use the test option on both sides of a cross-connect simultaneously.

Broadcast cannot be looped back.

You cannot activate a loopback on a broadcast cross-connection.

Bus cannot be looped back.

You cannot assign a multirate HSU port to more than 30 time slots of a WAN E1 link or 24 time slots on a T1 link.

Cannot be STDBY while BERT test is running.

You cannot change a port from the activ (active) state ot the stdby (standby) state while the Bit Error Rate Tester (BERT) is running. You must end the BERT test first.

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Cannot define any more PVC connections.

The maximum number of PVC connections has been reached.

Cannot define any more XCON circuits.

The maximum number of cross-connect circuits is 99.

Can NOT delete circuit while test is active.

You must end the test in progress before deleting the circuit.

Cannot do it in Viewer mode.

You are logged in under the Viewer password, but that level of access does not allow you to perform the desired operation. Log out of the system, log back in under the Operator or Manager password, and repeat the command. Or, perform an operation that is permitted by the Viewer access level.

Cannot exceed 32 TS's for ports 1-32 or 33-64.

Each set of 32 ports can have one time slot (total of 32 time slots).

Cannot have REMOTE and LOCAL loopbacks.

You cannot place the card port in both a local loopback and a remote loopback simultaneously.

Cannot insert errors without BERT running.

You must start BERT testing before inserting bit errors.

Cannot switch non-compatible WANs.

The current WAN card arrangement does not support redundant WAN switching.

Cannot talk to NTU while BERT is running.

You must stop the BERT test before accessing the NTU.

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Cannot use the same TS on different WAN.

You cannot assign an SRU card port to the same time slot on different WAN ports.

Can’t define any more IP entries.

The maximum number of IP entries has been reached.

Can’t initialize modem.

The Interface card modem was not initialized.

Card already installed.

You cannot use the Configuration option on an occupied chassis slot.

Card does not respond.

The card is not responding to your commands. Remove the card from the chassis, plug it back in again, and repeat the command. If the message appears again, replace the card.

Card has broadcast/monitor links.

You cannot place the HSU card in standby when it has active broadcast lines.

Card is not available.

You cannot test the card because it is faulty. Replace the card.

Channel test is available from WAN XCON screen.

To test a cross-connected voice circuit, go to the Cross-Connect Screen.

Circuit is already used, no subaddress allowed.

You cannot assign the same circuit number to different ports in the FRAD User Port screen.

Circuit nmae must be entered.

You must enter a name for the cross-connect circuit before attempting this command.

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Combined ADPCM rate must equal 64K.

You cannot assign a 40 kbps and a 32 kbps channel to the same ADPCM 64 kbps engine. The only valid combinations are 40 kbps + 24 kbps, 32 kbps + 32 kbps, and 24 kbps + 40 kbps.

Command rejected. Switch in progress.

The command was not executed because a redundancy switch is in progress.

Config. changes must be made from primary WAN.

You cannot make configuration changes to a redundant WAN port. This is allowed only on primary WAN ports.

CONG stat is not available for FRAD port.

Frame relay packet congestion data is not available for this FRAD port.

Cumulative bandwidth exceeds 115.2K.

You cannot assign more than 115.2 kbps of aggregate bandwidth to an SRU card. Be sure the sum-total rate of all card ports does not exceed 115.2 kbps.

Current CPU does not support redundancy.

The selected CPU card does not support redundancy. If the system has two CPUs, be sure they are both 8803s.

Dialing is not available with Alarm Card.

If an External Alarm card is present in the system, you cannot use dial triggers for the HSU card. Remove the External Alarm card first.

ds0-n available only with 64K rate.

You cannot generate a DS0 time slot (ds0-n) loopback on an OCU-DP port with a data rate of less than 64 kbps. This is possible only on ports operating at 64 kbps and higher.

Duplicate prt report element.

You have asked the Print Alarms option to print the smae element twice.

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Each WAN can have only one d-chan.

You cannot assign two D-channels to the same WAN port.

Empty field is not allowed.

You cannot assign a blank password on the CPU Card Main Screen. Always enter alphanumeric characters.

Empty slot.

You cannot access the card or associated screen because it is not plugged into the chassis.

Engine pair must have same ADPCM WAN and TS.

You must assign each pair of ADPCM engines (1-2, 3-4, 5-6, etc.) to the same WAN port and time slot.

ERR COR bch_ts must be larger than TS.

For BCH error correction, you must assign a separate WAN time slot that is numerically higher than the time slot carrying the normal data.

Error correction is not supported.

Error correction is not supported on the five-port or ten-port OCU-DP card. Or, majority voting (maj-v option setting) error correction is not supported for data rates higher than 9.6 kbps. Use bch error correction instead, or do not use error correction.

ERROR found in the RESTORE file.

The system restoral failed due to a software error. Repeat the restoral, and call Technical Support if this message reappears.

Field can NOT be MODIFIED.

You cannot edit this field.

Group ‘A’ is not allowed for slcd4.

You cannot use trunk group A in the slcd4 mode.

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Group already taken.

This group is already assigned.

Illegal IP Mask.

The IP netmask number you chose is invalid.

Invalid character in Node Id.

The only valid characters for a Node ID are alphanumeric characters and the underscore.

Invalid date/time format.

You have entered an invalid date or time.

Invalid Dlci value.

The DLCI number you chose is invalid.

Invalid endpoint name.

The endpoint name you chose is invalid.

Invalid IP address.

The IP address you chose is invalid.

Invalid IP netmask.

The IP netmask you chose is invalid.

Invalid parameters for ADPCM.

You cannot use ADPCM on voice cards that use A-Law coding. This is only allowed on mu-Law voice cards.

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Invalid password for this command.

You cannot use the debug command from the System Test and Debug Screen without the proper password authorization.

Invalid secondary clock format.

You cannot assign an external clock source as the secondary system clock.

Invalid SR TS.

You cannot assign an SRU card subrate port to a WAN time slot that does not have enough room on the subrate time slot for that much bandwidth. For example, if you have a port with b-5 framing occupying subrate time slots 1 to 4, you cannot also assign a fifth port whose bandwidth exceeds 9.6 kbps to subrate time slot 5.

Invalid sub address.

You cannot assign the same subaddress number to two different user ports on the FRAD Card Main Screen.

Invalid Timeslot.

When assigning time slots to user voice and data ports, you must choose time slot nubmer 1 to 24 for a WAN T1 port, or 1 to 31 for a WAN E1 port.

Invalid WAN/SRVR.

You cannot assign services to an unavailable WAN or Server card.

IP Address must be unique.

The IP address is already assigned.

ISDN connected circuit.

You cannot place an HSU card port with an active ISDN call in standby. Wait for the call to end.

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Local LB & Test Pattern can't be ON together.

You cannot perform a loopback with a test pattern applied, and you cannot apply a test pattern if a loopback is active.

MAJ EC is not available with RATE> 9.6.

You cannot use majority-vote error correction on an SRU card port with a Rate higher than 9.6 kbps. Use bch error correction instead, or disable error correction.

Mode cannot be changed when any ts are allocated.

You cannot change the WAN card mode from d-i (drop and insert) to term (terminal), or vice versa, when time slots are occupied. First, make all time slots available.

Modification can't be saved while test is active.

You cannot make changes in this screen while a test is in progress.

Module is not installed.

You cannot use the Configuraiton option on a WAN port that doesn't have a CSU, DSX/CEPT, or HDSL plug-in module attached. Be sure to install the proper module(s) on the WAN card. For HDSL interfacing, an 8011 WAN Card is required.

Must be in terminal mode.

You cannot use the Configuration option on a WAN card in the drop-and-insert mode.

Must have clean WAN.

You cannot use the Configuration option on a WAN card whose time slots are already occupied.

Must have OOS status.

You cannot delete a card that has not been removed from the system. Remove the card first.

Must have WAN card installed.

You cannot use the Configuration option on an uninstalled WAN card. Install the card first.

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N392 must be less than or equal to N393.

N392 determines the amount of errors that will be tolerated during the amount of events assigned in N393. FRAD rules require that N392 be less than or equal to N393.

No changes for selected switch.

When connected to an ISDN office switch, you cannot change the status of a B-channel.

No changes while BERT is running.

You cannot change the port configuration while Bit Error Rate Testing is active. Turn the test mode off before making your changes.

No d-i mode for this slot.

In a redundant cross-connect system, you cannot assign the drop-and-insert (d-i) mode to the WAN card in slot W3, which holds the redundant WAN card.

No historical alarms.

You have selected the History command in the Alarm Screen, but no alarms exist in that log.

No more profiles allowed.

You cannot assign more than 16 call profiels to the Interface Card.

No more than 1 ts allowed.

You cannot assign more than one WAN time slot to a FRAD circuit.

No more than 2 ts allowed.

The Frame Relay PVC circuit cannot exceed 128 kbps (two 64 kbps time slots).

No more than one BERT test per BRI card.

You cannot perform more than one BERT test on each BRI card.

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No more than two WANs in BERT test are allowed.

You can place only two WAN ports in the BERT test mode simultaneously.

No second net-lb allowed when bw = 115.2 kbps.

You cannot activate more than one network loopback at a time on an SRU card port.

No timeslot(s) specified.

You cannot activate a user card that doesn't have any WAN time slots assigned to it.

No Voice Compress. WAN card using ALL resources.

No ADPCM card is currently available for voice compression.

Not applicable for S/T card.

This does not apply for a BRI S/T card.

Not enough available U-slots.

You cannot use the Configuration option with less than three available user card slots in the chassis for T1 operation, or four available user card slots for E1 operation.

Not implemented yet.

You cannot use a feature or function that is not yet released. This message normally appears on software versions for beta testing.

Not supported.

This command is currently not supported by the system.

Number of TS from must be equal to TS to.

You cannot assign a time slot cross-connection with an unequal number of "from" (source) and "to" (destination) time slots.

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Only broadcast.data type can be controlled.

You cannot update or delete a regular cross-connect circuit from the Cross-Connect Broadcast Screen.

Only broadcast/data type can be controlled.

You cannot update or delete a regular cross-connect circuit from the Cross-Connect Broadcast Screen.

Only network or data type can be broadcasted.

You cannot broadcast a Broadcast circuit from the Cross-Connect Broadcast Screen.

Only one ADPCM redundant in the system.

You cannot make more than one ADPCM a redundant card in the system.

Only one port can be at 128K.

You cannot configure more than one port of the card for 128 kbps.

Only U-slots can be configured.

You cannot use the Configuration option for the P slots, C slots, or I slot of a chassis.

Only w1-1 or w1-2 are supported.

You can use the Configuration option only on WAN ports W1-1 and W1-2.

Parameters are not saved.

You have selected the Main command from the bottom of the screen without first saving your changes. Press “s” to invoke the Save command first.

Parameters have been saved.

You have made changes to the card and typed “s” to invoke the Save command. (This is a normal message, it always appears when you type “s” to save changes.)

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Performance statistics is not available in slc96.

You cannot obtain performance statistics for a WAN port in the slc96 mode.

Performance statistics not available.

You cannot obtain performance statistics for this card or port.

Phone number must be unique.

The primary phone number on an HSU card must be unique.

Port already configured for Remote Terminal.

This port is already configured for use with a remote terminal.

Port is in use.

You cannot make any changes to an active port.

Port is not active.

You cannot use the Hangup option on an HSU card port in the standby state.

Port is not configured for ASCII.

This port is not configured for ASCII operation.

Port is not configured for TCP/IP.

This port is not configured for TCP/IP operation.

Primary WAN is not operational.

You cannot switch from a redundant WAN port back to a primary WAN port if the primary port is still not operational.

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Profile has to be loaded first.

You cannot use the Dial command in the HSU Card Main Screen without first loading a call profile.

Profile Id was not found.

Upon using the Load command in the HSU Card Main Screen, you requested a non-existing call profile from the Interface card.

RATE = 19.2 must have DATA = 8 for adpcm or hlink.

If you set the SRU card port rate to 19.2 kbps, you also must set the number of data bits for that port to 8.

Redundancy requires WAN Model 8014 in Slot W4.

Your system must have an 8014 WAN Card in slot W4 for WAN redundancy operation.

Redundancy switchover is complete.

You have asked the system to switch to the redundant WAN card, and the switchover was successfully completed. (This is not an error message; it normally appears after you initiate the switchover.)

Redundant CPU.

The current CPU card is the redundant card.

Redundant WAN is taken already.

You cannot switch to the redundant WAN card in slot WAN-4 if it is already in use from a previous WAN card switch.

Remote session active. Can’t change setting.

You cannot change this setting because a remote operator has accessed the system and is controlling it. Wait for that operator to log off and disconnect.

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Restricted field.

You cannot access the Superuser password field on the CPU Card Main Screen. This password is factory-assigned.

Selected ADPCM can be primary only.

The current ADPCM card cannot be a redundant card.

Selected circuit is not primary.

The current circuit is redundant, not a primary circuit.

Selected circuit is under the test already.

The current circuit is already being tested.

Service table is currently used by profile.

You cannot change the service table on the ISDN configuration screen when the service is selected and stored in an Interface card call profile.

Simultaneous loopback tests not allowed.

You cannot activate two or more loopbacks at the same time.

SNMP Options not available on this CPU.

The current CPU card does not support SNMP configuration.

Specify Sys Ph# before activating REMOTE vt100.

You must enter the integrated access system's phone number before a remote operator can connect to the system.

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SR TS overlapping.

The subrate circuit assigned does not allow enough space for a previously assigned circuit on the same subrate time slot. For example, if you have a 19.2 kbps device on subrate time slot 1 in b-5 framing, you cannot assign another 19.2 kbps circuit to subrate time slot 2, because the circuit on 1 actually occupies subrate time slots 1 and 2. You must therefore assign that other circuit to subrate time slot 3 or 4.

Switch request sent to card.

The system has sent your redundancy switchover command to the associated card.

Switchover must be made from the primary WAN.

You cannot switch to a redundant WAN port from another redundant WAN port. You can only switch from a primary port to a redundant port.

Test function is not available.

The selected test is not available on the current card.

Test in progress. No changes from this screen.

You cannot change any settings in this screen while a card test is in progress.

Test is not available in slc96.

You cannot perform this test on an slc96 WAN port.

This option not available on INTF-2.

You cannot perform this action on the current Interface card.

Timeslot has different framing.

You cannot assign different subrate framing to the same WAN time slot. For example, if you have a port with b-5 framing on one WAN time slot, you cannot assign a different port with b-10 framing to that time slot.

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TS 16 cannot be used with v&s.

You cannot assign a voice circuit with signaling to time slot 16 of an E1 WAN port.

TS 16 is already in use.

You cannot assign time slot 16 of a CEPT E1 WAN port programmed for cas.

TS Connection must be specified.

You must specify a time slot connection for the WAN circuit.

TS(s) cannot be allocated.

You cannot assign a voice cross-connect to time slot 16 of a CEPT E1 WAN port.

Unit controlled by FEC.

The user card is controlled by forward error correction.

Units in pair must have the same source.

You must configure the Source parameter of User units on a FRAD card in pairs.

Voice CPU is not responding.

The voice CPU is not working. Power down the system, then power it up again.

WAN must be active (no loopback) to run BERT test.

You must turn off all WAN loopbacks before starting a BERT test on a WAN port.

WAN must have SLC format.

The WAN port must be configured for slc96.

Xconnect table can be accessed from primary WAN.

You cannot access the WAN cross-connect information from a redundant WAN port. Do this from a primary WAN port instead.

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Appendix C
Glossary

C.1 Introduction

This Appendix lists the glossary of terms used in the telecommunications industry today.

AAL

ATM Adaption Layer

ABCD bits

The bits that carry signaling information over a T1 or E1 line.

ABR

Available Bit Rate

ACAMI

Alternate Channel AMI, transmitting data on every other DS0 in a DS1 to ensure ones-density.

ACO

Alarm Cutoff

ADPCM

Adaptive Differential Pulse Code Modulation

ADPCM Card

A resource card used to compress voice or subrate data on a DS0.

ADSL

Asymmetric Digital Subscriber Line

aggregate

A single bitstream combining many bitstreams of lower rates.

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AIS

Alarm Indication Signal

AIM

ATM Inverse Multiplexer

a-law

E1 companding standard used in the conversion between analog and digital signals in PCM systems.

AMI

Alternate Mark Inversion, a line coding format for T1 lines.

ANSI

American National Standards Institute

ASCII

American Standard Code for Information Interchange

ATM

Asynchronous Transfer Mode

AWG

American Wire Gauge (the size of an electrical wire)

B7R

Bit #7 Redundant

B7R card

A network card used to provide Network Management capability for the system.

B8ZS

Bipolar 8-Zero Substitution, a coding scheme that maintains minimum-ones density on a T1 line.

B-channel

In ISDN**,** a full-duplex, 64 kbps (“bearer”) channel that carries user data.

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BECN

Backward Explicit Congestion Notification

BER

Bit Error Rate, the number of errored bits divided by the total number of bits.

BERT

Bit Error Rate Tester

bit

Contraction of the words "binary" and "digit."

bps

Bits per second

BRI

Basic Rate Interface, (2B+D) in ISDN

CAS

Channel-Associated Signaling, a means of conveying voice-circuit signaling over an E1 line.

CAS–CC

Channel Associated Signaling–Common Channel

CAS–BR

Channel Associated Signaling–Bit-robbing mode, used to convey voice-circuit signaling over a T1 line.

CBR

Constant Bit Rate

CCITT

Consultative Committee for International Telegraph and Telephone, now known as the ITU (International Telecommunications Union).

CCR

Current Cell Rate

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CCS

Common Channel Signaling

CEP

Connection End Point

CEPT

Conference on European Posts and Telecommunications, a European standards organization.

CES

Circuit Emulation Service

CGA

Carrier Group Alarm, a condition that results from a network failure. Forces all voice circuits off-hook or on-hook until the alarm-causing condition is cleared and the CGA ends.

CLUE

Customer-Located Equipment

clear channel

A DS0 channel without formatting restrictions (i.e., uses the full 64 kbps bandwidth for data transmission).

CO

Central Office

channel bank

A device that places multiple voice and/or data channels onto a digital or analog carrier

CL

Connectionless Service

CPE

Customer Premises Equipment

CODEC

COder/DECoder (a device that encodes and decodes signals)

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companding

Non-linear reduction of a signal, usually compressing the larger signal values

CRC

Cyclic Redundancy Check

CRC-4

CRC using four check bits

CRC-6

CRC using six check bits

CSA

Carrier Serving Area

CSC

Common Signaling Channel

CSU

Channel Service Unit, an interface to a T1 line that terminates the local loop.

CTE

Channel Terminating Equipment (Network)

CTS

Clear To Send, a lead on an interface indicating that the DCE is ready to receive data.

D4

A common T1 framing format, consisting of 12 frames. Also known as SF framing.

DACS

Digital Access and Cross-connect System (an electronic digital test access and patching system)

DCC

Data Communication Channel

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DCE

Data Communications Equipment

DCS

Digital Cross-connect System

D-channel

Full-duplex, 16 kbps BRI channel or 64 kbps PRI ISDN channel.

DDS

Digital Data Service

d/i

Drop and Insert, one of the modes of operation for the WAN card.

DID

Direct Inward Dialing

DLC

Digital Loop Carrier

DLCI

Data Link Connection Identifier

DMA

Direct Memory Access

DPO

Dial-Pulse Originating

DPT

Dial-Pulse Terminating

DS0

Digital Signal - Zero, the standard bandwidth for digitized voice channels. Also referred to as a time slot.

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DS0–A

Strategy for mapping a single low-speed data circuit to a single DS0.

DS0–B

Strategy for multiplexing two or more DS0-A low-speed data circuits onto a single DS0 (e.g., 5x9.6kbps, 10x4.8kbps or 20x2.4kbps).

DS0–DP Card

Digital Signal Zero–Dataport Card (one of the data cards for this system).

DSL

Digital Subscriber Line

DSR

Data Set Ready

DSX

Digital Signal Cross-connect

DTE

Data Terminal Equipment

DTR

Data Terminal Ready

DX

Duplex Signaling

E1

Digital 2.048 Mbps line rate, widely used in countries outside the U.S. and Canada.

EFCI

Explicit Forward Congestion Indicator

ELAN

Emulated Local Area Network

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EPROM

Electronic Programmable Read-Only Memory, stores firmware on plug-in modules of the system.

ESF

Extended Superframe (24-frame sequence for a T1 line; consists of two superframes)

ESS

Electronic Switching System

E&M

Earth and Magnetic, or recEive and transMit. The signaling leads on inter-switch voice connections.

E&M Card

An E&M voice card for this system.

F4

Four-frame multiframe structure used in T1 signals.

FAS

Frame Alignment Signal

FCC

Federal Communications Commission

FDL

Facility Data Link, consists of every other framing bit of an extended T1 superframe. The FDL is used to convey performance data, line test/loopback status, and other parameters for an ESF-framed T1 line. The FDL rate is 4 kHz.

FOTS

Fiber Optics Transmission Systems

frame

A delineated assembly of information, consisting of one sequence of 24 encoded channel samples (T1) or 32 channel samples (E1).

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FRAD

Frame Relay Assembler/Disassembler, a card used in this system.

FRS

Frame Relay Server, a card used in this system.

FS

Frame Signaling bits (T1 line).

FT

Frame Terminal bits (T1 line)

FUNI

Frame User Network Interface

FX

Foreign Exchange, a line that goes from a CO or PBX beyond the PBX or the CO's normal service area.

FXO

Foreign Exchange - Office, performs analog to digital and digital to analog transmission at the CO.

FXO Card

One of the voice cards for this system

FXS

Foreign Exchange - Subscriber or Station, an interface at the end of an FX line connected to a telephone or PBX. Performs digital to analog and analog to digital transmission at the station end.

FXS Card

One of the voice cards for this system

Ground

A physical connection to the earth, chassis, or other reference point

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HDB3

High-Density Bipolar Order of 3, three-zero maximum coding for E1 lines. Provides a fourth zero violation for data bytes.

HDLC

High-Level Data Link Control (bit-oriented protocol)

HDSL

High-bit rate Digital Subscriber Line

hlink

A proprietary format for subrate data when using the ADPCM card.

HSU Card

High-Speed Unit Card (one of the data cards for this system).

ICMP

Internet Control Message Protocol

IEC

Interexchange Carrier (also called **IXC**)

IMUX

Inverse Multiplexer

IMUX Card

A resource card that gives users access to the ISDN network for bandwidth-on-demand applications.

inverted a-law

A variation of a-law encoding that provides a higher ones density on E1 lines.

IP

Internet Protocol

ISP

Internet Service Provider

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ITU

International Telecommunications Union (previously known as CCITT [Consultative Committee for International Telegraph and Telephone])

ITU-T

International Telecommunications Union, Technical sector

IXC

Interexchange Carrier (also called **IEC**)

LAN

Local Area Network

LANE

LAN Emulation

loopback

Path for returning a signal back to the point of origin for circuit testing

modem

Contraction of the words “modulator” and “demodulator”

MRD

Manual Ringdown

MSP

Maintenance Service Provider

mu-law

T1 companding standard used in the conversion between analog and digital signals in PCM systems.

Network card

A CPU card, Resource card, or WAN card used in this system.

NMS

Network management system, a computer used to control networks from a single location.

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NNI

Network Node Interface

NOS

No-Signal Alarm

NRZ

Non-Return-to-Zero signal format

NTU

Network Termination Unit, connects BRI station equipment to the integrated access system. Any standard 2B1Q (U interface) device that supports "nailed-up" (one or two B-channels) connections with no D-channel signaling.

OCU–DP Card

Office Channel Unit - Dataport (one of the data cards for this system).

OOF

Out Of Frame, an indication that the system is searching for the framing bit pattern in the signal received from the network.

OOS

Out of Service, an indication that a system element has failed.

OSI

Open Systems Interconnection

PAM

Pulse Amplitude Modulation

PBX

Private Branch Exchange, a small phone switch inside a company.

PCM

Pulse Code Modulation

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PDU

Protocol Data Unit

ping

A program used to test IP-level connectivity from one IP address to another.

PLAR

Private Line Automatic Ringdown

PLR

Pulse Link Repeater

POP

Point of Presence, usually a telephone carrier office.

POTS

Plain Old Telephone Service

PPP

Point-to-Point Protocol

protocol

Procedure or set of rules for communication between two devices.

PSTN

Public Switched Telephone Network.

PTT

Postal, Telephone, and Telegraph authority

QAM

Quadrature Amplitude Modulation

RAI

Remote Alarm Indication

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Red alarm

A local alarm on a T1 line, indicating that a major failure has occurred at this location.

robbed-bit

A type of analog signaling that occasionally “robs” information bits to convey encoded voice-circuit signaling.

RZ

Return-to-Zero signal format

SAP

Service Access Point

SF

Superframe, a T1 framing format consisting of 12 frames. Also known as D4 framing.

SLC®

Subscriber Loop Carrier (made by Lucent Technologies, one example of a Digital Loop Carrier (DLC) System.

SLIP

Serial Line Internet Protocol

SMDS

Switched Multimegabit Data Service

SNMP

Simple Network Management Protocol

SONET

Synchronous Optical Network

SRU Card

Subrate Unit Card (one of the data cards for this system).

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system

Often used as a synonym for the integrated access system.

TA

Terminal Adapter

TE

Terminal Equipment

T1

The North American DS1 transmission rate, 1.544 Mbps.

TAD

Test Access Digroup

TCP/IP

Transmission Control Protocol/Internet Protocol

TDM

Time-Division Multiplexing

TELNET

An application protocol offering virtual terminal service in the Internet suite of protocols.

time slot map

Specification of the connections between all incoming and outgoing lines connected to the system. A cross-connect map allows users to split the bandwidth of T1 and E1 lines into amounts more suitable for normal voice and data communications.

TS

Time Slot

UDP

User Datagram Protocol

UI

Unit Interval

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UNI

User Network Interface

User card

A Voice card, Data card, or Alarm card.

VBR

Variable Bit Rate

VC

Virtual Channel

VCL

Virtual Channel Link

VP

Virtual Path

VPC

Virtual Path Connection

WAN Card

Wide Area Network Card (one of the cards for this system).

wideband

A bandwidth equal to many individual channels

X.50

CCITT (ITU) standard data transmission protocol.

yellow alarm

Remote alarm on a T1 line. A major failure has occurred at a remote location.

ZCS

Zero Code Suppression

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