

*Data Cards*  
*Reference Guide*

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## Product Description

The Data Cards provide an interface between local and remote data devices and a digital network.

This integrated access system offers Data Cards that support HSU, SRU, OCU-DP, FRAD, DS0-DP, B7R and BRI interfaces.

### Data Cards

- **HSU** Two-Port HSU 530/35 (8202), HSU-T V11 (8203), HSU 35 (8212)  
HSU-AD (8213), HSU-T V35 (8214), Four-Port HSU 530/35 (8215),
- **SRU** SRU 232\*10 (8220)
- **OCU-DP** OCU-DP (8249), OCU-DP 5 (8247), OCU-DP 5 (8248)
- **FRAD** FRAD 232\*10 (8231), FRAD-18 (8230)
- **DS0-DP** DS0-DP 4 (8254)
- **B7R** B7R (8228)
- **BRI** BRI U\*8 (8260), BRI-SC U\*8 (8261), BRI-ST\*8 (8262)

# Using this Data Card Reference Guide

This Data Card Reference Guide provides technicians with switch settings, connector pinouts, configuration, and troubleshooting information for the Data Cards.

Chapter 1. *HSU Card*

Chapter 2. *SRU Card*

Chapter 3. *OCU-DP Card*

Chapter 4. *FRAD Card*

Chapter 5. *DS0-DP Card*

Chapter 6. *B7R Card*

Chapter 7. *BRI Card*

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# Chapter 1

## HSU Card

### 1.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the High-Speed Data Unit (HSU) Cards. These cards are labeled as follows on their faceplate ejectors: Two-port HSU 530/35 (8202), HSU-T V11 (8203), HSU 35 (8212), HSU-AD 530/35 (8213), HSU-T V35 (8214) and the Four-port HSU 530/35 (8215). This chapter also provides information for the Personality Modules used with some of these cards.

The HSU Cards allow you to connect high-speed data terminal equipment (DTE) and/or data communications equipment (DCE) to WAN links, resource cards, and/or other HSU cards.

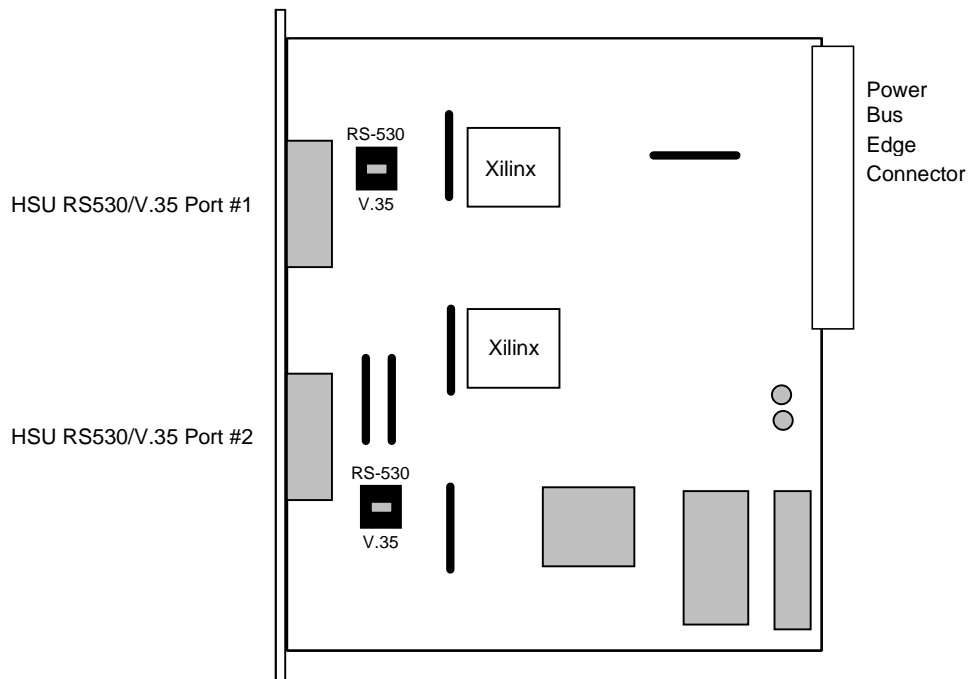
### 1.2 HSU Cards

#### 1.2.1 Two-Port HSU530/35 Card Description (8202)

The two-port HSU 530/35 Card supports two RS-530 or RS-449 CPE data devices. It can also support V.35 and RS-232 data when used with personality modules, which are described later in this chapter.

**1.2.1.1 Two-Port HSU Card Jumper/Switch Settings**

The HSU 530/35 Card has two slide switches that you must set for either RS-530 or V.35 interfacing on its data ports. Figure 1-1 shows these switches, which are factory-set to RS-530 operation (up positions) for both ports. To change a card port for V.35 operation, reset its associated switch to the down position.



**Figure 1-1. Two-Port HSU 530/35 Card Switches**

**1.2.1.2 Installing the Two-Port HSU 530/35 Card**

Install the Two-Port HSU 530/35 Card into any user card slots. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.

## 1.2.2 HSU-T V11 Card Description (8203)

The HSU-T V11 Card has two ports that connect to RS-530 or X.21 CPE devices. Each port can operate as either DCE or DTE, with data speeds ranging from 56 or 64 kbps to 1.536 or 1.984 Mbps.

### 1.2.2.1 HSU-T V11 Card Jumper/Switch Settings

The HSU-T V11 Card doesn't have any jumpers or switches on its mainboard.

### 1.2.2.2 Installing the HSU-T V11 Card

Install the HSU-T Card into any user card slots. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.

## 1.2.3 HSU 35 Card Description (8212)

The HSU 35 Card supports two V.35 data ports.

### 1.2.3.1 HSU 35 Card Jumper/Switch Settings

The HSU 35 Card doesn't have any jumpers or switches on its mainboard.

### 1.2.3.2 Installing the HSU 35 Card

Install the HSU 35 Card into any user card slots. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.

## 1.2.4 HSU-AD 530/35 Card Description (8213)

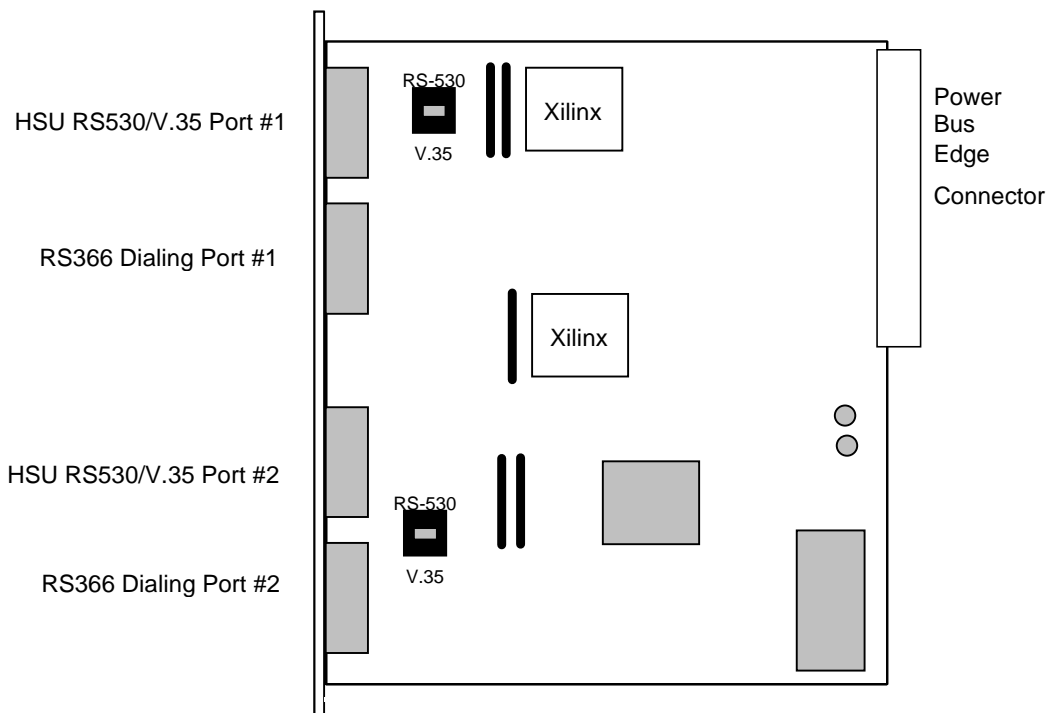
The HSU-AD 530/35 Card supports two RS-530 or V.35 CPE devices. The selection of RS-530 or V.35 is made on a port-by-port basis using on-board switches as described below. This card also supports V.25bis dialing (an inband dialing protocol) and RS-366 dialing through separate DB-15 RS-366 jacks on the card. The HSU-AD 530/35 Card also has a proprietary inband performance monitoring system.

**1.2.4.1 HSU-AD Card Jumper/Switch Settings**

Set the card switches for operation of ports 1 and 2 in either the RS-530 or V.35 mode. These switches are shown in Figure 1-2; they are factory-set for RS-530 operation. To change a port to V.35 operation, reset its switch as shown.

The ports can be set individually for either RS-530 or V.35 operation, but once you set them, they remain in that mode until the slide switches are reset.

RS366 Dialing Port #1 and RS366 Dialing Port #2 are dialing ports for Port #1 and Port #2 (HSU RS530/V.35) respectively; they serve no other purpose.



**Figure 1-2. HSU-AD 530/35 Card Switches**

**1.2.4.2 Installing the HSU-AD 530/35 Card**

Install the HSU-AD 530/35 Card into any user card slots. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.



### 1.2.5 HSU-T V35 Card Description (8214)

The HSU-T V35 Card supports two V.35 CPE data devices. Each card port can be configured to operate as either DCE or DTE, with data speeds ranging from 56 or 64 kbps to 1.544 or 2.048 Mbps.

#### 1.2.5.1 HSU-T V35 Card Jumper/Switch Settings

The HSU-T V35 Card must be set either to U.S. or European configuration by moving a jumper located on JP3. Figure 1-3 shows this jumper. Setting the jumper on the left two pins establishes the U.S. voltage configuration. Setting it on the right two pins establishes the European voltage. This setting should match the configuration of your particular chassis, or the card will not operate properly. The factory default setting is US.

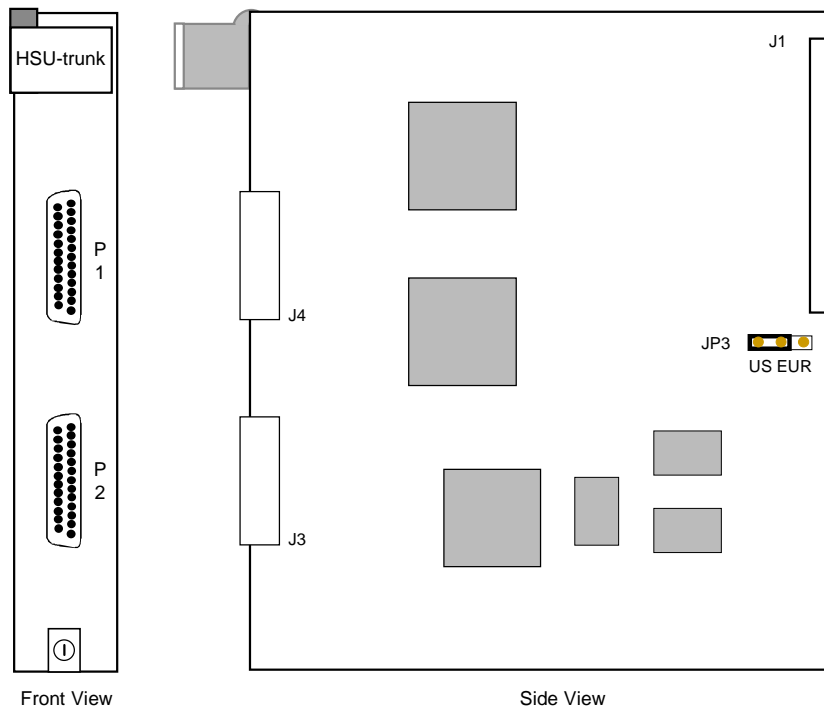


Figure 1-3. HSU-T V35 Card

#### 1.2.5.2 Installing the HSU-T V35 Card

Install the HSU-T V35 Card into any user card slots. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.

## 1.2.6 Four-Port HSU 530/35 Card Description (8215)

The four-port HSU 530/35 Card supports four RS530 or V.35 data ports. The selection of RS-530 or V.35 is made on a port-by-port basis using on-board switches.



### CAUTION!

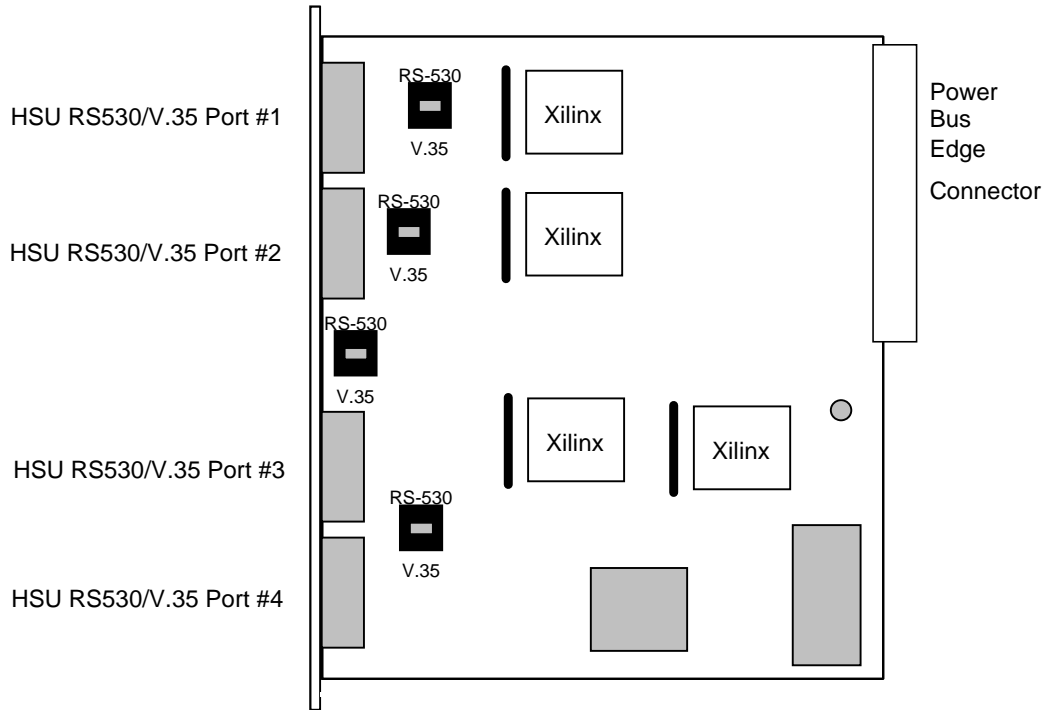
**If used in a system using a T1 “Line Code” other than “B8ZS,” HSU card ports assigned to multirate circuits greater than or equal to 4 or more consecutive time slots at 64kbps must have DTE connected to the port prior to activation. Failure to attach DTE will cause a false carrier alarm.**

### 1.2.6.1 Four-Port HSU Card Jumper/Switch Settings

The four-port HSU 530/35 Card has four slide switches that must be set for the proper type of interface (either RS-530 or V.35) on ports 1 through 4 of the card. Figure 1-4 shows these switches, which are factory-set for RS-530 operation on both ports. To change a port for V.35 operation, reset its associated switch as shown. Ports can be set individually for either RS530 or V.35 operation, but once set, they remain in that mode until the slide switches are reset.



**Note:** *When setting switch to V.35 mode it unbalances the CTS Lead. It does not change the voltage levels of the driver output. (The Personality Module will do the same thing as setting the switch).*



**Figure 1-4. Four-Port HSU 530/35 Card Switches**

**1.2.6.2 Installing the Four-Port HSU 530/35 Card**

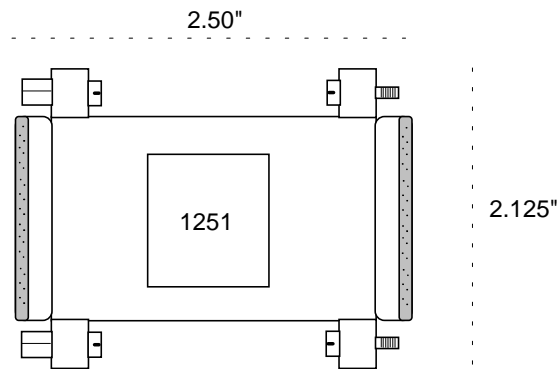
Install the Four-Port HSU 530/35 Card into any user card slots. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.

### 1.2.7 V.35 Personality Module (1251)

When using the two-port HSU 530/35, HSU-AD 530/35, and four-port HSU 530/35 Cards, you may want to connect the RS-530 output jack to RS-232 external equipment (for all of these cards). The V.35 Personality Module is an adapter module that plugs into the female DB-25 port and connectors, then attaches via a male/female connector to the external CPE device. Figure 1-5 shows this module.



**Note:** *The CPE connection cables should be less than 25 feet long. For RS232 operation, the recommended maximum cable length is less than 25 feet, and the speed should not exceed 56 kbps.*

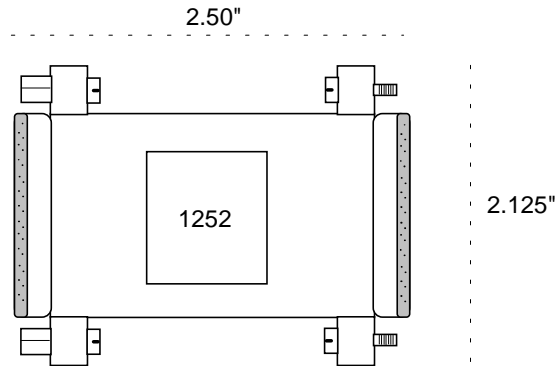


**Figure 1-5. V.35 Personality Module**

The three HSU 530/35 Cards also have internal switch settings for changing signals from RS-530 to V.35 format, as previously described. You must also set those switches for RS-530 interfacing when attaching personality modules to the associated card jacks.

### 1.2.8 RS-232 Personality Module Description (1252)

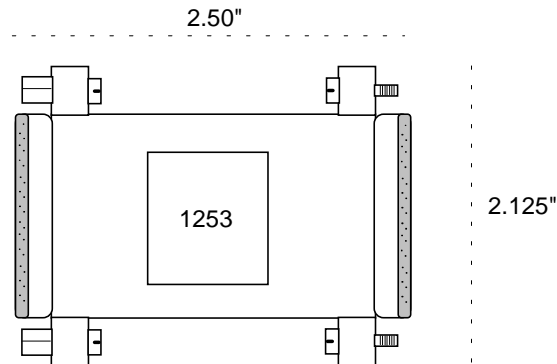
The RS-232 Personality Module similarly converts RS-530 signals to RS-232 format for the two-port HSU 530/35 Card. Because the four-port HSU 530/35 Card has DB-26 connectors, you must use a special cable to connect the external CPE to the personality module, which has a DB-25 connector on its CPE side. Figure 1-6 shows this module.



**Figure 1-6. RS-232 Personality Module**

### 1.2.9 RS-232-E Personality Module Description (1253)

The RS-232-E Personality Module converts 530-A signals to RS-232-E format which allows the HSU Cards to interoperate with equipment employing an interface conforming to the ANSI/EIA/TIA-232-E electrical characteristics. Figure 1-7 shows this module.



**Figure 1-7. RS-232 Personality Module**

### 1.2.10 HSU Card Cables

Table 1-1, Table 1-2, and Table 1-3 represent a matrix used for connecting cables to HSU Cards for DTE and DCE transmit clocking. The following HSU Cards apply (8202, 8203, 8212, 8213, 8214, 8215 and 8216).

**Table 1-1. HSU to Cable Matrix (To DTE Clock)**

HSU CARD	TO A DTE THAT ACCEPTS CLOCK				
	RS232	RS366	RS449	RS530	V.35
8202 NO SWITCHES	1252/1221*		1212F/M	1204F/M	1203F/1251
8202 WITH SWITCHES	1252/1221*		1212F/M	1204F/M	1261F/M
8203 DCE	1252/1221*		1212F/M	1204F/M	1261F/M
8203 DTE					
8212					1203F/M
8213/8215/8216	1264F/1253**	1206F	1265F/M	1264F/M	1263F/M
8214 DCE					1260F/M
8214 DTE					
2 PORT EXT. CABLES	1221			1222	1224
4 PORT EXT. CABLES				1269	1268

\*8202/8203 Switches set to RS-530 and 1252 Connected to HSU Card

\*\*The 1253 Connects to the end of the 1264F Cable

1253 is a New Version of the 1252 and can replace a 1252.

**Table 1-2. HSU to Cable Matrix (To DCE Clock)**

HSU CARD	TO A DCE THAT ACCEPTS CLOCK		
	RS449	RS530	V.35
8202 NO SWITCHES	1212X	1204X	1203X/1251
8202 WITH SWITCHES	1212X	1204X	1261X
8203 DCE	1212X	1204X	1261X
8203 DTE			
8212			1203X
8213/8215/8216	1265X	1264X	1263X
8214 DCE			1203X
8214 DTE			
2 PORT EXT. CABLES		1222	1224
4 PORT EXT. CABLES		1269	1268

**Table 1-3. HSU to Cable Matrix (DCE Provides Clock)**

HSU CARD	DCE PROVIDES CLOCK		
	RS530	V.35	RS449
8202 NO SWITCHES			
8202 WITH SWITCHES			
8203 DCE			
8203 DTE	1204X		1211
8212			
8213/8215/8216			
8214 DCE			
8214 DTE		1260F/M	
2 PORT EXT. CABLES			
4 PORT EXT. CABLES			

### 1.3 HSU Card User Screens and Settings

The HSU Cards permit configuration and operation through use of several user screens and optional settings.

#### 1.3.1 HSU Card Main Screen

You must configure the HSU Card ports for operation. Configuration can be performed from the HSU Card Main Screen, which is shown in Figure 1-8. To access that screen, highlight the desired card in the System Main Screen and press <Enter>. *The screen displayed in Figure 1-8 shows the 8213 HSU Card. See the notes in Table 1-5 for other HSU Card settings.*

Node_1	U1 HSU-366x2	Rev A4-0	Ser 01103	12-31-99	14:33
	1	2			
STATE	stdby	stdby			
WAN/SRV	w1-1	w1-1			
MODE	dce	dce			
TS	table	table			
RATE	64K	64K			
Tx CLOCK	int	int			
CLOCK PLRTY	norm	norm			
DATA PLRTY	norm	norm			
CTS	perm	perm			
CTS DELAY	0	0			
LOCAL LB	off	off			
LB GEN MODE	dds	dds			
LB GEN	off	off			
LB DET	w/to	w/to			
ISDN CONN	no	no			
EER	n/a	n/a			

Save | Undo | Refresh | Copy | Test | Dial | Perf | Main

Figure 1-8. Typical HSU Card Main Screen



The bottom highlighted line on this screen lists several actions you can perform from the screen. To perform an operation, simply press the uppercase letter associated with the desired action. For example, to save your option settings, type “s”. Table 1-4 lists the actions you can perform.

**Table 1-4. HSU 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).
Copy	Copies the contents of the current column to the next column. Useful if you change a lot of entries in one column and want to repeat those changes in subsequent columns.
Test	Initiates and monitors testing of all HSU Card ports. Refer to the Test section of this chapter.
Dial	Allows you to identify the HSU port by telephone number, download and modify call profiles from the Interface card, and dial and broadcast ISDN calls.
Perf	Brings up the Performance Data Screen.
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 1-5. HSU Card Setting Option Settings and Defaults**

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
WAN/SRV	wan serv user	1	w1-1
MODE	dce dte	5	dce
TS	table	2	table
RATE	64k 56k		56k
TX CLOCK	int ext		int
CLOCK PLRTY	norm inv	7	norm
DATA PLRTY	norm inv		norm
CTS	perm rlocal ignor local		perm
CTS DELAY	0 30 60 100		0
LOCAL LB	off dte net		off
LB GEN MODE	dds v.54 ft1		dds
LB GEN	off ocu csu (csu-1, csu-2) dsu ds0 (ds0-1, ds0-2)	3	off
LB DET	w/to on off		w/to
ISDN CONN	no	4	no
EER	off on none $10e^{-4}$ - $10e^{-9}$	6	none

*Notes:*

1. The WAN/SRV parameter has three optional choices: **wan**, **serv** and **user**. In **wan** mode, the options are w1-1 through w4-2. In **serv** mode, the option are P1-P3 and in **user** mode, the options are U1-U8 (Port 1-4).
2. If the WAN selected above has a CSU or DSX module connected, the values range from **1-24**. If a CEPT module is installed the values are **1-31**.
3. These options are only valid if the Loopback Generation Mode selected is **dds**. If the Loopback Generation Mode is **v.54** or **ft1**, then the LB GEN options are **off** and **on**.
4. This is an information-only field, there are no user selections.
5. DTE mode is only for HSU-T (8203, 8214).
6. Displays only for HSU-AD 530/35 (8213).

**STATE**

The State setting determines whether the port is active or inactive. An inactive port does not occupy time slots on a WAN link. Set State to standby (**stdby**) for ports you are not using or have not yet configured. Set it to active (**actv**) for ports that are ready for use. The control leads assume the status shown in Table 1-6 for the different states.

**Table 1-6. HSU Card State Status**

Control Leads	Active	WAN Link Down	Standby
RLSD	High or follows remote RTS	Low	Low
DSR	High	High	Low
CTS	Definable	Definable	High

**WAN/SRV**

The WAN/SRV setting identifies the card to which the output of this port is directed. If **wan** is chosen, the data from this card port will be directed to a WAN port (the options are **w1-1** to **w4-2**).

If **user** is chosen, the data will be routed to another HSU Card. First, highlight the selected user slot (U1 to U8). Then, if there is a compatible HSU Card in that slot, the system will ask for the number of the port to which you want to connect (1 to 2 or 1 to 4). Type in the number of the port desired. If a number higher than the possible number of available ports is chosen (e.g., 9), the system will automatically select port 1 on the destination user card.

Note that the **serv** setting is not available for the HSU-T V11 and HSU-T 35 Cards.

## MODE

The Mode parameter appears only for the HSU-T V11 and HSU-T 35 Cards. It allows you to identify how the HSU port appears to the device on the other end of the interface cable. The **dce** option causes the port to be recognized as a DCE (data circuit-terminating equipment) device. The **dte** option causes the port to be recognized as a DTE (data terminal equipment) device.

Note that the choices appearing for some of the parameters that follow will depend on whether you choose **dce** or **dte** as the Mode. Those parameters and their available settings are described below.

## TS

The TS (time slot) setting identifies the time slots on the WAN link when **wan** is the WAN/SRV setting. Unlike other user cards, the HSU Card can use many time slots on a single WAN port to create a super-rate circuit for an individual HSU port. One or all DS0 time slots on a single T1 or E1 link can be assembled for use by an HSU port in order to satisfy the speed requirements of the DTE.

The time slot numbers range from **1** to **24** for T1 links and **1** to **31** for E1 links. However, time slot 16 is not available on E1 links programmed for CAS or CCS signaling. Figure 1-9 shows the display when **table** is selected. Using the space bar to select and deselect the time slot, this example shows time slots 11 to 16 on WAN 1-1 assigned to this port. The time slot assignments do not have to be contiguous on any card port.

Do not change this parameter when the HSU Card is linked to an ISDN-PRI connection.

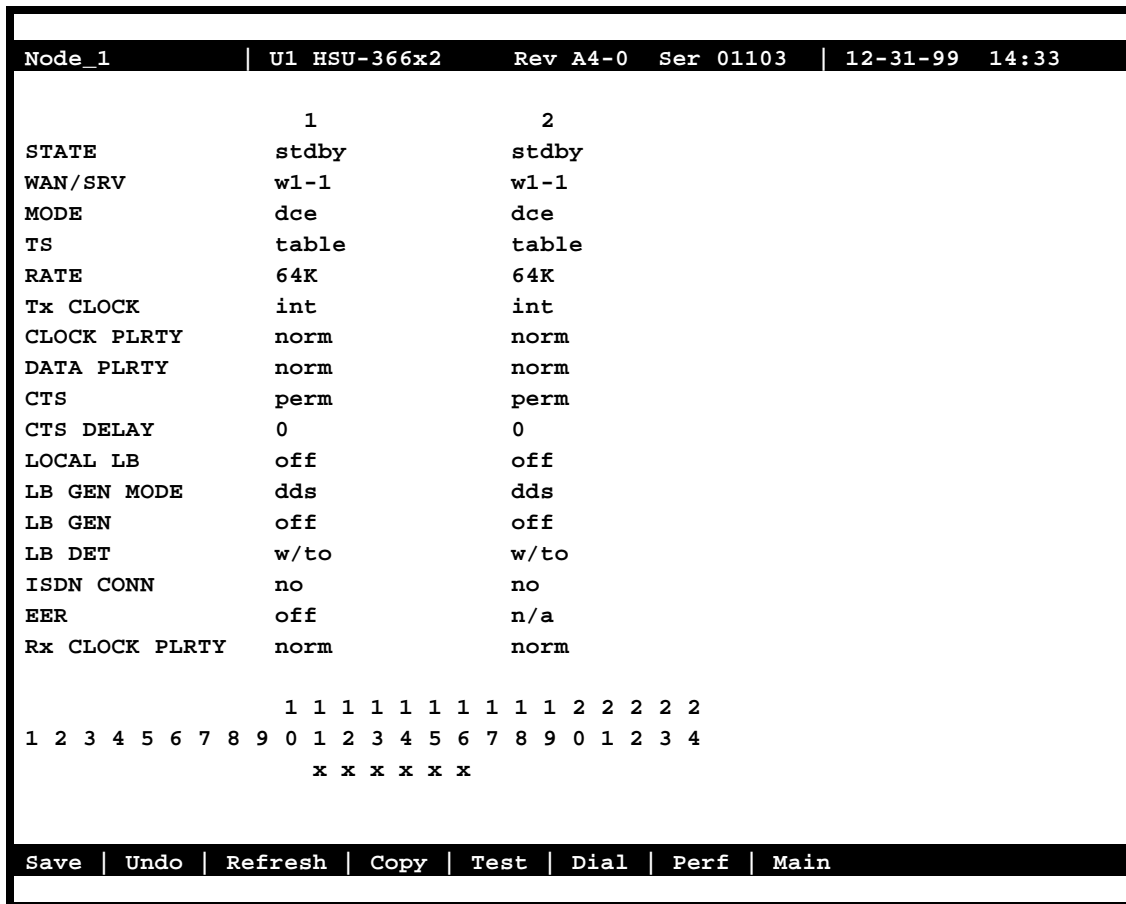


Figure 1-9. Typical HSU Port Time Slot Assignment Screen

**RATE**

The Rate setting allows you to select the bandwidth for all time slots assigned to this port. The available options are **56k** or **64k**. This selection is multiplied by the number of time slots assigned to the port, to define the overall port speed. For example, if you choose **64k** as the port Rate and assign four time slots to that port, the overall port speed is 256 kbps.

**Tx CLOCK**

The Transmit Clock (Tx CLOCK) setting identifies the clock source for the SD (send data) signal from the external CPE. The **int** (internal) setting requires an external DTE to synchronize its transmitted data with the clock on the SCT leads. The **ext** (extended) setting requires the DTE to synchronize its transmitted data with the clock on the SCTE leads.

Use **ext** with a long cable run to ensure the data and clock are in-phase when they arrive at the system. The DTE must loop back the clock on the SCT leads to the SCTE leads. If **ext** is selected but the system does not detect an incoming clock on the SCTE leads, the HSU Card automatically generates an internal clock. If this clock is not synchronized with the incoming data, reset the CLOCK PLRTY option to synchronize the clock and data. The Tx CLOCK PLRTY option settings are described in the next paragraphs.

On the HSU-T V11, HSU-T 35 and HSU\*4E 530/35 SS Cards, the Transmit Clock option can be set only if the Mode for the card port is set to **dce**. The default TX Clock setting in the **dce** mode is **int**. For a **dte** port, the only available setting is **n/a**.

### CLOCK PLRTY

The Clock Polarity (CLOCK PLRTY) setting provides another way to compensate for long cables in those cases where the DTE equipment does not provide SCTE. When you choose **inv** (inverted mode), the relationship between the clock and data is altered to compensate for long cable runs that the data signals must traverse between the card port and CPE. When you choose **norm** (normal), the relationship between the clock and data is unchanged. If you use **inv**, set the Tx CLK (Transmit Clock) option above to **int** (internal).

On the HSU-T V11 and HSU-T 35 Cards, the Clock Polarity setting above can be set only if the port Mode is set to **dce**. The default setting in that mode is **norm**. For a **dte** port, the only available setting is **n/a**.

### DATA PLRTY

The Data Polarity (DATA PLRTY) option allows you to either send all data bits to the network as normal ones and zeros, or to invert all bits in the transmitted data stream. Choose **norm** (normal) to leave the transmitted data intact; or, choose **inv** (inverted) to invert all outgoing data. This can be helpful in ensuring minimum-ones density transmission over T1 links when the data contains long strings of zeros. Inverting the zeros reduces the likelihood that the composite T1 stream will not meet minimum-ones density requirements. Both systems of the end-to-end HSD circuit path require the same DATA PLRTY option setting.

On the HSU-T V11 and HSU-T 35 Cards, the Data Polarity option is available only if the port Mode is set to **dce**. The default setting in that mode is **norm**. For a **dte** port, the only available setting is **n/a**.

## CTS

The Clear To Send (CTS) setting controls when data is sent. Some DTE equipment must receive a CTS signal before transmitting data. Set the CTS option to **perm** (permanent) to make CTS permanently High (asserted). Choose **rlocal** (remote-local) to allow RTS to control both CTS on the local DTE device and RLSD on the remote DTE device.

Choose to **ignor** (ignore) to always force CTS Low (negated). Set the CTS option to **locl** (local) to make CTS follow RTS from the local DTE.

On the HSU-T V11 and HSU-T 35 Cards, the CTS settings are used only if the port Mode is set to **dce**. The default setting in that mode is **perm**. For a **dte** port, the only available setting is **n/a**.

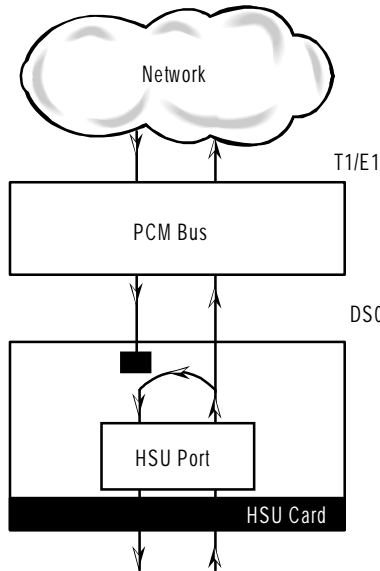
## CTS DELAY

The Clear To Send (CTS) Delay setting delays changes in the CTS signal in the local mode. Enter the value you need in milliseconds. The available options are **0**, **30**, **60**, and **100** ms. If you do not know what value you need, start with **0** (zero) ms and increase the value gradually until you no longer experience problems. The CTS option above must be set to **locl** before the CTS DELAY setting has any effect.

On the HSU-T V11 and HSU-T 35 Cards, the CTS Delay settings are used only if the port Mode is set to **dce**. The default setting in that mode is **0** (zero). For a **dte** port, the only available setting is **n/a**.

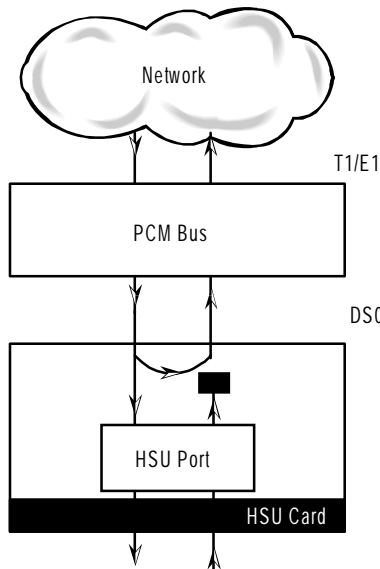
## LOCAL LB

The Local Loopback (LOCAL LB) option activates a loopback on the selected card port. Choose the **dte** setting to loop the outgoing data from the external DTE device back to the DTE receiver. This loopback (see Figure 1-10) allows you to check the local cabling and most of the circuitry in the HSU Card. It also disconnects the incoming data from the far end.



**Figure 1-10. Local DTE Loopback**

Choose the **net** (network) setting to loop the incoming data from the network back toward the far end. This loopback is shown in Figure 1-11. It tests some of the local HSU Card circuitry, the local system common cards, the WAN link card, the far-end HSU Card and CPE device, and the WAN link between the two sites. The **net** setting also drops the Data Set Ready (DSR) control signal output on the HSU port.



**Figure 1-11. Local Network Loopback**

On the HSU-T V11 and HSU-T 530/35 Cards, the same choices above appear if the port Mode is set to **dce**. For a **dte** port, the choices are **dce**, **local**, and **off**. The **dce** loopback is functionally identical to the **dte** loopback depicted in Figure 1-10, and the **local** loopback is the same as the **net** loopback depicted in Figure 1-11.

## LB GEN MODE

The Loopback Generation Mode (LB GEN MODE) setting defines the type of inband loop-up and loop-down codes that will be sent to the remote equipment. Three industry-standard codes are supported: **dds**, which sends a DDS-compatible latching loopback code in each of the DS0s that make up the circuit; **v.54**, which is compatible with CCITT V.54 standard and **ft1**, which is compatible with ANSI Fractional T1 standards. The final option, **perf** (performance data), activates an 8 kbps performance data monitoring channel (isolated from the total bandwidth of the circuit) that collects end-to-end performance statistics from a local HSU Card to a remote HSU Card.

On the HSU-T V11 and HSU-T 35 Cards, the same choices above appear if the port mode is set to **dce**. For a **dte** port, this setting is always **n/a**.

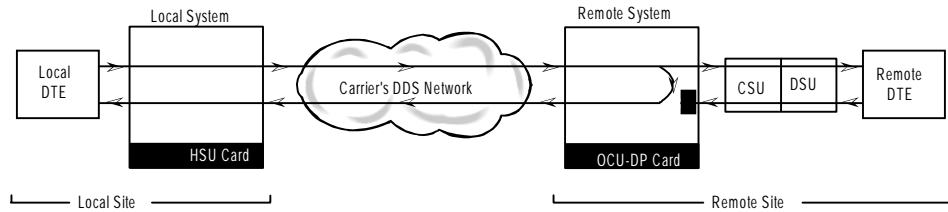
## LB GEN

If you selected **v.54**, **ft1**, or **perf** as the Loopback Generation (LB GEN) mode setting, the Loopback Generation setting allows you to send an **on** (loop-up command) or **off** (loop-down command). If you selected **dds** as the Loopback Generation mode, this setting allows you to define the type of DDS loopback that you wish to generate. The four options are **ocu** (Office Channel Unit), **dsu** (Data Service Unit), **csu** (Channel Service Unit), and **ds0** (a full 64 kbps loopback). Figure 1-12 through Figure 1-14 show where these loopbacks occur. You can also turn all DDS remote loopbacks **off**.

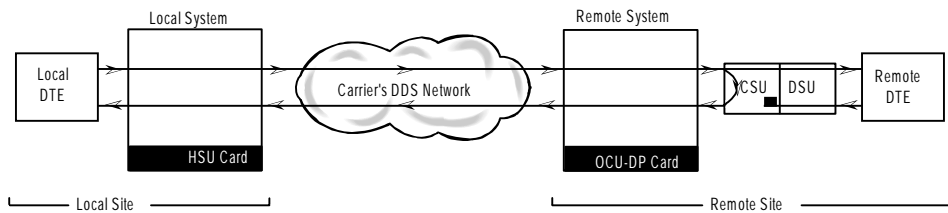
Note that you cannot perform loop-up and loop-down commands on more than one port of the same card simultaneously. You must finish all loopback operations on one port before starting them on another port.

On the HSU-T V11 and HSU-T 530/35 Cards, the same choices shown above appear if the port Mode is set to **dce**. For a **dte** port, the choices are **llb** (local loopback), **rlb** (remote loopback), and **off**. The **llb** setting loops the incoming signal from the network back toward the network and far end. This loopback occurs at the HSU-T V11 or HSU-T 35 Card. The **rlb** performs the same loopback at the far-end card.

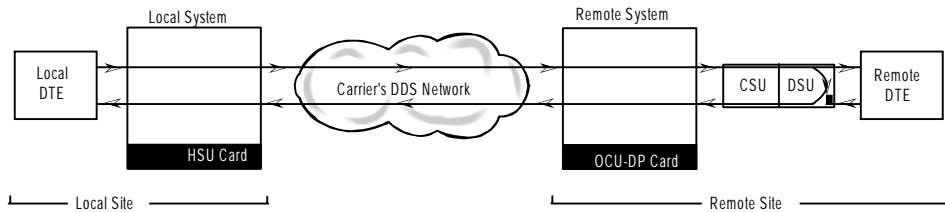




**Figure 1-12. Remote OCU or DS0 Loopback**



**Figure 1-13. Remote CSU Loopback**



**Figure 1-14. Remote DSU Loopback**

**LB DET**

Depending on the selection you made for the Loopback Generation mode above, the HSU Card port will respond to any of the loopback codes generated by a remote system. The Loopback Detection (LB DET) setting lets you enable or disable this capability on each card port. However, this setting does not affect local loopback commands from a local control terminal.

Choose **off** to have the system ignore remote loopback commands. Choose **on** to make the system monitor the card ports for loopback commands sent from the remote equipment. Note that the system will detect only the loopbacks in the format selected as the LB GEN mode.

When the system detects a loopback code, it loops the data back until the remote equipment releases the loopback. The **w/to** (with time-out) setting is the same as **on**, except that after 10 minutes the system automatically releases the loopbacks initiated by the remote equipment.

On the HSU-T V11 and HSU-T 35 Cards, the same choices above appear only if the port Mode is set to **dce**. For a **dte** port, this setting is always **n/a**.

### **ISDN CONN**

The ISDN Connection parameter alerts the user to ISDN calls on an active HSU port. The field will either show **no** (for non-ISDN calls) or **idsn** (for ISDN calls). Since this is an information only field, there are no user selections.

### **EER (8213 card)**

The Excessive Error Rate (EER) parameter is only available on the HSU-AD 530/35 Card. This setting defines an error rate threshold which, when exceeded, causes an alarm to be declared. If the number of errors exceeds this threshold, an **E** will be placed in the Status Column of the card's Performance Monitoring Screen. The available options are from **10e-4** (one error in 10,000 bits) to **10e-9** (one error in 1,000,000,000 bits), or **none**. Choose **none** if you do not want to report alarms for excessive error rates.

### 1.3.2 HSU Card Test Screen

Selecting "Test" from the HSU Card Main Screen will access the Test Screen shown in Figure 1-15. From this screen, you can create test situations between HSU Cards, or between a single card and test equipment at a remote site. Table 1-7 lists the actions you can perform from the bottom line of this screen, and Table 1-8 lists the settings presented on this screen, along with their possible and default values.

Node_1	U1 HSU-V35	Rev A4-0	Ser 01103	12-31-99	14:33
	1	2			
BERT	n/a	n/a			
CTS	norm	norm			
RLSD	norm	norm			
DSR	norm	norm			
SYNC	no	no			
BE	*****	*****			
ES	*****	*****			
CSES	*****	*****			
OSS	*****	*****			
BER	*****	*****			
ELAP	*****	*****			
RTS	*****	*****			
DTR	*****	*****			
LB ST	*****	*****			
Save	Undo	Refresh	InsertErr	Clear	Main

Figure 1-15. Typical HSU Card Test Screen

**Table 1-7. 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).
InsertErr	Allows you to manually insert a single error into the clear data signal.
Clear	Clears the Test Screen and resets all counters to zero.
Main	Returns to the HSU Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

**Table 1-8. Test Screen Option Settings and Defaults**

Parameter	User Options	Notes	Default
BERT	off mark space 1:1 1:7 511 qrss 2047 ds0 ff 7e 32 40 ocu-a csu-a dsu-a csu1a csu2a	1	off
CTS	norm off on		norm
RLSD	norm off on		norm
DSR	norm off on		norm
SYNC	information only—no user options		
BE	information only—no user options		
ES	information only—no user options		
SES	information only—no user options		
OSS	information only—no user options		
BER	information only—no user options		
ELAP	information only—no user options		
RTS	information only—no user options		
DTR	information only—no user options		
LB ST	information only—no user options		

**Notes:**

1. The following BERT settings are available only on the four-port HSU 530/35 Card: **ds0**, **ff**, **7e**, **32**, **40**, **ocu-a**, **dsu-a**, **csul-a**, and **csu2a**. These settings are not available on the HSU-T V11 and HSU-T 35 Cards.

**BERT**

The Bit Error Rate Tester (BERT) sends a data pattern and measures the bit error rate (BER) on the selected HSU port. The patterns that can be selected are **off**, **mark** (1111), **space** (0000), **1:1** (1010 alternating), **1:7** (0100-0000), **511** (511 test pattern), **qrss** (quasi-random signal source), and **2047** (2047 test pattern).

On the four-port HSU 530/35 Card, selecting the **ds0** pattern will display another set of BERT patterns. Additional non-latching loopback patterns are **ff** (1111-1111), **7e** (0111-1110), **32** (0011-0010), **40** (0100-0000), **ocu-a** (ocu-alternating byte), **csu-a** (csu-alternating byte), **dsu-a** (dsu-alternating byte), **csu1a** (csu—one repeater—alternating byte), and **csu2a** (csu—two repeater—alternating byte). The results of the alternating patterns (**ocu-a**, **csu-a**, **dsu-a**, **csu1a** and **csu2a**) appear in the Test Screen.

Also note that the Bit Error Rate Tester is supported on the HSU-T V11 and HSU-T 35 Cards only if the port mode is set to **dce** in their Card Main Screens.

## CTS

The Clear To Send (CTS) option allows you to define whether the CTS control lead should be held **on** (high, asserted) or **off** (low, negated). Selecting either **on** or **off** will override the selection made in the HSU Card Main Screen. The third option is **norm** (normal), which allows CTS to operate in the mode selected in the HSU Card Main Screen. *Not available for 8203/8214 when DTE is selected.*

## RLSD

The Receive Level Signal Detect (RLSD) option allows you to define whether the RLSD control lead is held **on** (high) or **off** (low). The third option is **norm** (normal), which means that RLSD will behave as described in Table 1-8. *Not available for 8203/8214 when DTE is selected.*

## DSR

The Data Set Ready (DSR) option allows you to define whether the DSR control lead should be held **on** (high) or **off** (low). The third option is **norm** (normal), which means that DSR will behave as described in Table 1-8. *Not available for 8203/8214 when DTE is selected.*

## SYNC

The Synchronization field indicates if the integrated BERT has achieved synchronization either with itself via a remote loopback or with the remote test equipment. This is an information-only field; it is not user-configurable.

## BE

The Bit Error (BE) field indicates the total number of bit errors logged. This is an information-only field; it is not user-configurable.

**ES**

The Errored Seconds (ES) field indicates the total number of seconds in which errors were detected. This is an information-only field; it is not user-configurable.

**SES**

The Severely Errored Seconds (SES) field indicates the total number of seconds in which the bit error rate exceeded one bit per thousand ( $1 \times 10^{-3}$ ). This is an information-only field; it is not user-configurable.

**CSES**

The Consecutive Severely Errored Seconds (CSES) field is triggered by the occurrence of ten consecutive Severely Errored Seconds. Once triggered, this field will increment (by one) for each elapsed second until the system logs ten consecutive non-Severely Errored Seconds. This is an information-only field; it is not user-configurable.

**OSS**

The Out of Synchronization Seconds (OSS) field indicates the number of seconds that the HSU BERT has been out of synchronization. This is an information-only field; it is not user-configurable.

**BER**

The Bit Error Rate (BER) field indicates 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. This is an information-only field; it is not user-configurable.

**ELAP**

The Elapsed time (ELAP) setting indicates the running tally of the total number of seconds during the test. This is an information-only field; it is not user-configurable.

**RTS**

The Request To Send (RTS) field indicates the current status of the RTS control lead. The two values that can be displayed are **on** and **off**. This is an information-only field; it is not user-configurable.

## DTR

The Data Terminal Ready (DTR) field indicates the current status of the DTR control lead. The two values that can be displayed are **on** and **off**. This is an information-only field; it is not user-configurable.

The DTR field will always indicate **on** for the HSU 35 Card (Revision A and earlier), but it will toggle between **off** and **on** all other HSU Cards.

## LB ST

The Loopback State (LB ST) field indicates whether there are any remotely-initiated loopbacks currently active on the HSU port. This field displays both latching and non-latching loopbacks initiated from a remote device via in-band loop-up codes. In addition to **none**, the six messages that can be displayed in that field are **l-ocu**, **l-dsu** and **l-csu** for latching loopbacks, and **ocu**, **dsu** and **csu** for non-latching loopbacks. This is an information-only field; it is not user-configurable.

### 1.3.3 Performance Data

The HSU-AD 5 35 Card supports proprietary end-to-end performance data for super-rate circuits (Nx64 kbps or Nx56 kbps, minus 8 kbps). This mode is only available for users transmitting data from one card (local) to another (remote). You can select between normal operation (full bandwidth allocated to data traffic) and performance data monitoring, where 8 kbps of the total bandwidth is used for monitoring data traffic by selecting the **perf** setting as the Loopback Generation Mode described earlier in the chapter.

Each one-hour reporting period is divided into 3600 seconds, and statistics are kept for the current hour and the past 24 one-hour periods.

Figure 1-16 shows a typical Performance Data Screen, which is accessed by typing “**p**” (**Perf** command) from the bottom highlighted line of the HSU Card Main Screen. Table 1-9 lists the actions on the bottom line of the Performance Data Screen.

Node_1   U1 HSU-V35x2 Rev A4-0 Ser 01103   12-31-99 14:33							
Unit 1 PERFORMANCE LOCAL REGISTERS Sec. 0 of 0							
	ES	UAS	SES	BES	LOPS	LOFC	STATUS
CUR	0	0	0	0	0	0	. . .
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: T=Test; L=LOS; E=Excessive Error Rate							
Refresh   Local   remote   pgUp   pgDn   Clearregs   Main							

Figure 1-16. Typical HSU Performance Data Screen

Table 1-9. Performance Data Screen Actions

Action	Function
Refresh	Updates performance data fields that are not automatically updated in real time. Use the Refresh command to display the latest data.
Local	Shows the local register data.
remoTe	Shows the remote register data.
pgUp	Allows you to see the first 12-hour period (current + 1 to 12).
pgDn	Allows you to see the second 12-hour period (current + 12 to 24).
Clearregs	Clears the registers currently being viewed (remote or local).
Main	Returns to the HSU Card Main Screen.

**ES**

An Errored Second (ES) is any second containing one or more frames of CRC-5 errors.



**UAS**

An Unavailable Second (UAS) is any second during which service is unavailable. An unavailable signal state is declared after ten consecutive SESs (Severely Errored Seconds) are logged. An unavailable state is cleared after ten consecutive non-Severely Errored Seconds are logged.

**SES**

A Severely Errored Second (SES) is any second in which the BER exceeds  $1 \times 10^{-3}$ .

**BES**

A Bursty Errored Second (BES) is any second in which the BER is between zero and  $1 \times 10^{-3}$ .

**LOFC**

The Loss of Frame Count (LOFC) is the accumulation of the number of times an LOF (Loss Of Frame) is declared. An LOF is declared after 2.5 seconds of a continuous LOS (Loss Of Synchronization) or OOF (Out-Of-Frame) condition. The LOF is cleared after one second without an LOS or OOF condition.

**LOPS**

A Loss of Packet Second (LOPS) is any second during which no remote data is received. **This is valid only for local statistics.**

**STATUS**

If one of the errors above occurs during any 15-minute interval, the status column for that period displays the code for that error. The codes are displayed at the bottom of the screen. The possible Status values are **T** (test; port is in loopback), **L** (loss of synchronization, with 2 out of 4 frame bits in error), and **E** (excessive error rate).

### 1.3.4 HSU Dial Screen

A call profile template must be downloaded to the HSU port before it can be used as a dialing resource by DTE devices, such as video codecs or LAN routers.

Each DTE device is assigned a telephone number which is stored on the HSU port Dial screen. This number will be used as the “Calling Number” on the download copy of a call profile template for outgoing calls. Additionally, this number is used by other DTE as the “Called Number” when placing a call to that device (an incoming call).

Figure 1-17 shows the screen when highlighting the desired HSU port and press “d” (Dial) from the Main Screen of all HSU cards. Table 1-10 lists the screen actions from the bottom of the screen and Table 1-11 lists the available options with the settings and defaults for this screen.

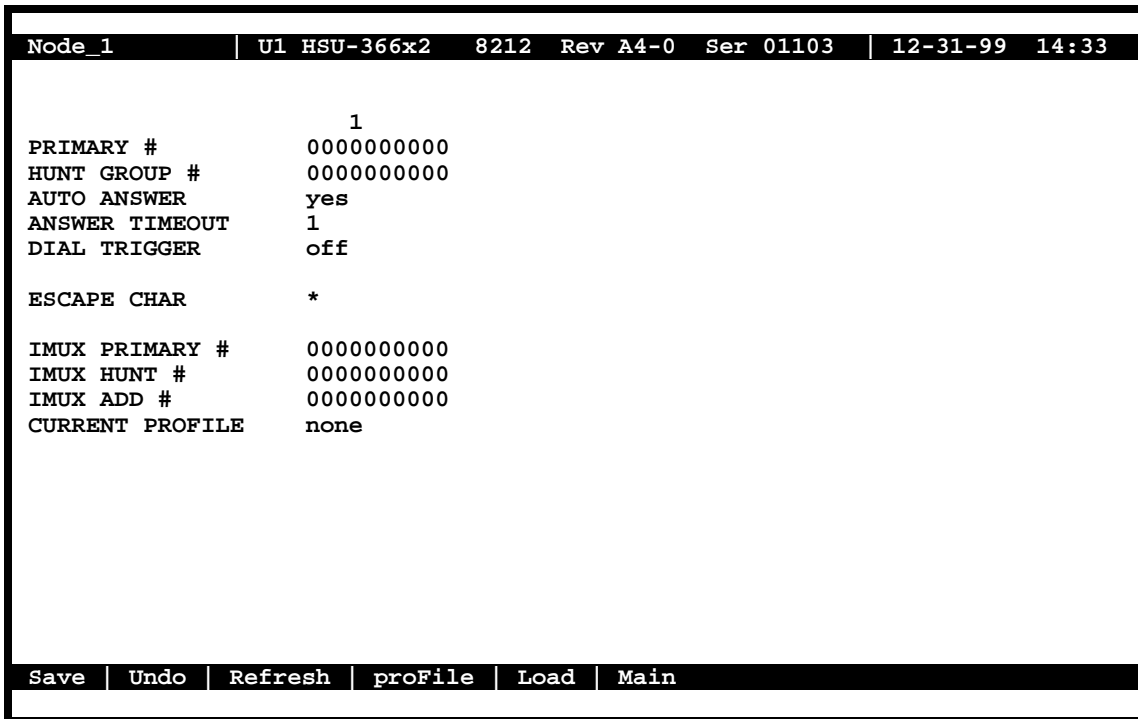


Figure 1-17. HSU Dial Screen

**Table 1-10. HSU Dial 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).
proFile	Brings up the call profile screen.
Load	This option loads a profile from the Interface card template. A call profile number must be inserted. Changes the Current Profile parameter from "none" to "loaded."
Main	Returns to the HSU card main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

**Table 1-11. Dial Screen Option Settings and Defaults**

Parameter	User Options	Default
PRIMARY #	up to 10 numeric characters	0000000000
HUNT GROUP #	up to 10 numeric characters	0000000000
AUTO ANSWER	yes no	yes
ANSWER TIMEOUT	01-60	01
DIAL TRIGGER	off dtr rs366 v.25b	off
ESCAPE CHAR	* # 5 6 7 9 0 00	*
IMUX PRIMARY #	up to 10 numeric characters	0000000000
IMUX HUNT #	up to 10 numeric characters	0000000000
IMUX ADD #	up to 10 numeric characters	0000000000
CURRENT PROFILE	none loaded	none

**PRIMARY #**

The Primary Number is the main phone number used to route incoming calls for this HSU port. This number must be unique throughout all HSU ports system.

**HUNT GROUP #**

The Hunt Group Number is an optional number that makes the port of this HSU part of a hunt group. The hunt group number is the same for all HSU ports in the hunt group. The system will route any incoming calls placed to the hunt group number to the first available HSU port in the group. A hunt group number must be within the range of numbers assigned by the carrier controlling the ISDN switch.

### AUTO ANSWER

The Auto Answer feature allows the HSU port to automatically answer an incoming call either the primary number or the hunt group number. A value of **yes** means the equipment will always accept the incoming call for an unbusy port. A value of **no** means the HSU will not answer the call until the attached DTE responds with DTR high. RS530 ports will respond to auto answer with the Ring Indicator lead, V.35 ports must be set to auto answer for this version of the software.

### ANSWER TIMEOUT

If the user chooses **no** for Auto Answer (above), the Answer Timeout parameter tells the system how long to wait for the DTE to raise DTR after the call has been sent to the DTE. This parameter is measured in seconds, and the valid choices are **1-60**.

### DIAL TRIGGER

The Dial Trigger tells the 8213 HSU card when to initiate dialing (see Dialing with High Speed Data Cards later in this chapter). *In order for dialing to be initiated, there must be a call profile active for this HSU port.* The values are **n/a** (all other HSU cards), **off** (do not dial any calls), **dtr** (dial the active call profile when the DTE raises DTR), **rs366** (trigger dialing on this port when RS366 commands are received on the associated RS366 port) and **v.25b** (trigger dialing on this port when V.25bis commands are received on the associated V.25bis port).

### ESCAPE CHARACTER

The Escape Character is the character used by RS366 dialing as a special character to initiate the dialing command (see next section). The options are: **\*, #, 5, 6, 7, 9, 0, 00**.

### IMUX PRIMARY #

The IMUX Primary Number is the main phone number used to route incoming IMUX calls for this HSU port. This number must be unique throughout all HSU ports in the system. The number must be within the range of numbers assigned by the carrier controlling the IDSN switch.

### IMUX HUNT #

The IMUX Hunt Number is an optional number that makes the port of this HSU part of a hunt group. The hunt group number is the same for all HSU ports in the hunt group. The system will route any incoming IMUX calls placed to the hunt group number to the first available HSU port in the group, provided there is an available IMUX engine. A hunt group number must be within the range of numbers assigned by the carrier controlling the ISDN switch.

### IMUX ADD #

The IMUX Add Number is the second number used to synchronize IMUX bandwidth. An IMUX call is placed to the primary number which begins to synchronize the call. Part of that synchronizing process is to report the additional number to the calling IMUX card. The calling IMUX card then dials the IMUX additional number to set up the rest of the bandwidth needed before completing the call. If there is no additional number, the IMUX card will synchronize the call on the primary number only.

### CURRENT PROFILE

The Current Profile indicates if a call profile is loaded into the HSU port's dialing memory. The options for this parameter are **none** (indicating that the copy of a call profile template has not been downloaded to this port) or **loaded** (indicating that the copy of a call profile template has been downloaded to this port).

## 1.3.5 HSU Call Profile Screen

Once a call profile is copied from the Interface card template, it can be used by the DTE on the individual HSU port for placing calls to other devices throughout the network. The HSU Call Profile screen is shown in Figure 1-18. Table 1-12 lists the screen of actions and Table 1-13 lists the settings and defaults for each parameter.

Once the appropriate information is inserted or changed on the fields of this screen, you can place a call by pressing “**D**” (**Dial**) command from the Call Profile screen. When finished, the call can be disconnected by pressing “**H**” (**Hangup**) command from the Call Profile screen.

**It is important to note that the HSU port used to dial the call must be in the standby (stdby) state when the call is placed.** The state changes from standby to active after the call has been placed. The system will not allow a call to be placed from an active port.



**Note:** *Any changes made to the loaded call profile will stay with the call profile copy until changed in a future session. Changes made to this copy will not change the call profile template on the Interface card.*

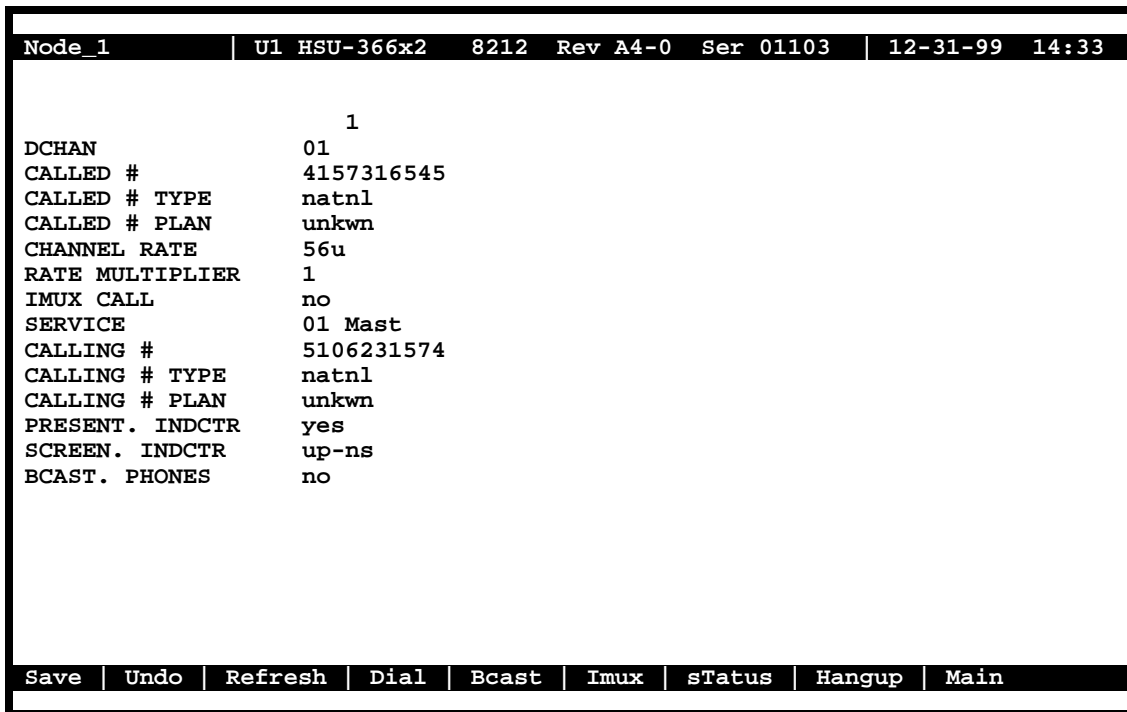


Figure 1-18. HSU Card Call Profile Screen

Table 1-12. HSU Card Call Profile 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).
Dial	Causes the HSU port to dial the number on the original call profile or the changed call profile.
Bcast	Provides access to the Broadcast screen. See the Broadcast section later in this chapter.
Imux	Provides access to the IMUX screen. See the IMUX section in this chapter.
sTatus	This command shows the status of both ISDN calls and IMUX calls. Press the key once for ISDN call status, press it a second time for IMUX call status.
Hangup	Causes the HSU port to terminate the current call.
Main	Returns to the HSU card main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 1-13. HSU Card Call Profile Screen Option Settings and Defaults

Parameter	User Options	Default
DCHAN	01-08	01
CALLED #	telephone number (25 numeric characters)	blank
CALLED # TYPE	natnl intl sbscr	natnl
CALLED # PLAN	unkwn isdn phone print	unkwn
CHANNEL RATE	56u 56r 64u 64r 384u 384r 1536u 1536r MRate	56u
RATE MULTIPLIER	1, 6, 24 2-24 (applies only to MRate)	1
IMUX CALL	no yes	no
SERVICE	service from list set on ISDN card for this D channel (first 7 characters)	blank
CALLING #	telephone number (25 numeric characters)	blank
CALLING # TYPE	natnl intl sbscr	natnl
CALLING # PLAN	unkwn isdn phone print	unkwn
PRESENT. INDCTR	yes no	yes
SCREEN. INDCTR	up-ns	up-ns
BCAST. PHONES	no yes	no

### DCHAN

The D Channel number identifies which D Channel to route all outgoing calls that use this call profile. The options are numbers **1-8**.

### CALLED #

The Called Number is the full telephone number of the device you are calling. Up to 25 numeric characters are allowed, although most calls use only ten digits. This parameter can be overridden on a call-by-call basis when RS366 or V.25bis dialing is used with the Model 8213 HSU card.

### CALLED # TYPE

The Called Number Type identifies the type of network used to reach the called phone number. The options are **natnl** for domestic calls, **intl** for international calls, and **sbscr** for VPN (Virtual Private Network) calls. Your carrier can provide more detail about this option.

### CALLED # PLAN

The Called Number Plan refers to the type of numbering plan used to reach the device you are calling. The options are **unkwn**, **isdn**, **phone** and **privt**. Your carrier will provide more detail about this option.

## CHANNEL RATE

The Channel Rate selection specifies the bandwidth to be used by the call. Different carriers support different rates, so it is important to check with your carrier before setting rates greater than 64Kbps. When using any Channel Rate other than **MRate**, the system knows the size of the bandwidth required and will automatically select the rate multiplier. If **MRate** is selected, the rate multiplier must be entered by the user.

The **u** (unrestricted) and **r** (restricted) in these selections are for data calls. An unrestricted call means the user can send any type of data information in the circuit. A restricted call means the user is responsible for maintaining the ones-density-integrity of the T1 data stream.



*Note:* Channel Rates of 1536r and 1536u require the use of NFAS.

If the IMUX CALL field is set to **yes** (see below), the channel rate shows either **56, 64** or **H0** (384K).

## RATE MULTIPLIER

The Rate Multiplier parameter is automatically set depending upon the Channel Rate (other than **MRate** or an IMUX call) chosen in the previous paragraph. Valid entries for **MRate** are **2-24**. If an incorrect rate multiplier is input, the carrier equipment will reject the call.

If the IMUX CALL field is set to **yes** (see below), the channel rate shows either **56, 64** or **H0** (384K).

## IMUX CALL

The IMUX Call field indicates whether this is an IMUX call or a regular ISDN call. The options are **no** and **yes**. If **yes** is selected, the Channel Rate and Rate Multiplier selections will change (see above).

Since IMUX calls cannot be broadcast, if IMUX call is **yes**, the user will not be able to use the Broadcast Phones option mentioned later in this section.

## SERVICE

The Service parameter is entered only if call-by-call service selection is supported on the D channel selected in the DCHAN parameter above. If call-by-call service selection is provisioned on the selected D channel, the first service type is entered in this field automatically. Valid service codes are those that were entered for this D channel in the Services subscreen of the D channel configuration screen.



To change this selection, highlight the selection with the cursor and press the <Enter> key. A list of all service options for this D channel will appear at the bottom of the screen. Move the cursor to the appropriate selection using the right and left arrow keys and press the <Enter> key again when the correct choice is highlighted.

### **CALLING #**

The Calling Number is the phone number of the calling party that is presented to the called party when the incoming call is delivered. (This feature is often known as Automatic Number Identification or “ANI”).

If the user wants the system’s main (billing) number to be presented to the called party, this field must contain a number of up to 25 digits. If the user wants the specific phone number of the HSU port making the call to be presented, this field must be left blank.

### **CALLING # TYPE**

The Calling Number Type identifies the type of network used by the calling party. The options are **natnl** for domestic calls, **intl** for international calls, and **sbscr** for VPN (Virtual Private Network) calls. Your carrier will provide more detail about this option.

### **CALLING # PLAN**

The Calling Number Plan refers to the type of numbering plan used by the calling party. The options are **unkwn**, **isdn**, **phone** and **privt**. Your carrier will provide more detail about this option.

### **PRESENT. INDCTR**

The Present Indicator field determines whether or not the calling number may be displayed to the called party. The selections are **yes** and **no**.

### **SCREEN. INDCTR**

The Screen Indicator field is reserved for future use.

### **BCAST. PHONES**

The Broadcast Phones parameter allows the user to select the use of the Broadcast Option (See the following page). The selections for this parameter are **no** and **yes**.

### 1.3.6 Broadcast Screen

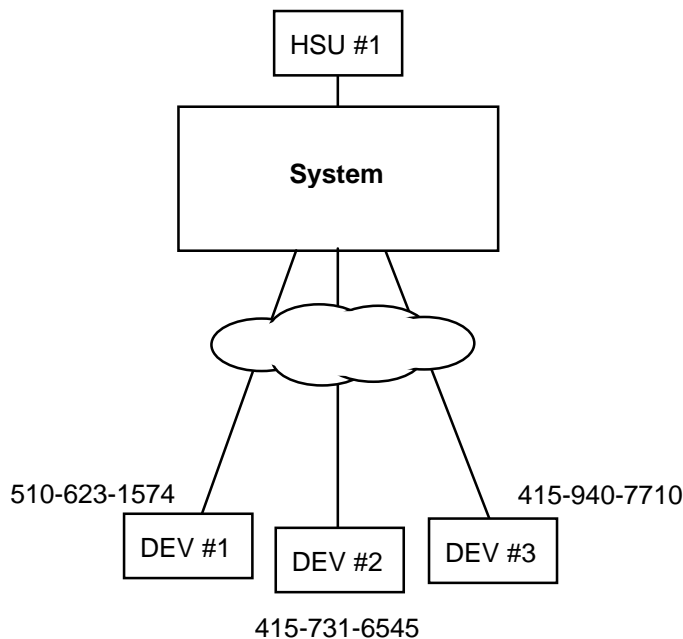
One of the special features of the HSU Call Profile is the ability to establish a “two-way” connection to the Called # on the Call Profile and broadcast a “one-way” copy of the data sent by the Calling # to a series of additional users. The Bcast Phones parameter must be set to **yes** to enable this feature.

The Broadcast screen allows the user to specify up to eight additional phone numbers of other devices that will receive data from a “host” HSU port in the system. Figure 1-19 shows one of the ways the broadcast feature could work.

In this example, a two-way call is placed from HSU #1 to the primary number, 510-623-1574 (DEV #1). When the call is connected, the system will dial the remaining secondary numbers until all numbers have been dialed and all available connections are established. In this example, it will dial 415-731-6545 (DEV #2), then dial 415-940-7710 (DEV #3). A notation on the screen will signify if the connection is completed.

When the primary call is disconnected, the broadcast connections are also terminated, however secondary callers can disconnect with no disruption of service to the primary or secondary calls.

Selecting no on the Bcast Phones parameter on the Call Profile screen will disable this feature while keeping the list of broadcast phone numbers intact. Figure 1-20 shows the Broadcast screen.



**Figure 1-19. HSU Broadcast Function**

Node_1	U1 HSU-366x2	8212	Rev A4-0	Ser 01103	12-31-99	14:33
1						
BCAST. PHONE #	4157316545					Not Connected
BCAST. PHONE #	4159407710					Not Connected
BCAST. PHONE #	000000000000					Not Connected
BCAST. PHONE #	000000000000					Not Connected
BCAST. PHONE #	000000000000					Not Connected
BCAST. PHONE #	000000000000					Not Connected
BCAST. PHONE #	000000000000					Not Connected
BCAST. PHONE #	000000000000					Not Connected
BCAST. PHONE #	000000000000					Not Connected
Save   Main						

Figure 1-20. HSU Broadcast Screen

### 1.3.7 Broadcast Connection Status Screen

When the main ISDN call is placed, the system will attempt to establish connection with all of the numbers on the Broadcast screen. The Broadcast screen allows the user to monitor or change the status of each broadcast phone number on the list. Figure 1-21 shows how the example used in the previous section will look after the call is placed. In this example, the call to 415-731-6545 was “Not Connected” while the call to 415-940-7710 was “Connected.”

If the user highlights the “Not Connected” telephone number on the list and uses the “Connect” command, the ISDN card will attempt to place the call again. The status of the call will change to “Connecting.” When the call is completed the status will change to show “Connected.”

To disconnect one of the Broadcast phones prior to the disconnect of the main call, the user highlights the number and uses the “Disconnect” command. The system will prompt you with a yes/no message before action is taken. When disconnected, the call status will change to “Not Connected.”

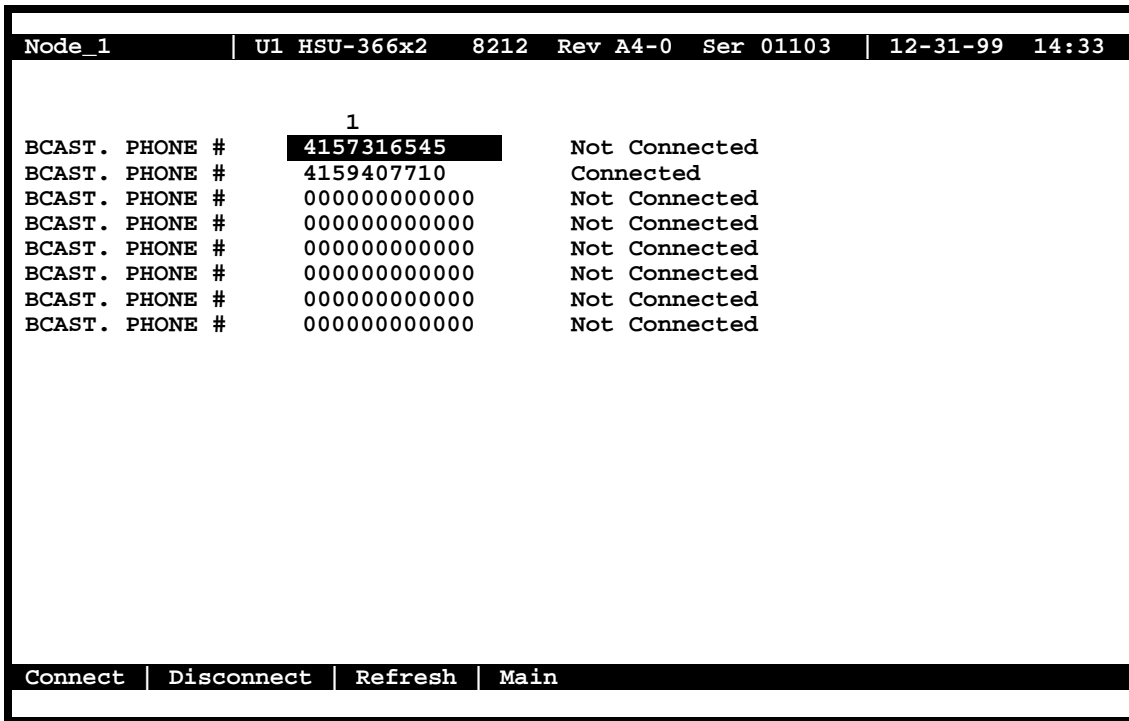


Figure 1-21. Call Profile Broadcast Screen

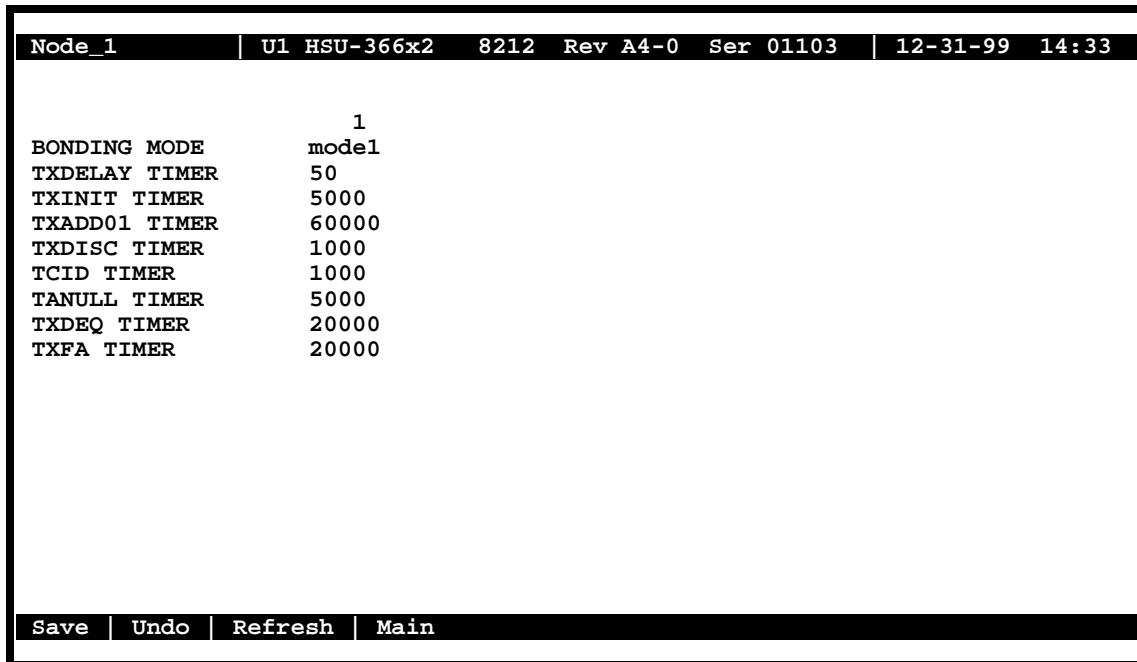
**Table 1-14. Call Profile Broadcast Screen Actions**

Action	Function
Connect	If the call placed to one of the Broadcast phone numbers fails to connect, this command will attempt to reconnect the call.
Disconnect	Breaks the connection of the number highlighted on the screen. The user will be prompted with yes/no question before disconnecting.
Refresh	Updates the connection status information.
Main	Returns to the Call Profile screen.

### 1.3.8 Inverse Multiplexer (IMUX) Screen

The Inverse Multiplexer feature requires the installation of appropriate firmware. An ISDN-PRI card is also required. The screens that follow will only appear when the system is properly configured.

Figure 1-22 displays the IMUX screen. Table 1-15 lists the IMUX screen actions and Table 1-16 shows lists the available options with the settings and defaults.



**Figure 1-22. IMUX Call Screen**

**Table 1-15. IMUX Call 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).
Main	Returns to the HSU call profile screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

**Table 1-16. IMUX Call Screen Option Settings and Defaults**

Parameter	User Options	Default
BONDING MODE	mode0 mode1	mode1
TXDELAY TIMER	50 100 250 500	50
TXINIT TIMER	5000 2500 7500 10000	5000
TXADD01 TIMER	60000 40000 80000 120000	60000
TXDISC TIMER	1000 500 1500 2000	1000
TCID TIMER	1000 2000 3000 4000	1000
TANULL TIMER	5000 2500 7500 10000	5000
TXDEQ TIMER	20000 10000 30000 50000	20000
TXFA TIMER	20000 10000 30000 40000	20000

**BONDING MODE**

The Bonding Mode setting defines which end of the IMUX call will perform the synchronizing tasks needed to complete the call. The options are **mode0** (the end user equipment will synchronize bandwidth) and **mode1** (the terminating IMUX card will synchronize bandwidth).



*Note: Almost all IMUX applications will use mode1 synchronization.*

**TXDELAY TIMER**

The Timer (bothway) Delay setting defines the duration of time for the final delay equalization acknowledgment before allowing the call to commence. The values (in milliseconds) are **50, 100, 250** and **500**. This timer is used for **mode1** calls.

**TXINIT TIMER**

The Timer (bothway) Initial Channel setting defines the duration of time necessary for negotiation for the initial 56kbps or H0 (384kbps) channel. The values (in milliseconds) are **5000, 2500, 7500** and **10000**. This timer is used for **mode0** and **mode1** calls.

**TXADD01 TIMER**

The Timer (bothway) Additional Channel setting defines the duration of time necessary for additional 56kbps, 64kbps or H0 (384kbps) channels to be connected. This value is often called the “call-processing time.” The values (in milliseconds) are **60,000, 40,000, 80,000** and **120,000**. This timer is used for **mode0** and **mode1** calls.

**TXDISC TIMER**

The Timer (bothway) Disconnect setting defines the duration of time necessary for sending the disconnect indication prior to disconnecting the call. The values (in milliseconds) are **1000, 2000, 3000** and **4000**. This timer is used for **mode1** calls.

**TCID TIMER**

The Timer Channel Identifier setting defines the duration of time spent by the network looking for secondary B channel allocation information before disconnecting the call. The values (in milliseconds) are **1000, 2000, 3000** and **4000**. This timer is used for **mode2** and **mode3** calls (when available).

**TANULL TIMER**

The Timer (answer) Null State setting defines the duration of time spent by the called user looking for bonding information before disconnecting the call. The values (in milliseconds) are **5000, 2500, 7500** and **10000**. This timer is used for **mode0** and **mode1** calls.

**TXDEQ TIMER**

The Timer (bothway) Delay Equalization setting defines the duration of time given the called user to complete equalization of the call. The values (in milliseconds) are **20000, 10000, 30000** and **50000**. This timer is used for **mode1** calls.

**TXFA TIMER**

The Timer (bothway) Frame Alignment setting defines the duration of time (per channel) for the called user needs to find frame alignment. The values (in milliseconds) are **20000, 10000, 30000** and **40000**. This timer is used for **mode1** calls.

## 1.4 Dialing with High Speed Data Cards

All models of HSU cards can place outgoing calls and can receive incoming calls.

All outgoing calls use call profile information to dial (see HSU Call Profile section earlier in this chapter). A call profile is loaded into an HSU port's dialing memory using the "D" (Dial) option from the HSU Card Screen.

All incoming calls are routed to HSU ports based on the primary and hunt (optional) group phone number(s) assigned to the HSU port. These numbers are assigned to each HSU port using the Dial command option from the HSU Card Screen.

### 1.4.1 Basic HSU Dialing

Any port on any model HSU card can load a call profile into its dialing memory. Once a call profile is loaded, the HSU port can be set to initiate dialing (using the currently loaded call profile information) whenever it senses a raised DTR (Data Terminal Ready) lead from the attached DTE device. Since this DTR lead can have only two values (low-don't dial, and high-go ahead and dial), any call must use the currently-loaded call profile. IF the user wants an HSU port to dial a different call profile when DTR goes high, the user must first use the Dial menu to load a different call profile into the HSU port's dialing memory.

### 1.4.2 RS366 and V.25bis HSU Dialing

As described in the previous paragraph, all models of HSU cards can initiate dialing when they sense DTR high, but must use the currently-loaded call profile information to dial.

The HSU 8213 card switched services provides two methods for the DTE to dynamically signal an HSU port to cause it to load a new call profile or to permanently modify the currently-loaded call profile information.

One method uses the RS366 dialing port that is associated with the HSU data port to accept RS366 dialing commands from the DTE. The other method provides dialing commands over the data port using the V.25bis protocol. In both cases, the DTE can command the HSU port to load a call profile into the HSU's dialing memory, then can command the HSU to modify some of the call profile information (e.g. data rate of the call or phone number to dial).

### 1.4.3 Master Dialing

As described in the previous paragraphs, call profile information can be changed by the DTE prior to making a call only by using RS366 or V.25bis commands. Normally this would limit dynamic DTE dialing to ports on the Model 8213 switched services HSU card. However, there is a way for the DTE to indicate to the system that it wants to do dynamic dialing for an HSU port other than itself.



This type of dialing is called “master” dialing. With master dialing, the DTE will signal the Model 8213 HSU master port (via RS366 or V.25bis) that the following commands should be applied to another HSU port, not to itself. Once the master HSU port receives the command that says “apply all subsequent commands received on this dialing port to a different HSU port,” the master port will process dialing information for another HSU port until it receives a command that says, “apply all subsequent commands to yourself.”

A detailed description of both RS366 and V.25bis dialing command structures are provided on the following pages.

#### 1.4.4 Dialing with RS366 Commands

When the system is equipped with a Model 8213 HSU card, two dialing ports are available for use by that card. Those RS366 ports can also be made available to all HSU cards in the system regardless of the model number using the “Master Dialing” feature.

DTE, such as FAX machines, video codecs and other equipment with dialing capability can send dialing commands to the system using these special dialing ports. The commands are either stores in call profiles or RS366 standard commands using the keypad.

These commands are used to dial a call, call profiles, change the amount of channels required for the session, change service and call types, establish and clear loopback modes and set protocol specific parameters.

The dialing commands are approved by the SDSAF (Switched Digital Services Applications Forum) Subcommittee on DTE-DCE Interfaces (an industry group that has defined extensions to the standard RS366 specifications to support dialing of switched digital services).

Additionally, the system has implemented several extensions to be used specifically with call profile information.

Since the RS366 protocol only allows the transmission of digits, \* and #, the command structure must be made up of these characters.

#### 1.4.5 Command Types

There are five specific commands available that will override the call profile parameters of the selected HSU port. Each command will be covered as a specific section.

- Basic Change
- Call Profile Loading
- Loopback Management
- Call Profile Change
- Master Dialing

### 1.4.6 Escape Character

The Escape Character marks the beginning of the new command. It can also be used to initiate an action (i.e. dial a phone number).

Values for the Escape Character can be: \*, #, 5, 6, 7, 9, 0 (zero) or 00 (double zero). The default value is \*.

## 1.5 Basic Dialing Changes

The Basic Dialing Changes involve changes in the channelization of the highlighted HSU port. When using Basic Dialing, the user specifies the number of channels to use, the service type and call type. Optionally, the user can specify a number to dial. **All of the other calling information is derived from the active call profile.**

The Basic Dialing command syntax is: [escape character] [number of channels needed] [service type] [call type] [number of dial (**optional**)].

A typical command would be: \*06300. The first character of the command string is always the escape character (in this case an \*).

The second and third characters specify the number of 64kbps channels needed for this call. The options are **00-31**. The HSU will appropriate that amount of B channels for the duration of this call. For the above example, 6 channels were chosen for this call.

The third required field is service type (see Table 1-17).

**Table 1-17. Values for Service Type Field**

Field Value	Meaning
0	Use current value in call profile
1	Switched H11 (1536kbps)
3	Switched H0 (384kbps)
5	Switched 56kbps
6	Switched 64kbps
7	Multirate ISDN

For the above example, service type **3** (Switched H0) was chosen

The fourth required field is call type. The values for this field are **00** (use the current value of call type) and **01** (transparent), a bit-in-bit-out protocol. These are the only call types supported at this time.

### 1.5.1 Example

If a specific call requires a 384kb multirate channel, and the current call profile for that port is set to 64kb channelization can be changed directly from the keypad by typing the digits, \*06000. In this case, the escape character tells the HSU that a parameter change is coming, the 06 in the second and third position tells the HSU to change the existing value of 01 (64kb) to 06 (384kb). The 0 in the fourth position means keep the existing service type and 00 in the fifth and sixth places means to keep the existing call type.

There is a special case that applies to basic channelization changes. If the second and third characters of the command string are 00 (zero, zero), it tells the HSU to keep the existing channelization for this port.

The information presented in this section is listed in the RS366 dialing matrix shown in Table 1-20.

## 1.6 Call Profile Loading

Sometimes the user may want to use a different call profile template than the one that is active for a particular HSU port. The change can be performed through either the VT-100 interface or the RS366 port. If the RS366 mode is chosen, the escape character, an eight (8) and three subsequent digits will make up a command string that will designate a new call profile template number to load into the HSU port dialing memory.

The command string for call profile loading is: [escape character] [8] [new call profile number] [number to dial (**optional**)] [escape character to initiate action (**optional**)].

The command, \*8002, tells the HSU to replace the currently active call profile (if any) with call profile #002.

Another use of the escape character is to tell the HSU port to initiate dialing. The command, \*8002\*, tells the equipment to change the active call profile template to call profile template #002, and then dial the called number in that call profile, using all of the parameters in call profile #002.

Other combinations of the elements of the initial RS366 command string can also be useful. The command, \*80176231574, tells the HSU to change the call profile to #017 and change the called number to 6231574.

Call profile changes will always have eight (8) in the second position.

The information presented in this section is listed in the RS366 dialing matrix shown in Table 1-20.

## 1.7 Loopback Management

The RS366 command structure allows the user to control the loopback state for active calls within the system. The user can start a call with one RS366 command string and place a loopback on it with another command. Loopbacks can only be initiated on active calls. Table 1-18 shows the loopback commands.

The command string for loopback management is: [escape character] [loopback code].

**Table 1-18. Call Profile Parameter Numbers and Values**

Loopback Code	Meaning
70	Clear all loopbacks
71	Loopback #1 enable (i.e. DTE loopback)
72	Loopback #2 enable (i.e. local network loopback)
73	Loopback #3 enable (i.e. remote network loopback)

The information presented in this section is listed in the RS366 dialing matrix shown in Table 1-20.



**Note:** *In order to make use of the loopback management feature, your DTE must support the generate call command while connected and in use.*

## 1.8 Call Profile Changes

Another application for RS366 dialing is modifying call profile parameters that cannot be changed by the Basic Dialing commands. The system uses this application for making changes to all of the fields in the call profiles embedded in the system. A different command string is used to make these changes.

The command string is: [escape character] [64] [parameter number] [parameter value] where the parameters are found on the call profile screen of the Interface card.

Table 1-19 shows the Call Profile parameter name, parameter number and parameter value to be used with this command.

Table 1-19. IMUX Call Screen Actions

Parameter Name	Parameter Number	Parameter Value
DChan	01	a number from 01-08
Called #	02	4 through 25 numeric characters can be entered
Called # Type	03	01=natnl, 02=intnl, 03=sbscr
Called # Plan	04	01=unkwn, 02=isdn, 03=phone, 04=print
Channel Rate	05	01=56u, 02=56r, 03=64u, 04=64r, 05=364u, 06=364r, 07=1536r, 09=MRate
Rate Multiplier	06	02-24 (only available if MRate is chosen)
IMUX Call	07	01=no, 02=yes
Service	08	01=first billing plan, 02=second billing plan, etc.
Calling #	09	4 through 25 numeric characters can be entered
Calling # Type	10	01=natnl, 02=intnl, 03=sbscr
Calling # Plan	11	01=unkwn, 02=isdn, 03=phone, 04=print
Present. Indctr	12	01=yes, 02=no
Screen. Indctr	13	01=up-ns

If the IMUX Call is yes, the selection for Channel Rate will be 01=56, 02=64 and 03=H0. If the IMUX Call is used, the selections for Rate Multiplier will be 02-30 for 56/64 and 2-3 for H0.

### 1.8.1 Example

The command, \*64122, sets the current value of Present. Indctr to **no**.

The command, \*640303, sets the Called Number TYpe to **sbscr**. Call Profile changes permanently alert the active call profile for this HSU port.

The information presented in this section is listed in the RS366 dialing matrix shown in Table 1-20.

## 1.9 Master Dialing

Master Dialing, discussed previously, is another unique application for RS366 dialing for the system when using an 8213 HSU RS366 dialing port to dial for any other HSU card in the system. A different command string is used to make these changes.

The command string is: [escape character] [35] [slot number] [port number], where “slot number” is the user card (1-8) and “port number” is the port in that slot to which subsequent dialing commands should be applied.

The command: \*3511, would indicate that the next series of commands would apply to port #1 of the HSU card in slot U1.

Once a Master Dialing command is issued for HSU 8213 RS366 dialing ports, all further dialing commands on this port will be applied to the new slot and port designated by the Master Dialing command.

To return the RS366 to its normal position, the user can apply the special value of 0 (zero). The command, \*3500, tells the RS366 dialing to return to its home port. Table 1-20 shows the possible modes of RS366 dialing, and command structures.

**Table 1-20. Field Values for Command Strings**

<b>Basic Dialing</b>				
<b>Field #1</b>	<b>Field #2</b>	<b>Field #3</b>	<b>Field #4</b>	<b>Field #5</b>
[escape char]	[00-31] Channelization	[service type]	[call type]	[number to dial] Optional
<b>Call Profile Loading</b>				
[escape char]	[8]	[call profile #]	[number to dial] and/or [initiate action] Optional	
<b>Loopback Management</b>				
[escape char]	[70-73]			
<b>Call Profile Change</b>				
[escape char]	[64]	[Parameter #]	[Parameter val]	
<b>Master Dialing</b>				
[escape char]	[35]	[User slot#]	[Hsu port #]	

## 1.10 V.25bis Dialing

The 8213 HSU card also recognizes V.25bis commands, as in-band protocol for dialing by DTE equipment. V.25bis defines two modes, Addressed and Direct. The Direct call mode is enabled by selecting **dtr** as the dial trigger form the Dial Screen on the HSu card. The Addressed call mode is enabled by selecting **v.25b** as the dial trigger. Reference to V.25bis will be for the Addressed mode only. Refers to **dtr** dialing will be for the Direct mode and can be found in the HSU section. This method allows the use of control signals and commands sent over the HSU Card data interface to establish and terminate calls. Addressed calls are packaged in synchronous data frames and are sent when the interface is idle.

CRN commands can alter existing call profiles loaded to the HSU card with new telephone numbers and bandwidth without having to access the call profile through the HSu card screen. CRS commands can load call profiles form the Interface card without having to use the Load command form the HSU card screen.

New call profiles and changes made to existing call profiles are permanent and will remain with the card until changed by any of the procedures discussed in this chapter.

### 1.10.1 The CRN Command

The Call Request with Number command is sent form the DTE to the HSU card to request a particular number to be dialed. The DTE may include parameters setting the call type, rate bandwidth range, etc.

Other than the new phone number, type and bandwidth, the CRN command uses the data form the currently loaded HSU call profile.

### 1.10.2 The SCT Parameter

The Switched Call Type parameter to the CRN command selects the type of call made. Call types define the data rate of a single channel, the type of carrier service for the call and indicate if multiple channels can be aggregated for this call. If this parameter is not specified, the value in the HSU Card current call profile is used.

### 1.10.3 The BWR Parameter

The Bandwidth Request parameter to the CRN command selects the desired bandwidth in terms of the minimum and maximum number of channels the HSU Card can allocate to a call. This parameter is ignored if the SCT does not allow aggregating channels (if N is specified for the SCT parameter). If this parameter is not specified, the value in the HSU Card current call profile is used.

### 1.10.3.1 Example

An example of a CRN command (using the semicolon character as a field separator) is:  
CRN5103537728;SCT56;BWR1-24.

This example commands the system to call the number 510-3537128 using Switched 56kbps and Bandwidth request from 1 to 24 channels.

## 1.10.4 The CRS Command

The Call Request with Memory Address dials the number and uses all of the parameters on the call profile from those stored on the Interface card. This command changes the current loaded call profile on the HSU card.

### 1.10.4.1 Example

An example of a CRS command is: CRS4

This example commands the system to change the existing loaded call profile to call profile #4 of the Interface card and dial the number.

## 1.10.5 The DIC Command

The Disregard Incoming Call command is issued by the DTE to reject an incoming call.

## 1.10.6 The CIC Command

The Connect Incoming Calling command is issued by the DTE to accept an incoming call. IF the DTE is configured for Auto Answer, the call will be answered if the command is sent or not.

## 1.10.7 The INC Indication

The Incoming Call indication is sent by the HSU Card to notify the DTE of a pending connection.

## 1.10.8 The VAL Indication

The Valid Indication is sent to the DTE whenever the HSU Card receives a syntactically valid command (this does not imply it was semantically valid).



### 1.10.9 The INV Indication

The Invalid Indication is sent to the DTE whenever the HSU Card receives an unknown or syntactically invalid command.

## 1.11 HSU Card Error Messages

Refer to Appendix B in the System Reference Guide for further information on HSU Card Error Messages.

## 1.12 HSU Card Troubleshooting

Problems with an HSU Card could be caused by a number of things. Typically, a problem is indicated by a loss of incoming signal on a data port at either end of the circuit. You can perform numerous tasks to isolate the trouble and clear it. When troubleshooting transmission problems on a data circuit passing through an HSU Card, follow this general sequence:

1. First, verify that the T1 or E1 network is working properly by checking for current CGA-Red and CGA-Yellow alarms. If the network is faulty, the same transmission problem will exist with the other port of the same HSU Card, and also with the data ports of all other data cards connected to the same T1 or E1 line. If no CGA alarms are present, continue with step 2.
2. If the trouble exists on both ports of the same card, but not on any other cards, replace the local HSU Card. If the trouble is only with the current HSU Card and port, continue with step 3.
3. Check the DS0 time slot assignments of the faulty port at both ends of the data circuit path. Also be sure the port is connected to the proper WAN card and port at each end. If these assignments are correct, continue with step 4.
4. At the local end (where the incoming data loss was first observed), use the loopback and test signal functions of the HSU Card to test the affected port. These tests are accessible from the HSU Card Main Screen and associated Test Screen, as previously described in this chapter. They allow you to test the circuit path in segments and thereby quickly pinpoint the problem.
5. If necessary, also perform loopbacks and send test signals to the affected circuit from the other end. In addition, you can perform end-to-end tests using a suitable data test set at one or both ends of the circuit in conjunction with the loopback functions of the HSU Card at either end.
6. If the HSU Card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

## 1.13 HSU Card Specifications

Model Number	Number of Data Ports	Physical Interfaces	Electrical Interfaces
8202	2	2 female 25-pin DB25 D-connectors	ITU-T V.35, V.11, RS232, RS530/RS449, V.24*
8203	2	2 female 25-pin DB25 D-connectors	ITU-T V.11, RS 530
8212	2	2 female 25-pin DB25 D-connectors	ITU-T V.35 (True V.35)
8213	2	2 female 26-pin DB26 D-connectors	ITU-T V.35, V.11, RS232, RS530, V.24* (V25 bis and/or RS-366 dialing when used with 8840 PRI Card)
8214	2	2 female 26-pin DB26 D-connectors	ITU-T V.35 (True V.35)
8215	4	4 female 26-pin DB26 D-connectors	ITU-T V.35, V.11, RS232, RS530, V.24*



**Note:** \*External adapter is required.

<b>Data Speeds</b>	N x 56k and N x 64k, where N = 1 to 31 (up to 1984 kbps) - Software Configurable by DS0
Data Format	Synchronous
Data Protocol	Transparent
Transmit Clock per Port	Internal or External (software selectable)
Clock Polarity per Port	Normal or inverted (software selectable)
Data Polarity per Port	Normal or inverted (software selectable)

<b>Dial Capability</b>	Model 8213 only (when used with 8840 PRI Server Card)
Number of Dialing Ports	2
Dialing Electrical Interface	EIA RS-366, ITU-T V.25 bis
Dialing Physical Interface	2 female 15-pin D-connectors

<b>ISDN Call Profiles - Software</b>	
Primary Number	Main phone number used to route incoming calls for this HSU port
Hunt Group Number	Optional number that makes the port of this HSU part of a hunt group
Auto Answer	Allows the HSU port to automatically answer an incoming call for the primary number or the hunt group number
Answer Time Out	How long to wait for the DTE to raise DTR after the call has been sent to the DTE
Escape Character	To initiate the dialing command
IMUX Primary Number	The main phone number used to route incoming IMUX calls for this HSU port
IMUX Hunt Number	An optional number that makes the port of this HSU part of a hunt group
IMUX Add Number	Second number used to synchronize IMUX bandwidth
Channel	D-channel on which to route all outgoing calls that use this call profile
Called Number	Full telephone number of the device you are calling
Channel Rate	Bandwidth to be used by the call
IMUX Call Service	Whether this is an IMUX call or a regular ISDN call
Service	Service from list set on ISDN card for this D channel (first 7 characters)
Calling Number	Automatic Number Identification (ANI)
Present Indicator	Determines whether or not the calling number may be displayed to the called party
Broadcast Phones	Select the use of the Broadcast option

<b>Diagnostics</b>	V.54 or DDS format local and remote loopbacks with automatic timeout
RTS/CTS Delay: per Port	0, 30, 60 or 100 ms (software selectable by port)
RTS Handshake per Port	Permanent, local, ignore, local (software selectable by port)
BER Test per Port	Active or inactive BER Test Patterns All Marks, All Spaces, 1:1, 1:7, QRSS, 511, 2047 On the four-port HSU 530/35 Card, there are additional BERT patterns
Local Loopback per Port	None, towards DTE, towards the network
Loopback Generation per Port	Off, CSU, DSU, OCU-DP, V5.4, DS0
Loopback Detection per Port	Disabled, enabled, enabled with timeout
Performance Statistics	Errored Seconds, Unavailable Second, Severely Errored Second, Burst Errored Second, Loss of Packet Seconds, Loss of Frame Count

**Standards Compatibility**

ITU-T	V.35	Data Transmission of 48 kbps using 60-108 kHz Group Bank Circuits.
	V.11 (10/96)	Electrical characteristics for balanced double-current interchange circuits operating at data signaling rates up to 10 Mbit/s.
	V.28	Electrical characteristics for unbalanced double-current interchange circuits.
	V.25 bis	(Model 8213 only) (10/96) - Automatic answering equipment and general procedures for automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically.
EIA	Recommendations RS-422	Electrical Characteristics of Balanced Voltage Digital Interface Circuits.
	Recommendations RS-449	General Purpose 37 Position and 9 Position Interface for DTE and DCE Equipment Employing Serial Binary Data Interchanges.
	Recommendations RS-530	High Speed 25 Position Interface for Data Terminal Equipment, Including Alternative 25 Position Connector.
	Recommendations RS-366	Interface between Data Terminal Equipment and Automatic Calling Equipment for Data Communication.
UL	1950	UL Standard for Safety of Information Technology Equipment.
CEN	EN 50 082-1	Electromagnetic compatibility generic emission standard Part 1 Residential, commercial and light industry.
	EN 50 082-2	Electromagnetic compatibility generic immunity standard Part 1 Residential, commercial and light industry.
	EN 60 950/A2	Safety of information technology equipment including electrical business equipment.



# Chapter 2

## SRU Card

### 2.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the Subrate Data (SRU) Card, which is identified as an SRU 232\*10 (8220) on its faceplate ejector.

The SRU 232\*10 Card allows you to connect up to 10 RS-232, low-speed and medium-speed (300 kbps to 38.4 kbps) data terminals to the integrated access system. You can multiplex a number of those devices onto a single DS0 time slot of a WAN card. The card ports can also be multiplexed with voice traffic on an ADPCM engine.

Each port of the SRU 232\*10 Card receives timing from either the external DTE or the integrated access system clock. If the DTE supplies the transmit timing, that clock signal must be synchronized to the integrated access system's clock source.

### 2.2 SRU Card Descriptions

#### 2.2.1 SRU 232\*10 Card Description (8220)

The SRU 232\*10 Card supports published Digital Data Service (DDS) rates. Typical DDS rates include 2.4, 4.8, 9.6, and 19.2 kbps. Up to ten 4.8 kbps DTE devices can be connected to this card for placement on a single DS0 time slot of a T1 or E1 line. Or, the card can similarly accommodate up to five 9.6 kbps devices.

You can also mix rates on the individual ports of an SRU 232\*10 Card. Any combination of rates can be used, up to an aggregate total bandwidth of kbps for the card. For example, you can connect three 9.6 kbps terminals and one 19.2 kbps terminal to a single card. Other DTE transmission rates supported by the card include 300 bps, 14.4 kbps, 28.8 kbps, and 38.4 kbps.

##### 2.2.1.1 Card Jumper/Switch Settings

The SRU 232\*10 Card has US/Euro jumpers or switches on its mainboard. JP1 and JP2. See Figure 2-1.

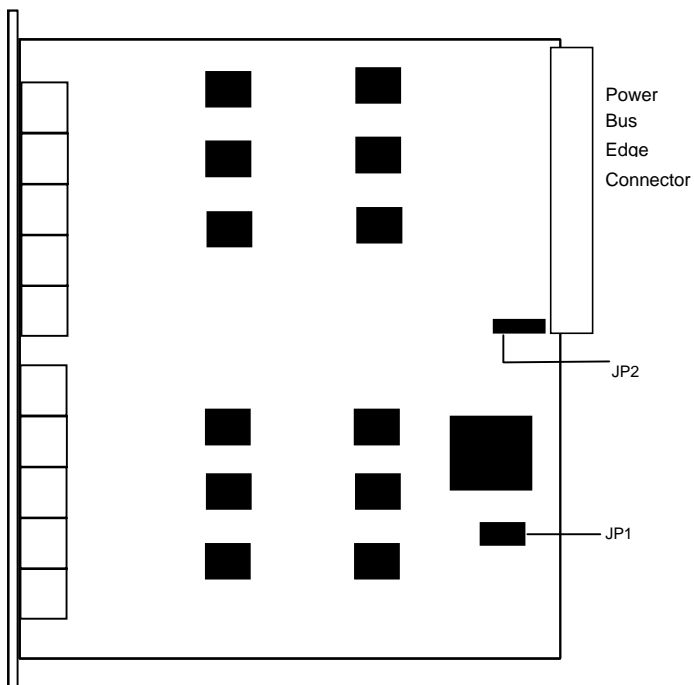


Figure 2-1. SRU 232\*10 Jumper Settings

**2.2.1.2 Installing the SRU 232\*10 Card**

Install the SRU 232\*10 Card into any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, or P1 to P4 and W1 to W4 on the front-loading chassis with power supplies on the side.



## 2.3 SRU Card User Screens and Settings

You must configure the SRU card for operation after installing it in the system chassis. This is done from the SRU Card Main Screen (Figure 2-2). To go to that screen, highlight the desired card on the System Main Screen and press <Enter>. The SRU Card Main Screen has numerous columns of data for port configuration purposes. The port numbers on the screen correspond to the card faceplate jacks from top to bottom (see Figure 2-2).

Node_1	U1	SRU-232x10	RevAB-0	SER 00101	12-31-99	14:33					
	1	2	3	4	5	6	7	8	9	10	
STATE	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby
WAN/SRV	01	01	01	01	01	01	01	01	01	01	01
TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FRAME	a	a	a	a	a	a	a	a	a	a	a
RATE	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
SR TS	01	01	01	01	01	01	01	01	01	01	01
INTF	01	01	01	01	01	01	01	01	01	01	01
COM CF	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N	8,1,N
CTS	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm	perm
TX CLK	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LB	off	off	off	off	off	off	off	off	off	off	off
LB GEN	off	off	off	off	off	off	off	off	off	off	off
LB DET	w/to	w/to	w/to	w/to	w/to	w/to	w/to	w/to	w/to	w/to	w/to
DL OPT	off	off	off	off	off	off	off	off	off	off	off
ADPCM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MAJ EC	off	off	off	off	off	off	off	off	off	off	off

Save | Undo | Refresh | Copy | Test | Main

Figure 2-2. Typical SRU Card Main Screen

The highlighted bottom line of this screen shows numerous actions you can perform from this screen. To perform an action, simply press the uppercase key indicated on this line. For example, to save your option settings for this card, press “s”. Table 2-1 lists the actions you can perform.

Table 2-1. 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., test status).
Copy	Copies the contents of the current column to the next column. Useful if you change a lot of entries in one column and want to repeat those changes in subsequent columns.
Test	Initiates and monitors testing of all SRU card ports. Refer to the Test section of this chapter.
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 2-2 lists the SRU Card Main Screen parameters and available option settings.

Table 2-2. Main Screen Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby act		stdby
WAN/SRV	none wan (w1-1 through w4-2) serv (P1 through P3)		w1-1
TS	01-24 01-31	1	01
FRAME	a b-5 b-10 b-20 x.50 adpcm hlink nlink		a
RATE	.3 1.2 2.4 4.8 9.6 14.4 19.2 28.8 38.4	2	.3
SR TS	n/a 1 1-5 1-10 1-20		1
INTF	asyn sync v.14		asyn
COM CF	8 7 6 5	3	8
	1 2		1
	none odd even space mark		none
CTS	perm 10 130 160 1100 r10 r13 r16 r110 off		perm
TX CLK	n/a int ext		n/a
LB	off dte net		off
LB GEN	n/a off ocu csu dsu		off
LB DET	n/a w/to on off		off
DL OPT	off on		off
ADPCM	n/a P1 P2 P3		n/a
MAJ ERR	off on none 10e-3 10e-4 10e-5 10e-6 10e-7	4	off

**Notes:**

1. Time slot 16 is not available if the port is assigned to an E1 WAN link whose TS 16 is programmed for **cas** or **ccs**.
2. Speeds of **0.3**, **1.2**, and **14.4** are not supported for synchronous channels (except 14.4 **sync** with FRAME set to **adpcm** or **hlink**).

3. Communication Configuration is a three step process. This field will show **n/a** when **sync** is chosen as the INTF option.
4. Majority Error Correction is a two step process. You will only see the choices **off** and **on**. When **on** is chosen, the other alternatives will appear.

## STATE

The State setting determines whether the port is active or inactive. Set this field to **stdby** (standby) for ports that are not to be used or that have not yet been configured. Set it to **actv** (active) for ports that are ready for use. The control leads assume the status shown in Table 2-3 for the different states.

**Table 2-3. SRU Card State Status**

Control Leads	Active	WAN Link Down	Standby
RLSD	High or follows remote RTS	Low	Low
CTS	Definable	Definable	Low

## WAN

The WAN setting identifies the WAN link assigned to this port. It is not necessary for ports on the same card to be assigned to the same WAN link, or to contiguous time slots on a WAN link (see the restriction in the TS field below).

## TS

The Time Slot setting identifies the time slot on the WAN link to which this port is connected. Values range from **01** to **24** for T1 links and **01** to **31** (excluding time slot 16 when CCS or CAS is used) for E1 links. The SRU card can further subdivide the WAN time slot into smaller segments for transmission of low-speed data. Each WAN time slot can be further divided into a maximum of twenty 2.4 kbps time slots (see Figure 2-3).

The only restriction to assigning WAN time slots is that the same time slot number on different WANs cannot be used for subrate data ports on the same SRU card. For example, if you assign time slot 1 on WAN 1-1 to one port on an individual card, you cannot assign time slot 1 on any other WAN link to other ports on the same card.

## FRAME

The Frame setting allows you to define the sub-rate format that the port will use and to set the usable space allotted to each WAN time slot. The choices are DS0A (**a**) for one subrate time slot, DS0B with a limit of five subrate time slots (**b-5**), DS0B with a limit of ten subrate time

slots (**b-10**), and DS0B with a limit of twenty subrate time slots (**b-20**). Figure 2-3 shows the DS0A and DS0B framing subrate time slot interaction. In a **b-20** frame, two or more SRU cards can be configured to occupy the same WAN time slot.

Additional choices include **x.50** (an ITU standard), **adpcm** (used to multiplex subrate data on an ADPCM card) **hlink** (a proprietary format used when far end of the circuit has an ADPCM card while the near end does not) and **nlink** (used to transmit clock to related units) (Note: the RATE and INTF will change when **nlink** is chosen). The **adpcm** frame uses a 24 kbps portion of the ADPCM engine.

## RATE

The Rate setting allows you to select the rate in kilobits per second (kbps) for data transmission. The selection will change depending upon the framing mode and interface selected. Figure 2-3 shows the bandwidth available for each selection.

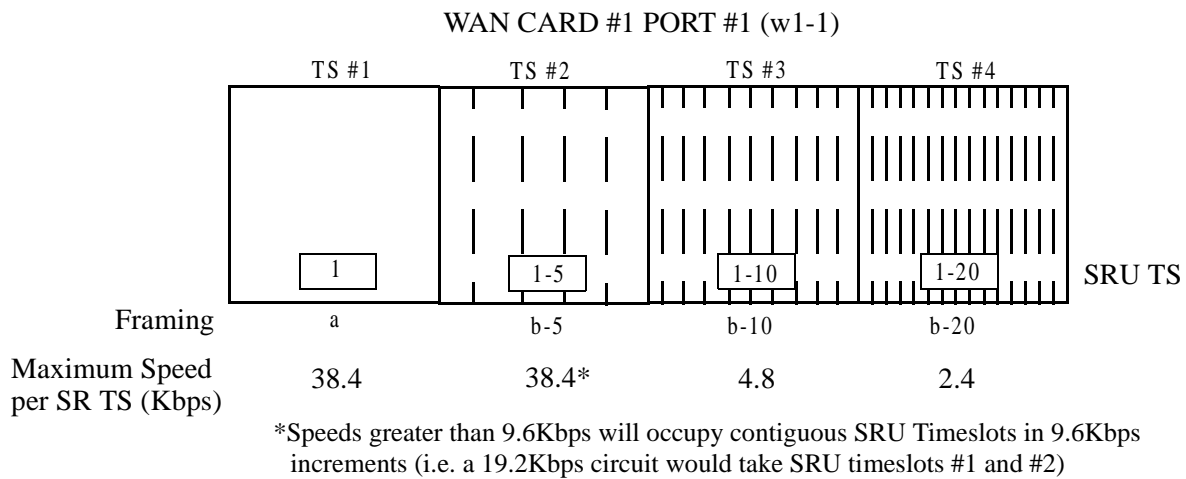
*The maximum total bandwidth of any SRU card cannot exceed 115.2 kbps.*

The maximum bandwidth of the card depends upon the mode of operations for each port. The maximum bandwidth for the **sync** Interface setting is 115.2 kbps and the host will not allow more than this to be assigned.

The maximum bandwidth for **async** and **v.14** is harder to compute because the computation depends upon the amount of data being sent.

The **async** ports have a minimum multiplication factor of 1.2 times a **sync** port, and **v.14** has a multiplication factor of 1.6 times that of a **sync** port. Using the Delay Optimization feature will also degrade the maximum bandwidth by a factor of 1.5 times the maximum bandwidth figure.

These computation factors suggest a maximum of 96 kbps ( $96 \text{ kbps} \times 1.2 = 115.2 \text{ kbps}$ ) for **async** ports and 72 kbps ( $72 \text{ kbps} \times 1.6 = 115.2 \text{ kbps}$ ) for **v.14** ports. However, because of the nature of **async** and **v.14** data transmission, these limits are not fixed because the user will not be transmitting data at the full rate. The Delay Optimization feature also degrades the maximum bandwidth by a factor of 1.5 times the total bandwidth. BERT adds another 2x multiplication factor to the data rates shown above.



**Figure 2-3. SRU Time Slot Integration**

## SR TS

The Subrate Time Slot (SR TS) indicates the subrate position within the DS0 time slot the port will occupy (see Figure 2-3). If **a** framing is selected, only one subrate time slot is supported and the SR TS setting will default to 1. If **b-5** framing is selected, the available subrate time slots are 1 to 5. If **b-10** framing is selected, the available subrate time slots are 1 to 10. If **b-20** framing is selected, the available subrate time slots are 1 to 20. Portions of subrate time slots can be assigned to any SRU port from any SRU card in the system (see the configuration example later in this chapter). If **adpcm** or **hlink** are chosen for the frame parameter, this field will show **n/a**.

In **b-5** framing, if circuits with speeds greater than 9.6 kbps are assigned to the subrate time slot, adjacent subrate time slots must be available to accommodate their size. A 19.2 kbps circuit would occupy two contiguous subrate time slots (leaving space for up to three 9.6 kbps circuits) and a 38.4 kbps circuit would occupy four contiguous subrate time slots (leaving space for one 9.6 kbps circuit).

The SR TS number selected will be the first segment occupied by this circuit. If a 28.8 kbps circuit occupies three segments of the **b-5** frame, selecting SR TS 1 will assign it to segments 1, 2 and 3. Segments 4 and 5 may be assigned either independently to 9.6 (or less) kbps circuits in SR TS 4 and 5 or combined for a 19.2 kbps circuit assigned to SR TS 4.

If a circuit exceeds the slots necessary to accommodate it, such as a 38.4 kbps circuit to SR TS 3 in **b-5** framing, the message "Invalid SR TS" will be displayed. If a circuit requires more space than the SR TS has available, such as having a 38.4 kbps circuit in SR TS 1 and then attempting to assign a 19.2 kbps circuit to SR TS 4, the message "SR TS overlapping" will be displayed.

The number of subrate time slots available for **x.50** depend on the selected Rate. If the **2.4** Rate is selected, the number available will be 20. If the **4.8** Rate is selected, the number available will be 10. If the **9.6** Rate is selected, the number available will be 5. When multiplexing different rate circuits on the same time slot, the following formula is necessary to compute the position in the sub-rate time slot: a 9.6 kbps circuit will occupy slots n, n+5, n+10, and n+15. Similarly, a 4.8 kbps circuit will occupy slots n and n+10, and a 2.4 kbps circuit will occupy slot n (where n is the time slot selected).

## INTF

The Interface setting allows you to choose the protocol necessary for the terminal associated with this port. The choices are **asyn** (Asynchronous), **sync** (Synchronous), and **v.14** (v.14). If Synchronous transmission is selected, the choices for STOP, DATA and PAR will show as **n/a** (not applicable).

Both **asyn** and **v.14** options provide asynchronous to synchronous conversion. The **v.14** option is an industry standard which will allow the card to operate with many DSUs. The **asyn** option is a streamlined proprietary algorithm which will increase the performance of the card.

## COM CF

The Communication Configuration setting is a three-step process that allows you to choose the Data bits, Stop bits, and Parity to be used. The Data setting allows you to change the bits-per-byte number depending upon the type of terminal associated with this particular port. The options are **8**, **7**, **6**, and **5**.

The Stop bits option allows you to select the number of Stop bits that check data sampling for the terminal associated with this port. The options are **1** and **2**.

The third choice is the Parity setting that changes the data parity for the terminal associated with this port. The options are **none**, **odd**, **even**, **space** and **mark**.

## CTS

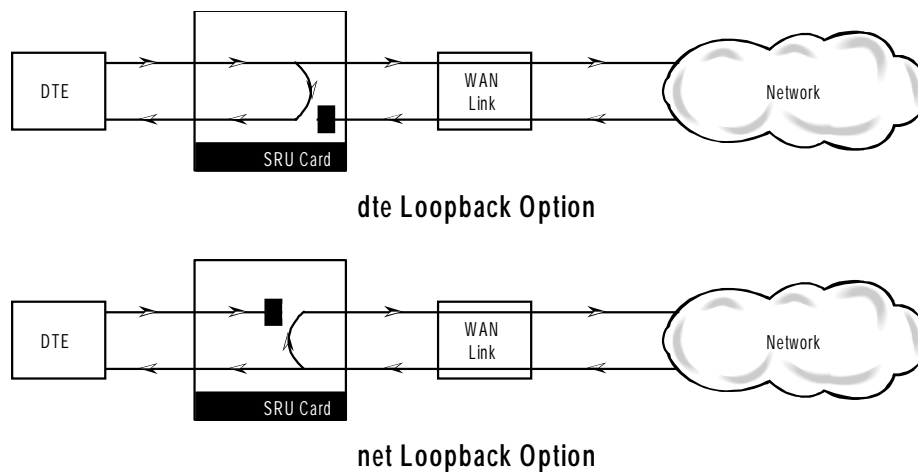
The Clear To Send (CTS) setting allows you to define how the port should respond upon receiving a Request to Send (RTS) from the attached DTE. This setting also allows you to change the delay time (in milliseconds) from when the card receives RTS until it issues CTS. The local option allows RTS to control CTS. The remote-local options allows RTS to control both the CTS of the local equipment and RLSD of the remote equipment. The options are **perm** (permanent), **l0** (local-immediate), **l30** (local - 30 ms), **l60** (local - 60 ms), **l100** (local - 100 ms), **rl0** (remote/local - immediate), **rl30** (remote/local - 30 ms), **rl60** (remote/local - 60 ms), **rl100** (remote/local - 100 ms), and **off**.

## TX CLK

The Transmit Clock setting allows you to choose the timing source for this port. The options are **n/a** if **async** interfacing is chosen and **int** (internal), if **sync** interfacing is chosen. The **int** setting uses the integrated access system as the clock source, and **ext** allows the DTE to generate transmit timing with EXT ports are grouped: 1,2 / 3,4,5,6 / 7,8,9,10.

## LB

The Loopback setting allows you to activate local loopbacks on the SRU card. These settings are **off**, toward the **dte** (DTE), and toward the **net** (network). Figure 2-4 shows a diagram of the local loopback conditions.



**Figure 2-4. Local Loopbacks**

## LB GEN

The Loopback Generate setting generates inband 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. You can start loopbacks at the remote **ocu** (Office Channel Unit), **dsu** (Data Service Unit), or **csu** (Channel Service Unit). Figure 2-5 through Figure 2-7 show the loopbacks locations. You can also turn each loopback **off**. This field shows **n/a** if **adpcm** or **hlink** are chosen for the Frame parameter.

Note that loop-up and loop-down commands cannot be implemented for two ports of the same card simultaneously. You must finish all loopback operations on one port before attempting them on another port.

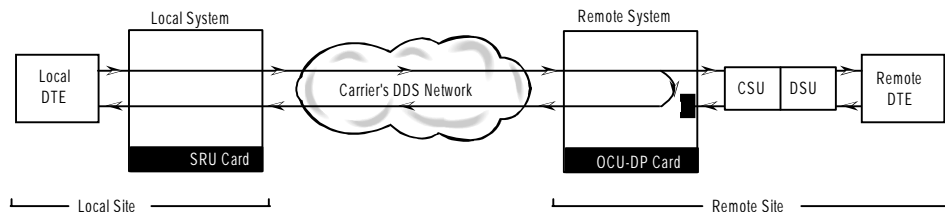


Figure 2-5. Inband Remote SRU Loopback

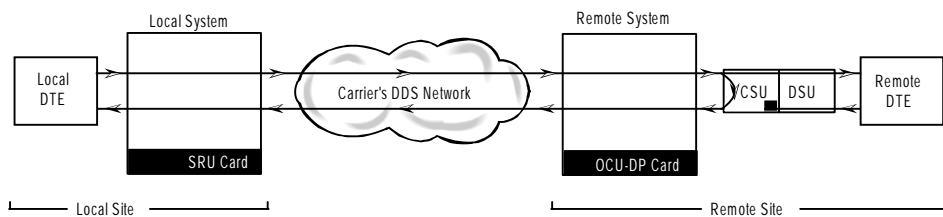


Figure 2-6. Inband Remote CSU Loopback

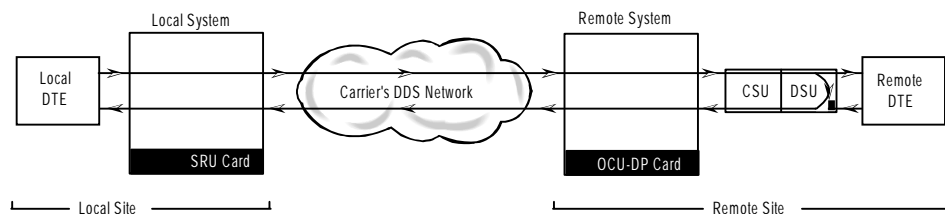


Figure 2-7. Inband Remote DSU Loopback

**LB DET**

The Loopback Detection setting determines how the card will respond to latching and non-latching loopback commands from remote equipment. The SRU reacts only to the inband DDS-format loopback commands for OCU Loop, CSU Loop, and DSU Loop. The Loopback Detection setting does not affect local loopback commands from the local control terminal.

The **on** option causes the card to monitor ports for DDS format loopback commands from the remote equipment. If the card detects a loopback command, it loops the data back until the remote equipment sends a stop loopback command. The **w/to** (with time-out) option is the same as the **on** option, except that after ten minutes the SRU card automatically releases



loopbacks commanded by the remote equipment. The **off** option causes the SRU card to ignore all remote loopback commands. This field will show **n/a** if **adpcm** or **hlink** are chosen for the FRAME parameter.

## DL OPT

Delay Optimization decreases the end-to-end delay time for applications that require lower delay time. The options are **off** and **on**.

The cost of using Delay Optimization is a decrease in total bandwidth for the card by a factor of 1.5. For example, a customer that has 10 ports using the sync Interface will have a 115.2 kbps maximum bandwidth. If delay optimization is used on all 10 ports, the maximum bandwidth will be 76.8 kbps.

## ADPCM

If **adpcm** is chosen as the Frame parameter, this field allows you to select the ADPCM card to direct this traffic. The ADPCM card options are **P1**, **P2** and **P3** (the resource card slot designations stamped on the chassis). If any other option is selected, this field will show **n/a**.

## MAJ EC

The Majority-Vote Error Correction parameter is available for ports using DS0A framing at speeds of 9.6 kbps and lower. This option selection is a two-step process. The initial options are **off** and **on**. If the **on** option is chosen, a new set of options will appear at the bottom of the screen.

The new options are used to select the error threshold, above which the card will generate an alarm. The choices are **none**, **10e-3**, **10e-4**, **10e-5**, **10e-6**, and **10e-7**. While the majority vote algorithm is capable of correcting error rates in excess of 10e-3, the Excessive Error Rate alarm gives system administrators advanced notice of problems before users detect them. Table 2-4 shows the bit error rates for majority-vote error correction.

**Table 2-4. Bit Error Rates for Majority-Vote Error Correction**

Threshold	EER Set	EER Reset	Period
none	none	none	none
10e-3	64 or more errors	63 or less errors	1 second
10e-4	64 or more errors or any of the above	63 or less errors	10 seconds
10e-5	38 or more errors or any of the above	37 or less errors	60 seconds
10e-6	3 or more errors or any of the above	2 or less errors	60 seconds
10e-7	17 or more errors or any of the above	16 or less errors	three 15 minute time intervals

### 2.3.1 Card Configuration Examples

Figure 2-8 shows ways in which SRU cards can be used to network low-speed data with DS0A and DS0B framing. In this diagram, five cards are connected to eight WAN time slots of one WAN port on one WAN card (many combinations of cards/ports/time slots are possible). Each card is separated to show the ten ports on each card. Each port is assigned to a low-speed data device, and the transmission speed of that device is shown in the center of the SRU data port.

Note that the diagram sometimes shows only one connection, in order to eliminate unnecessary lines in the diagram. Each port is a direct connection and does not support interchange of data transmission between ports.

The first time a WAN card/port/time slot is used, the framing selected on the SRU card port will segregate that WAN time slot into SRU time slots. Once selected, those SRU TSs will apply to all ports assigned to that WAN time slot.

Once the framing is selected for the WAN card/port/time slot, low-speed data devices can be arranged and selected on the SRU card settings to maximize the system capabilities.

In this example, the first port on SRU 1 assigned **a** framing to WAN 1-1, TS 1, and selected a 38.4 kbps device for its use. The second port has **b-5** framing to WAN 1-1, TS 2. Of the five SRU time slots on that WAN time slot, the first three are used to support a 28.8 kbps device (three 9.6 kbps contiguous SRU time slots). The 9.6 kbps device on SRU 1, port 3 occupies the fourth SRU time slot and another 9.6 kbps from SRU 3, port 10 is placed in the fifth slot.

WAN 1-1, TS 3 was segregated into ten SRU time slots by the selection of **b-10** framing, which supports 0.3, 1.2, 2.4, or 4.8 kbps transmission. Six 4.8 kbps ports are assigned to the first six SRU time slots. *The diagram shows only one connection to eliminate unnecessary lines in the diagram. The six ports are six direct connections and will not support interchange of data transmission.* The other four SRU time slots are used by ports 1 to 4 on SRU 4. *Again, the single line does not imply interexchange.*

WAN 1-1, TS 4 has **b-20** framing and will support up to twenty 0.3, 1.2 or 2.4 kbps circuits from two (or more) SRU cards. In this example, SRU 1, port 10 is assigned to SRU TS 1, SRU 2, ports 1-10 are assigned to SRU TS 2 to 11. The nine SRU time slots left are used by SRU 3, ports 1-9. As mentioned earlier, SRU 3, port 10 is a 9.6 kbps circuit assigned to WAN 1-1, TS 2, SRU time slot 5. WAN 1-1, TS 5, has **a** framing. Only one device can transmit data in this SRU time slot. In this example, a 2.4 kbps circuit was assigned to SRU 4, port 5.

WAN 1-1, TS 6 has **b-5** framing, so five SRU time slots are available. The first two 9.6 kbps slots are used by a 19.2 kbps circuit on SRU 4, port 6, while the other three are used by 9.6 kbps circuits on SRU 4, ports 7 to 9.

WAN 1-1, TS 7 has the same characteristics as TS 6, except that the first SRU time slot is used by a 9.6 kbps circuit on SRU 4, port 10, SRU time slots 2-4 are assigned to the single 28.8 kbps port on SRU 5. WAN 1-1, TS 8 was designated as **b-10** framing and the first eight SRU time slots are associated with the 2.4 and 4.8 kbps circuits on SRU 5, ports 3 to 10.

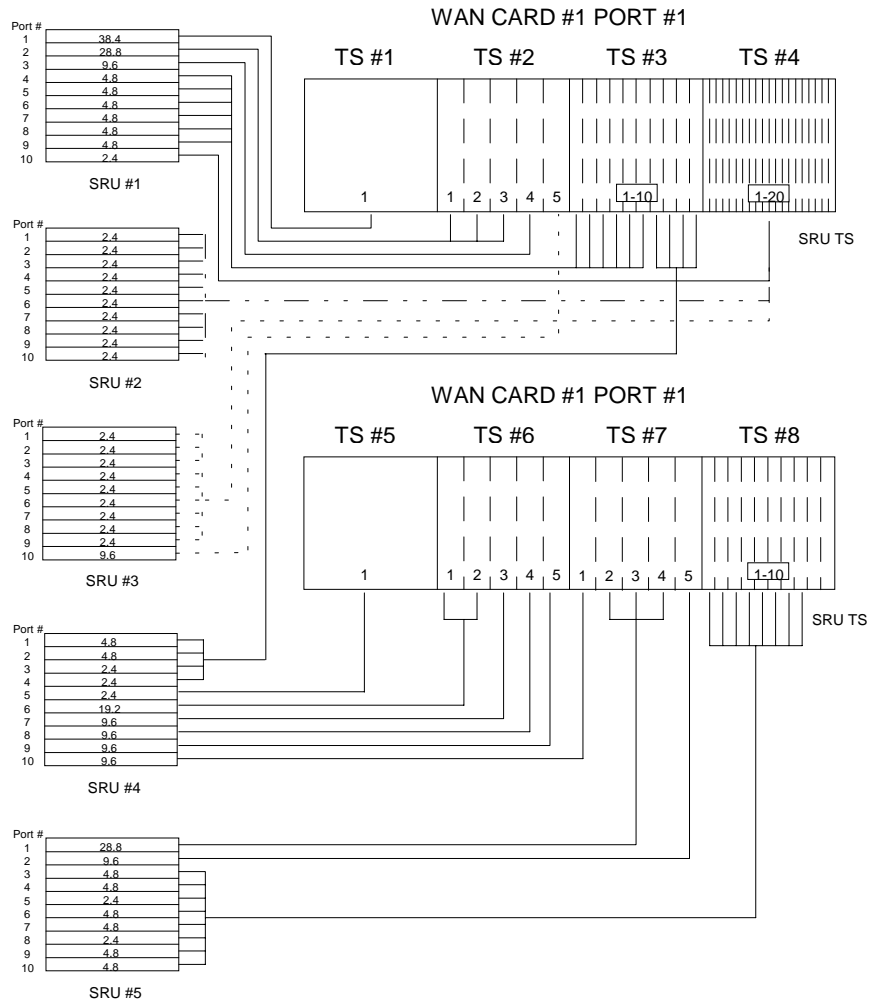


Figure 2-8. Typical WAN Time Slot Assignments to an SRU Card

### 2.3.2 Test Screen

Pressing “t” (Test command) in the SRU Card Main Screen will bring up the Test Screen shown in Figure 2-9. From this screen, you can create test situations between SRU cards, or between a single card and data test equipment at a remote site.

Node_1	U1	SRU-232x10	RevAB-0	SER 00101	12-31-99	14:33					
	1	2	3	4	5	6	7	8	9	10	
BERT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DIR	net	net	net	net	net	net	net	net	net	net	net
CTS	norm	norn	norm	norn	norm	norn	norm	norn	norm	norn	norn
RLSD	norm	norn	norm	norn	norm	norn	norm	norn	norm	norn	norn
SYNC	no	no	no	no	no	no	no	no	no	no	no
BE	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
ES	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
SES	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
CSES	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
OSS	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
BER	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
ELAP	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
RTS	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
SR/OSS	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
LB/ST	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
EER	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Save | Undo | Refresh | InsertErr | Clear | Main

Figure 2-9. Typical SRU Card Test Screen

The bottom highlighted line of the Test Screen shows some actions you can perform from this screen. To perform an action, just press the uppercase key for the desired choice. Table 2-5 lists these actions, and Table 2-6 lists the settings in the Test Screen, along with their possible and default values. These settings are also described in the following paragraphs.

Table 2-5. 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., test status).
InsertErr	Allows you to manually insert a single error into the clear data signal.
Clear	Clears the Test Screen and resets all counters to zero.
Main	Returns to the SRU Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 2-6. Test Screen Option Settings and Defaults

Parameter	User Options	Default
BERT	off mark space 1:1 1:7 511 qrss 2047	off
DIR	net user	net
CTS	norm off on	norm
RLSD	norm off on	norm
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	*****
RTS	information only—no user options	*****
SR OSS	information only—no user options	*****
LB ST	information only—no user options	*****
ERR	information only—no user options	*****

## BERT

Bit Error Rate Tester (BERT) sends a data pattern and measures the bit error rate (BER) on the selected SRU port. The patterns that can be selected are **off**, **mark** (all ones), **space** (all zeros), **1:1** (alternating 10101010), **1:7** (10000000), **511** (511 test pattern), and **2047** (2047 test pattern).

## DIR

The Direction (DIR) setting allows you to specify where the BERT test signal should be directed. The first option is **net** (network) which means that the test signal will be transmitted through the system toward the Wide Area Network (WAN). The **user** option means that the signal will be directed toward the attached DTE device over the RS-232 interface.

## CTS

The Clear To Send (CTS) option allows you to define whether the CTS control lead should be held **on** (high) or **off** (low). Selecting either **on** or **off** will override the selection made in the SRU Card screen. The third option is **norm** (normal) which means that CTS will behave as described in Table 2-3.

## RLSD

The Receive Level Signal Detect (RLSD) option allows you to define whether the RLSD control lead should be held **on** (high) or **off** (low). The third option is **norm** (normal) which means that RLSD will behave as described in Table 2-3.

## 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 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 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 ( $1 \times 10^{-3}$ ). Since this is an information-only field, there are no user-selectable parameters.

## 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 field shows the number of seconds that the SRU 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 for this option.

**RTS**

The Request To Send (RTS) field shows the current status of the RTS control lead. The two values that can be displayed are **on** and **off**. Since this is an information-only field, there are no user-selectable parameters for this option.

**SR OSS**

The Subrate Out of Synchronization Seconds (SR OSS) field shows how many seconds in which there was a Subrate framing loss. Since this is an information-only field, there are no user-selectable parameters for this option.

**LB ST**

The Loopback State (LB ST) field indicates whether there are any remotely-initiated loopbacks currently active on the SRU port. This field will display both latching and non-latching loopbacks that are initiated from a remote device via in-band loop-up codes. In addition to **none**, the six possible messages that can be displayed in that field are **l-ocu**, **l-dsu**, and **l-csu** for latching loopbacks; or **ocu**, **dsu**, and **csu** for non-latching loopbacks. Since this is an information-only field, there are no user-selectable parameters for this option.

**EER**

The Excessive Error field will display the computed the DS0 error rate for each port where that option was selected. The Majority Error Rate will be computed based on the integration period for the selected threshold. For example, if the  $10e-4$  threshold was selected, the integration would be 10 seconds.



## 2.4 SRU Card Error Messages

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

## 2.5 SRU Card Troubleshooting

SRU card problems could indicate a number of possible causes, including:

- Faulty receiving DTE at the near end (where the problem was first noticed)
- Faulty transmitting DTE at the far (opposite) end
- Faulty cabling between the DTE and SRU card at the near end
- Faulty cabling between the DTE and SRU card at the far end
- T1 or E1 network failure
- Improper card configuration at either end (e.g., time slot and/or WAN port assignments)

Typically, a problem is indicated by a loss of incoming signal on a data port at either end of the circuit. You can perform numerous tasks to isolate the trouble and clear it. When troubleshooting transmission problems on a data circuit passing through an SRU card, follow this general sequence:

1. If all ports are affected, verify that the US/EUR jumper is correctly placed to match the US/EUR jumper on the chassis.
2. Verify that the T1 or E1 network is working properly by checking for current CGA-Red and CGA-Yellow alarms. If the network is faulty, the same transmission problem may exist with the other ports of the same SRU card, and also with the data ports of all other data cards connected to the same T1 or E1 line. If no CGA alarms are present, continue with step 3.
3. Verify that the DS0 time slot and sub-rate TS assignments of the faulty port at both ends of the data circuit path are correct. Also be sure the port is connected to the proper WAN card and port and that other critical parameters, such as **RATE**, are set the same at each end. If these assignments are correct, continue with step 4.
4. At the local end (where the incoming data loss was first observed), use the loopback and test signal functions of the SRU card to test the affected port. These tests are accessible from the SRU Card Main Screen (through the **LB** and related parameters) and its associated Test Screen (through the **BERT** parameter), as previously described in this chapter. These allow you to test the circuit path in segments and thereby quickly pinpoint the problem.

5. If necessary, also perform loopbacks and send test signals to the affected circuit from the other end. In addition, you can perform end-to-end tests using a suitable data test set at one or both ends of the circuit in conjunction with the loopback functions of the SRU card at either end.
6. If the SRU card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

## 2.6 SRU Card Specifications

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### SRU Card (Models 822060)

Number of Ports	10
Physical Interface	female 8-pin RJ-48
Electrical Interface	RS232C, ITU-T V.28
Operational Interface	DCE - Full Duplex
Interface Settings	Asynchronous, Synchronous, V.14
Sub-rate Framing Format	X.50, V.14, DS0-A, DS0-B with 5, 10, or 20 divisions per DS0
Sub-rate Time slot Number	1 through 20 depending on Sub-rate Framing Format

---

### Synchronous Data

Format	Transparent
Transmit Clocking	Software selectable per port; internal or external
Speeds	2.4, 4.8, 9.6, 14.4, 19.2, 28.8 and 38.4 kbps

---

### Asynchronous Data

Format	V.14 or proprietary
Stop Bits	Software selectable per port; 1 or 2
Data Bits	Software selectable per port; 5, 6, 7 or 8
Parity	Software selectable per port; none, odd, even, space or mark
Speeds	.3, 1.2, 2.4, 4.8, 9.6, 14.4, 19.2, 28.8 and 38.4 kbps

---

### Signaling

DSR	Tied to DTR
CTS	Software selectable per port; on, off (tied to RTS)
CTS delay	Software selectable per port; immediate, 30, 60 or 100 ms
RLSD	Software selectable per port; permanently on, follows remote RTS (drop on receipt of IDLE or CGA RED)

---

### Diagnostics & Alarms

BERT	Integral
Direction	Toward DTE or toward Network
Data Patterns	Off, mark, space, 1:1, 1:7, 511, 2047 zeros

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### Loopbacks

Local	Toward DTE or toward Network
Remote - Generation	Inband, latching, DDS format at CSU, DSU or OCU-DP
Remote - Detection	Inband, latching and non-latching DDS Format for OCU Loop, CSU Loop and DSU Loop. Optional automatic ten (10) minute timeout

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### Error Correction

Majority Vote Error Correction	Available for DS0-A ports operating at 9.6 Kbps or less, triggers EER ALARM when specified threshold is exceeded
Majority Vote Error Thresholds	None, 10e-3, 10e-4, 10e-5, 10e-6 or 10e-7

**Standards Compatibility**

Bellcore	GR-63-CORE Issue 1	Network Equipment-Building System (NEBS) Requirements: Physical Protection
AT&T	TR 54075	Subrate Data Multiplexing - A Service of DATAPHONE Digital Service
ITU-T	V.28	Electrical characteristics for unbalanced double-current interchange circuits
	X.50 Division 3	Fundamental Parameters of a Multiplexing Scheme for the International Interface Between Synchronous Data Networks (note: does not support 600 bps data)
	V.14	Transmission of Start-Stop Characters over Synchronous Bearer Channels (using asynch to synch converters)
EIA	RS 232	Interface Between DTE and DCE Employing Serial Binary Data Interchange
UL	1950	UL Standard for Safety of Information Technology Equipment
CEN	EN 500 081-1	Electromagnetic compatibility generic emission standard Part 1 Residential, commercial and light industry
	EN 500 082-1	Electromagnetic compatibility generic immunity standard Part 1 Residential, commercial and light industry
	EN 50 950/A2	Safety of information technology equipment including electrical business equipment

# Chapter 3

## OCU-DP Card

### 3.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the Office Channel Unit - Dataport (OCU-DP) Cards. These are labeled as the OCU-DP 2, OCU-DP 5 and OCU-DP 10 Cards on their faceplate ejectors. This chapter also provides installation information for the OCU-DP port activation card, which is used on the OCU-DP 5 Card.

The integrated access system uses OCU-DP cards to interface directly with Data Service Units/Channel Service Units (DSU/CSUs) supporting data traffic up to and including 64 kbps. A four-wire circuit can connect the OCU-DP card to a DSU/CSU up to four miles away. In the Switched 56 kbps mode, customers access the network on an as-needed basis via dial-up commands. The system must be equipped to provide -48 VDC power to fully support the OCU-DP card.

### 3.2 OCU-DP Card Descriptions

#### 3.2.1 OCU-DP 10 Card Description (8249)

The OCU-DP 2 Card has only two ports. Each card may be connected to a DSU/CSU operating at one of the rates stated above for the OCU-DP 5 Card. In addition, the OCU-DP 2 supports BCH error correction, performance monitoring and the CUS operating mode.

##### 3.2.1.1 Card Jumper/Switch Settings

The OCU-DP card doesn't have any jumpers or switches on its mainboard.

##### 3.2.1.2 Installing the OCU-DP 2 Card

Install the OCU-DP 2 Card in any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

### **3.2.2 OCU-DP 5 Card Description (8248)**

The OCU-DP 5 Card supports up to five data ports with the ability to be expanded by a 845 sub board to ten ports operating at speeds up to 64 kbps inclusive. This card interfaces directly with DSU/CSUs which can be located up to 4 miles away.

#### **3.2.2.1 Card Jumpers/Switch Settings**

The OCU-DP 5 Card doesn't have any jumpers or switches on its mainboard.

#### **3.2.2.2 Installing the OCU-DP 5 Card**

Install the OCU-DP 5 Card in any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

### **3.2.3 OCU-DP 10 Card Description (8247)**

The OCU-DP 10 Card supports up to 5 data ports, each connected to a DSU/CSU operating at 64 kbps, 56 kbps, Switched 56 kbps, 19.2 kbps, 9.6 kbps, 4.8 kbps, or 2.4 kbps. However, this card does not support BCH error correction, performance monitoring, or the CSU operating mode.

#### **3.2.3.1 Card Jumpers/Switch Settings**

The OCU-DP 10 Card doesn't have any jumpers or switches on its mainboard.

#### **3.2.3.2 Installing the OCU-DP 10 Card**

Install the OCU-DP 10 Card in any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

### **3.2.4 Port Activator Card Description (845)**

The port activator card is a sub-module board that sits on the OCU-DP 10 Card. This sub-module board activates data ports 6 through 10 on that card, thereby allowing it to accommodate up to 10 DSU/CSUs. If the port activator card is not installed on an OCU-DP 10 Card, only ports 1 through 5 are available.

### 3.3 OCU-DP Card User Screens and Settings

#### 3.3.1 OCU-DP Card Main Screen

You must configure the OCU-DP Card for proper operation. This is done from the OCU-DP Card Main Screen, which is shown in Figure 3-1. To go to this screen, highlight the desired card in the System Main Screen and press <Enter>.

Node_1	U1	OCU-DP×2	Rev AC-0	Ser 00101	12-31-99	14:33
		1		2		
STATE		stdby		stdby		
WAN/SRV		w1-1		P1-C3		
TS		01		n/a		
FRAME		a		a		
RATE		2.4		64k		
SR TS		01		01		
MODE		ocu		ocu		
ERR COR		off		n/a		
SECOND		off		n/a		
USER LB		d		d		
LB		off		off		
LB GEN		off		off		
LB DET		w/to		w/to		
<div style="border: 1px solid black; padding: 2px;"> <span>Save</span>   <span>Undo</span>   <span>Refresh</span>   <span>Perf</span>   <span>Test</span>   <span>Main</span> </div>						

Figure 3-1. Typical OCU-DP Card Main Screen

The bottom highlighted line of this screen lists various actions that you can perform from this screen. To perform an action, simply type the uppercase letter corresponding to the desired action on this line. For example, to save your card option settings, press “s” to invoke the **Save** command. Table 3-1 lists the actions you can perform from this screen, and Table 3-2 lists the OCU-DP Card Main Screen parameters and available settings. These are also described in the following paragraphs.

**Table 3-1. 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).
Perf	Brings up the Performance Data Screen.
Test	Initiates and monitors testing of all OCU-DP card ports. Refer to Test section of this chapter.
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 3-2. Main Screen Option Settings and Defaults**

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
WAN/SRV	wan (w1-1 through w4-2) serv (P1 through P3)		w1-1
TS	01-24 01-31		01
FRAME	a b-5 b-10 b-20		a
RATE	2.4 4.8 9.6 19.2 56k 64k sw56k	1	2.4
SR TS	01 01-05 01-10 01-20		01
MODE	ocu csu		ocu
ERR COR	off maj-v bch	2	off
SECOND	n/a off on		off
USER LB	d o		d
LB	off dte net-d net-a		off
LB GEN	off ds0-n ocu-n csu-n csu-u		off
LB DET	w/to on off		w/to

*Notes:*

1. When the WAN/SRV option is set to **P1**, **P2**, or **P3** (Server cards), the only valid options for RATE are **56K** and **64K**.
2. The **maj-v** option is supported on all cards if the Rate is **2.4**, **4.8** or **9.6**. Error Correction is not supported if the Rate is **sw56k**. BCH Error Correction is not supported on the 5-port and 10-port OCU-DP card. The BCH algorithm is supported only at 19.2, 56, and 64 kbps.



## STATE

The State setting determines whether the port is active or inactive. An inactive port does not occupy a time slot on a WAN link. Set the state setting to **stdby** (standby) for ports that are not to be used or that are not yet configured. Set it to **actv** (active) for ports that are ready for use.

## WAN/SRV

The WAN/SRV setting identifies the card to which the output of this port is directed. If **wan** is chosen, the data from this port will be directed to a WAN port (the options are **w1-1** to **w4-2**). If **serv** is chosen, the data will be directed to a port on a Resource card (the options are **P1**, **P2** and **P3**. **P1** is FRS in slot P1, **P2** is FRS in slot P2 and **P3** is FRS in slot P3. After selecting card, select logical port).

The only available rates available when routed to a server are **56K** and **64K**.

## TS

The TS setting identifies the time slot on the WAN link to which this port is connected. Values range from **01** to **24** for T1 links and **01** to **31** (excluding TS 16 in **cas** or **ccs** mode) for E1 links. For a display of the available time slots, refer to the cross-connect map for the WAN link.

## FRAME

The Frame setting allows you to define the framing of the time slot connected to the OCU-DP port. The options are **a** (DS0A), **b-5** (DS0B) with a limit of five ports, **b-10** (DS0B) with a limit of 10 ports, and **b-20** (DS0B) with a limit of 20 ports, as shown in Figure 3-2.

## RATE

The Rate setting identifies the highest data transmission rate for the current port. Values are **2.4**, **4.8**, **9.6**, **19.2**, **56k**, **64k**, and **sw56k** (Switched 56 kbps). Figure 3-2 shows the various rates. When the WAN/SRV option is set to **P1**, **P2**, or **P3** (Four Server cards), the only valid options for RATE are **56K** and **64K**.

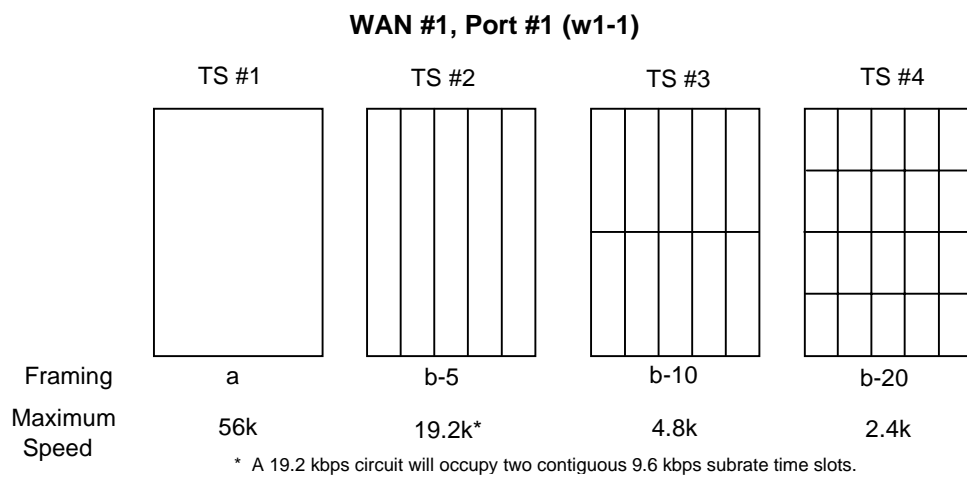
## SR TS

The Sub-Rate Time Slot (SR TS) indicates the subrate position within the DS0 time slot the port will occupy (see Figure 3-3). If **a** framing is selected, only one subrate time slot is supported and the SR TS setting will default to **1**. If **b-5** framing is selected, the subrate time slots available are **1** to **5**. If **b-10** framing is selected, the subrate time slots available are **1** to **10**. If **b-20** framing is selected, the subrate time slots available are **1** to **20**.

In **b-5** framing, if circuits with speeds greater than 9.6 kbps are assigned to the subrate time slot, adjacent subrate time slots must be available to accommodate their size. A 19.2 kbps circuit would occupy two contiguous subrate time slots. This leaves space for up to three 9.6 kbps circuits from other OCU-DP cards and ports.

The SR TS number selected will be the first segment occupied by this circuit. If a 19.2 kbps circuit occupies two segments of the **b-5** frame, selecting SR TS 1 will assign it to segments 1 and 2. Segments 3, 4 and 5 may be assigned independently to 9.6 kbps (or less) circuits from other OCU-DP cards.

If a circuit is assigned that exceeds the slots necessary to accommodate it, such as a 19.2 kbps circuit to SR TS 5 in **b-5** framing, the message "Invalid SR TS" will be displayed. If a circuit requires more space than the SR TS has available, such as a having a 19.2 kbps circuit assigned to SR TS 1, a 19.2 kbps circuit assigned to SR TS 3 and then attempting to assign a 19.2 kbps circuit to SR TS 4, the message "SR TS overlapping" will be displayed.



**Figure 3-2. Data Frames, Rates, and Time Slot Assignments**

**MODE**

The Mode setting options are **ocu** and **csu**. You should select **ocu** whenever the OCU-DP port is attached to a DSU/CSU over a 4-wire circuit. In that mode, the OCU-DP port will generate the necessary sealing current and the DSU/CSU will terminate it. The **csu** mode should not be used unless you have two back-to-back OCU-DP ports. In that case, to achieve proper orientation and sealing current, configure one of two OCU-DP ports for the **ocu** mode and the other for the **csu** mode. The **csu** mode is not supported on the OCU-DP 5 Card, which has five or ten ports.

## ERR COR

The Error Correction setting is used only on the OCU-DP 2 Card. It provides different methods of error correction, depending on the data Rate selected. The default ERR COR setting is **off**. If you choose subrate speeds of **9.6k** or less in the Rate setting, the Error Correction option **maj-v** (majority voting) is available. Using majority-vote error correction allows the system to poll the data for errors and decide on the correct data based on the repeated bit pattern.

The **bch** error correction option is available for **19.2K** only. **Bch** Error Correction is not supported on the OCU-DP5 or OCU-DP 10 Card. **Maj-v** is supported for **2.4**, **4.8**, and **9.6K**.

## SECOND

Secondary channel operation allows the DSU/CSU to establish a separate lower-speed data circuit with the OCU-DP port. When synchronized, this special circuit can be used for testing and maintenance of the main circuit, or for transmission of other low-speed data. The settings are **on** and **off**.

The secondary channel is transported in the 8th bit position of the DS0 time slot to which the OCU-DP is assigned. Table 3-3 shows the secondary channel rate associated with the various primary port rates supported by the card. For a further description of the secondary channel function, refer to Pub 62310 and TA-TSY 000077 and TA-TSY 000083.

**Table 3-3. OCU-DP Primary and Secondary Channel Rates**

Primary Port Rate	Secondary Channel Rate
56 kbps	2666 bps
19.2 kbps	1,066 bps
9.6 kbps	533 bps
4.8 kbps	266 bps
2.4 kbps	133 bps

## USER LB

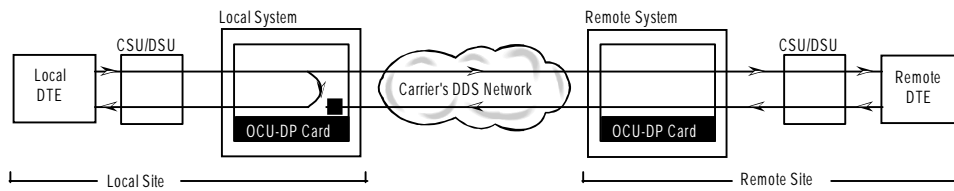
The User Loopback (USER LB) is a specialized code conversion function that is only relevant in Taiwan and some other countries in the Far East. The options are **d** and **o**, neither of which has any effect in North America.

## LB

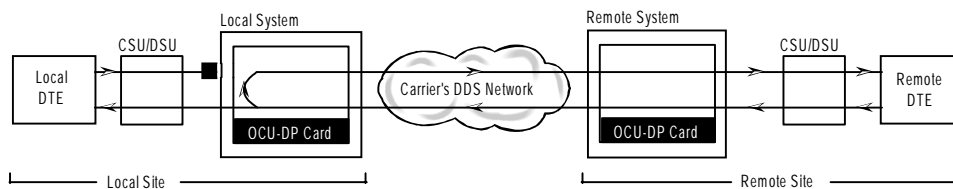
The OCU-DP card supports three Loopback options that test on the card itself. The **dte** option loops the 4-wire analog interface of the OCU-DP port towards the attached CSU/DSU. It is used to test the local cabling and the analog drivers in the OCU-DP card (see Figure 3-3).

The **net-a** (Network A) option loops the 4-wire OCU-DP interface towards the network. Use it to test all of the OCU-DP card circuitry, the system common equipment, the WAN link card, the remote equipment and the WAN line between the two sites (see Figure 3-4).

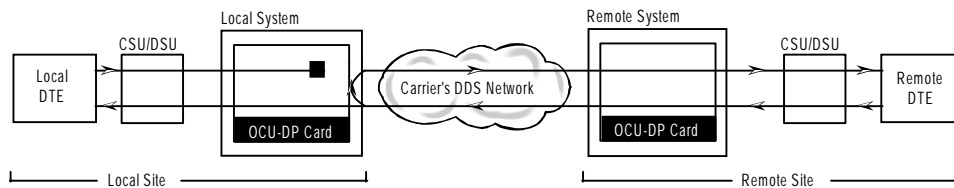
The **net-d** (Network D) option puts a loopback towards the network at the point where the OCU-DP card interfaces with the system bus. It separates the OCU-DP card circuitry from the system common equipment, WAN card, remote equipment, and WAN line between the two sites (see Figure 3-5).



**Figure 3-3. OCU Local Loopback (dte option)**



**Figure 3-4. OCU Local Loopback (net-a option)**



**Figure 3-5. OCU Local Loopback (net-d option)**

**LB GEN**

The Loopback Generate settings initiate various in-band diagnostic codes sent to the remote equipment. These codes are compatible with DDS networks and allow users to command a latching loopback at remote DDS equipment. The **ds0-n** loopback loops the analog interface of the remote OCU-DP device back towards the network for circuits using the 64K Rate. The

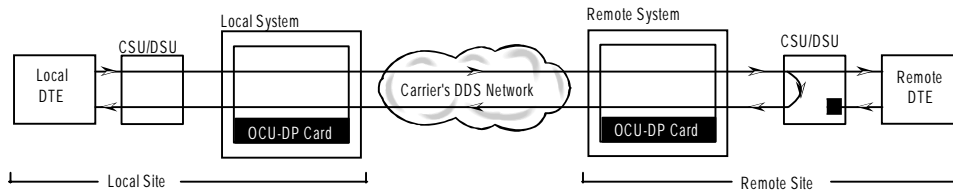
**ocu-n** loopback loops the analog interface of the remote OCU-DP device back towards the network for circuits using the 56K or less Rates. The **csu-n** loopback loops the 4-wire interface of the remote CSU/DSU device back towards the network. **A 48V converter is required for this loopback.**

The **csu-u** loopback loops the 4-wire interface of the local CSU/DSU device towards the network. Figure 3-6 through Figure 3-8 show the loopback locations. You can also turn all remote loopbacks **off**.

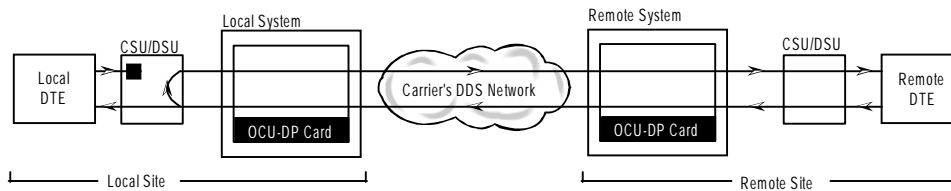
Loop-up or loop-down commands cannot be implemented for two ports on the same card simultaneously. You must finish all loopback operations on one port before trying to perform any loopbacks on another port.



**Figure 3-6. OCU Remote Loopback (ds0-n and ocu-n options)**



**Figure 3-7. OCU Remote Loopback (csu-n option)**



**Figure 3-8. OCU Remote Loopback (csu-u option)**

## LB DET

The Loopback Detection setting determines how the system responds to latching loopback commands from remote equipment. The OCU-DP reacts only to the in-band DDS format loopback commands for Channel Loop, OCU Loop and DSU Loop. The Loopback Detection setting does not affect local loopback commands from the local control terminal. The settings are **off**, **on** and **w/to** (on with time out).

The **off** option causes the system to ignore all remote loopback commands. The **on** option causes the system to monitor for DDS format loopback commands from the remote equipment. If the system detects a loopback command, it loops the data back until the remote equipment sends a stop loopback command. The time-out (**w/to**) option is the same as the **on** option, except that after 10 minutes the system automatically releases loopbacks commanded by the remote equipment.

When using the OCU-DP port for a clear-channel, 64 kbps circuit in DS0A mode, you should set the loopback detection to **off** to prevent unintentional loopback activation.

### 3.3.2 Performance Data Screen

If "majority vote" or "BCH" error correction is enabled on the OCU-DP 2 Card, the system will support performance monitoring of data traffic. The Performance Data Screen is accessed by selecting one of the two ports from the OCU-DP Card Main Screen and pressing "**p**" (**Perf**). A typical Performance Data Screen is shown in Figure 3-9. However, note that error correction and performance data are not supported on the OCU-DP 5 Card.

If the BCH method of error correction is selected, the OCU-DP card will monitor data traffic coming in from the T1 network and use the BCH polynomial values that accompany the data to log the number of errors and to try and correct such errors. Any data errors that are observed are considered "input" data errors and contribute to the input error statistics, including Input Errored Seconds (IES), Input Severely Errored Seconds (ISES), and Input Consecutive Severely Errored Seconds (ICSES).

Depending on the severity of the input errors, the BCH algorithm may be able to correct the data prior to transmitting it over the four-wire DDS circuit. If an error is so severe that it cannot be corrected, then it will also be logged as an "output" data error and will increment the Output Errored Seconds (OES), Output Severely Errored Seconds (OSES), and Output Consecutive Severely Errored Seconds (OCSES) counters.

If the majority vote method of error correction is selected, the OCU-DP card will monitor data traffic coming in from the T1 network and use the majority-vote algorithm to determine if any data errors have occurred. Any data errors that are observed are considered "input" data errors and contribute to the input error statistics such as Input Errored Seconds (IES), Input Severely Errored Seconds (ISES) and Input Consecutive Severely Errored Seconds (ICSES). Since the majority vote algorithm assumes that it can correct any data input errors, the "output" data

error category has no meaning in this context. Consequently, the Output Errored Seconds (OES), Output Severely Errored Seconds (OSES) and Output Consecutive Severely Errored Seconds (OCSES) fields do not apply to the majority vote mode.

Performance data covering the previous twenty-four hours are available and are totaled at the bottom of the screen, as shown in Figure 3-9.

Node_1	U1	OCU-DP×2	Rev AC-0	Ser 00101	12-31-99	14:33
<b>UNIT 1 PERFORMANCE</b>						
	<b>IES</b>	<b>ISES</b>	<b>ICSES</b>	<b>OES</b>	<b>OSES</b>	<b>OCSES</b>
<b>CUR</b>	0	0	0	0	0	0
<b>01</b>	0	0	0	0	0	0
<b>02</b>	0	0	0	0	0	0
<b>03</b>	0	0	0	0	0	0
<b>04</b>	0	0	0	0	0	0
<b>05</b>	0	0	0	0	0	0
<b>06</b>	0	0	0	0	0	0
<b>07</b>	0	0	0	0	0	0
<b>08</b>	0	0	0	0	0	0
<b>09</b>	0	0	0	0	0	0
<b>10</b>	0	0	0	0	0	0
<b>11</b>	0	0	0	0	0	0
<b>12</b>	0	0	0	0	0	0
<b>TOTAL</b>	0	0	0	0	0	0
<b>Refresh</b>	<b>Clear</b>	<b>pgUp</b>	<b>pgDn</b>	<b>Main</b>		

**Figure 3-9. Typical Performance Data Screen**

Table 3-4 lists the actions you can perform from the above screen by pressing the keys corresponding to the uppercase letters shown on the bottom highlighted line of the screen.

**Table 3-4. Performance Data Screen Actions**

Action	Function
Refresh	Updates certain time-related information fields that are not automatically updated (i.e. performance and test data).
Clear	Clears the test screen.
pgUp	Scrolls through data screens from the oldest to the newest.
pgDn	Scrolls through data screens from the newest to the oldest.
Main	Returns to the OCU-DP card main screen.

**IES**

The Input Errored Seconds (IES) field shows the total number of seconds in which any input errors were detected. Since this is an information-only field, there are no user-selectable parameters.

**ISES**

The Input Severely Errored Seconds (ISES) field shows the total number of seconds in which the input bit error rate exceeded one bit per thousand ( $1 \times 10^{-3}$ ). Since this is an information-only field, there are no user-selectable parameters.

**ICSES**

The Input Consecutive Severely Errored Seconds (ICSES) field is triggered by the occurrence of ten consecutive Input Severely Errored Seconds. Once triggered, the ICSES field will increment (by one) for each elapsed second until the system logs ten consecutive seconds that are not severely errored. Since this is an information-only field, there are no user-selectable parameters.

**OES**

The Output Errored Seconds (OES) field shows the total number of seconds in which any output errors were detected. This field only applies if the error correction method selected is BCH. Since this is an information-only field, there are no user-selectable parameters.

**OSES**

The Output Severely Errored Seconds (OSES) field shows the total number of seconds in which the output bit error rate exceeded one bit per thousand ( $1 \times 10^{-3}$ ). This field only applies if the error correction method selected is BCH. Since this is an information-only field, there are no user-selectable parameters.

**OCSES**

The Output Consecutive Severely Errored Seconds (OCSES) field is triggered by the occurrence of ten consecutive Output Severely Errored Seconds. Once triggered, the OCSES field will increment by one for each elapsed second until the system logs ten consecutive that are not severely errored. This field only applies if the error correction method selected is BCH. Since this is an information-only field, there are no user-selectable parameters.



### 3.3.3 Test Screen

Pressing “t” (Test) in the OCU-DP Card Main Screen will bring up the Test Screen shown in Figure 3-10. From this screen, you can create test situations between OCU-DP cards, or between a single OCU-DP card and data test equipment at a remote site.

Node_1	U1	OCU-DP×2	Rev AC-0	Ser 00101	12-31-99	14:33
		1		2		
BERT		n/a		n/a		
DIR		net		net		
DATA		pri		pri		
SYNC		no		no		
BE		*****		*****		
ES		*****		*****		
SES		*****		*****		
CSES		*****		*****		
OSS		*****		*****		
BER		*****		*****		
ELAP		*****		*****		
LB ST		*****		*****		
4W DDS		*****		*****		
Save	Undo	Refresh	insertErr	Clear	Main	

Figure 3-10. Typical OCU-DP Card Test Screen

Table 3-5 lists the actions you can perform from the Test Screen. These appear on the bottom highlighted line of the screen. Table 3-6 lists the settings controlled on this screen along with their possible and default values.

Table 3-5. Test Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Since the data in this screen is not updated in real time, the Refresh command is used to obtain the latest statistics.
insertErr	Allows you to manually insert a single error into a clear data signal.
Test	Clears the Test Screen.
Main	Returns to the OCU-DP Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

**Table 3-6. Test Screen Option Settings and Defaults**

Parameter	User Options	Notes	Default
BERT	off mark space 1:1 1:7 511 2047 qrss		off
DIR	net user		net
DATA	pri sec		pri
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 ST	information only—no user options		
4W DDS	information only—no user options		

**BERT**

The Bit Error Rate Tester (BERT) sends a data pattern and measures the bit error rate (BER) on the selected OCU-DP port. The patterns that can be selected are **off**, **mark** (all ones), **space** (all zeros), **1:1** (1010), **1:7** (0100-0000), **511** (511 test pattern), **2047** (2047 test pattern) and **qrss** (quasi-random pseudo signal).

**DIR**

The Direction (DIR) setting allows users to specify where the BERT test signal should be directed. The **net** (network) option transmits the test signal toward the Wide Area Network (WAN). The **user** option directs the signal toward the attached CSU/DSU device over the 4-wire interface.

**DATA**

The DATA setting specifies whether the BERT test signal should be connected to the **pri** (Primary) or the **sec** (Secondary) channel of the OCU-DP port. If there is no Secondary channel associated with the OCU-DP port, the only option available is **pri**.

**SYNC**

The Synchronization (SYNC) field shows 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 ( $1 \times 10^{-3}$ ). Since this is an information-only field, there are no user-selectable parameters.

**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 OCU-DP 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.

### 4W DDS

The 4-wire DDS setting shows if the 4-wire interface is both present and operational. The field will show **norm** if the interface is connected or **nos** for No Signal. Since this is an information-only field, there are no user-selectable parameters.

## 3.4 OCU-DP Card Error Messages

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

## 3.5 OCU-DP Card Troubleshooting

OCU-DP card problems could indicate a number of possible causes, including:

- Faulty receiving DTE at the near end (where the problem was first noticed)
- Faulty transmitting DTE at the far (opposite) end
- Faulty cabling between the DSU/CSU and OCU-DP card at the near end
- Faulty cabling between the DSU/CSU and OCU-DP at the far end
- T1 or E1 network failure
- Improper card configuration at either end (e.g., time slot and/or WAN port assignments)

Typically, a problem is indicated by a loss of incoming signal on a data port at either end of the circuit. You can perform numerous tasks to isolate the trouble and clear it. When troubleshooting transmission problems on a data circuit passing through an OCU-DP card, follow this general sequence:

1. First, verify that the T1 or E1 network is working properly by checking for current CGA-Red and CGA-Yellow alarms. If the network is faulty, the same transmission problem may exist with the other ports of the same OCU-DP card, and also with the data ports of all other data cards connected to the same T1 or E1 line. If no CGA alarms are present, continue with step 3.
3. Verify that the DS0 time slot and sub-rate TS assignments of the faulty port at both ends of the data circuit path are correct. Also be sure the port is connected to the proper WAN card and port and that other critical parameters, such as **RATE**, are set the same at each end. If these assignments are correct, continue with step 4.
4. At the local end (where the incoming data loss was first observed), use the loopback and test signal functions of the OCU-DP card to test the affected port. These tests are accessible from the OCU-DP Card Main Screen (through the **LB** and related parameters) and its associated Test Screen (through the **BERT** parameter), as previously described in this chapter. They allow you to test the circuit path in segments and thereby quickly pinpoint the problem.
5. If necessary, also perform loopbacks and send test signals to the affected circuit from the other end. In addition, you can perform end-to-end tests using a suitable data test set at one or both ends of the circuit in conjunction with the loopback functions of the OCU-DP card at either end.
6. If the OCUDP card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

### 3.6 OCU-DP Card Specifications

<b>OCU-DP Card 8249</b>													
Number of Ports - 2	Connector - female 8-pin RJ-48												
<b>OCU-DP Card 8248</b>													
Number of Ports - 10	Connector - female 8-pin RJ-48												
<b>OCU-DP Card 8247</b>													
Number of Ports - 5	Connector - female 8-pin RJ-48												
<b>OCU-DP 824x Card Specifications</b>													
Data Format	Synchronous-binary, serial												
Data Encoding	Bipolar, return to 0, AMI												
Line Interface	4-wire												
Speeds	2.4, 4.8, 9.6, 19.2, 56 and 64 kbps												
Sub-rate Framing Formatting	DS0-A, DS0-B with 5, 10, or 20 divisions per DS0												
Error Correction	Majority vote for speeds 9.6 kbps or less (All Cards) BCH for 19.2, 56, 64 kbps (Model 8249 Only)												
Secondary Channel	As described in AT&T 62310, 62411 Addendum (pass through only) and TA TSY 000077 and TA TSY 000083, a separate lower speed data circuit which may be used for testing and maintenance. Modes are on or off. Secondary Speeds Supported are:												
	<table border="1"> <thead> <tr> <th>Primary Port Rate</th> <th>Secondary Port Rate</th> </tr> </thead> <tbody> <tr> <td>56 kbps</td> <td>2,666 bps</td> </tr> <tr> <td>19.2 kbps</td> <td>1,066 bps</td> </tr> <tr> <td>9.6 kbps</td> <td>533 bps</td> </tr> <tr> <td>4.8 kbps</td> <td>266 bps</td> </tr> <tr> <td>2.4 kbps</td> <td>133 bps</td> </tr> </tbody> </table>	Primary Port Rate	Secondary Port Rate	56 kbps	2,666 bps	19.2 kbps	1,066 bps	9.6 kbps	533 bps	4.8 kbps	266 bps	2.4 kbps	133 bps
Primary Port Rate	Secondary Port Rate												
56 kbps	2,666 bps												
19.2 kbps	1,066 bps												
9.6 kbps	533 bps												
4.8 kbps	266 bps												
2.4 kbps	133 bps												
Operational Modes	OCU or CSU (software selectable per line)												
Loopbacks	Off, DTE, Net-a, Net-d (software selectable) (Net-a loops 4-wire interface to the network, Net-d loops to the network at card interface to system bus)												
Loopback Generation (Latching only)	Various loopbacks sent in-band to remote equipment: Off, DS0-n (loops the analog interface of the remote for 56K or less rate), CSU-N (loops the 4-wire interface of the remote), CSU-N (loops the 4-wire interface of local device).												
Loopback Detection	Off, On, On with 10 minute time-out (Latching and Non-Latching)												

**Distances Supported**

Primary Rate	Secondary Rate	Line Rate	Loss Limit dB	19 Ga. (KF)	22 Ga. (KF)	24 Ga. (KF)	26 Ga. (KF)
2400	---	2400	34	133.0	90.7	71.5	56.8
2400	133	3200	34	114.3	79.1	61.9	48.7
4800	---	4800	34	97.6	65.8	51.1	40.2
4800	267	6400	34	86.3	57.5	44.8	35.1
9600	---	9600	34	74.2	48.3	37.1	28.4
9600	533	12800	34	67.5	42.9	32.8	25.2
19200	---	19200	34	60.0	36.9	27.6	21.0
19200	1067	25600	34	57.0	33.9	25.1	19.9
56000	---	56000	43	60.7	35.0	24.5	17.6
56000	2667	72000	43	57.6	33.3	23.1	16.5
64000	---	72000	43	57.6	33.3	23.1	16.5

**Standards Compatibility**

AT&T	TR 62411 Pub 62310	Accunet T1.5 Service, Description and Interface Specifications DS0 Digital Local Channel Description and Interface Specification, August 1993
Bellcore	TA-TSY-000077 TA-TSY-000083	Digital Channel Banks - Requirements for Data port Channel Unit Functions, Issue 3, April 1986 Generic Requirements for the Digital Data System (DDS) Network Office Channel Unit, Issue 2, April 1986
ANSI	T1.107-1988	Digital Hierarchy - Format Specifications 1988





# Chapter 4

## FRAD Card

### 4.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the Frame Relay Assembly/Disassembly (FRAD) Card. These cards are labeled FRAD 232\*10 (8231) and FRAD 232\*8 (8230) on their faceplate ejector.

### 4.2 FRAD Card Descriptions

#### 4.2.1 FRAD 232\*10 Card Description (8231)

The FRAD 232\*10 Card provides access to the Frame Relay network of carriers via ten RS232 ports on the card.

##### 4.2.1.1 Card Jumper/Switch Settings

The FRAD 232\*10 Card has US/Euro jumpers on its mainboard.

##### 4.2.1.2 Installing the FRAD 232\*10 Card

Install the FRAD 232\*10 Card into any user card slot. These slots are U1 to U8 on the two-sided chassis or front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

### 4.3 FRAD Card User Screens and Settings

#### 4.3.1 FRAD 232\*10 Card Main Card Screen

The FRAD card must be configured for operation. This is done from the FRAD Card Main Screen, which is shown in Figure 4-1. To go to that screen, highlight the desired card on the System Main Screen and press <Enter>.

Node_1	U1	FRAD 232x10	RevA2-0	SER 01103	12-31-99	14:33					
	1	2	3	4	5	6	7	8	9	10	
STATE	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby
PRT TYP	frad	frad	frad	frad	frad	frad	frad	frad	frad	frad	frad
SRC	none	none	none	none	none	none	none	none	none	none	none
TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RATE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DLCI	n/a	16	16	16	16	16	16	16	16	16	16
SUB ADR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LMI	none	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTE PRM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DES PRT	1	1	1	1	1	1	1	1	1	1	1
FORMAT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
COM CF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CTS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TX CLK	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LB	off	off	off	off	off	off	off	off	off	off	off
FRM LEN	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Save | Undo | Refresh | Perf | Test | Lmi | Main

Figure 4-1. Typical FRAD Card Main Screen

The bottom highlighted line of this screen shows several actions you can perform from the screen. To perform an action, simply press the key indicated by the uppercase letter of the desired action. For example, to save your configuration settings, press “s”. Table 4-1 lists these actions, and Table 4-2 summarizes the FRAD card parameters and available settings. These are also described in the following paragraphs.

Table 4-1. 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).
Perf	Allows you to access the screen that contains performance statistics of the Frame Relay port. Refer to the Performance Data section of this chapter.
Test	Allows you to access the screen that initiates and measures testing statistics for highlighted user. Refer to the Test section of this chapter.
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 4-2. Main Screen Option Settings and Defaults

Parameter	User Options	Default
STATE	stdby actv	stdby
PRT TYP	frad conc	frad
SRC	wan serv rs232 none	none
TS	n/a table	n/a
RATE	0.6 1.2 2.4 4.8 9.6 14.4 19.2 28.8 38.4 56k 64k n/a	n/a
DLCI	n/a 1-1023	16
SUB AD	no yes (if yes then a number is entered <1-15>)	no
LMI	n/a none ansi ccitt lmi	n/a
DTE PRM	n/a	n/a
DES PRT	n/a 1-10	1
FORMAT	hdlc trnsp async	n/a
COM CTF	n/a (8,7,6,5) for char bits, (1,2) for stop bit (None, Odd, Even, Space, Mark) for parity bit	n/a
CTS	n/a perm loc off	n/a
TX CLK	n/a int ext	n/a
LB	off dte net	off
FRM LEN	32 64 128 256 n/a	n/a

## STATE

The State (STATE) setting determines whether the port is active or inactive. An inactive port does not occupy time slots on a WAN link. Set the State setting to standby (**stdby**) for a port that is not to be used or is not yet configured. Set it to active (**actv**) for a port that is ready for use.

## PRT TYPE

The Port Type (PRT TYPE) identifies the type of interface expected for this port. The selections are **frad** and **conc**. If **frad** is selected, **wan**, **serv**, or **rs232** is the input source. If **conc** is selected then **wan**, **serv** or **rs232** are the input options.

## SRC

The Source parameter (SRC) allows users to select the type and source of data input to that port. The options are **wan**, **serv**, and **rs232**. If **rs232** is selected, the card will expect direct transmission of data through the corresponding RS232 input port (i.e., the ten numbers at the top of the screen are also associated with the ten user ports on the back of the card).

The User card is set up as five groups of two ports each (1-2, 3-4, 5-6, 7-8, and 9-10). These ports are considered pairs so that if **rs232** is selected for port 1, port 2 will also require an RS-232 input.

## TS

The Timeslot (TS) setting identifies the time slots on the WAN link to which the Frame Relay port is connected. Highlight the table option and press the <Enter> key. At the bottom of the screen, the system will display the time slots that can be assigned to the WAN link selected in the previous selection (i.e. if w1-1 is chosen and the SRC option is either CSU or DSX, 24 timeslots will show available for assignment, if w1-1 is CEPT, 31 (with no CAS/CCS) timeslots will show available for assignment).

## RATE

The Rate parameter (RATE) is user-selectable depending upon the SRC and Format settings. If **frad** and **rs232** is selected, the options (in kbps) are **0.6** to **38.4**. Since these ports are considered pairs, if **rs232** is selected above for port 3, port 4 will also have choices for **0.6** to **38.4 kbps** rates.

If **conc** is selected the rate parameter selection options will be **56k** and **64k**.

## DLCI

The Data Link Connection Identifier (DLCI) identifies the frame's logical connection within the Frame Relay port. This number is assigned by the carrier. The options are **1-15** and **992 – 1023** are reserved.

**SUB ADR**

The Subscriber Address parameter (SUB ADR) selection options will be **no** and **yes**. If **yes** is selected the number is assigned by the carrier. The options are **1-15**.

**LMI**

The Local Management Interface options are **n/a** when the Port Type is set to FRAD. When Port Type is set to CONC then the settings for LMI are **ansi**, **ccitt**, and **lmi**.

**DTE PRM**

The DTE PRM option is **n/a**.

**DES PRT**

The Destination Port options are **n/a** if **frad** port type is selected and **1** to **10** if **conc** (concentrator) is selected.

**FORMAT**

The Format parameter can be set to **hdlc**, **trnsp**, and **async**.

**COM CTF**

The COM CTF options are **n/a**, **character bits (8,7,6,5)**, **stop bits (1,2)**, **parity bits (none, odd, even, space, mark)**.

**CTS**

The CTS settings are **n/a**, **perm**, **loc** and **off**.

**TX CLK**

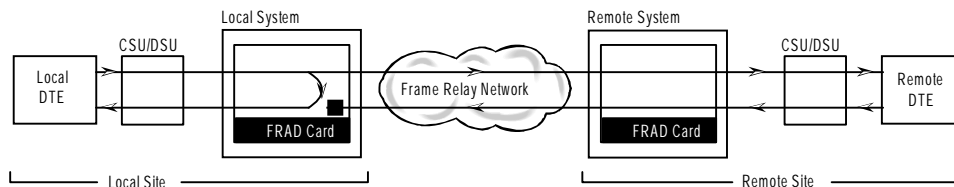
The Transmit Clock (TX CLK) setting is only available to users who selected **rs232** in the SRC setting. The options are **int** (internal) and **ext** (external). If any other SRC setting was selected, this setting will show as **n/a**.

**LB**

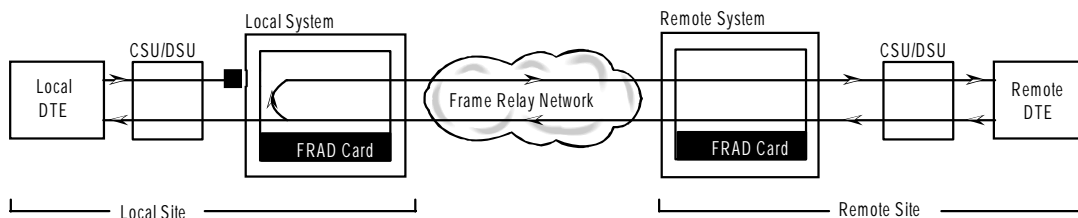
The Loopback (LB) setting allows you to activate a number of different loopback options for RS232. The **off** option is the default setting. The **dte** (DTE) option (shown in Figure 4-2) loops data from the local DTE back to itself through the local FRAD card. The **net** (network) option is shown in Figure 4-3; it loops data back toward the distant DTE through the local FRAD card.

**FRMLEN**

The Frame Length is the amount of bytes in a frame.



**Figure 4-2. DTE Loopback**



**Figure 4-3. Network Loopback**

### 4.3.2 Performance Data Screen

The FRAD card records various performance statistics for the Frame Relay port, and displays them in the Performance Data Screen (see Figure 4-4). Measurements are taken for each previous 15 minutes intervals increment up to 24 hours. A second counter at the top of the screen shows elapsed time from the last expired or current minute.

The performance statistics are not updated in real time. You must press “r” (**Refresh** command) in this screen to update this display. The total at the bottom of each column is the total for the entire 24-hour period that ended during the previous hour. However, it does not include the current-hour figure.

Node_1   U1 FRAD 232x10 Rev A2-0 Ser 01103   12-31-99 14:33								
Port 01 PERFORMANCE SEC. 00000 of 900								
	FRAME Rx	FRAME Tx	OCTETS Rx	OCTETS Tx	DRPRx	DRPTx	STATUS	
CUR	0	0	0	0	0	0	.LS	
01	0	0	0	0	0	0	.LS	
02	0	0	0	0	0	0	.LS	
03	0	0	0	0	0	0	.LS	
04	0	0	0	0	0	0	.LS	
05	0	0	0	0	0	0	.LS	
06	0	0	0	0	0	0	.LS	
07	0	0	0	0	0	0	.LS	
08	0	0	0	0	0	0	.LS	
09	0	0	0	0	0	0	.LS	
10	0	0	0	0	0	0	.LS	
11	0	0	0	0	0	0	.LS	
12	0	0	0	0	0	0	.LS	
TOTAL	0	0	0	0	0	0	.LS	
STATUS: T=DTE Down L=LOOPBACK S=STANDBY								
pgUp   pgDn   Refresh   Main								

Figure 4-4. Typical Performance Data Screen

The bottom highlighted line of this screen shows several actions you can perform from the screen. To perform an action, simply press the key indicated by the uppercase letter of the desired action. Table 4-5 lists these actions.

**Table 4-3. Performance Data Screen Actions**

<b>Action</b>	<b>Function</b>
pgUp	Shows the first 15 minute period (current + 1-12).
pgDn	Shows the second 15 minute period (current + 13-24).
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., performance and test data).
Main	Returns to the FRAD Card Main Screen.

**FRAME Rx**

The Frame Receive column shows the number of frames received during that particular one 15 minute period.

**FRAME Tx**

The Frame Transmit column shows the number of frames transmitted during that particular 15 minute period.

**OCTETS Rx**

The Octets Receive column shows the number of bytes received during that particular 15 minute period.

**OCTETS Tx**

The Octets Transmit column shows the number of bytes received during that particular 15 minute period.

**DRPRx**

The Dropped (frame) Received column tabulates the number of frames dropped before being received during the 15-minute period.

**DRPTx**

The Dropped (frame) Transmitted column tabulates the number of frames dropped before being transmitted during the 15-minute period.



## STATUS

The Status column shows an alphabetic character that describes the condition that caused the error in the last two columns. Conditions displayed include **T** (DTE port down), **L** (loopback in progress), and **S** (standby).

### 4.3.3 Test Screen

The FRAD card test screen allows testing of the FRAD card. Figure 4-5 shows the test screen. The bottom highlighted line of this screen shows several actions you can perform from the screen. To perform an action, simply press the key indicated by the uppercase letter of the desired action. For example, to save your configuration settings, press “s”. Table 4-5 lists these actions, and Table 4-3 summarizes the Test Screen parameters and available settings. These are also described in the following paragraphs.

Node_1	U1	FRAD	232x10	Rev	A2-0	Ser	01103	04-01-96	14:33	
	1	2	3	4	5	6	7	8	9	10
FRM GEN	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N/a
LENGTH	32	32	32	32	32	32	32	32	32	32
SYNC	no	no	no	no	no	no	no	no	no	no
FR RX	****	****	****	****	****	****	****	****	****	****
EF	****	****	****	****	****	****	****	****	****	****
ES	****	****	****	****	****	****	****	****	****	****
ELAP	****	****	****	****	****	****	****	****	****	****
IEC	****	****	****	****	****	****	****	****	****	****
Undo	Refresh	InsertErr	Clear	Main						

Figure 4-5. Typical FRAD Test Screen

**Table 4-4. Test Screen Actions**

Action	Function
Save	Saves the changes to the test.
Undo	Undoes the current changes made to the test screen.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., test data).
InsertErr	Inserts an error for testing the FRAD card.
Clear	Clears all input information currently on the screen.
Main	Returns to the FRAD Card Main Screen.

**Table 4-5. Test Screen Option Settings and Defaults**

Parameter	User Options	Default
FRM GEN	n/a on off	n/a
LENGTH	bytes in frame	32
SYNC	yes no	no
FR RX	number of frames received	*****
EF	errored frames	*****
ES	Total number of errored seconds. Information only field - cannot edit.	*****
ELAP	Total number of seconds during the test. Information-only field - cannot edit.	*****
IEC	Total number of inserted errors	*****

**FRM GEN**

The Frame Generate turns on or off the test.

**LENGTH**

The Length is the amount of bytes in a frame.

**SYNC**

The Synchronization field tells you if the integration has achieved synchronization either with itself via a remote loopback or with the remote test equipment. This is an information-only field; you cannot edit it.

**FR RX**

The FR RX is the number of frames received.

**EF**

The Errored Frames field shows the total number of frame 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 errors were detected. This is an information-only field; you cannot edit it.

**ELAP**

The Elapsed time (ELAP) setting shows the running tally of the total number of seconds during the test. This is an information-only field; you cannot edit it.

**IEC**

The Insert Error Count field shows the total number of errors that were intentionally inserted using the “I” or “E” commands from the Menu of Actions. Since this is an information-only field, there are no user-selectable parameters.

### **4.3.4 FRAD 232\*8 Card Description (8230)**

The FRAD 232\*8 Card provides access to the Frame Relay network of carriers via eight on-board RS232 ports on the back of the card.

#### **4.3.4.1 Card Jumper/Switch Settings**

The FRAD 232\*8 Card has US/Euro jumpers on its mainboard.

#### **4.3.4.2 Installing the FRAD 232\*8 Card**

Install the FRAD 232\*8 Card into any user card slot. These slots are U1 to U8 on the two-sided chassis or front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

### 4.3.5 FRAD 232\*8 Card Main Card Screen

The FRAD 232\*8 card is a plug-in user card for the integrated access system. The FRAD card provides user access to the Frame Relay network of carriers through the use of eight on-board RS232 ports on the back of the card. Additionally, DS0-B traffic can be routed through the FRAD card across the backplane via WAN cross-connect and low speed data cards.

Figure 4-6 shows the FRAD main screen. Table 4-7 lists the FRAD card main screen menu of actions and Table 4-7 lists the settings controlled on this screen along with their possible and default values.

Node_1		U1	FRAD-18	8230	Rev A0-0	Ser 01103	12-31-99	14:33
STATE		stdby						
WAN/SRV		w1-1						
TS		table						
RATE		56k						
LMI		none						
MAX PVC		1						
FRAME SIZE		256						
N391		n/a						
N392		n/a						
N393		n/a						
T391		5						
EQP TYPE		dte						
Save		Undo	Refresh	pVc	Performance	Main		

Figure 4-6. FRAD 232\*8 Card Main Screen

Table 4-6. FRAD 232\*8 Card Main Screen Menu of Actions

Action	Function
Save	Saves the changes to the test.
Undo	Undoes the current changes made to the test screen.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., test data).
pVc	Allows the user to access the screen to assign Permanent Virtual Circuits to the Frame Relay Port.
Perf	Allows the user to access the screen that contains performance statistics of the Frame Relay port. Refer to the Performance section later in this chapter.
Main	Returns to the FRAD Card Main Screen.

Table 4-7. FRAD 232\*8 Card Main Screen Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
WAN/SRV	w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 P1 P2 P3		w1-1
TS	table		blank
RATE	56k 64k		56k
LMI	none ansi ccitt lmi	1	none
MAX PVC	1 2 3 4 5 6		1
FRAME SIZE	5-256		256
N391	n/a 1-255		n/a
N392	n/a 1-10		n/a
N393	n/a 1-10		n/a
T391	n/a 5 10 15 20 25 30		n/a
EQP TYPE	dte dce		dte

**Notes:**

- Setting **LMI** (Local Management Interface) to **none** will cause **N391**, **N392**, **N393** and **T391** fields to show as **n/a**. Setting LMI to any of the other choices will allow users to select values for those fields.

**STATE**

The State setting determines whether the port is active or inactive. An inactive port does not occupy time slots on a WAN link. Set State to **stdby** (standby) for a port that is not in use or not yet configured. Set it to **actv** (active) for a port that is ready for use.

### WAN/SRV

The WAN/SERV setting identifies the incoming WAN or server link connected to this engine. The WAN setting identifies the WAN link assigned to this port. Choices are **w1-1** through **w4-2**. To identify a server link enter P1-P3.

### TS

The TS (time slot) setting identifies the time slot on the WAN link to which the Frame Relay port is connected. Highlight the table option and press the "Enter" key. At the bottom of the screen, the system will display the time slots that can be assigned to the WAN link selected in the previous selection (i.e. if w1-1 is chosen in the WAN option is either CSU or DSX, 24 timeslots will show available for assignment, if w1-1 is CEPT, 30 timeslots will show available for assignment). Only one timeslot can be selected for each Frame Relay port.

### RATE

The Rate parameter establishes the bits per second transmission rate of the timeslot selected for this Frame Relay port. The options are **56k** and **64k**.

### LMI

The Local Management Interface setting allows users to select the protocol to be used for this port. The options are **none**, **ansi** (ANSI T1.617 Annex D), **ccitt** (ITU Q.933 Annex A) and **lmi**. This release does not support CCITT.

### MAX PVC

The Maximum Permanent Virtual Circuit parameter sets the total PVCs that can be used for this port. The options are **1-8**.

### FRAME SIZE

The Frame Size setting allows users to set the maximum size of the individual Frame Relay frames. This setting is measured in bytes. The options are **5-256**.

### N391

The N391 parameter allows users to select the number of "keep alive" messages (see T391 below) that should elapse before the full status inquiry message is sent. This number should be set to the desired number according to each user's environment. The options are **n/a** (if **none** is selected in LMI above) or **1-255**.

**N392**

The N392 parameter allows users to select the number of errors that will be tolerated during the number of events set in N393 below. This number should be set to the desired number according to each user's environment. The options are **n/a** (if **none** is selected in LMI above) or **1–10**.

**N393**

The N393 parameter allows users to select the number of events in which errors will be counted and works with the N392 parameter above (therefore N393 should be greater than or equal to N392). This number should be set to the desired number according to each user's environment. Options are **n/a** (if **none** is selected in LMI above) or **1–10**.

**T391**

The T391 parameter allows the user to select the time (measured in seconds) that should elapse between "keep alive" messages (see N391 above). This number should be set to the desired number according to the user's environment. The options are **n/a** (if none is selected in LMI above) or **5, 10, 15, 20, 25** and **30**.

**EQP TYPE**

The equipment type is either **dte** or **dce**. The default is **dte**.



### 4.3.6 Performance Monitoring Screen

The Frame Relay card records performance statistics for the Frame Relay port. Measurements are taken during the current hour and each previous hour increments for a total of 24 hours. There is a minute counter at the top of the screen that shows elapsed time from the last expired hour or in the current hour. The Performance statistics are not updated in real time. Users must use the "R" (**Refresh**) command to update columns. The total at the bottom of the column is the total for the entire 24 hour period (it does not include the current hour figure). Figure 4-7 shows the Performance Monitoring screen for the main Frame Relay card screen.

Node_1   U1 FRAD-18 8230 Rev A0-0 Ser 01103   12-31-99 14:33								
Port 1 Performance Min. 00 of 60								
	RX FRAME	TX FRAME	RX BYTE	TX BYTE	ERXS	ETXS	STS	
CUR	0	0	0	0	0	0	. .	
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: D=Down; E=LMI Err								
Refresh	Clear	pgUp	pgDn	Main				

Figure 4-7. Port Performance Monitoring Screen

**Table 4-8. Performance Monitoring Screen Menu of Actions**

<b>Action</b>	<b>Function</b>
Refresh	Updates certain time-related information fields that are not automatically updated (i.e. performance and test data).
Clear	Clears the testing screen and resets all counters to zero.
pgUp	Allows the user to see the first 12 hour period (current + 1-12).
pgDn	Allows the user to see the second 12 hour period (current + 13-24).
Main	Returns to the user port configuration screen.

**RX FRAME**

The Receive Frame column shows a total of frames received during that particular one hour period.

**TX FRAME**

The Transmit Frame column shows a total of frames transmitted during that particular one hour period.

**RX BYTE**

The Receive Byte column shows a total of bytes received during that particular one hour period.

**TX BYTE**

The Transmit Byte column shows a total of bytes received during that particular one hour period.

**ERXS**

The Error Receive Sequence column shows the total number of times the LMI sequence number has been reset due to receive errors.

**ETXS**

The Error Transmit Sequence column shows the total number of times the LMI sequence number has been reset due to transmit errors.

## STS

The Status column shows an alphabetic character to describe the condition that caused the error in the last two columns. Conditions described are **D** (Frame Relay port down) and **LMI E** (Error).

### 4.3.7 PVC Settings

Choosing the "V" (pVc) option from the Menu of Actions of the Main Frame Relay screen brings up the PVC screen used to define the PVCs (up to eight) contained in the Frame Relay port. Figure 4-8 shows the PVC main screen. Table 4-9 lists the PVC screen menu of actions and Table 4-10 shows the parameters and options for this screen.

Node_1	U1	FRAD-18	8230	Rev A0-0	Ser 01103	12-31-99	14:33	
	1	2	3	4	5	6	7	8
FR PORT	undef	undef	undef	undef	undef	undef	undef	undef
DLCI	16	16	16	16	16	16	16	16
SUB ADR	no	no	no	no	no	no	no	no
CONG CTL	disab	disab	disab	disab	disab	disab	disab	disab
CB FWD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CB BWD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
EB FRD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
EB BWD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CRMI FWD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CRMI BWD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Save | Undo | Refresh | Copy | usEr | Perf | Main

Figure 4-8. PVC Main Screen

**Table 4-9. PVC Screen Menu of Actions**

Action	Function
Save	Saves the changes to the settings.
Undo	Returns all settings to the last saved state.
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., test data).
Copy	Copies the contents of the current column to the next column. Useful if users change a lot of entries in one column and want to repeat those changes in subsequent columns.
usEr	Allows the user to access the screen necessary to assign user ports to PVCs on the FRAD port.
Perf	Allows the user to access the screen that contains performance statistics of all active FRAD ports.
Main	Returns to the main screen. If changes are made to settings and not saved, the system will prompt users to save or lose changes.

**Table 4-10. PVC Screen Option Settings and Defaults**

Parameter	User Options	Default
FR PORT	undef 1	undef
DLCI	16-991	16
SUB ADR	no yes	no
CONG CTL	disab enab	disab
CB FWD	n/a 0-65000	n/a
CB BWD	n/a 0-65000	n/a
EB FWD	n/a 0-65000	n/a
EB BWD	n/a 0-65000	n/a
CRMI FWD	n/a 1-65000	n/a
CRMI BWD	n/a 1-65000	n/a

**FR PORT**

The Frame Relay Port parameter shows the Frame Relay Port to which the PVC is assigned. Since the current revision only supports one Frame Relay port, the valid options are **undef** (undefined) and **1** (one).

**DLCI**

The Data Link Connection Identifier (DLCI) identifies the frame's logical connection within the Frame Relay port. This number is assigned by the carrier. The options are **16–991**.

### SUB ADR

The Subordinate Address setting gives the user the ability to segregate one PVC into several different paths (up to eight) for Frame Relay traffic. The options for this parameter are either no or yes. This is a proprietary implementation and will not work with other equipment. A corresponding unit is required at the far end to decode information. *Choosing yes will make all other vendor's equipment incompatible.*

### CONG CTL

The Congestion Control setting allows the user to set up the following six congestion control parameters. These features are detailed in the subscription document between the user and the carrier. The options are **disab** (disable) and **enab** (enable). Selection of disable will cause the following six fields to show as **n/a**.

### CB FWD

The Committed Burst in the Forward direction parameter defines the threshold for the average-receive-rate (incoming frames) where the carrier will make every effort to deliver the traffic to the subscriber (in effect, this is the guaranteed receive rate). Frames received in excess of this parameter setting are eligible for discard within the carrier network. The options are **0–65000**.

### CB BWD

The Committed Burst in the Backward direction parameter defines the threshold for the average-transmission-rate (outgoing frames) where the carrier will make every effort to deliver the subscriber traffic to its destination (in effect, this is the guaranteed transmission rate). Frames sent in excess of this parameter setting are eligible for discard within the carrier network. The options are **0–65000**.

### EB FWD

The Excessive Burst in the Forward direction parameter defines the threshold for the average-burst-rate (incoming frames) over and above the CB FWD setting where the carrier will admit the frames into the network (in effect, this is the maximum receive rate). Frames sent below this threshold, but above the CB FWD threshold, are admitted into the carrier network with the DE (discard eligible) bit set. If congestion occurs in the network, these frames are the first to be discarded. The options are **0–65000**.

**EB BWD**

The Excessive Burst in the Backward direction parameter defines the threshold for the average-burst-rate (outgoing frames) over and above the CB BWD setting where the carrier will admit the frames into the network (in effect, this is the maximum transmission rate). Frames sent below this threshold, but above the CB BWD threshold, are admitted into the carrier network with the DE (discard eligibility) bit set. If congestion occurs in the network, these frames are the first to be discarded. The options are **0–65000**.

**CRMI FWD**

The Committed Rate Measuring Interval in the Forward direction parameter shows the time (in 100 millisecond increments) that is used with CB and EB rates to obtain the average used for inclusion or exclusion of outgoing information in the data bursts. The options are **1–65000**.

**CRMI BWD**

The Committed Rate Measuring Interval in the Backward direction parameter shows the time (in 100 millisecond increments) that is used with CB and EB rates to obtain the average used for inclusion or exclusion of incoming information in the data bursts. The options are **1–65000**.

### 4.3.8 PVC Performance Screen

The Frame Relay card records performance statistics for active PVCs. Measurements are taken during the current hour and each previous hour increments for a total of 24 hours. There is a minute counter at the top of the screen that shows elapsed time from the last expired hour or in the current hour. The Performance statistics are not updated in real time. Users must enter the "R" (**Refresh**) command to update columns. The total at the bottom of the column is the total for the entire 24 hour period (it does not include the current hour figure). Figure 4-9 shows the Performance Monitoring screen for the PVC screen.

Node_1   U1 FRAD-18 8230 Rev A0-0 Ser 01103   12-31-99 14:33						
Port 1 Performance Min. 00 of 60						
	RX FRAME	TX FRAME	RX BYTE	TX BYTE	STS	
CUR	0	0	0	0	. .	
01	0	0	0	0	. .	
02	0	0	0	0	. .	
03	0	0	0	0	. .	
04	0	0	0	0	. .	
05	0	0	0	0	. .	
06	0	0	0	0	. .	
07	0	0	0	0	. .	
08	0	0	0	0	. .	
09	0	0	0	0	. .	
10	0	0	0	0	. .	
11	0	0	0	0	. .	
12	0	0	0	0	. .	
TOTAL	0	0	0	0	. .	
STATUS: I=Inactive; D=Deleted						
Refresh   Clear   pgUp   pgDn   Main						

Figure 4-9. PVC Performance Monitoring Screen

**Table 4-11. PVC Performance Monitoring Screen Menu of Actions**

Action	Function
Refresh	Updates certain time-related information fields that are not automatically updated (i.e., performance and test data).
Clear	Clears the testing screen and resets all counters to zero.
pgUp	Allows the user to see the first 12 hour period (current + 1-12).
pgDn	Allows the user to see the second 12 hour period (current + 13-24).
Main	Returns to the user port configuration screen.

**RX FRAME**

The Receive Frame column shows a total of frames received on the PVC (highlighted by the cursor on the previous screen) during that particular one hour period.

**TX FRAME**

The Transmit Frame column shows a total of frames transmitted on the PVC (highlighted by the cursor on the previous screen) during that particular one hour period.

**RX BYTE**

The Receive Byte column shows a total of bytes received on the PVC (highlighted by the cursor on the previous screen) during that particular one hour period.

**TX BYTE**

The Transmit Byte column shows a total of bytes transmitted on the PVC (highlighted by the cursor on the previous screen) during that particular one hour period.

**STS**

The Status column shows an alphabetic character to describe the condition that caused the error in the last two columns. Conditions described are PVC **I** (Inactive) and PVC **D** (Deleted).



### 4.3.9 User Screen

Choosing the "E" (**usEer**) option from the Main PVC screen brings up the User screen used to define the input of user circuits on the PVC. Input can come from either direct RS232 connections on the back of the card or DS0-B traffic across the backplane from WAN cross-connects. Figure 4-10 shows the User screen. Table 4-12 lists the user screen menu of actions and Table lists the parameters and options for this screen.

Node_1	U1	FRAD-18	8230	Rev A0-0	Ser 01103	12-31-99	14:33	
	1	2	3	4	5	6	7	8
STATE	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby
CIRCUIT	1	1	1	1	1	1	1	1
SUB ADDR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
PRIORITY	low	low	low	low	low	low	low	low
SRC	rs232	rs232	rs232	rs232	rs232	rs232	rs232	rs232
WAN	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RATE	2.4	2.4	2.4	2.42	2.4	2.4	2.4	2.4
SR TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FMT	hdlc	hdlc	hdlc	hdlc	hdlc	hdlc	hdlc	hdlc
DELAY	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DATA CNF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FLOW CTL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CTS	perm	perm	perm	perm	perm	perm	perm	perm
TX CLK	int	int	int	int	int	int	int	int
LB	off	off	off	off	off	off	off	off
LB DET	w/to	w/to	w/to	w/to	w/to	w/to	w/to	w/to

Save | Undo | Refresh | Test | Main

Figure 4-10. User Screen

Table 4-12. User Screen Menu of 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).
Test	Allows the user to access the screen that initiates and measures testing statistics for highlighted user. Refer to Test section.
Main	Returns to the main screen. If changes are made to settings and not saved, users will be prompted to save or lose changes.

Table 4-13. User Screen Option Settings and Defaults

Parameter	User Options	Default
STATE	stdby actv	stdby
CIRCUIT	1-8	1
SUB ADDR	n/a 1-15	n/a
PRIORITY	low med high	low
SRC	rs232 b-5 b-10 b-20	rs232
WAN	n/a w1-1 through w4-2	n/a
TS	n/a 1-24 1-16 and 17-31	n/a
RATE	2.4 4.8 9.6	2.4
SR TS	n/a 1-5 1-10 1-20	n/a
FMT	hdlc trnsp async	hdlc
DELAY	n/a 0-7	n/a
DATA CNF	8 7 6 5	8
	1 2	1
	none odd even space mark	none
FLOW CTL	n/a none xon/f dtr	n/a
CTS	perm 10 130 160 1100 off	perm
TX CLK	n/a int ext	int
LB	off dte net rem ocu csu dsu	off
LB DET	w/to on off	w/to

### STATE

The State setting determines whether the port is active or inactive. Set State to **stdby** (standby) for a port that is not being used or is not yet configured. Set it to **actv** (active) for a port that is ready for use.

### CIRCUIT

The Circuit number is the number of the PVC specified on the PVC screen. The options are **1-8**.

### SUB ADDR

The Subordinate Address is a proprietary subdivision of the PVC into up to eight specific data channels. Even though there are only eight possible channels, the options for this parameter are **1-15** and **n/a**.

## PRIORITY

The Priority setting allows the user to assign a value to the data being sent on a specific channel. The options are **low**, **med** and **high**. If a conflict arises in transmission on the PVC, high priority data will supersede low priority data.

## SRC

The Source parameter allows the user to select the type and source of data input to that port. The options are **rs232**, **b-5**, **b-10** and **b-20**. If **rs232** is selected, the card will expect direct transmission of data through the corresponding RS232 input port (i.e. the eight numbers at the top of the screen are also associated with the eight user ports on the back of the card). If any of the DS0-B formats are chosen, the card will expect input from the WAN link selected in the WAN, TS and SRTS parameters.

The User card is set up as four groups of two ports each (1-2, 3-4, 5-6 and 7-8). These ports are considered pairs so that if **rs232** is selected for port #1, port #2 will also require RS232 input. DS0-B input, however, can be mixed with the three different formats (e.g. port #1 could have a **b-5** input, while port #2 could have a **b-20** input).

## WAN

The WAN setting allows the user to select the WAN port used to facilitate data transmission to the FRAD card. The options are **w1-1-w4-2**.

## TS

The Time Slot parameter selects the specific timeslot on the WAN link chosen in the previous setting the card can expect data traffic destined for the FRAD card. The options are determined by the equipment on the WAN link selected in the previous setting. If WAN 1-1 is equipped with either a CSU or DSX module, the options are **1-24**. If a CEPT module is installed on that link, the options are **1-15** and **17-31**.

## RATE

The Rate parameter is user selectable depending upon the SRC and the Format settings. If **rs232** is selected, the options (in kbps) are **9.6**, **4.8** and **2.4**. If **b-5** is selected, the only option (in kbps) available is **9.6**. If **b-10** is selected, the only option (in kbps) available is **4.8**. If **b-20** is selected, the only option (in kbps) available is **2.4**. Since these ports are considered pairs, if **rs232** is selected above for port #3, port #4 will also have choices for **9.6**, **4.8** and **2.4** rates.

## SR TS

The Sub-Rate Time Slot is also selectable depending upon the SRC setting above. If **rs232** is selected, the only option available is **n/a**. If **b-5** is selected, the options available are **1-5**. If **b-10** is selected, the options available are **1-10**. If **b-20** is selected, the options available are **1-20**. Since these ports are considered pairs, if **rs232** is selected above for port #3, port #4 will also have no options available except **n/a**.

## FMT

The Format parameter is also selectable depending upon the SRC setting above. If **rs232** is selected, the options available are **hdlc**, **trnsp** (bit-in-bit-out) and **async**. If **b-5**, **b-10** or **b-20** are selected, the only option available is **hdlc**. The Maximum Frame Size parameter set on the Main Screen is not applicable if the Format chosen is **trnsp**. Also, the **trnsp** format will not support a Rate of 9.6 kbps. Since these ports are considered pairs, if **b-5** is selected above for port #5, port #6 will also have no choices other than **hdlc**.

## DELAY

The Delay parameter is only available for users who select **trnsp** (transparent) (bit-in-bit-out) format in the previous setting. The delay figure determines how many frames are accumulated before transmission begins to insure synchronization. Frame size is determined by the priority setting (i.e. a high priority **trnsp** circuit has a 64 byte frame size, medium priority is a 128 byte frame and low priority has a 192 byte frame). The options (measured in frames) are **0-7**.

## DATA CNF

The Data Configuration setting is a three-step process that is only available to users who selected **async** in the Format setting above. The first step allows the user to choose data bits. The options are **8**, **7**, **6**, and **5**. The second step is to choose the stop bits. The options are **1** and **2**. The third step is to choose the parity setting. The options are **none**, **odd**, **even**, **space** and **mark**. If any other Format setting was selected, this setting will show as **n/a**.

## FLOW CTL

The Flow Control setting is only available to users who selected **async** in the Format setting above. The options are **none**, **xon/f**, and **dtr**. If any other Format setting was selected, this setting will show as **n/a**. Xon and Xoff are used for software flow control and DTR is hardware flow control. The RTS signal is used in place of the DTR command since the RJ48 connector does not have a provision for the DTR signal. The option could also be called **dtr/rts**.

## CTS

The Clear to Send setting is only available to users who selected **rs232** in the SRC setting above. The options are **perm**, **10**, **130**, **160**, **1100**, and **off**. If any other SRC setting was selected, this setting will show as **n/a**. If the **perm** setting is selected, CTS is always "on." All of the "I" (local) settings let the CTS follow the state of the incoming RTS signal. The numbers after the "I" are millisecond figures of **0** (immediate), **30**, **60** and **100**.

## TX CLK

The Transmit Clock setting is only available to users who selected **rs232** in the SRC setting and **hdlc** or **trnsp** in the Format setting above. The options are **int** (internal), and **ext** (external). If any other SRC or Format setting were selected, this setting will show as **n/a**. (A special cable, available from vendors, is necessary to enable the external clock.)

## LB

The Loopback setting allows users to activate a number of different loopback options for both RS232 and DS0-B formats. The **off** option is the default setting. The **dte** (DTE) option (shown in Figure 4-11) loops data from the local DTE back to itself through the local FRAD card. **net** (network) option (shown in Figure 4-12) loops data back toward the distant DTE through the local FRAD card. The **rem** (remote) option (shown in Figure 4-13) uses the proprietary subaddressing mode to tell the remote FRAD card to loop data back to the local FRAD card.

Additionally, if one of the DS0-B formats are used, normal DDS loopback commands are also recognized. The other options (shown in Figure 4-14) are toward **ocu** (OCU), toward the **csu** (CSU) and toward the **dsu** (DSU).

## LB DET

The Loopback Detection setting determines how the FRAD card will respond loopback commands from remote and local equipment. The **(on)** option causes the card to monitor ports for loopback commands from remote equipment or the DDS network. The **w/to** (with time-out) option is the same as the **on** option, except that after ten minutes loopbacks are automatically released. The **off** option causes the FRAD card to ignore all loopback commands.

DTE Loopback

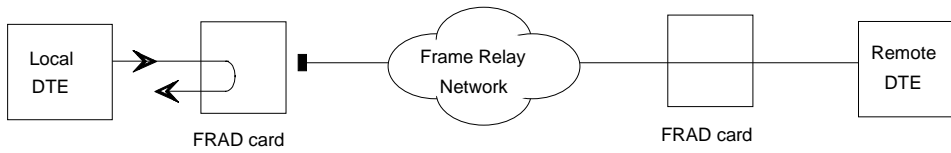


Figure 4-11. DTE Loopback

Network Loopback

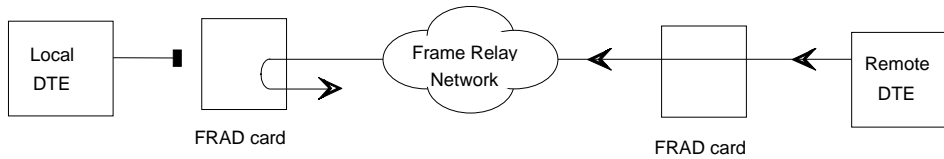


Figure 4-12. Network Loopback

Remote Loopback

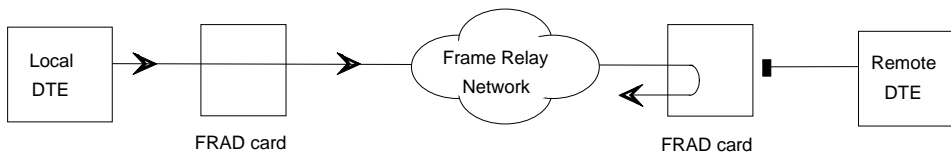


Figure 4-13. Remote Loopback

CSU, DSU and OCU Loopbacks

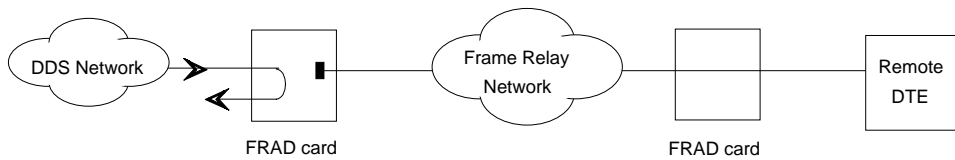


Figure 4-14. DDS Loopbacks

### 4.3.10 User Test Screen

The Test option facilitates proprietary testing of the eight User addresses. This feature can only operate if the data format is **hdlc** with sub-addressing enabled. It is a Link Integrity test which is used to send test frames to either the network or network or user. **This is not a BERT test.** Figure 4-15 shows the User Test screen. Table 4-14 lists the user test screen menu of actions and Table 4-15 lists the settings controlled on this screen along with their possible and default values.

Node_1	U1	FRAD-18	8230	Rev	A0-0	Ser	01103	12-31-99	14:33
	1	2	3	4	5	6	7	8	
STATE	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby
DIR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CTS	net	net	net	net	net	net	net	net	net
RLSD	norm	norm	norm	norm	norm	norm	norm	norm	norm
SYNC	no	no	no	no	no	no	no	no	no
EF	*****	*****	*****	*****	*****	*****	*****	*****	*****
ES	*****	*****	*****	*****	*****	*****	*****	*****	*****
FER	*****	*****	*****	*****	*****	*****	*****	*****	*****
ELAP	*****	*****	*****	*****	*****	*****	*****	*****	*****
IEC	*****	*****	*****	*****	*****	*****	*****	*****	*****
RTS ST	*****	*****	*****	*****	*****	*****	*****	*****	*****
LB ST	*****	*****	*****	*****	*****	*****	*****	*****	*****
RLB ST	*****	*****	*****	*****	*****	*****	*****	*****	*****

Save	Undo	Refresh	InsertErr	Clear	Main
------	------	---------	-----------	-------	------

Figure 4-15. User Test Screen

Table 4-14. User Test Screen Menu of 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).
InsertErr	Allows the user to manually insert a single error into the clear data signal.
Clear	Clears the testing screen and resets all counters to zero.
Main	Returns to the main screen. If changes are made to settings and not saved, users will be prompted to save or lose changes.

Table 4-15. User Test Screen Option Settings and Defaults

Parameter	User Options	Default
STATE	off on n/a	n/a
DIR	net user	net
CTS	norm off on	norm
RLSD	norm off on	norm
SYNC	no yes	no
EF	information only-no user input	*****
ES	information only-no user input	*****
FER	information only-no user input	*****
ELAP	information only-no user input	*****
IEC	information only-no user input	*****
RTS ST	information only-no user input	*****
LB ST	information only-no user input	*****
RLB ST	information only-no user input	*****

### STATE

The State setting initiates the testing procedure. The options are **off**, **on** and **n/a**.

### DIR

The Direction setting allows users to specify where the test data should be directed. The first option is **net** (network) which means that the test data will be transmitted through the system toward the Frame Relay Network. The **user** option means that the data will be directed toward the attached DTE device over the RS232 interface or WAN cross-connect.

### CTS

The Clear To Send (CTS) option allows users to define whether the CTS control lead should be held **on** (high) or **off** (low). Selecting either **on** or **off** will override the selection made in the User screen. The third option is **norm** (normal) which means that CTS will behave in the normal manner.

### RLSD

The Receive Line Signal Detect (RLSD) option allows users to define whether the RLSD control lead should be held **on** (high) or **off** (low). The third option is **norm** (normal) which means that RLSD will behave in the normal manner.



**SYNC**

The Synchronization (SYNC) field shows if the data has achieved synchronization or not. Since this is an information-only field, there are no user-selectable parameters.

**EF**

The Errored Frames field shows the total number of frame errors logged. This field is used to calculate the FER field below. Since this is an information-only field, there are no user-selectable parameters.

**ES**

The Errored Seconds 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.

**FER**

The Frame Error Rate field shows the total number of errored frames divided by the total frames received for the duration of the test. Since this is an information-only field, there are no user-selectable parameters.

**ELAP**

The Elapsed Time field shows the time (in seconds) from the time when the state field was changed from **off** to **on** or when the Clear command was used. This figure is used to show the duration of the test. Since this is an information-only field, there are no user-selectable parameters.

**IEC**

The Insert Error Count field shows the total number of errors that were intentionally inserted using the “I” or “E” commands. Since this is an information-only field, there are no user-selectable parameters.

**RTS ST**

The Request to Send State field shows the state of the RTS during the test. Since this is an information-only field, there are no user-selectable parameters.

**LB ST**

The Loop Back State field shows the state of the Local Loop Back during the test. Since this is an information-only field, there are no user-selectable parameters.

**RLB ST**

The Remote Loop Back State field shows the state of the Remote Loop Back during the test. Since this is an information-only field, there are no user-selectable parameters.

## 4.4 FRAD Card Error Messages

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

## 4.5 FRAD Card Troubleshooting

FRAD card problems could indicate a number of possible causes, including:

- Faulty receiving DTE at the near end (where the problem was first noticed)
- Faulty transmitting DTE at the far (opposite) end
- Faulty cabling between the DTE and FRAD card at the near end
- Faulty cabling between the DTE and FRAD card at the far end
- T1 or E1 network failure
- Improper card configuration at either end (e.g., time slot and/or WAN port assignments)

Typically, a problem is indicated by a loss of incoming signal on a data port at either end of the circuit. You can perform numerous tasks to isolate the trouble and clear it. When troubleshooting transmission problems on a data circuit passing through a FRAD card, follow this general sequence:

1. If all ports are affected, verify that the US/EUR jumper is correctly placed to match the US/EUR jumper on the chassis.
2. Verify that the T1 or E1 network is working properly by checking for current CGA-Red and CGA-Yellow alarms. If the network is faulty, the same transmission problem may exist with the other ports of the same FRAD card, and also with the data ports of all other data cards connected to the same T1 or E1 line. If no CGA alarms are present, continue with step 3.
3. Verify that the FRAD port is connected to the proper WAN card and time slot or server port and that the correct type of LMI is selected. The LMI must be UP for data to flow on the circuit. Do not proceed with further steps until the LMI is up.
4. Verify that the FRAD port to Concentrator port assignments are correct. Go to the Performance Monitoring (**Perf**) screen for the selected FRAD port and analyze the performance register information, as well as the **Status** column. If this all appears normal, data should be flowing on the circuit.
5. Loop-backs toward the DTE and toward the network are available on both the FRAD port and the Concentrator port. These may be used to verify FRAD card operability.
6. If the FRAD card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

## 4.6 FRAD Card Specifications

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### FRAD Card 8230 and 8231

Number of Ports	8
Speeds (configurable by port)	2.4, 4.8, 9.6, 14.4, 19.2, 28.8, 38.4, 56K, 64K
Physical Interface	10 female 8-pin RJ-48 sockets
Electrical Interface	RS232C, ITU-T V.28
Data Format	Synchronous and asynchronous
Data Protocol	Async or HDLC (SDLC); transparent
DLCI	16 up to 991
LMI	ANSI, ITU, LMI (Gang of Four)
Maximum Frame Size	5 to 512 bytes
Frame Relay Aggregate Rate	56 or 64 kbps
Time slot number for WAN	1 through 31 on any WAN (T1/E1) link

---

### Synchronous Data

Format	Transparent
Transmit Clocking	Software selectable per port; internal or external

---

### Asynchronous Data

Format	V.14 asynchronous
Stop Bits	Software selectable per port; 1 or 2
Data Bits	Software selectable per port; 5, 6, 7 or 8
Parity	Software selectable per port; none, odd, even, space or mark

---

### Diagnostics

HDLC Test Pattern	Active or inactive
Loopback	to DTE, to network, remote

---

### Standards Compatibility

ITU-T	V.28	Electrical characteristics for unbalanced double-current interchange circuits
EIA	RS232-C	Interface Between DTE and DCE Employing Serial Binary Data Interchange
Bellcore	GR-63-CORE Issue 1	Network Equipment-Building System (NEBS) Requirements: Physical Protection
UL	1950	UL Standard for Safety of Information Technology Equipment
CEN	EN 50 081-1	Electromagnetic compatibility generic emission standard Part 1 Residential, commercial and light industry.
	EN 50 082-1	Electromagnetic compatibility immunity emission standard Part 1 Residential, commercial and light industry.
	EN 60 95/A2	Safety of information technology equipment including electrical business equipment.

# Chapter 5

## DS0-DP Card

### 5.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the DS0 Dataport (DS0-DP) Card. This card is labeled as the DS0-DP 4 card on its faceplate ejector.

### 5.2 DS0-DP Card Description

#### 5.2.1 DS0-DP 4 Card Description (8254)

The DS0-DP 4 Card Contradirectional/Codirectional Data Unit (DS0-DP/G.703) provides a 64 kbps interface to a DS0 time slot of a T1 or E1 network. Since the byte alignment of the 64 kbps data stream to the time slot is essential, the interface provides a 64 kbps bit clock and an 8 kHz byte clock in the DS0-DP mode.



#### **Notice!**

##### **UL STATEMENT**

**OPERATION OF THIS INTERFACE IS LIMITED TO INTRA-BUILDING CONNECTIONS ONLY**

#### 5.2.1.1 Card Jumper/Switch Settings

The DS0-DP 4 Card doesn't have any jumpers or switches on its mainboard.

#### 5.2.1.2 Installing the DS0-DP4 Card

Install the DS0-DP 4 Card into any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

## 5.3 DS0-DP Card User Screens and Settings

### 5.3.1 DS0-DP Card Main Screen

You must configure the DS0-DP card for operation. This is done from the DS0-DP Card Main Screen, which is shown in Figure 5-1. To go to that screen, highlight the desired card in the System Main Screen and press <Enter>.

Node_1	U1	DS0DPx4	8254	Rev A01-0	Ser 01103	12-31-99	14:33
	1	2	3	4			
STATE	stdby	stdby	stdby	stdby			
WAN	w1-1	w1-1	w1-1	w1-1			
TS	01	01	01	01			
MODE	ds0dp	ds0dp	ds0dp	ds0dp			
CLK	int	int	int	int			
LB	off	off	off	off			
LBGEN	off	off	off	off			
LB DET	off	off	off	off			
Save   Undo   Refresh   Copy   Main							

**Figure 5-1. Typical DS0-DP Card Main Screen**

The bottom highlighted line of this screen shows several actions you can perform from the screen. To perform an action, simply press the key indicated by the uppercase letter of the desired action. For example, to save your configuration settings, press “s”. Table 5-1 lists these actions, and Table 5-2 summarizes the DS0-DP card parameters and available settings. These are also described in the following paragraphs.

**Table 5-1. Main Screen Actions**

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Redraws the Main Screen.
Copy	Copies the contents of the current column to the next column. Useful if you change a lot of entries in one column and want to repeat those changes in subsequent columns.
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 5-2. Main Screen Option Settings and Defaults**

Parameter	User Options	Default
STATE	stdby actv	stdby
WAN	none wan	none
TS	n/a 01-24 01-31	n/a
MODE	ds0dp contr codir	ds0dp
CLK	int ext n/a	int
LB	off dte net	off
LB GEN	off ocu dsu csu ds0	off
LB DET	off enab w/to	off

## STATE

The State setting determines whether the port is active or inactive. An inactive port does not occupy a time slot on a WAN link. Set the state setting to **stdby** (standby) for ports that are not to be used or are not yet configured. Set it to **actv** (active) for ports that are ready for use.

## WAN

The WAN setting identifies the card to which the output of this port is directed. If **wan** is chosen, the data from this port will be directed to a WAN port (the options are **w1-1** to **w4-2**). You then need to select a time slot.

The WAN setting identifies the WAN link assigned to this port. It is not necessary for all ports on the same card to be assigned to the same WAN link, or to contiguous time slots on a WAN link. Ports can be split between WAN and Server card links.

## TS

If the WAN/SRV parameter is **none**, the TS parameter will always be **n/a**. If the WAN/SRV parameter is **wan** (or a WAN port) then TS setting identifies the time slot on the WAN link to which this port is assigned. Values range from **1** to **24** for T1 links and **1** to **31** (excluding time slot 16 in **cas** or **ccs** mode) for E1 links.

## MODE

This option displays the selection of modes. In **ds0dp** mode, the port will provide a common bit and byte clock to be used by the attached DTE device for both receive and transmit. When one port is set to **ds0dp** all other ports will default to the DS0-DP mode as well. Similarly, when one port is changed to one of the G.703 modes (Codirectional or Contradirectional), any port set for the DS0-DP mode will default to the Contradirectional mode. The **contr** selection configures the port for the Contradirectional mode. In this mode, the card supplies both the transmit and receive clocks to the DTE. The **codir** selection configures the port for the Codirectional mode. In this mode, the clocks and data make up a composite signal. The clocks must be derived from the data.

## CLK

This option allows the selection of the desired clocking mode when in the DS0-DP mode. When set to **int**, the card generates the bit and byte clocks to the DTE. When set to **ext**, the card receives the bit and byte clocks from the attached device. All ports must have the same clock setting, therefore, when one port is changed, all ports are changed. When a G.703 mode is selected, this option defaults to **n/a**. See Table 5-2 for further detail on CLK selection.

## LB

This option allows users to set local loopbacks. The **off** option is for no loopbacks. The **dte** selection loops data towards the DTE. The **net** option loops data towards the network.

## LB GEN

This option allows users to set local loopbacks. The **off** option is for no loopbacks. The other options are **ocu**, **dsu**, **csu**, **ds0** and force the card to send the appropriate DDS latching loopback code towards the remote end. This option will only function in the DS0-DP mode.



**LB DET**

This option allows the card to detect DDS latching loopbacks. When set to **off**, no loopbacks can be detected. When set to **enab**, loopbacks will be detected. When a loopback is detected, it will be maintained until a loop down is detected. **w/to** is the same as **enab** except that if no loop down is detected after 10 minutes, the loopback will self-terminate. This option only functions in the DS0-DP mode.

## 5.4 DS0-DP Card Error Messages

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

## 5.5 DS0-DP Card Troubleshooting

Problems with a DS0-DP card could indicate a number of causes. Some possibilities are:

- Faulty receiving DTE at the near end (where the problem was first noticed)
- Faulty transmitting DTE at the far (opposite) end
- Faulty cabling between the DTE and DS0-DP card at the near end
- Faulty cabling between the DTE and DS0-DP card at the far end
- T1 or E1 network failure
- Improper card configuration at either end (e.g., time slot and/or WAN port assignments)

Typically, a problem is indicated by a loss of incoming signal on a data port at either end of the circuit. You can perform numerous tasks to isolate the trouble and clear it. When troubleshooting transmission problems on a data circuit passing through a DS0-DP card, follow this general sequence:

1. If all ports are affected, verify that the US/EUR jumper is correctly placed to match the US/EUR jumper on the chassis.
2. Verify that the T1 or E1 network is working properly by checking for current CGA-Red and CGA-Yellow alarms. If the network is faulty, the same transmission problem may exist with the other ports of the same DS0-DP card, and also with the data ports of all other data cards connected to the same T1 or E1 line. If no CGA alarms are present, continue with step 3.
3. Verify that the DS0 time slot assignments of the faulty port at both ends of the data circuit path are correct. Also be sure the port is connected to the proper WAN card and port at each end. If these assignments are correct, continue with step 4.
4. At the local end (where the incoming data loss was first observed), use the loopback functions of the DS0-DP card to test the affected port. These tests are accessible from the DS0-DP Card Main Screen, as previously described in this chapter. They allow you to test the circuit path in segments and thereby quickly pinpoint the problem.
5. If necessary, also perform loopbacks and send test signals to the affected circuit from the other end. In addition, you can perform end-to-end tests using a suitable data test set at one or both ends of the circuit in conjunction with the loopback functions of the DS0-DP card at either end.
6. If the DS0-DP card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

## 5.6 DS0-DP Card Specifications

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**DS0-DO Card (8254)**

Data Rate	64 Kbps
Interface Connector	DB15 Receptacle

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**Electrical Interface**

DS0-DP	$\pm 5.0V$ , 135 Ohms
G.703	$\pm 1.0V$ , 120 Ohms

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**Control**

Configuration	Control via local terminal or remote NMS
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**Dimensions**

Height	8" (20.32 cm)
Width	6.75" (17.15 cm)

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**Operating Environment**

Ambient	0 to 50 ° C
Storage	-40 to 70 ° C
Relative Humidity	Maximum 95% non-condensing @ 40 degrees ° C
Altitude	Up to 10,000 Ft. AMSL



# Chapter 6

## B7R Card

### 6.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the Bit-7 Redundant (B7R) Card. This card is labeled as the B7R card on its faceplate ejector.

The B7R Card allows the integrated access system to accept network management information from eight separate DS0 time slots. It then multiplexes the data in those time slots into a single 38.4 kbps asynchronous bitstream running the Serial Line Interface Protocol (SLIP).

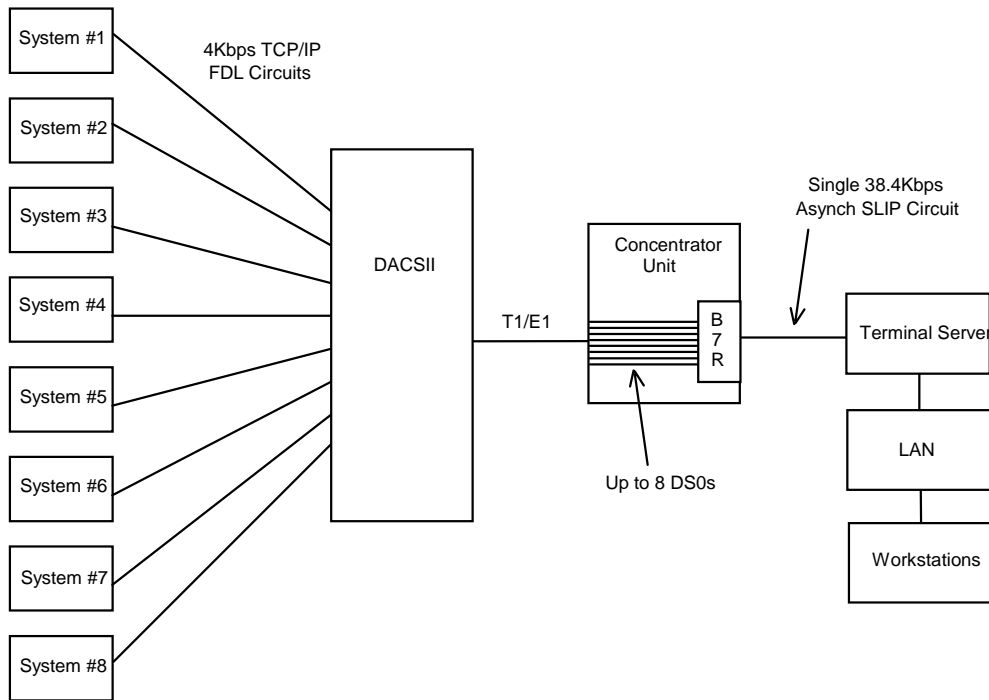
### 6.2 B7R Card Descriptions

#### 6.2.1 B7R Card Description (8228)

The B7R Card multiplexes up to eight B7R-formatted data channels, each on a different DS0 time slot. This card has a separate maintenance and testing channel (port 9) and a single aggregate channel (port 10) that redirect information from the time slots to a single RS-232 connector in back of the card.

Figure 6-1 shows the role of the B7R card in the Network Management System. SNMP alarm traps and TELNET configurations run over this path. Both formats can use the 4 kbps FDL (Facility Data Link) of an ESF-framed T1 link, a full time slot of a T1 link, or the computer port of the Interface card via the SLIP protocol.

If a T1 ESF FDL is used to send and receive information, a DACSII (6.1 or higher) must be used to convert the FDL/IP information to a full DS0 (on point-to-point circuits, a DACSII is not needed). The B7R card is used at the NMS site to multiplex the contents of eight DS0 circuits into a single 38.4 kbps asynchronous circuit using SLIP. This link is used by a communication server or terminal server for routing to a Local Area Network.



**Figure 6-1. Typical B7R Card NMS Application**

### 6.2.1.1 Card Jumper/Switch Settings

The B7R card doesn't have any jumper or switches on its mainboard.

### 6.2.1.2 Installing the B7R Card

Install the B7R card into any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

## 6.3 B7R Card User Screens and Settings

### 6.3.1 B7R Card Main Screen

The B7R card must be configured for operation before use. This is done from the B7R Card Main Screen, which is shown in Figure 6-2. To go to that screen, highlight the desired card in the System Main Screen and press <Enter>.

Node 1	U1	B7Rx8	RevA0-0	SER 00101	12-31-99	14:33				
STATE	1	2	3	4	5	6	7	8	9	10
	stdy	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby
WAN	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1
TS	01	01	01	01	01	01	01	01	01	01
FORMAT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
COM CF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CTS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	off
ADDR	ip	ip	ip	ip	ip	ip	ip	ip	ip	off
NETMSK	ip	ip	ip	ip	ip	ip	ip	ip	ip	n/a

Save | Undo | Refresh | Copy | Main

**Figure 6-2. Typical B7R Card Main Screen**

The bottom highlighted line of this screen shows several actions you can perform from the screen. To perform an action, simply press the key indicated by the uppercase letter of the desired action. For example, to save your configuration settings, press “s”. Table 6-1 lists these actions, and Table 6-2 lists the B7R Card Main Screen option settings and defaults. These are also described in the following paragraphs.

Table 6-1. Main Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Redraws the Main Screen.
Copy	Copies the contents of the current column to the next column. Useful if you change a lot of entries in one column and want to repeat those changes in subsequent columns.
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 6-2. Main Screen Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
WAN	w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 n/a		w1-1
TS	01 to 24 01 to 31		01
FORMAT	9.6 19.2 28.2 38.4	1	
COM CF	8 7 6 5	2	8
	1 2		1
	none odd even space mark		none
CTS	off on		off
ADDR	ip	3	0.0.0.0
NETMASK	ip	4	0.0.0.0

**Notes:**

1. Format settings are only available for port 10.
2. Com CF is a three-step process available only for ports 9 and 10.
3. The IP address of ports 1 to 8 must match the IP address assigned to the remote system unit on that DS0. Port 9 does not require an IP address because it is a debug port.
4. Ports 1 to 8 share the same subnetwork mask, and the subnet address for ports 1 to 8 must be different than the one used for port 10.

**STATE**

The State setting determines whether the port is active or inactive. Set the State setting to standby (**stdby**) for ports that are not to be used or are not yet configured. Set it to active (**actv**) for ports that are ready for use. Port #9 is used for debug purposes and is normally in the **stdby** position.



## WAN

The WAN setting identifies the WAN link that carries the data for this B7R port (either from the DACS or directly from the WAN link). The choices for this setting are **w1-1** through **w4-2**. Ports 9 and 10 do not require input from WAN links, therefore this field shows **n/a** for these ports.

## TS

The TS (timeslot) setting identifies the timeslot on the WAN link carrying data for the B7R port (either from the DACS or directly from the WAN link). Acceptable values for this field are **01-24** for a T1 link or **01-15** and **17-31** for an E1 link.

Generally, timeslots are assigned sequentially. For example, card 1 would be assigned to ports 1-8, card 2 to ports 9-16 and card 3 would be assigned to ports 17-24, but this is not required.

## RATE

The Rate setting allows users to select the rate in thousands of bits per second (kbps) for transmission of data. The rate of ports 1 to 8 are preset to FDL or 4 kbps. The rate of port #9 is preset to 9.6 kbps. The options for port 10 are **9.6**, **19.2**, **28.8** and **38.4**. Since the combined output of ports 1 to 8 are 32 kbps, port 10 should be set to **38.4** to accommodate a full system.

## COM CF

The Communication Configuration setting is not applicable for ports 1 to 8, and the **n/a** value cannot be changed. Ports 9 and 10 can be changed in a three step procedure that selects the data bits, parity and stop bits. The default values are **8**, **N**, **1**.

## CTS

The Clear To Send setting selects an option that will allow hardware handshaking with the terminal server and the B7R card when enabled for port 10. Since it is not applicable for ports 1 to 8, the **n/a** value cannot be changed. Ports 9 and 10 can be changed. The values for this setting are **off** and **on**.

*All cabling must be terminated before activating the CTS feature.*

## ADDR

The Address setting defines the IP address for each system unit associated with the first eight ports and port 10. Port 9 does not require an IP address and cannot be changed from the **n/a** setting. This address must be the same as the address used in the PORT IP ADDR field on the

Interface card of the system unit with which it is associated for ports 1 to 8. The IP address for port 10 is a unique address for each B7R card and must be on a different network than ports 1 to 8. This allows users to "ping" each B7R card itself for system diagnostics.

### **NETMSK**

The Network Mask setting defines the single subnet mask address for each system unit associated with the first eight ports and a different subnet mask for port 10. A change of subnet mask for any of the first eight ports will change all of the ports. Port 9 does not require a subnet mask and cannot be changed from the **n/a** setting. This address must be the same as the address used in the **NETMASK** field on the Interface card of the system unit with which it is associated for ports 1 to 8.

## **6.4 B7R Card Error Messages**

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

## **6.5 B7R Card Troubleshooting**

On power-up, the B7R card performs a self-test. This is the only diagnostic available for the B7R.

The indications that a B7R is not on-line are:

1. Inability to communicate with the system by any means (VT-100 Term, Telnet, etc.).
2. If the B7R card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

## 6.6 B7R Card Specifications

<b>B7R Card (8228)</b>		
<b>External Ports</b>		
Number of Ports		2
Port 9		Available for maintenance and diagnostics (9.6 kbps)
Port 10		Asynchronous SLIP port for aggregated NMS data (9.6, 19.2, 28.2, and 38.4 kbps).
Physical Interface		Female 8-pin RJ-48
Electrical Interface		RS232-C, ITU-T V.28
Procedural Interface		DCE - Full Duplex
IP Address		Software configurable on Port 10
Subnet Mask		Software configurable on Port 10
Options (Port 10)		
Data Bits		Software selectable per port; 5, 6, 7 or 8
Stop Bits		Software selectable per port; 1 or 2
Parity		Software selectable per port; none, odd, even, space, or mark
<b>Internal Ports</b>		
Number of Ports		8
Protocol		DS0 using Bit-7 Redundant (B7R) protocol.
Data Rate		Preset to 4 kbps
IP Address		Of the corresponding remote Integrated Access System
Subnet Mask		Software configurable (same for all 8 internal ports)
<b>Diagnostic Capability</b>		
Port 9		Provides an asynchronous interface for diagnostics
Port 10		Can be assigned a unique IP address and subnet mask and can be PINGed by the NMS
<b>Standards Compatibility</b>		
EIA	RS232-C	Interface Between DTE and DCE Employing Serial Binary Data Interface
ITU-T	V.28	Electrical characteristics for unbalanced double-current interchange circuits

# Chapter 7

## BRI Card

### 7.1 Introduction

This chapter provides installation, configuration, and troubleshooting information for the Basic Rate Interface (BRI) cards. These cards are labeled as the BRI U\*8 (8260), BRI-SC U\*8 (8261) and BRI-S T\*8 (8262) cards on their faceplate ejectors.

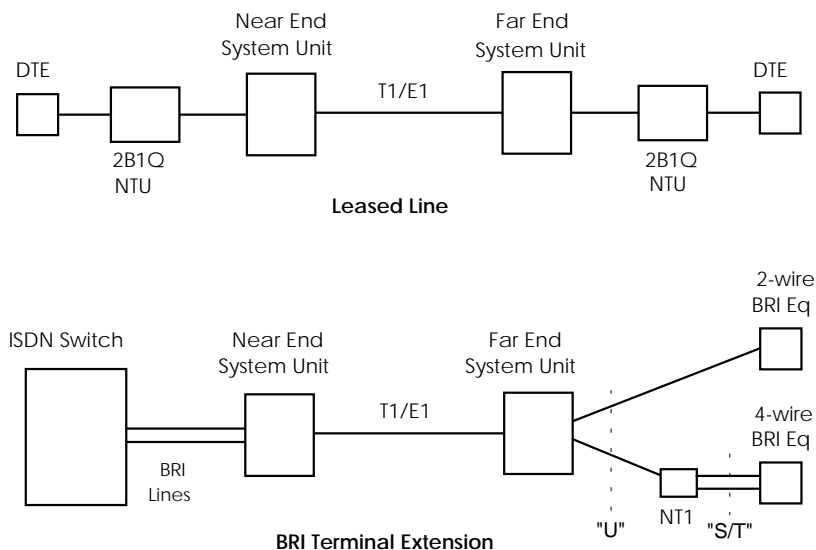
The BRI U\*8 and BRI-SC U\*8 Cards offer connectivity to sites located up to 18,000 feet from the integrated access system. This distance is influenced by factors such as wire gauge, bridge tap, and loading patterns, as described in ANSI T1.601-1992. These cards have eight “U” interfaces apiece that can carry one BRI, 2B+D-channel. This provides either two 64 kbps or one 128 kbps bearer channels per interface.

The BRI-S T\*8 Card supports the “S” and “T” interfaces. The connection distances for this card are largely dependent on the number of devices connected to each port.

### 7.2 BRI Card Descriptions

Figure 7-1 shows the difference between leased and brite circuits. The leased circuit can be any standard 2B1Q (U interface) NTU device that supports "nailed-up" (one or two B-channel) connections with no D-channel signaling. The BRITE mode supports switched connectivity to ISDN-compatible switches and D-channel signaling via either a full DS0 time slot or multiplexed 4:1 on a single DS0.

For both examples, B-channels carrying voice traffic on the BRI card can be compressed through the ADPCM card to extend the user resources (see the Conversion section of this chapter). The only limitation on BRI-U traffic is that the NTUs or NT1s must be located less than 18,000 feet from the system unit.



**Figure 7-1. Typical BRI Applications**

## 7.2.1 BRI U\*8 Card Description (8260)

The BRI U\*8 Card has software-selectable LT and NT (line terminal and network terminal) modes. It supports up to eight leased or BRI terminal extension applications. However, this card does not support sealing current, and it also does not provide metallic terminations according to ANSI specification on any ports.

### 7.2.1.1 Card Jumpers/Switch Settings

The US/Euro jumper pair on the BRI U\*8 card must be configured to the same setting as that of the chassis backplane. The factory default setting for cards and backplane is **US** position.

### 7.2.1.2 Installing the BRI U\*8 Card

Install the BRI U\*8 card into any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

## 7.2.2 BRI-SC U\*8 Card Description (8261)

The BRI-SC U\*8 Card has the same functionality as the BRI U\*8 Card. However, it also supports ANSI specification which includes metallic sealing current on LT and termination on NT. Metallic termination is used for (CO) Central Office testing on sealing current sink. This current prevents wiring splice corrosion between the card and external equipment, thereby maintaining the integrity of the connection.

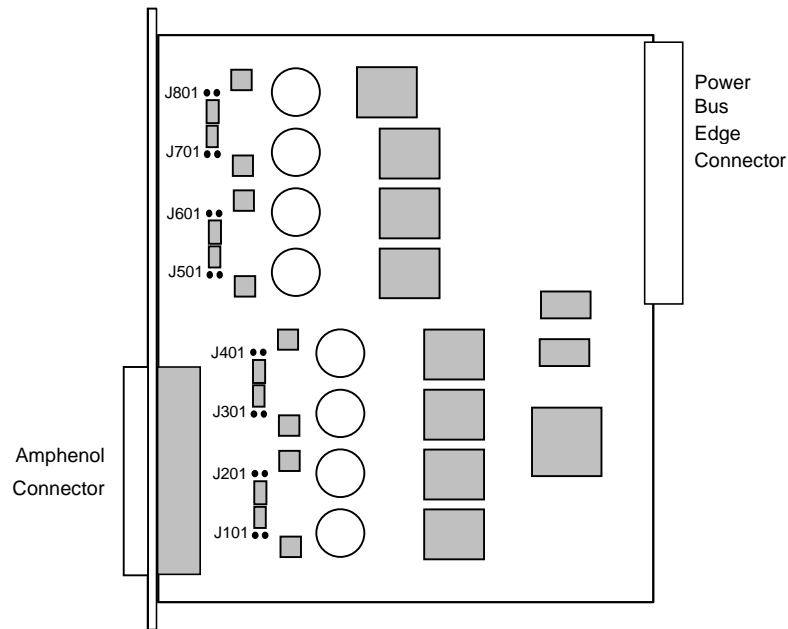
### 7.2.2.1 Card Jumper/Switch Settings

#### Terminal Type Selection

You must set several jumpers on the BRI-SC U\*8 Card to configure its individual ports for **NT** (Network Terminal) or **LT** (Line Terminal) operation. Figure 7-2 shows these jumpers. In addition, you must also ensure that the **TERMINAL** setting in the User Interface screen agrees with the physical jumper settings (jumper settings must match the Terminal mode).

These cards are shipped with LineTerminal as the default (jumpers open). To change termination to the Network Terminal mode, install the shorting jumpers across the pins labeled **J101** to **J801** on both sets of pins next to the front edge of the card, as shown in Figure 7-2. In these numbers, the first digit (e.g., 101) is the port number indicator.

The interface can be set individually for the **lt** feature but, once set, remain in the **lt** mode until the jumpers are removed. If jumpers are removed then the ports are set to NT (Network Terminal) mode.



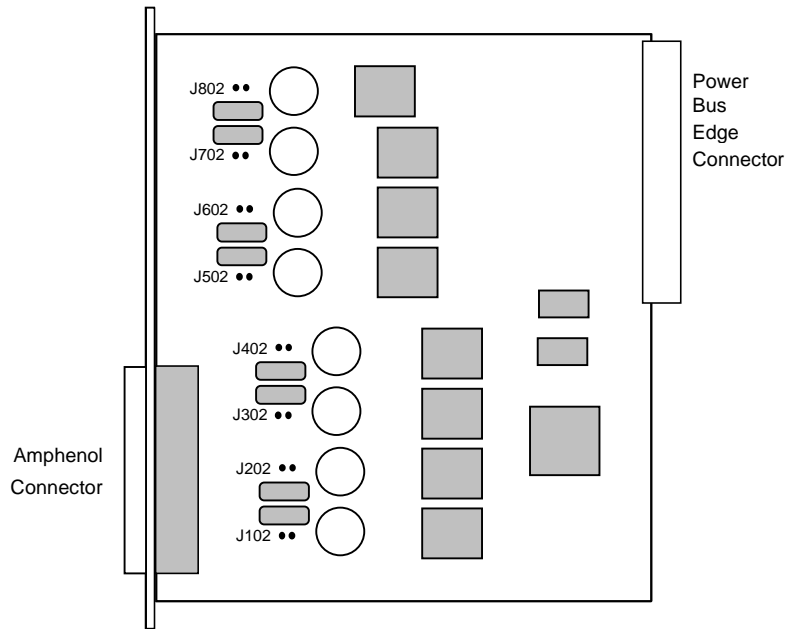
**Figure 7-2. BRI-SC U\*8 Card LT/NT Jumpers**

### Sealing Current Jumpers

You also must set the following jumpers on the BRI-SC U\*8 Card for the proper sealing current on its individual ports (15 mA or 7.5 mA). All cards are shipped with 15 mA as the default (jumpers closed). To change a port to 7.5 mA, remove the shorting jumpers across the pins labeled **J102** to **J802** on both sets of pins next to the front edge of the card, as shown in Figure 7-3. In these numbers, the first digit (e.g., 101) is the port number indicator.

The ports can be set individually for 7.5 mA but, once set, remain in that setting until the jumpers are reattached. If jumpers are added then the ports are set to 15 mA.





**Figure 7-3. BRI-SC U\*8 Card Sealing Current Jumpers**

### 7.2.2.2 Installing the BRI-SC U\*8 Card

Install the BRI-SC U\*8 card into any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

## 7.3 BRI Card User Screens and Settings

### 7.3.1 BRI U\*8 and BRI-SC U\*8 Cards Main Screen

You must configure the BRI U\*8 and BRI-SC U\*8 cards for operation after installing them in the system chassis. This is done from the BRI Card Main Screen (see Figure 7-4). To go to that screen, highlight the desired card in the System Main Screen and press <Enter>.

Node_1	U1 BRI-Ux8sc	Rev D2-0	Ser 01103	12-31-99	14:33				
Version: #1.5									
STATE	1	2	3	4	5	6	7	8	
STATE	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby
TERMINAL	lt	lt	lt	lt	lt	lt	lt	lt	lt
TYPE	lease	lease	lease	lease	lease	lease	lease	lease	lease
B MODE	none	none	none	none	none	none	none	none	none
B1 WAN/SRV	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1
B1 TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B2 WAN/SRV	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1
B2 TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D WAN/SRV	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1	w1-1
D TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D SUBCHAN	off	off	off	off	off	off	off	off	off
LOCAL LB	off	off	off	off	off	off	off	off	off
LB CHAN	B1	B1	B1	B1	B1	B1	B1	B1	B1
LBGEN MD	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT
LB GEN	off	off	off	off	off	off	off	off	off
SEAL CURR	off	off	off	off	off	off	off	off	off
TR COND	off	off	off	off	off	off	off	off	off
Save   Undo   Refresh   Copy   conVert   Eoc   Ntu   Test   Perf   Main									

**Figure 7-4. Typical BRI U\*8 and BRI-SC U\*8 Card Main Screen**

Table 7-1 lists the actions you can perform from the bottom line of this screen. To perform an action, type the letter corresponding to the uppercase letter of the desired action. For example, to save your option settings, press “s”. Table 7-2 lists the option settings and their default values.

Table 7-1. BRI U\*8 and BRI-SC U\*8 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).
Copy	Copies the contents of the current column (except time slot) to the next column. Useful if a user changes a lot of entries in one column and wants to repeat those changes in subsequent columns.
conVert	The Conversion feature allows the B channels to be used with ADPCM compression features.
Eoc	Embedded Operations Channel (not yet supported)
Ntu	Network Terminating Unit programming. (not applicable to 8262).
Test	Initiates and monitors testing of all BRI card ports. See Test section.
Perf	Shows the performance statistics for the port highlighted. See the Performance Monitoring section. Not implemented in S/T card.
Main	Returns to the main terminal screen. If changes are made to settings and not saved, users will be prompted to save or lose changes.

Table 7-2. BRI U\*8 and BRI-SC U\*8 Card Configuration Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
TERMINAL	lt nt		lt
TYPE	lease brite iw ntu-1		lease
B MODE	none B1 B2 B1+B2 128K		none
B1 WAN/SRV	none w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 P1 P2 P3		none
B1 TS	n/a 01-24 01-31		n/a
B2 WAN/SRV	none w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 P1 P2 P3		none
B2 TS	n/a 01 to 24 01 to 31		n/a
D WAN/SRV	n/a w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2	1	n/a
D TS	n/a 01 to 24 01 to 31	1	n/a
D SUBCHAN	n/a off 1 2 3 4	1	n/a
LOCAL LB	off ta net		off
LB CHAN	B1 B2 B1+B2		B1
LBGEN MD	ddsT ddsN v54T v54N ft1T ft1N eoc		ddsT
LB GEN	off B1ocu B1csu B1ds0 B1dsu B2ocu B2csu B2ds0 B2dsu	2	off
SEAL CURR	n/a off on		n/a
TR COND	off on		off

**Notes:**

1. D-Channels will only show if **brite** is selected for Type.
2. These options are only available for LB GEN Modes of **ddsT** and **ddsN**. See LB GEN paragraph below.

### 7.3.2 BRI-SC U\*8 Sealing Current

This screen applies to the BRI-SC U\*8 card only, and only in LT mode. Move the cursor to the SEAL CURR selection for the desired channel and press <Enter> to bring up the screen in Figure 7-5.



Figure 7-5. Typical BRI-SC U\*8 Card Sealing Current Screen

Table 7-3. BRI-SC U\*8 Card Sealing Current 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).
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 7-4. BRI-SC U\*8 Card Sealing Current Option Settings and Defaults**

Parameter	User Options	Default
START (h)	0 to 24	0
DURATION (m)	0 to 60	0
REPEAT	no yes	no
REP EVRY (h)	0 1 to 24	0

**START (h)**

The Start parameter allows you to set the time (in hours) the sealing current is to be applied to the port selected. The values are **0** to **24**. Selection of **0** will start the sealing current as soon as the changes are saved. Selection of any other number from **1** to **24** turns on the sealing current that many hours from the time selected (e.g., **6** will turn on the current in six hours).

**DURATION (m)**

The Duration parameter allows you to set the duration of time (in minutes) the sealing current is to be applied to the port selected. The values are **1** to **60**.

**REPEAT**

The Repeat parameter allows you to repeat the application of sealing current to the line of the port selected. The values are **yes** and **no**.

**REP. EVRY (h)**

The Repeat Every parameter allows you to set the time (in hours) the sealing current is to be repeated on the port selected. The values are **0** to **24**. Selection of any number from **1** to **24** repeats turning on the sealing current that many hours (e.g., **1** will repeat the current every hour).



**Note:** To turn on and sustain sealing current, set *DURATION (m)* to **60**, *REPEAT* to **yes**, and *REP. EVRY (h)* to **1**.

### 7.3.3 BRI-ST\*8 Card Description (8262)

The BRI-ST\*8 card is designed to support "S/T" 4-wire interface applications. It also supports both internal and external phantom power arrangements. Jumpers are available to select terminations on the receive and transmit sides individually.

The jumper defaults are as follows:

- Phantom Power - OFF
- Phantom Power Source - Internal IN
- 100 Ohm Term - Xmt OUT, Rcv IN



#### **Notice!**

##### **UL STATEMENT**

**OPERATION OF THIS INTERFACE IS LIMITED TO INTER-BUILDING CONNECTIONS LESS THAN 1,000 METERS.**

#### 7.3.3.1 Card Jumper/Switch Settings

The BRI-ST\*8 Card has four jumpers (JPx01, JPx02, JPx03, and JPx04) for each of its eight BRI ports. In these numbers, the "x" indicates card port numbers 1 through 8. You must set these jumpers before using the BRI-ST\*8 Card. The jumpers are shown in Figure 7-6.

Jumpers JPx02, when installed, provide a 100-ohm transmit termination. Jumpers JPx03 are installed as the default to apply a 100-ohm receive termination. The actual network design determines the setting of these terminations.

Jumpers JPx01 and JPx04 are installed (ON) to provide either internal (INT) or external (EXT) -48V power to the phantom leads, based on the setting of JP5 and JP6 (see the markings on the card). When the JPx01 and JPx04 jumpers are ON, they provide power out to the cable pair. When OFF, there is no power out on the cable pair.



#### **WARNING!**

**If external power is used, jumpers JP5 and JP6 must be set to EXTERNAL mode. Failure to do so could damage or destroy the card or system.**

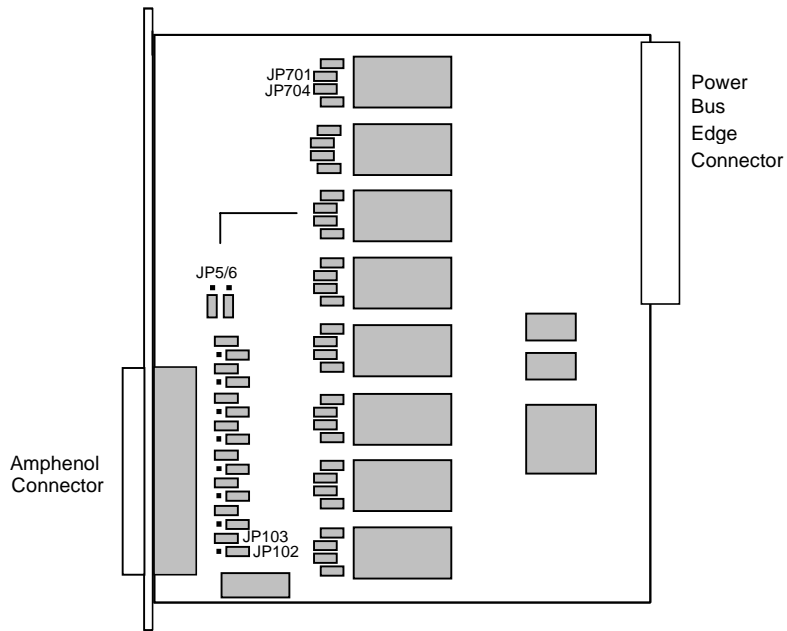


Figure 7-6. BRI-ST\*8 Card Jumpers

**7.3.3.2 Installing the BRI-ST\*8 Card**

Install the BRI-ST\*8 card into any user card slot. These slots are U1 to U8 on the two-sided chassis and front-loading chassis with power supplies on top, and P1 to P4 or W1 to W4 on the front-loading chassis with power supplies on the side.

### 7.3.4 BRI-ST\*8 Card Main Screen

Figure 7-7 shows the BRI-ST\*8 Card Main Screen, and Table 7-5 lists the actions you can perform from the bottom line of this screen. Table 7-6 lists the option setting controlled on the screen, along with the default values.

Node_1	U1	BRI-ST*8	Rev	E2-0	Ser	00047	12-31-99	14:33	
Version: #1.7									
	1	2	3	4	5	6	7	8	
STATE	stdby	stdby	stdby	stdby	stdby	stdby	stdby	stdby	
TERMINAL	nt-pp	nt-pp	nt-pp	nt-pp	nt-pp	nt-pp	nt-pp	nt-pp	
TYPE	lease	lease	lease	lease	lease	lease	lease	lease	
B MODE	none	none	none	none	none	none	none	none	
B1 WAN/SRV	none	none	none	none	none	none	none	none	
B1 TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
B2 WAN/SRV	none	none	none	none	none	none	none	none	
B2 TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
D WAN/SRV	none	none	none	none	none	none	none	none	
D TS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
D SUBCHAN	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
LOCAL LB	off	off	off	off	off	off	off	off	
LB CHAN	B1	B1	B1	B1	B1	B1	B1	B1	
LBGEN MD	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT	ddsT	
LB GEN	off	off	off	off	off	off	off	off	
RCVE	noTst	noTst	noTst	noTst	noTst	noTst	noTst	noTst	
TR COND	off	off	off	off	off	off	off	off	
Save	Undo	Refresh	Copy	conVert	Eoc	Ntu	Test	Perf	Main

Figure 7-7. Typical BRI-ST\*8 Card Main Screen



Table 7-5. BRI-ST\*8 Card Screen of 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).
Copy	Copies the contents of the current column (except time slot) to the next column. Useful if a user changes a lot of entries in one column and wants to repeat those changes in subsequent columns.
conVert	The Conversion feature allows the B channels to be used with ADPCM compression features.
Eoc	Embedded Operations Channel (not yet supported)
Ntu	Network Terminating Unit programming. (not applicable to 8262).
Test	Initiates and monitors testing of all BRI card ports. See Test section.
Perf	Shows the performance statistics for the port highlighted. See the Performance Monitoring section. Not implemented in S/T card.
Main	Returns to the main terminal screen. If changes are made to settings and not saved, users will be prompted to save or lose changes.

Table 7-6. BRI-ST\*8 Card Configuration Option Settings and Defaults

Parameter	User Options	Notes	Default
STATE	stdby actv		stdby
TERMINAL	nt-pp nt-sb nt-eb te		nt-pp
TYPE	lease brite iw		lease
B MODE	none B1 B2 B1+B2 128K		none
B1 WAN/SRV	none w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 P1 P2 P3	1	none
B1 TS	n/a 01 to 24 01 to 31		n/a
B2 WAN/SRV	none w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 P1 P2 P3	1	none
B2 TS	n/a 01 to 24 01 to 31		n/a
D WAN	none w1-1 w1-2 w2-1 w2-2 w3-1 w3-2 w4-1 w4-2 P1 P2 P3	2	none
D TS	n/a 01 to 24 01 to 31	2	n/a
D SUBCHAN	n/a off 1 2 3 4	2	n/a
LOCAL LB	off ta net		off
LB CHAN	B1 B2 B1+B2		B1
LBGEN MD	ddsT ddsN v54T v54N ft1T ft1N		ddsT
LB GEN	off B1ocu B1csu B1ds0 B1dsu B2ocu B2csu B2ds0 B2dsu	3	off
RCVE	noTst cdVol		noTst
TR COND	off on		off

*Notes:*

1. SRV functions (P1, P2 and P3) may be activated from the Conversion Screen when an ADPCM server is installed.
2. D-Channels will only show if **brite** is selected for Type.
3. These options are only available for LB GEN Modes of **ddsT** and **ddsN**. See LB GEN paragraph below.

**STATE**

The State setting determines whether the port is active or inactive. An inactive port does not occupy a time slot on a WAN link. Set the State option to **stdby** (standby) for ports that are not in use or not yet configured; set it to **actv** (active) for ports that are ready for use. The default is **stdby**.

**TERMINAL**

The BRI U\*8 and BRI-SC U\*8 Terminal setting allows the port to be set as an **lt** (line termination) or **nt** (network termination), which is the default. Generally, if the BRI is facing a switched line, the card should be set to **nt**, via both the user interface and the physical jumpers on the board. Likewise, if the BRI is facing an NT1, the card should be set to **lt**, via both the user interface and the physical jumpers on the board.

The BRI-ST\*8 Terminal setting allows the port to be set as an **nt-pp** (network termination point-to-point), **nt-sb** (network termination short-bus), **nt-eb** (network termination extended-bus) or **te** (terminal equipment) device. The default for the BRI-ST\*8 card is **nt-pp**.

**TYPE**

The Type setting determines the type of BRI connection for this port. The options available are **lease** (a permanent circuit), **BRITE** (BRI Terminal Emulation), **iw** (interworking) and **ntu\_1** (Network Terminating Unit - Lease, BRI-U and BRI-SC cards only).

When Terminal mode **lt** is selected the options for Type are **lease**, **brite**, **iw** and **ntu\_1**. When **nt** is selected the options are **lease**, **brite** and **iw**. When **lunt** and **lult** are selected the option is **brite** only.

If **ntu\_1** is selected, the user is required to select either **64** (which corresponds to the Adtran NTU) or **2560** (which corresponds to the 2560/2561 NTUs). If the wrong type of NTU is selected, the user will not be able to perform remote configuration of the NTU.

## B MODE

The B-channel Mode option determines the B-channel usage for this port. Setting the port to **none** tells the system that the equipment associated with this port does not require a B-channel and access to both B WANs is disabled. Setting the highlighted port to **B1** tells the system that only one B-channel is required for the BRI equipment. Selecting **B1** enables the B1 WAN and B1 TS and disables the B2 WAN and B2 TS. Setting the port to **B2** tells the system that only one B-channel is required for the BRI equipment. Selecting **B2** enables the B2 WAN and B2 TS and disables the B1 WAN and B1 TS.

Setting the port to **B1+B2** tells the system that two B-channels are required for the BRI equipment. Selecting **B1+B2** enables both the B1/B2 WANs and TSs. Any WAN and any time slot can be assigned to either B-channel.

Setting the port to **128K** tells the system that a 128 kbps "pipe" is required for the DTE equipment. Selecting **128K** enables both the B1/B2 WANs and TSs. Both B-channels must be assigned to the same WAN.

## B1 WAN/SRV

The WAN setting identifies the WAN link for the first B-channel assigned to this port. It is not necessary for all 8 ports on the same card to be assigned to the same WAN link, or to contiguous time slots on a WAN link. If B1 needs to be assigned to FRS or ATM card then "serv" under that P1 to P3 could be selected. If voice compression wants to be selected for B1 then B1 WAN/SRV needs to be assigned to WAN. ADPCM slot and RATE needs to be selected from conVert screen.

## B1 TS

The TS setting identifies the time slot on the WAN link for the first B-channel assigned to this port. Values range from **1-24** for T1 links and **1-31** for E1 links. Time slot 16 is not available on E1 links that are programmed for **cas** or **ccs** signaling. **The up and down arrow keys are used to scroll through the time slots.** For a display of the available time slots, refer to the cross-connect map for the WAN link. There is no assignment to a server.

## B2 WAN/SRV

The WAN setting identifies the WAN link for the second B-channel assigned to this port. If **128K** is selected for the B Mode, the second B-channel must be assigned to the same WAN link as the first B-channel. If B2 needs to be assigned to FRS or ATM card then "serv" under that P1 to P3 could be selected. If voice compression wants to be selected for B2 then B2 WAN/SRV needs to be assigned to WAN. ADPCM slot and RATE needs to be selected from conVert screen.

## B2 TS

The TS setting identifies the time slot on the WAN link for the second B-channel assigned to this port. Values range from **1** to **24** for T1 links and **1** to **31** for E1 links. Time slot 16 is not available on E1 links that are programmed for **cas** or **ccs** signaling. **The up and down arrow keys are used to scroll through the time slots.** There is no assignment to a server.

## D WAN/SRV

The D WAN setting identifies the WAN link for the D-channel assigned to this port for **brite** circuits. It is not necessary for all ports on the same card to be assigned to the same WAN link, or to contiguous time slots on a WAN link.

## D TS

The D TS setting identifies the time slot on the WAN link for the D-channel assigned to this port for **brite** circuits. Values range from **1-24** for T1 links and **1-31** for E1 links. Time slot 16 is not available on E1 links that are programmed for **cas** or **ccs** signaling.

## D SUBCHAN

The D Subchannel option allows you to use a full DS0 time slot for the D-channel, or split that time slot into four 16 kbps sections to allow D-channels to be combined into a single 64 kbps time slot. If a full time slot is used for the D-channel, only bits 0 and 1 are used; the rest of the bits are unused. Options are **off**, **1**, **2**, **3** or **4**. Default is **n/a**.



## WARNING!

**D-subchannels must be used on the same BRI card only.**

## LOCAL LB

The Local Loopback setting controls the direction of the local loopback. The settings are **off** (no loopback), **ta** (loopback toward the DSL or U interface) and **net** (loopback toward the WAN).

## LB CHAN

The Loopback Channel setting places the local loopback on either **B1** (the first B-channel), **B2** (the second B-channel), or **B1+B2** (both B-channels).

## LBGEN MD

The Loopback Generation Mode specifies the type of loopback to be placed on the circuit. The BRI card only generates loopback codes, it does not detect loopback codes. The options are **ddsT** (DDS loopback on the terminal side of the line), **ddsN** (DDS loopback on the network side of the line), **v54T** (V.54 loopback toward the terminal), **v54N** (V.54 loopback toward network), **ft1T** (fractional T1 loopback toward the terminal), **ft1N** (fractional T1 loopback toward the network), and **eoc** (embedded operations channel loopback towards the U interface for the BRI-U and BRI-SC cards).

## LB GEN

The Loopback Generation option specifies different loopback codes depending on the selection of loopback generation mode above. The options for **ddsT** and **ddsN** are **off** (no loopback), **B1ocu** (an OCU loopback on the first B-channel), **B1csu** (a CSU loopback on the first B-channel), **B1ds0** (a full DS0 loopback on the first B-channel), **B1dsu** (a DSU loopback on the first B-channel), **B2ocu** (an OCU loopback on the second B-channel), **B2csu** (a CSU loopback on the second B-channel), **B2ds0** (a full DS0 loopback on the second B-channel), and **B2dsu** (a DSU loopback on the second B-channel).

The options for **v.54T**, **v.54N**, **ft1T** and **ft1N** are **off** (no loopback), **B1** (v.54 or Ft1 loopback on the first B-channel), **B2** (v.54 or Ft1 loopback on the second B-channel), and **B1+B2** (v.54 or Ft1 loopback on both B-channels).

The options are **B1** (loopback on the first B-channel), **B2** (loopback on the second B-channel) and **B1+B2** (loopback on the both B-channels).

If the loopback is directed toward the DSL or U interface, the loopback pattern selected will not start until the U-ST parameter on the test screen shows the status of **actv**. (See the test section below for further information about the U-ST parameter).

## RCVE

The settings are **noTst** (no code violation test) and **cdVol** (code violation test). If **cdVol** is set and a code violation is detected, the card sends an interrupt toward the network line. **This option is valid only for the BRI-ST\*8 card.**

## SEAL CURR

The Sealing Current (SEAL CURR) option is **n/a** for **nt** and **lunt**, **off** or **on** for **lt** and **lult**.

## TR COND

The Trunk condition (TR COND) setting allows the card to pass trunk conditions from the network to the U/ST interface when set to **on**. Setting the TR COND state to **off** prevents the condition to be passed through the card.

### 7.3.5 Conversion Screen

The conversion operation (**conVert** command) allows you to compress B-channel voice traffic used with the ADPCM card. Figure 7-8 shows a Conversion Screen, Table 7-7 lists the actions you can perform from its bottom line, and Table 7-8 shows the option settings and defaults. To display the Conversion Screen, type “**v**” (**conVert**) in the BRI Card Main Screen.

You do not need to assign both B-channels of a B1+B2 circuit to ADPCM engines. Also, B-channels can share an ADPCM time slot with any other type of service.

Node_1	U1	BRI-Ux8sc	Rev	D2-0	Ser	01103	12-31-99	14:33
	1	2	3	4	5	6	7	8
B1 CNV	ad-u	off	off	off	off	off	off	off
B1 RATE	24k,1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B1 ADPCM	P1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B2 CNV	ad-u	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B2 RATE	24k,1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
B2 ADPCM	P1	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Save | Undo | Refresh | Main

Figure 7-8. Typical Conversion Screen

Table 7-7. Conversion Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Redraws the screen.
Main	Returns to the BRI Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 7-8. ADPCM Conversion Option Settings and Defaults

Parameter	User Options	Default
B1 CNV	off ad-u ad-A	off
B1 RATE	n/a 24k,1 32k,1 40k,1 24k,2 32k,2 40k,2	n/a
B1 ADPCM	n/a P1 P2 P3	n/a
B2 CNV	off ad-u ad-A	off
B2 RATE	n/a 24k,1 32k,1 40k,1 24k,2 32k,2 40k,2	n/a
B2 ADPCM	n/a P1 P2 P3	n/a

### B1 CNV

The B-channel 1 Conversion parameter allows you to choose Pulse-Code Modulation (PCM) coding for B-channel 1 voice traffic. The values are **off**, **ad-u**, and **ad-A**. Use **ad-u** ( $\mu$ -law) when converting from T1 carriers, and use **ad-A** for E1 carriers (this signal is *inverted* A-law, not regular A-law).

### B1 RATE

The B-channel 1 Rate parameter allows you to choose both the speed of the B-channel traffic and the position on the ADPCM time slot.

**Two ADPCM engines must be assigned to each WAN time slot, and the rate combination of both engines must be 64 kbps.**

The values are **n/a**, **24k,1** (64 kbps to 24 kbps on the first ADPCM engine), **32k,1** (64 kbps to 32 kbps on the first ADPCM engine), **40k,1** (64 kbps to 40 kbps on the first ADPCM engine), **24k,2** (64 kbps to 24 kbps on the second ADPCM engine), **32k,2** (64 kbps to 32 kbps on the second ADPCM engine), and **40k,2** (64 kbps to 40 kbps on the second ADPCM engine).

### B1 ADPCM

The B-channel 1 ADPCM parameter allows you to choose the ADPCM card to which you would like to assign this B-channel. The options are **n/a**, **P1** (the ADPCM card in slot P1), **P2** (the ADPCM card in slot P2) and **P3** (the ADPCM card in slot P3).

**B2 CNV**

The B-channel 2 Conversion parameter allows you to choose PCM coding for the B-channel 2 voice traffic. The values are **off**, **ad-u**, and **ad-A**. Use **ad-u** ( $\mu$ -law) when converting from T1 carriers, and use **ad-A** for E1 carriers (this signal is *inverted* A-law, not regular A-law).

**B2 RATE**

The B-channel 2 Rate parameter allows you to choose both the speed of the B-channel traffic and the position on the ADPCM time slot.

**Two ADPCM engines must be assigned to each WAN time slot, and the rate combination of both engines must be 64 kbps.**

The values are **n/a**, **24k,1** (64 kbps to 24 kbps on the first ADPCM engine), **32k,1** (64 kbps to 32 kbps on the first ADPCM engine), **40k,1** (64 kbps to 40 kbps on the first ADPCM engine), **24k,2** (64 kbps to 24 kbps on the second ADPCM engine), **32k,2** (64 kbps to 32 kbps on the second ADPCM engine), and **40k,2** (64 kbps to 40 kbps on the second ADPCM engine).

**B2 ADPCM**

The B-channel 2 ADPCM parameter allows you to choose the ADPCM card to which you would like to assign this B-channel. The options are **n/a**, **P1** (the ADPCM card in slot P1), **P2** (the ADPCM card in slot P2), and **P3** (the ADPCM card in slot P3).



### 7.3.6 Remote NTU Configuration Screen

Pressing “n” (Ntu) in the BRI Card Main Screen allows you to configure up to eight remote NTUs per card with revision 1.8 firmware (this option is only currently available for 8260/8261 BRI cards). Figure 7-9 shows the Remote NTU Configuration Screen, Table 7-9 lists the actions you can perform from this screen, and Table 7-10 lists the option settings and defaults.

DEV TYPE: NTU560	SW VER: 5.2	12-31-99 14:33
	1	
DTE INTF TYPE	v.36	
DTE SYNC/ASYN	sync	
DTE DATA RATE	64k	
CLOCK MODE	int	
DCD OPTIONS	on	
DCD OFF DELAY	n/a	
DSR OPTIONS	on	
CTS OPTIONS	on	
CTS ON DELAY	n/a	
ASYN BAUDRATE	offset	
RI INDICATION	off	
RL LINE	dis	
LL LINE	ena	
NTU CONSOLE	ena	
Save	Undo	Refresh
Load	Write	Test
stAtus	Main	

Figure 7-9. Typical Remote NTU Configuration Screen

Table 7-9. Remote NTU Configuration Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Data is not automatically updated on screen. Press "r" to show updated data.
Load	Loads currently saved parameters from the NTU.
Write	Saves configuration information to the NTU.
Test	Brings up the NTU Test Screen (see next section of this chapter).
stAtus	Brings up the NTU Status Screen (see NTU Status section of this chapter).
Main	Returns to the BRI Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 7-10. Remote NTU Configuration Option Settings and Defaults

Parameter	User Options	Notes	Default
DTE INTF TYPE	v.24 v.36	1	---
DTE SYNC/ASYN	sync asy8 asy9 asy10 asy11		sync
DTE DATA RATE	sync: 1.2k 2.4k 4.8k 9.6k 14.4k 19.2k 28.8k 32k 38.4k 48k 56k 64k 72k 128k asy8/asy9/asy10/asy11: <1.2k 1.2k 2.4k 4.8k 9.6k 14.4k 19.2k 28.8k 38.4k		---
CLOCK MODE	int		int
DCD OPTIONS	off on r_rts		on
DCD OFF DELAY	n/a 5-80	2	n/a
DSR OPTIONS	off on		on
CTS OPTIONS	off on l_rts		on
CTS ON DELAY	n/a 0-60 bits 10-250 msec	3	n/a
ASYN BAUDRATE	offset exact		offset
RI INDICATION	off on		off
RL LINE	dis	4	dis
LL LINE	dis ena		ena
NTU CONSOLE	dis ena		ena

**Notes:**

1. Not user-selectable; the DTE INTF TYPE is automatically detected.
2. The DCD OFF DELAY is **n/a** if the DCD OPTIONS selection is **on** or **off**.  
If **r\_rts** is selected, the options are **5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, or 80** bits.
3. The CTS ON DELAY is **n/a** if the CTS OPTIONS selection is **on** or **off**.  
If **l\_rts** is selected, the CTS ON DELAY is measured either in bits or milliseconds. The options are **0, 10, 20, 30, 40, 50, or 60** bits, or **10, 20, 30, 40, 50, 100, or 250** milliseconds.
4. This option is always disabled.

**DTE INTF TYPE**

The DTE Interface Type indicates the type of connector on the rear panel of the NTU. For the 2560, the selection is **v.36**. For the 2561, the selection is **v.24**. This parameter is automatically detected and is not user-selectable.

### DTE SYNC/ASYN

This option selects the transmission mode. Synchronous transmission is indicated with the **sync** option (which is the default). Asynchronous transmission has four options: **asy8** (8-bit byte), **asy9** (9-bit byte), **asy10** (10-bit byte), or **asy11** (11-bit byte). These options include the start bit, stop bit, parity bit and data bits.

### DTE DATA RATE

Asynchronous transmission allows for the following rates: <**1.2k**, **1.2k**, **2.4k**, **4.8k**, **9.6k**, **14.4k**, **19.2k**, **28.8k**, or **38.4k**.

Synchronous transmission allows for the following rates: **1.2k**, **2.4k**, **4.8k**, **9.6k**, **14.4k**, **19.2k**, **28.8k**, **32k**, **38.4k**, **48k**, **56k**, **64k**, **72k**, or **128k**.

### CLOCK MODE

The only option available is **int**.

### DCD OPTIONS

The Data Carrier Detect option can be **off**, **on** (default), or **r\_rts**. The remote Ready To Send option requires setting of the DCD OFF DELAY option.

### DCD OFF DELAY

The Data Carrier Detect Off Delay setting is **n/a** (default) when the DCD OPTIONS selection is either **off** or **on**. When DCD OPTIONS is set to **r\_rts**, the Data Carrier Detect Off Delay can be set to the following options (in bits): **5**, **10**, **15**, **20**, **25**, **30**, **35**, **40**, **45**, **50**, **55**, **60**, **65**, **70**, **75**, or **80**.

If the user selects any other number, the value will be rounded up to the next option. For example, if you enter **52**, it would be rounded up to **55**.

### DSR OPTIONS

The Data Set Ready option can be set to **off** or **on** (default).

### CTS OPTIONS

The Clear To Send option can be **off**, **on** (default), or **l\_rts**. The local Ready To Send option requires setting of the CTS ON DELAY option.

### CTS ON DELAY

The Clear To Send On Delay setting is **n/a** (default) when the CTS OPTIONS selection is either **off** or **on**. When CTS OPTIONS is set to **l\_rts**, the Clear To Send On Delay can be set either in bits or in milliseconds. The bits settings are **0, 10, 20, 30, 40, 50, or 60**. The msec settings are **10, 20, 30, 40, 50, 100, or 250** milliseconds.

If you select any other number, the value will be rounded up to the next option. For example, if you enter **52** bits, it would be rounded up to **60**. However, if you select **52** milliseconds, it would be rounded up to **100**.

### ASYN BAUDRATE

The asynchronous baud rate can either be set as **offset** (default) or **exact**.

### RI INDICATION

This option allows the ring indicator setting to be turned **on** or **off** (default).

### RL LINE

The Remote Loop Line indicator for data port remote loop requests is always disabled (**dis**). This disallows loopback testing in the remote loop between the DTE and the BRI card (see Figure 7-10).

### LL LINE

The Local Loop Line indicator allows loopback testing between the NTU and DTE. This may be set either to **ena** (default) or **dis**. Loopback testing may be run in the local loop when this parameter is enabled (see Figure 7-10). Even when set to **dis**, however, this parameter can be overridden locally by means of a switch on the front panel of the NTU.

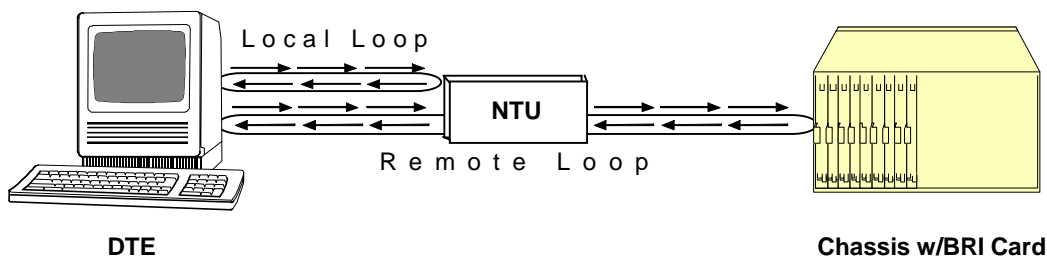


Figure 7-10. Local and Remote Loopback Testing

## NTU CONSOLE

This option may either be **ena** (default) or **dis**. When enabled, the parameters for a slave NTU may be viewed (but not changed) locally by running a direct line from the rear connector port to a DTE. When disabled, the NTU parameters cannot be viewed from a local console.

### 7.3.7 NTU Test Screen

Figure 7-11 shows the NTU Test Screen. To go to this screen, type “t” (**T**est) in the Remote NTU Configuration Screen. Table 7-11 lists the actions you can perform from this test screen, and Table lists the test option settings and defaults.

DEV TYPE: NTU560		SW VER: 5.2		12-31-99 14:33	
		1			
TEST		off			
TIMER		on			
STATUS		off			
ERROR		n/a			
TOTAL		n/a			
Save   Undo   Refresh   Main					

**Figure 7-11. Typical NTU Test Screen**

**Table 7-11. NTU Test Screen Actions**

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Test data is not automatically updated on the screen. Press "r" to show updated data.
Main	Returns to the Remote NTU Configuration Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 7-12. NTU Test Option Settings and Defaults

Parameter	User Options	Notes	Default
TEST	off net		off
TIMER	off on		on
STATUS	off loc net loc_net	1	off
ERROR	n/a	2	n/a
TOTAL	n/a	2	n/a

**Notes:**

1. The **loc** and **loc\_net** options are included to support manual loopback override at the NTU site.
2. These parameters are not supported in this release.

**TEST**

Choosing **net** allows you to set loopback configuration to the network loop (between the BRI card and NTU). The default is **off**.

**TIMER**

This indicates whether the loopback configuration is set to time out, or whether it is ongoing. The options are **off** and **on** (default). When this option is **on**, the loopback timeout is set to 15 minutes. This is a read-only parameter; it is not user-selectable.

**STATUS**

This parameter indicates the direction of the loopback configuration. The options are **off** (default), **loc** (local loop), **net** (network loop), and **loc\_net** (local and network loops). The **loc** and **loc\_net** parameters are included in the event that the local loopback testing is activated manually by selecting a switch on the front panel of the NTU. This is a read-only parameter; it is not user-selectable.

**ERROR**

This parameter is not supported in this release.

**TOTAL**

This parameter is not supported in this release.

### 7.3.8 NTU Status Screen

You can also view the current NTU status. To do this, press “a” (**stAtus**) in the Remote NTU Configuration Screen. Figure 7-12 shows a typical NTU Status Screen. Table 7-13 lists the actions you can perform from this screen, and Table 7-14 lists the possible status values.

DEV TYPE: NTU560		SW VER: 5.2	12-31-99 14:33
		1	
ALARM		none	
CTS		on	
DSR		on	
DCD		on	
RTS		off	
DTR		off	
RX FIFO ERR		no	
TX FIFO ERR		no	
HW CODE		1	
LINE TR		st5411	
ASIC REV		3	
EPLD REV		2	
Refresh		Main	

**Figure 7-12. Typical NTU Status Screen**

**Table 7-13. NTU Status Screen Actions**

Action	Function
Refresh	Data is not automatically updated on the screen. Press "r" to show updated data.
Main	Returns to the Remote NTU Configuration Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 7-14. NTU Status Data Option Settings and Defaults

Parameter	User Options	Default
ALARM	none U L R M	none
CTS	off on	---
DSR	off on	---
DCD	off on	---
RTS	off on	---
DTR	off on	---
RX FIFO ERR	yes no	no
TX FIFO ERR	yes no	no
HW CODE	0 to 255	---
LINE TR	tp3410 st5411	---
ASIC REV	0 to 255	---
EPLD REV	0 to 255	---

### ALARM

This parameter indicates whether or not any active alarms exist. The options are **none** (default), **U** (U interface is down), **L** (NTU has lost sync and is not yet configured), **R** (NTU has been reset and is not yet configured), and **M** (NTU is in the Master mode). This option is not user-selectable.

### CTS

This field indicates the control signal status for this parameter. The options are **off** and **on**. This option is not user-selectable.

### DSR

This field indicates the control signal status for this parameter. The options are **off** and **on**. This option is not user-selectable.

### DCD

This field indicates the control signal status for this parameter. The options are **off** and **on**. This option is not user-selectable.

### RTS

This field indicates the control signal status for this parameter. The options are **off** and **on**. This option is not user-selectable.



**DTR**

This field indicates the control signal status for this parameter. The options are **off** and **on**. This option is not user-selectable.

**RX FIFO ERR**

This field indicates whether there is currently a FIFO buffering error on the receive end. The options are **yes** and **no**. This option is not user-selectable.

**TX FIFO ERR**

This field indicates whether there is currently a FIFO buffering error on the transmitting end. The options are **yes** and **no**. This option is not user-selectable.

**HW CODE**

This option depends on hardware and is not user-selectable.

**LINE TR**

The options for the line transceiver type are **tp3410** (National Semiconductor chip) and **st5411** (SGS-Thompson chip). This option is dependent on the hardware and is not user-selectable.

**ASIC REV**

This option depends on the hardware and is not user-selectable.

**EPLD REV**

This option depends on the hardware and is not user-selectable.

### 7.3.9 BRI Card Test Screen

Pressing “t” (Test) from the BRI Card Main Screen will bring up the screen shown in Figure 7-13 for the BRI-U\*8 and BRI-SC U\*8 cards, Figure 7-14 for the BRI-ST\*8 cards. From this screen, you can create test situations between two BRI cards, or between a single card and data test equipment at a remote site. Table 7-15 lists the actions you can perform from the bottom line of this screen, and Table 7-16 lists the option settings controlled on this screen, along with their default values.

*Note:* The Test Screen is only a snap shot - the user must press “R” refresh to display current information.

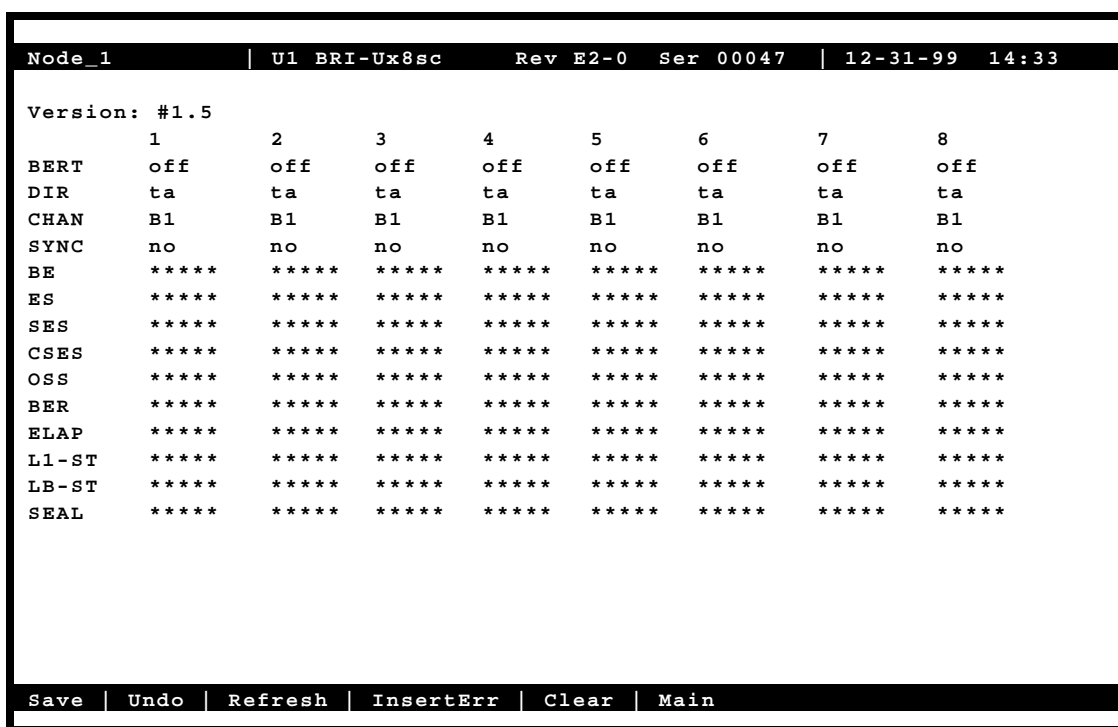


Figure 7-13. Typical BRI-U\*8 and BRI-SC U\*8 Card Test Screen

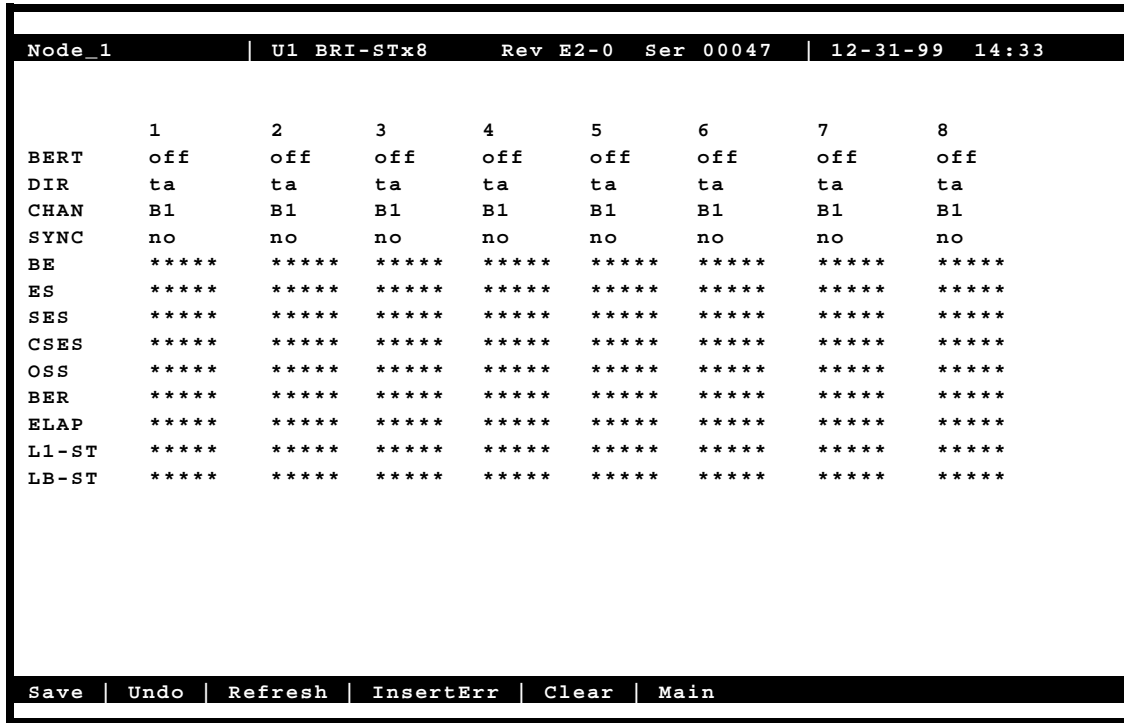


Figure 7-14. Typical BRI-ST\*8 Card Test Screen

Table 7-15. Typical BRI-ST\*8 Card Test Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Test data is not automatically updated on screen. Press “r” to show updated data.
insertErr	Allows you to manually insert a single error into the clear data signal.
Clear	Clears the Test Screen and resets all counters to zero.
Main	Returns to the BRI Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

Table 7-16. BRI Card Test Screen Option Settings and Defaults

Parameter	User Options	Default
BERT	no user options available	n/a
DIR	no user options available	n/a
CHAN	no user options available	n/a
SYNC	no user options available	no
BE	no user options available	*****
ES	no user options available	*****
SES	no user options available	*****
CSES	no user options available	*****
OSS	no user options available	*****
BER	no user options available	*****
ELAP	no user options available	*****
L1-ST	no user options available	*****
LB-ST	no user options available	*****
SEAL	no user options available (available only with the BRI-U*8 and BRI-SC U*8 cards)	*****

## BERT

The Bit Error Rate Tester (BERT) sends a data pattern and measures the bit error rate (BER) on the selected BRI port. Depending upon whether the test is on B-channels or D-channels, the patterns can be sent as either raw data or as HDLC packets containing the patterns. The BERT signal can only be sent on one port at a time. There are no user options available. The user selection is always **n/a**.

## DIR

The Direction (DIR) field allows you to select the direction of the test. There are no user options available. The user selection is always **n/a**.

## CHAN

The Channel (CHAN) field allows you to select which side of the line the BER pattern will be sent. There are no user options available. The user selection is always **n/a**.

## SYNC

The Synchronization (SYNC) field shows 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. You will see either **yes** or **no** in this field.

**BE**

The Bit Error field (BE) 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 ( $1 \times 10^{-3}$ ). Since this is an information-only field, there are no user-selectable parameters.

**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 BRI 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.

**ELA**

The Elapsed time field 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.

### L1-ST

The U Interface State field shows the actual status of the active ports at all times. Entries for this field include **stdby** (standby), **init** (initializing U interface activation), **actv** (U interface is active), **fail** (failed to activate U interface), **deact** (deactivated), **nos** (no signal), **los** (loss of signal), **b1eoc** (an eoc loopback on B1), **b2eoc** (an eoc loopback on B2), **2beoc** (an eoc loopback on both B-channels) and **bdeoc** (an eoc loopback on both B-channels and the D-channel).

If the LB GEN option (on the previous screen) is set to **ta**, the U-ST field must show **actv** before any loopbacks selected become operational.

### LB ST

The Loopback State (LB STATE) field indicates the local loopback selected on the main screen for this port. This field will show **off**, **ta**, or **net**. Since this is an information-only field, there are no user-selectable parameters.

### SEAL

The sealing current field indicates whether the sealing current option is selected or not. This only applies to the BRI-U\*8 and BRI-SC U\*8 cards.

### CRC-TEST

The CRC-Test tells the user whether the CRU test for LULT and LUNT is in progress or not. This is a read only field and the possible values are YES or NO. When the CRC test is in progress the LT may receive corrupted data blocks. CRC Test parameter is available when in LUNT or LULT mode.

## 7.3.10 Performance Data Screen

The BRI U\*8 and BRI-SC U\*8 cards support proprietary performance data monitoring, which continuously measures operation performance of the connection from the system unit to the NTU. Each one-hour segment is divided into 3600 seconds, and statistics are kept for the current hour and the past 24 one-hour periods.

To get performance data for a particular port, highlight the port in the BRI Card Main Screen and press “**p**” (**Perf**). The Performance Data Screen shown in Figure 7-15 will appear for the BRI U\*8 and BRI-SC U\*8 cards. Table 7-17 lists the actions you can perform for the BRI U\*8 and BRI-SC U\*8 cards from the bottom line of this screen.

While viewing the Performance Data Screen, press “**r**” (**Refresh**) to obtain updated information.

Node_1	U1	BRI-SC	Ux8	Rev	D2-0	Ser	01103	12-31-99	14:33
Unit 1 PERFORMANCE									
	ES	UAS	NOS	LOS	DM	NEBE	FEBE	STATUS	
CUR	0	0	0	0	0	0	0	.***.***.*	
01	0	0	0	0	0	0	0	.***.***.*	
02	0	0	0	0	0	0	0	.***.***.*	
03	0	0	0	0	0	0	0	.***.***.*	
04	0	0	0	0	0	0	0	.***.***.*	
05	0	0	0	0	0	0	0	.***.***.*	
06	0	0	0	0	0	0	0	.***.***.*	
07	0	0	0	0	0	0	0	.***.***.*	
08	0	0	0	0	0	0	0	.***.***.*	
09	0	0	0	0	0	0	0	.***.***.*	
10	0	0	0	0	0	0	0	.***.***.*	
11	0	0	0	0	0	0	0	.***.***.*	
12	0	0	0	0	0	0	0	.***.***.*	
TOTAL	0	0	0	0	0	0	0	.***.***.*	
STATUS: T=Test; L=LOS; N=NOS; t=NTM; S=STDBY/SWITCH									
Refresh	Clear	pgUp	pgDn	Main					

Figure 7-15. BRI U\*8 and BRI-SC U\*8 Card Performance Data Screen

Table 7-17. BRI U\*8 and BRI-SC U\*8 Card Performance Data Screen Actions

Action	Function
Refresh	Test data is not automatically updated on screen. Press “r” to show updated data.
Clear	Clears the screen and resets all counters to zero.
pgUp	Allows the user to go to previous page. If already in page 1 this option does not have any effect
pgDn	Allows the user to go to the next page. If already in page 3 this option does no have any effect
Main	Returns to the BRI Card Main Screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

**ES**

The Errored Seconds (ES) column registers the number of seconds for which the card detected a Near-End Block Error (NEBE) or Far-End Block Error (FEBE) greater than zero (0).

**SES**

The Severely Errored Seconds (SES) column registers the number of severely errored seconds for which the card detected a Near-End Block Error (NEBE) or Far-End Block Error (FEBE) greater than zero (0).

**UAS**

The Unavailable Seconds (UAS) column shows the number of seconds for which the U-Interface is not available (not active).

**NOS**

The No Signal Seconds (NOS) column shows the number of seconds for which the BRI card detected a NOS line condition. This counter is applicable for LT Terminal Type only. For NT Terminal Type, the no signal seconds are included in the Unavailable Seconds column (see above).

**LOS**

The Loss of Synchronization Seconds (LOS) column shows the number of seconds for which the BRI card detected a LOS line condition. This counter is applicable for LT Terminal Type only. For NT Terminal Type, the loss of synchronization seconds are included in the Unavailable Seconds column (see above).

**DM**

The Degraded Minutes (DM) register shows the number of minutes for which the BRI card detected ES, UAS, NOS or LOS greater than zero (0).

**NEBE**

The Near-End Block Error (NEBE) column shows the transmission errors detected by the near-end equipment.



**FEBE**

The Far-End Block Error (FEBE) column shows the transmission errors detected by the far-end equipment.

**STATUS**

The Status column displays error codes for line conditions that occur during the one-hour intervals. The codes are displayed at the bottom of the screen. The values are **T** (Test), **L** (loss of synchronization), **N** (no signal), **P** (power failure of primary source for NT), **p** (power failure of the secondary source for NT), **t** (network terminal test mode) and **S** (standby/switch).

## 7.4 BRI Card Error Messages

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

## 7.5 BRI Card Troubleshooting

BRI card problems could indicate a number of possible causes, including:

- Faulty receiving CPE at the near end (where the problem was first noticed)
- Faulty transmitting CPE at the far (opposite) end
- Faulty cabling between the CPE and BRI card at the near end
- Faulty cabling between the CPE and BRI card at the far end
- T1 or E1 network failure
- Improper card configuration at either end (e.g., time slot and/or WAN port assignments)
- Typically, a problem is indicated by a loss of incoming signal on a BRI port at either end of the circuit. On a BRI card, this may be either a voice or data circuit. You can perform numerous tasks to isolate the trouble and clear it. When troubleshooting transmission problems on a BRI circuit passing through an BRI card, follow this general sequence:

1. If all ports are affected, verify that the US/EUR jumper on the BRI card is correctly placed to match the US/EUR jumper on the chassis. Also, verify that LT and NT jumpers are correctly placed on the ports under test.
2. Verify that the T1 or E1 network is working properly by checking for current CGA-Red and CGA-Yellow alarms. If the network is faulty, the same transmission problem may exist with the other ports of the same BRI card, and also with the data ports of all other data cards connected to the same T1 or E1 line. If no CGA alarms are present, continue with step 3.
3. Verify that the BRI B-channel time slot and D-channel (if used) time slot assignments of the faulty port at both ends of the BRI circuit path are correct. Also be sure the port is connected to the proper WAN card and port and that other critical parameters, such as **TERMINAL**, **TYPE** and **B MODE**, are set correctly at each end. If these assignments are correct, continue with step 4.
4. Selecting the Test screen from the main menu, check the status of the **L1-ST** parameter. It should indicate **actv**. Any other status (such as **fail**) is an abnormal state and indicates problems that must be corrected before proceeding.
5. For “U” interface cards, go to the Performance Registers screen for the BRI port (which can be accessed by selecting **Perf** from the BRI Main Screen while the cursor is on the selected port). Analyze the performance register information, as well as the **Status** column. If all appears normal, continue with step 6.

6. At the local end (where the incoming BRI loss was first observed), use the loopback and test signal functions of the BRI card to test the affected port. These tests are accessible from the BRI Main Screen (through the **LOCAL LB** and related parameters) and its associated Test Screen (through the **BERT** parameter), as previously described in this chapter. These allow you to test the circuit path in segments and thereby quickly pinpoint the problem.
7. If necessary, also perform loopbacks and send test signals to the affected circuit from the other end. In addition, if it is an NTU circuit, you can perform end-to-end tests using a suitable data test set at one or both ends of the circuit in conjunction with the loopback functions of the BRI card or NTU at either end.
8. If the BRI card is determined to be faulty, replace it and return the faulty unit for repair to the location specified by your distributor.

## 7.6 BRI Card Specifications

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### BRI Cards (8260, 8261 and 8262)

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#### Physical Interface

Number of Ports	8
Capacity per port	Two B (64 kbps each) plus One D (16 kbps) channel
Physical Interface	Female 50-pin RJ-27X telco connector

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#### Electrical Interface

Model 8260 and 8261	2-wire, U-interface per ANSI T1.6014.2
Model 8262	4-wire, S/T-interface per ANSI T1.602/ITU I.430

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#### Transmission Range Model 8260 and 8261

Wire Gauge	22 AWG (.644 mm)	24 AWG (.511 mm)	26 AWG (.405 mm)
	23 UK SWG	25 UK SWG	27 US SWG
Distance	26,000 ft. (7.9 km)	22,000 ft. (6.7 km)	18,000 ft. (5.5 km)

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#### Transmission Range Model 8262

Mode	Distance
NT p-p	max. 1500mm
NT s-b	max. 150m
NT e-b	max. 1500m, max. 35m between devices

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#### Transmission Range

Code	Alternate Mark Inversion (AMI)
Rate	192Kbps $\pm$ 100ppm
Timing	External and Internal (software configurable)

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#### Remote NTU Configuration Options (for 256x NTU's only)

DTE Interface Type	V.36 or V.24
Synch/Asynch	Synchronous or Asynchronous Transmission
DTE Data Rate	
Async	1.2k, up to 38.4k
Synchronous	1.2k, up to 126k
Clock Mode	Internal
Data Carrier Detect	On, Off, RTS
Data Carrier Detect Off Delay	5, 10, 15 up to 80 bits
Data Set Ready	On, Off
Clear To Send	On, Off, Local Ready to send
Asynchronous Baud Rate	Offset, Exact
Ring Indication	On, Off
NTU Status	(Items monitored on the remote NTU)
	Alarm, CTS, DSR, CDC, RTS, DTR, Receive FIFO Error, Transmit FIFO Error, Line Transceiver Type

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#### Procedural Characteristics

Data Protocol	Transparent up to 64 kbps or 128 kbps
D Channel collision arbitration	(Models 8262 only) As per 1.430 (D channel bit echo)
Sealing Current	(Models 8261 only)
Amperage	Jumper selectable 7.5mA or 15mA (requires -48VDC power)
Control	Software selectable options for start time, duration, repeat time
Multidrop Capability	(Model 8262 only) Max. 2
Phantom Power	(Model 8262 NT mode only)
Wattage	Jumper selectable: max. 4W per port

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**Loopbacks**

Local Loopbacks	
Direction	Off, Toward TA or Toward Network
Channel Selection	B1, B2 or B1+B2
Remote Loopbacks - Generation	
Direction	Toward TA or toward Network (with options of B1, B2 or B1+B2)
	Loopback Types - DDS T - DDS loopback on terminal side of the line
	DD M - DDS loopback on the network side of the line
	V.54 T - V.54 loopback towards the terminal
	V.54 N - V.54 loopback towards the network
	ft1T - Fractional T1 loopback toward the terminal
	ft1N - Fractional T1 loopback towards the network
	EOC - Embedded Operation Channel loopback towards the U interface
Remote -Detection	Not Supported

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**Diagnostics**

BERT	
Test Patterns	off, mark, space, 1:1, 1:7, p_1, p_0, p_1:1, p_1:7 (Note: P stands for Packet)
Direction	TA (towards Terminal Adapter or U Interface), Network (towards network or WAN)
Channel	B1 (BERT on B channel 1), B2 (BERT on B channel 2), 128K (BERT on 128K pipe), D (BERT on D-channel)
Test Monitoring	Synch (synchronization of BERT with itself or remote loopback or test equipment), Bit Error, Errored Seconds, Severely Errored Seconds, Consecutive Severely Errored Seconds, Out of Synchronization, Bit Error Rate.
U Interface State	Standby, Initializing, Active, Fail, Deactivate, No signal, Loss of Signal, EOC loopback on B1 or B2, EOC loopback on both B channel and D channels)

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**Software Configurable Options**

Terminal Type	
Models 8260, 8261	U termination Network (nt) or User (lt)
Model 8262	S/T termination TE, NT point-to-point, NT short-bus, NT extended bus
Termination Mode	
Models 8260, 8261	Lease, Brite, Interworking, NTU-1
Model 8262	Lease, Brite, Interworking
B-channel Mode	None, B1, B2, B1+B2 or 128 kbps
D-subchannel	None, 1, 2, 3 or 4 (used for BRITE mode)
Sealing Current	Off or On per port (Model 8260 and 8261 only)

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**Standards Compatibility (Models 8260 and 8261)**

ANSI	T1.601	ISDN Basic Access Interface for Use on Metallic Loops for Application on the Network Side of the NT (layer 1 Specification)
	T1.602	ISDN Data Link Layer Signaling Specification for Application at the User-Network Interface
ITU-T	I.430	ISDN, Basic User-network Interface - Layer 1 specification
Bellcore	TR-NWT-000397	ISDN Basic Access Transport System Requirements
	GR-000303	Integrated Digital Loop Carrier System Generic Requirements, Objectives and Interface.