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Chapter 5
Interface Card

5.1 Introduction

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

5.2 Interface Card Descriptions

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

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

5.2.1.1 Card Jumper/Switch Settings

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

5.2.1.2 Card External Connector and Pinouts

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

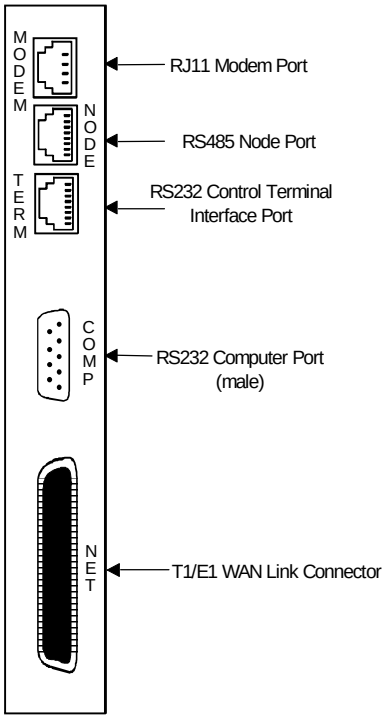


Figure 5-1. INF+M T1E1*8 Card Jacks

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

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

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

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

5.2.3 Using the Modem Port

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

Table 5-2. Modem Specifications

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

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

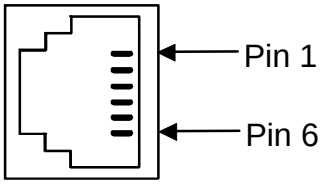


Figure 5-2. MODEM Jack

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

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

5.2.4 Logging On Remotely

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

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

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

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

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

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

5.2.5.1 Card Jumper/Switch Settings

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

5.2.5.2 Card External Connector and Pinouts

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

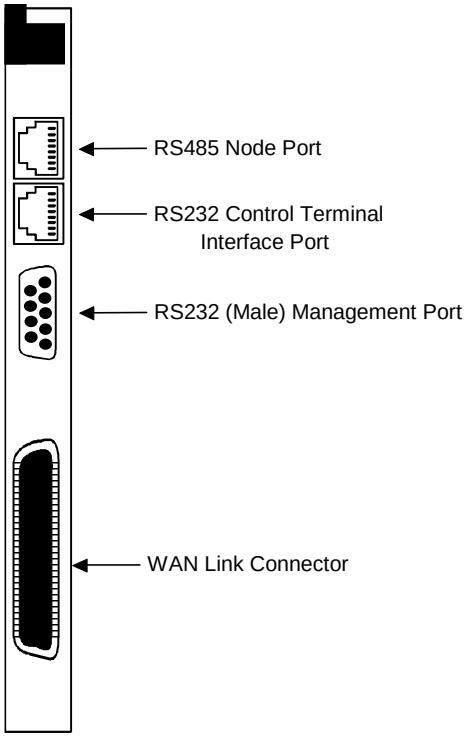


Figure 5-3. INF T1E1*8 Interface Card Ports

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

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

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

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

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

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

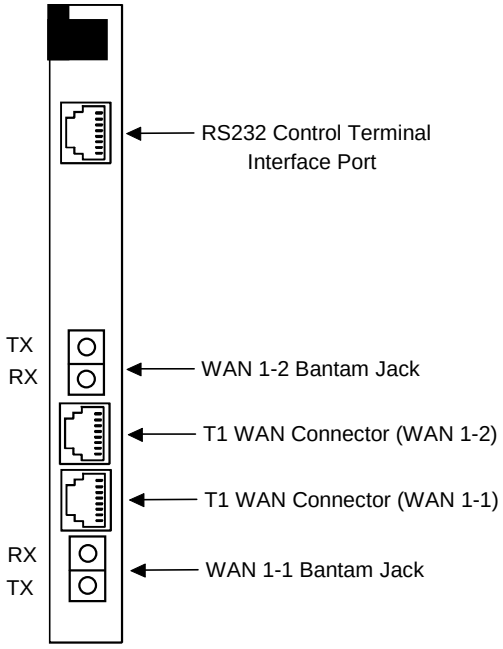


Figure 5-4. INF T1*2 Interface Card Ports

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

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

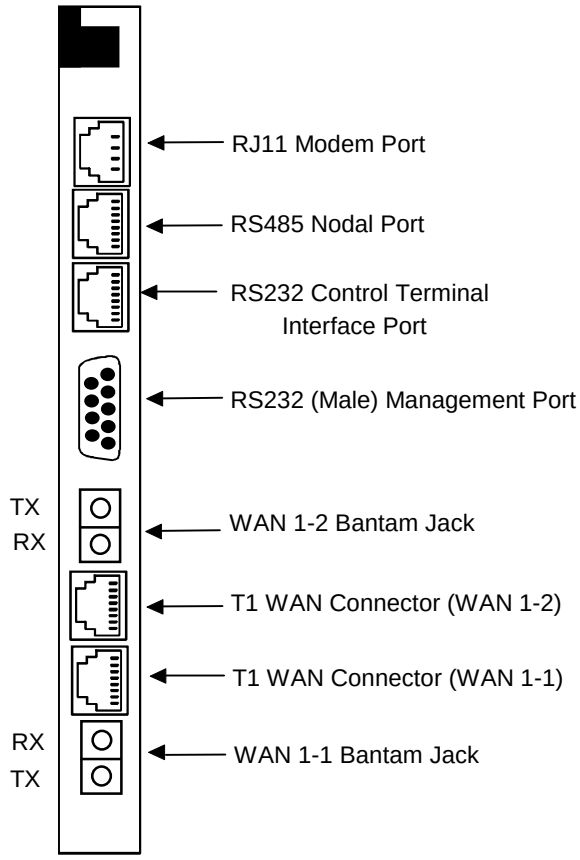


Figure 5-5. INF+M T1*2 Interface Card Port

5.2.9 INF E1*2 Card Description (892760)

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

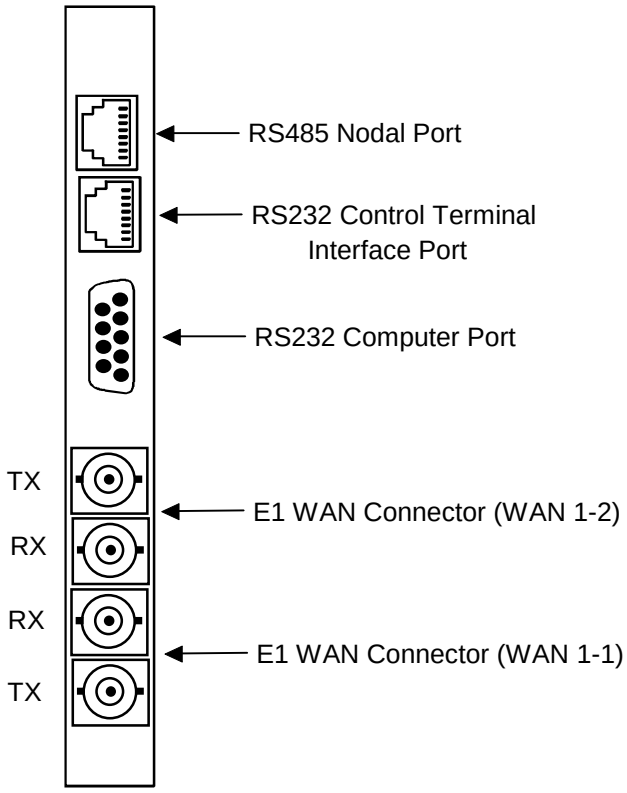


Figure 5-6. INF E1*2 Interface Card Port

5.3 Interface Card Ports and Functionality

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

Table 5-4. Interface Ports and Functions

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

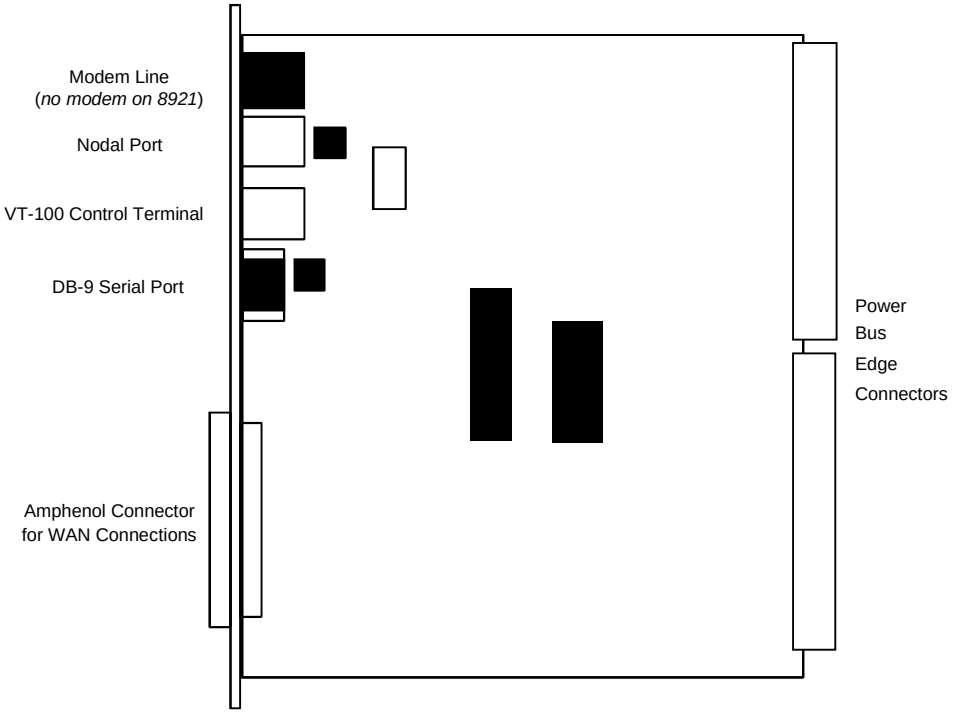


Figure 5-7. Component Layout for the INF+M T1E1*8 and INF T1E1*8 Interface Card

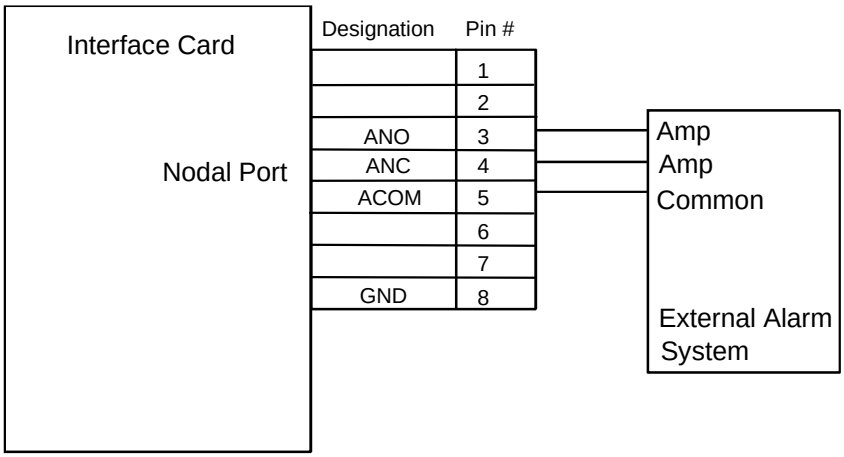
5.4 Using the Node Port

The Node Port allows the system to report ACO (Alarm Cutoff) alarms to an external system to alert the operator to critical situations. Using the ACO function, keeps the alarm active until manually cleared from the terminal.

The node port uses an Rj48 connector. Pins 3, 4, and 5 form an RS485 compatible c-contact closure that can be used to report ACO alarms to an external system. Pins 1, 2, 6 and 7 are reserved for future use. Pin 8 is ground.

Connection of the ACO alarm interface to an external alarm device (such as a buzzer or light) alerts you to problems with the system. Figure 5-8 shows a possible configuration connecting a unit to a generic external alarm system. The nominal input is 5V and the short-circuit current is 250mA.

The alarm interface is activated by the ACO setting. This will activate the device when a designated alarm occurs.



ANO = Open to ACOM on Alarm

ANC = Closed to ACOM on Alarm

Figure 5-8. Node Port ACO Alarm Interface

Table 5-5. INF Card NODE Jack Pinouts

RJ-48 Pin	Designation	Function
1	---	not used
2	---	not used
3	ANC	Alarm on OpenCondition
4	ANO	Alarm on Closed Condition
5	ACOM	Alarm Common Lead (Source)
6	---	not used
7	---	not used
8	GND	Chassis Ground

5.5 Interface Card User Screens and Settings

5.5.1 Main Screen

Figure 5-9 shows the Interface Card Main Screen. You must use this screen to define two timing sources for the card, and then go to other screens for additional setup and information viewing instructions. To go to the Interface Card Main Screen, highlight that card in the System Main Screen and press <Enter>.

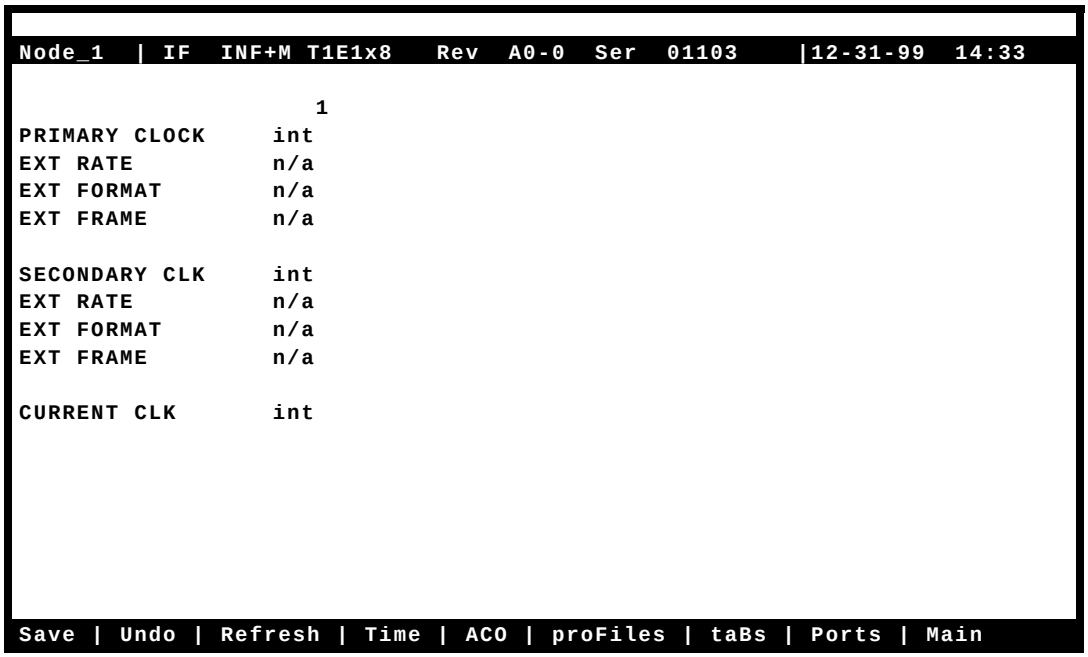


Figure 5-9. Typical Interface Card Main Screen

The bottom line of this screen shows numerous actions that you can perform from the screen. To perform an action, simply press the associated capital letter on your keyboard. For example, to save your option settings, press "**s**" (for **Save**). Table 5-6 lists the available actions.

Table 5-6. Interface Card Main Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Used to redraw the screen.
Time	Sets the system time and date. See the "Setting the System Date and Time" section later in this chapter.
ACO	ACO alarm.
proFiles	Profiles function inoperable with this release.
taBs	Signaling conversion tables for ABCD bits from ANSI to ITU-T for voice circuits.
Ports	Allows you to configure each Interface card port for operation. See the "Ports Screen" section later in this chapter.
Main	Returns to the Main screen. If changes are made to settings and not saved, you will be prompted to save or lose changes.

5.5.1.1 Setting the System Date and Time

To set the current date and time for the integrated access system, first press "**t**" in the Interface Card Main Screen to choose the **Time** action from the bottom line of that screen. The current date and time now appear in the lower left of the screen, in the format MM-DD-YY HH-MM. The **MM** field (month) is highlighted.

Use the up-arrow and down-arrow keys to set the current month (**01** to **12**, as required). Also move to each remaining field with the right-arrow and left-arrow keys, and select the current day (**DD**) and year (**YY**), and the current hour (**HH**) and minute (**MM**). The current time of day is displayed in 24-hour continuous format, where HH is **00** to **11** for a.m. and **12** to **23** for p.m.

When you finish setting these fields, press <Enter> and then press "**y**" to confirm that you want to save the changes. The system will subsequently stamp the current date and time on all alarm messages it reports.

5.5.1.2 Selecting the System Timing Clocks

Table 5-7 lists the Interface Card Main Screen configuration options, along with the possible and default values. In this screen, you must specify a primary and secondary timing source (clock) for the integrated access system. These settings are described in the following paragraphs.

Table 5-7. Interface Card Setting Options and Defaults

Parameter	User Options	Default
PRIMARY CLOCK	int serv(P1-P3) wan(w1-1 to w4-2) user(U1-U8)	int
EXT RATE	n/a	n/a
EXT FORMAT	n/a	n/a
EXT FRAME	n/a	n/a
SECONDARY CLK	int serv(P1-P3) wan(w1-1 to w4-2) user(U1-U8	int
EXT RATE	n/a	n/a
EXT FORMAT	n/a	n/a
EXT FRAME	n/a	n/a
CURRENT CLK	cannot edit this field	---

PRIMARY CLOCK

The primary clock provides all internal timing for the system. You can select a network clock source, the system's internal crystal oscillator.

A network clock is the best Primary Clock source. To select this source, set the Primary Clock field to **wan**, and then specify the WAN link to which the clock source is connected (for example, **w1-1** for T1 or E1 link 1 on the WAN card in chassis slot W1). The WAN clock source will be either 1.544 or 2.048 Mbps (T1 or E1 link). This clock must be accurate to within ±50 parts per million (50×10^{-6}).

Select **int** to have the system generate a clock from its own internal crystal oscillator. The stability of this Stratum 4 clock is ±25 parts per million (25×10^{-6}). If you use the system's internal crystal oscillator as a clock source, all other devices attached to the network should also derive their timing from it.

Select **serv** to use a primary clock derived from an ADPCM server card in the system. If yo uchoose this seeting, also specify the associated card slot (**P1, P2, or P3**). If you select a slot that contains any other type of server card, the message CARD CANNOT BE SELECTED appears.

Select **user** for a primary clock from a BRI card in the system. If you select **user**, also specify the chassis slot location of the desired card (**U1 to U8**), followed by the card prot from which the clock will be provided (**u1-1 through u8-8**) as required. If you select a chassis slot that contains any other type of user card, the message CARD CANNOT BE SELECTED appears.

SECONDARY CLOCK

If the Primary Clock signal fails, the system automatically switches to an operator-defined Secondary Clock source. The secondary clock source may be a different WAN link, server, user card, or external source, or it can be the system's internal crystal oscillator. Although a secondary clock source is not required for system operation, you should always provide one for the system.

CURRENT CLK

The Current Clock field shows the primary or secondary clock now in operation. You cannot edit this field.



Note: *Jumper positions will affect the available choices.*

5.5.2 Signaling Conversion Table Screen

Signaling conversion is required when cross-connecting a T1 (ANSI) voice circuit to E1 (ITU-T). This process translates the sequences of the ABCD signaling bits to allow proper signaling between the two carrier types.

You can set up signaling conversion for all types of voice circuits from the Signaling Conversion Table Screen, which is shown in Figure 5-10. To go to that screen, press "**b**" in the Interface Card Main Screen (**taBs** command).

You can accept the default bit pattern changes, or you can set a different ABCD signaling bit pattern and insert it in the table. Each voice circuit type is represented by two columns that correspond to ITU-T to ANSI conversion (C->A) and ANSI to ITU-T (A->C) conversion.

```
 Node_1  | IF  INF+M T1E1x8    Rev A0-0  Ser 01103 | 12-31-99  14:33

                  E&M       FXS/FXSC     FXO/FXOC       PLAR
ABCD          C->A  A->C  C->A  A->C  C->A  A->C  C->A  A->C
0000          0000  1101  0101  0101  0101  0101  1111  0101
0001          0000  1101  0101  0101  0101  0101  1111  0101
0010          0000  1101  0101  1101  0101  1101  1111  1101
0011          0000  1101  0101  1101  0101  1101  1111  1101
0100          0000  1101  0101  1101  0101  1101  1111  1101
0101          1111  1101  0000  1101  1111  1101  0000  1101
0110          0000  1101  0101  1101  0101  1101  1111  1101
0111          0000  1101  0101  1101  0101  1101  1111  1101
1000          0000  1101  0101  1101  0101  1101  1111  1101
1001          0000  1101  0101  0101  0101  1101  1111  1101
1010          0000  1101  0101  0101  0101  1101  1111  1101
1011          0000  1101  0101  1101  0101  1101  1111  1101
1100          0000  1101  0101  1101  0101  1101  1111  1101
1101          0000  0101  0101  0101  0101  1101  1111  1101
1110          0000  1101  0101  1101  0101  1101  1111  1101
1111          0000  0101  0101  0101  0101  1101  1111  1101

Enter Conv. bits: 0000

Save  |  Undo  |  Refresh  |   Default  |  Main
```

Figure 5-10. Signaling Conversion Table Screen

For example, an E&M circuit in the "0101" state (shown in the far-left ABCD column of the screen) will send **0101** as the ABCD bits from the ITU-T end of the circuit. The ANSI end will receive and convert those bits to **1111**. In the opposite direction, the signaling bit sequence will be sent as **1111** from the ANSI end and converted to **0101** at the ITU-T end. However, you can manually override the received ABCD bit pattern at either end.

The E&M portion of the Signaling Conversion Table Screen is also used for FXSDN, FXODN, PLAR-D3, DPO, and DPT signaling. The FXS/FXSC portion is used for FXO-to-FXS signaling, and the FXO/FXOC portion is used for FXS-to-FXO signaling. The PLAR portion is used for PLAR-D4 to PLAR and MRD.

Table 5-8 lists the actions you can perform from the Signaling Conversion Table Screen. These actions appear in the bottom highlighted line of the screen.

Table 5-8. Signaling Conversion Table Screen Actions

Action	Function
Save	Saves changes to settings.
Undo	Returns all settings to the last saved state.
Refresh	Redraws the current screen.
Default	Returns column to default settings, one column at a time. You must save your changes after using this command.
Main	Returns to the Interface Card Main Screen. If changes are made to settings and not saved, your changes will be lost.

5.5.3 Remote Terminal System (RTS)

The Remote Terminal System (RTS) is a special application for users using microwave transmission. Using communication software, a user can log into a number of different systems from a single control station (PC, MAC, Sun, or HP Workstation) to download alarm information, change card settings, and perform maintenance.

Systems are connected from the Interface card's COM port to a wireless control network through the RS232 input on one of the four service channels on the wireless network. The Control Station (PC) is connected to pin #2 out and #3 in. Each of the integrated access controllers is connected to RS232 pin #2 in and pin #3 out.

The actual number of the systems that can be connected together is determined by the amount of different numbers that can fit in the "SYS PH#" field in the CPU submenu. The CPU submenu is accessed by selecting a CPU through the user interface and pressing the <ENTER> key.

5.5.3.1 Identification

Each system has a unique identification number on the integrated access controller network (phone number). The unique identification number is used to determine which Controller can be accessed remotely on a serial line. The identification number for each console needs to be entered in the "SYS PH#" field in the CPU submenu. No two systems can have the same number in the "SYS PH#" on the same network. If that field is the same on more than one integrated access controller, race conditions will occur. Therefore each console on a single network must have an individual number in the "SYS PH#" field.

The identification numbers for the integrated access controllers cannot be entered through a control station. This safeguard is provided to ensure a reliable connection between a control station and an integrated access controller. Attempts to change an identification number of a system remotely will be denied.

5.5.3.2 Network Priorities

All integrated access controllers on the wireless network have equal priorities. Because of this equality, no Controller can interrupt a remote session between another Controller and a control station. This is why the control station always initiates all communication on the RTS network.

5.5.3.3 Intra-Network Communications

Integrated access controllers cannot communicate with each other. Communication on the network is only between the control station and a single Controller. Since the communications on the network of integrated access controllers is always initiated by the control station, the Controller systems cannot communicate with each other. Figure 5-11 shows a diagram of three RTS units.

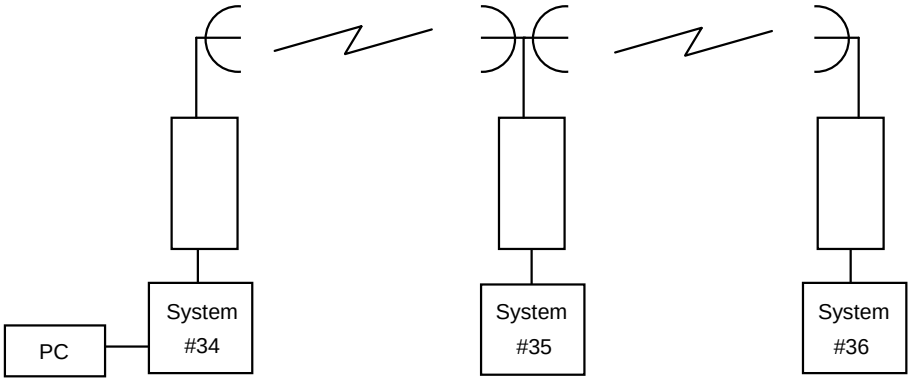


Figure 5-11. Typical RTS Configuration

The PC associated with integrated access controller #34 can engage any of the two other units by using “AT” commands from the communications software used. If a local VT-100 is active at any of the remote locations, the user will be logged off and the master PC will control the system unit. When the master PC logs off, the local user will be able to log into the unit again. Connections at all units are done through the DB9 computer port.

5.5.3.4 Terminal Security

No user may log into any integrated access controller on the network without knowing the individual password of each system.

Table 5-9 list the “AT” commands and the associated function. All “AT” commands are followed by pressing the <ENTER> key.

Table 5-9. "AT" Commands Used by RTS

AT Command	Function
ATDTxxx	Establish a user interface connection.
ATDTxxxR	Establish an alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display all alarms that are being reported by the system that have not yet been displayed.)
ATDTxxxC	Establish a current alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display all active alarms that are being reported by the system.)
ATDTxxxH	Establish a historical alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display the alarm history reported by the system.)
ATDTxxxCH	Establish a current and historical alarm reporting connection. (Connection only lasts for the length of time necessary to upload and display the current alarms and alarm history reported by the system.)
+++	Disconnects a remote session.
"L" (letter L)	Disconnects a remote session.
xxx indicates the phone number on the CPU card of the desired system unit.	

5.5.4 Ports Screen

You also must configure each of the Interface card's user interface ports. This is done from the Ports Screen, which is shown in Figure 5-12. To go to this screen, press "**p**" in the Interface Card Main Screen (**Ports** command).

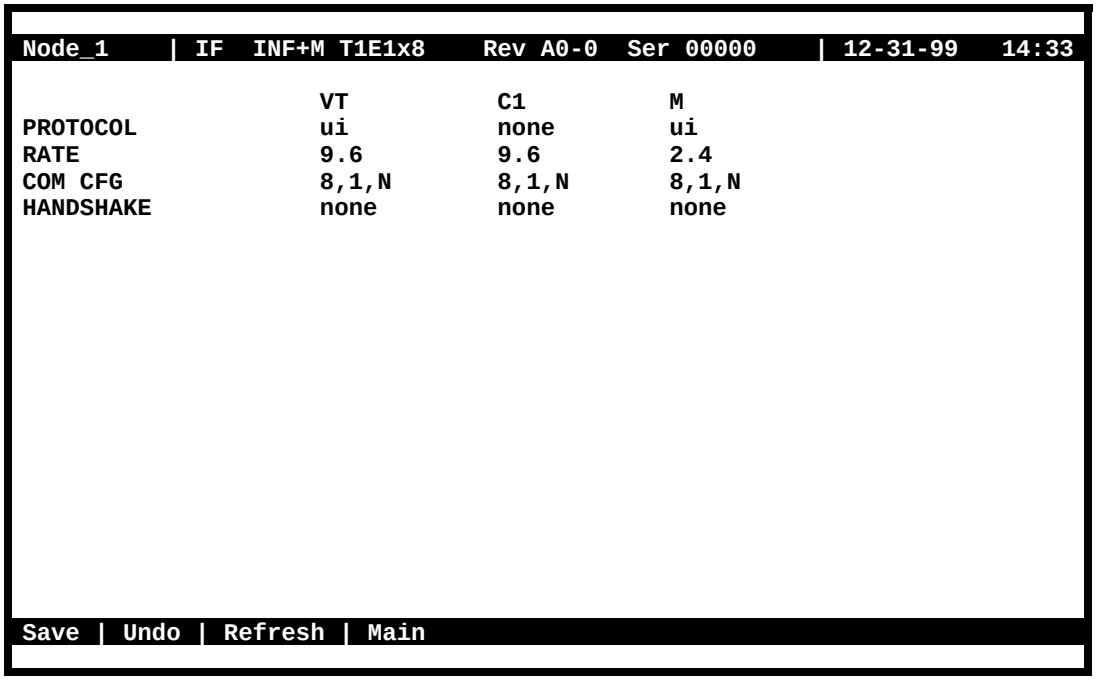


Figure 5-12. Typical Ports Screen (INTF+M)

This screen shows the Protocol, Rate, Communications, and Handshaking control settings for each port. The VT column lists the current settings for a VT100-compatible terminal connected to the TERM modular jack on the Interface card faceplate. The C1 column is for an external computer connection to the COMP (or COM1) DB-9 plug on the card. The M column is for a modem connection from an INF+M card to a remote facility via a phone line.

The screen settings are described in the following paragraphs.

Note: *There are two scenarios in Figure 5-12. The Typical INTF+M Ports Screen shown above displays (VT - VT100 terminal, C1 - COM1, and M-Modem). However, if INTF+E isn't used the screen will display (VT, C1, and C2 - COM2).*

PROTOCOL

For the VT-100 terminal port, the Protocol setting is always **ui** (user interface).

For the computer (C1) port, choose **ui**, **pr** (Printer), **slip** (Serial Line Interface Protocol), or **ppp** (Point-to-Point Protocol).

For the modem port, choose **ui**, **ui-pr**, or **none**.

RATE

The transmission rate for the VT **(9.6** kbps**)** and C1 ports when selecting PPPcan be **19.2** kbps. The rate for the M port is always **2.4** kbps. You cannot change these settings.

COM CFG

The Communication Configuration settings are always 8 data bits, one stop bit, and no parity (**8,1,N**) for all three ports. You cannot change these settings on any port.

HANDSHAKE

The Handshaking setting is always **none** for all three ports. You cannot change these settings on any port.

5.6 Interface Card Error Messages

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

5.7 Interface Card Troubleshooting

5.7.1 User Interface Problems

The Interface card provides the connections from the integrated access system to the external control terminals and/or other network management systems. This card may be faulty if you are connected to the system but receive no responses to your commands. However, the problem in this case also may be with the 8803 CPU Card.

First, check the cabling connections from the Interface card to the appropriate external device. Refer to the “Interface Card Description” section at the beginning of this chapter for more information on the card faceplate jacks and signal connections. If possible, substitute a known good cable for the one you suspect is faulty.

If the cable connection is good, unplug the CPU card from the system chassis and then plug it back in to restart the CPU and system. (The problem may have been a momentary system “freeze”.) Then, log into the system again and repeat the command (or series of commands) that initially caused the problem. If the problem continues, replace the Interface card with an identical new card.



Note: *Note that removal of the Interface card will cause a service disruption on all T1 and E1 WAN links of the system.*

If the problem persists with the new Interface card, the CPU card is probably faulty.

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

5.7.2 Alarm Reporting Problems

The Interface card also provides a relay contact closure to an external alarm annunciation (or other alarm reporting device at the system site) when an alarm is declared. The card may be faulty if an alarm is declared but not indicated on the external alarm reporting system. Check the wiring from the Interface card NODE port to the alarm system. If the wiring is good, replace the Interface card.

Note that removal of the Interface card will cause a service disruption on all T1 and E1 WAN links of the system.

5.7.3 WAN Transmission Problems

A faulty Interface card could cause T1 and E1 WAN service disruptions, since this card also provides the WAN connections. Electrically, the Interface card resides between the WAN cards and the T1/E1 network. If all T1 and E1 links are down (as evidenced by system alarms in progress), first check the cable from the WAN jack of the Interface card to the network. If the cable connection is good, replace the Interface card.

Note that removal of the Interface card will cause a service disruption on all T1 and E1 WAN links of the system.

If the problem is with only one T1 or E1 WAN link, refer to the WAN Chapter in this manual and troubleshoot that link and its associated WAN card. Use the loopbacks provided in the WAN card user interface screens in conjunction with the built-in test patterns you can apply from the integrated access system. These test functions allow you to isolate the problem to the local or far (remote) end. You can then check the interconnect cabling from the Interface card to that link, and sequentially replace the WAN and/or Interface card, one by one, until the trouble clears.

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