

Express 3010/3110
128 kbps ISDN Modem
Document Number 61200239L1-20A

Part Numbers:
1200239L1 (U-Interface)
1200240L1 (S/T Interface)

July 1999



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FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of the FCC rules. On the bottom of the equipment housing is a label that shows the FCC registration number and Ringer Equivalence Number (REN) for this equipment. If requested, provide this information to the telephone company.
2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.
3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment; advance notification and the opportunity to maintain uninterrupted service is given.
4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the network until the problem is corrected or it is certain the equipment is not malfunctioning.
5. This unit contains no user serviceable parts.
6. An FCC compliant telephone cord with a modular plug is provided with this equipment. In addition, an FCC compliant cable appropriate for the dial backup option ordered is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.
7. The following information may be required when applying to the local telephone company for leased line facilities.

Service Type	Digital Facility Interface Code	Service Order Code	Network Jacks
ISDN	021S5	6.0F	RI-49C

**FEDERAL COMMUNICATIONS COMMISSION RADIO FRE-
QUENCY INTERFERENCE STATEMENT:**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio or TV reception. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Change or modifications to this unit not expressly approved by ADTRAN will void the user's authority to operate the equipment.

**ADTRAN YEAR 2000 (Y2K)
READINESS DISCLOSURE**

ADTRAN has established a Year 2000 program to ensure that our products and operations will correctly function in the new millennium. ADTRAN warrants that all products meet Year 2000 specifications regardless of model or revision. Information about ADTRAN's Year 2000 compliance program is available at the following:

Web Site	www.adtran.com
Product Matrix	www.adtran.com/Y2Kfax.html
Faxback Document Line	(256) 963-8200 <i>Y2K plans and product certifications are listed in the matrix</i>
Y2K Project Line	(256) 963-2200
E-mail	year2000@adtran.com

CANADIAN EMISSIONS REQUIREMENTS

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Class A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par le ministre des Communications.

CANADIAN EQUIPMENT LIMITATIONS

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

Before installing this equipment, ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (telephone extension cord). Compliance with the above conditions may not prevent degradation of service in some situations.

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

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

WARNING

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

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

IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons. The precautions are listed below.

1. Do not use this product near water (for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement or near a swimming pool).
2. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.
4. Use only the power cord, power supply, and/or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check local codes for any special disposal instructions.
5. Use a suitably approved and certified power supply that has a minimum output rating of 12 VDC, 800 mA, with a maximum output power rating of 240 VA (W) (1200240L1). Use a "Listed" Class 2 power supply.

SAVE THESE INSTRUCTIONS.

AFFIDAVIT REQUIREMENTS FOR CONNECTION TO DIGITAL SERVICES

- An affidavit is required to be given to the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voiceband analog signals and transmitted on the network.
- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specifications.
- End user/customer will be responsible to file an affidavit with the local exchange carrier when connecting unprotected CPE to a 1.544 Mbps or subrate digital service.
- Until such time as subrate digital terminal equipment is registered for voice applications, the affidavit requirement for subrate services is waived.

**AFFIDAVIT FOR CONNECTION OF CUSTOMER PREMISES EQUIPMENT
TO 1.544 MBPS AND/OR SUBRATE DIGITAL SERVICES**

For the work to be performed in the certified territory of

(telco name)
State of _____
County of _____

I, _____ (name),

(business address),

(telephone number)

being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps and/or _____ subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specifications. With respect to encoded analog content and billing protection:

- () I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to encoded analog content and billing protection information continuously complies with Part 68 of the FCC Rules and Regulations.
- () The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.
- () The encoded analog content and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s)/maintainer(s) of the digital CPE responsible for establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following (check appropriate blocks):

() A. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

() B. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

() C. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

() D. In lieu of the preceding training requirements, the operator(s)/maintainer(s) is (are) under the control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (telco's name) with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, if so requested.

_____ Signature

_____ Title

_____ Date

Transcribed and sworn to before me on:

Month _____, Date _____, Year _____.

Notary Public

My commission expires:

WARRANTY: ADTRAN warrants that items manufactured by ADTRAN and supplied under Buyer's order shall be free from defects in materials and workmanship and will conform to applicable specifications and drawings. ADTRAN's liability herein, whether based upon breach of warranty or contract or negligence in manufacture, shall be limited to replacement or repair at ADTRAN's election of all such defective or nonconforming items, provided that this warranty shall apply only where Buyer has given ADTRAN written notice of such defects or nonconformity within five (5) years* after delivery by ADTRAN of such items to Buyer. ADTRAN shall have the right prior to return to inspect at Buyer's plant any items claimed to be defective or nonconforming.

*Note: The following items carry warranty period as shown.

1. Items not of ADTRAN manufacture will carry the remaining warranty and related terms and conditions of the original manufacturer.
2. Encapsulated U-Repeater and Encapsulated DDS Repeater - 2 years.

The foregoing constitutes the sole and exclusive remedy of the Buyer and exclusive liability of ADTRAN AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY AS TO MERCHANTABILITY, FITNESS FOR PURPOSE SOLD, DESCRIPTION, QUALITY, PRODUCTIVENESS OR ANY OTHER MATTER. Without limiting the foregoing, in no event shall ADTRAN be liable for the loss of use or profit or other collateral, special or consequential damages.

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SHIPPING: The cost of shipping the equipment from Buyer's facility back to ADTRAN shall be paid by the Buyer. The cost for return shipping of the equipment by surface carrier shall be paid by ADTRAN. ADTRAN will utilize other means of express shipment at the request of the Buyer. The cost of shipping shall be paid by the Buyer if express shipment is requested. In-warranty equip-

ment returned for repair that is found not defective will carry a nominal charge to cover handling cost.

OUT OF WARRANTY: The cost of out-of-warranty repairs including return shipment are subject to a charge as quoted by ADTRAN. The cost of the repair will be invoiced and the return of the item will be made using the most economical shipment means available. ADTRAN will use other means of express shipment at the request of the Buyer. In this case, the cost of shipping shall be paid by the Buyer.

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DATA RIGHTS: Rights to any intellectual property residing in the products or any data furnished hereunder are not granted except by specific written permission by an authorized representative of ADTRAN. Buyer shall have no right to copy or reproduce in whole or part any data furnished hereunder without the prior written consent of ADTRAN.

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In the event of a claim, suit or action against ADTRAN alleging infringement by the use of any such equipment or documentation, furnished under this Agreement, in combination with other articles or in carrying out any process covered by a patent owned or controlled by any other person, in which independent use of the equipment under this Agreement would not be an infringement. Buyer shall save ADTRAN harmless from liability, as finally determined by a court of competent jurisdiction, for such infringement, provided that ADTRAN shall have given Buyer full and exclusive control of the defense thereof, and that Buyer shall have the sole right to settle claim, suit or action.

Except as herein provided in this indemnity paragraph, neither Buyer nor ADTRAN makes any warranty to the other with respect to any claim, suit or action of any third party by way of infringement and neither party shall be responsible to the other for any loss, cost or damages consequential or otherwise, that may be suffered by the other as a result of any such claim, suit or action.

Telephone Company Contacts for ISDN Service in U.S.A.:

Ameritech ISDN Repair	1-800-TEAMDATA
Bell Atlantic South	1-800-570-ISDN
Bell South	1-800-247-2020
Cincinnati Bell	1-513-241-6900
Bell Atlantic North	1-800-GET-ISDN 1-800-430-ISDN (New England Area) Support: 1-888-676-4736
Pac Bell	1-800-4PB-ISDN
Rochester Tel	1-716-777-1811 (Repair) 1-716-777-2000 (Order)
Southwestern Bell	1-800-792-4736
US West	1-800-223-7508 (Repair) 1-800-244-1111 (Order)

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Chapter 1 Overview

The Express 3x10 series™ modems are versatile ISDN modems that convert a synchronous or asynchronous DTE port to a Basic Rate ISDN circuit at speeds up to 128 kbps. The Express 3010 presents a U-interface to the ISDN network. The Express 3110 presents an S/T interface to the ISDN network.

Key features offered by both the Express 3010 and Express 3110 are listed below.

EXPRESS 3X10 SERIES FEATURES

- Two ports for phone or analog service
- Synchronous DTE rates to 128 kbps
- Asynchronous data rates up to 230.4 kbps
- Custom calling features and Caller ID support
- Automatic SPID and Switch Detection using ADTRAN Expert ISDN (covered under patent number 5,715,241), or Auto SPID download where available for the Express 3010
- LZS® technology from hi/fn™ for compression up to 230.4 kbps
- Remote configuration
- Windows® Plug and Play compatibility
- Multilink PPP, Bonding Mode 1

REQUIREMENTS FOR COMPUTER CONNECTION

For a PC

- Personal computer 386 or higher
- Windows 95/98 or Windows NT 3.51 or higher

For a Macintosh

- Power Mac or 68020 Processor
- Macintosh high-speed modem cable

General Requirements (PC and Macintosh)

- 16550 UART high speed serial port (16650 UART required for data speed of 230.4 kbps)
- EIA-232 serial cable with a DB25 connector for the Express and the other end matching the COM port on the computer (do not use a null modem cable)
- One Basic Rate ISDN line (two ISDN phone numbers, sometimes referred to as local directory numbers)



Single ISDN phone number and point-to-point lines are not recommended for use with the Express.

Basic Rate ISDN Line

When ordering your ISDN line from the telephone company, request **EZ-ISDN 1** (Capability Package U) to ensure that it is set up properly. EZ-ISDN 1 is recommended by the industry for most home office/small business applications. If EZ-ISDN is not available from your service provider, order **Generic Data S**. For more information regarding ordering ISDN, see the ADTRAN document *Ordering ISDN Service User Guide* part number 60000.015-8, or contact the telephone company for alternative line configurations. The *Ordering ISDN Service User Guide* is available on the ADTRAN home page at <http://www.adtran.com> or by calling ADTRAN.

What ADTRAN Provides

The ADTRAN Express is packaged with the following contents (see Figure 1-1).

- Express unit
- AC power supply
- RJ-45 to RJ-11 telephone cable

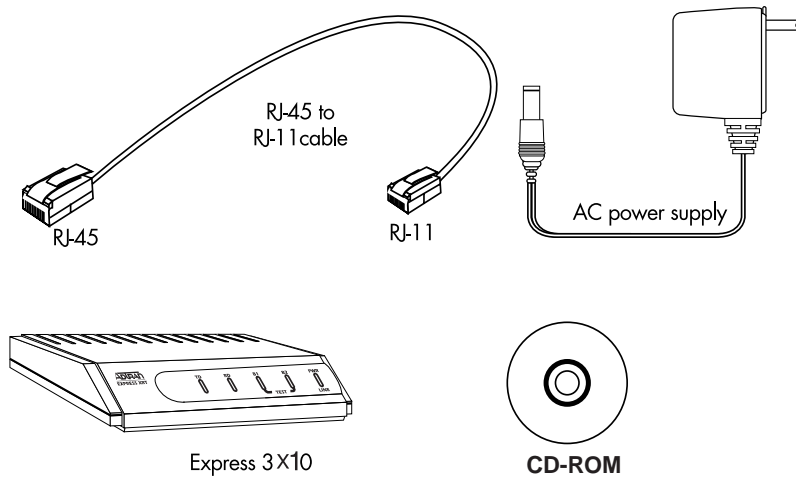


Figure 1-1. Express Package Contents

DIALING

Dialing from the Express is accomplished in the following ways:

- Using a VT 100 terminal connected to the rear panel EIA-232 port. (See *VT 100 Terminal Emulation* on page 2-7, *Configuring the Express* on page 3-1, and *Configuring the Express for V.25 bis In-band Dialing* on page 3-23.)
- Over the DTE interface using the AT command set. (See *AT Commands and S-Registers* on page A-1.)
- V.25 bis in-band (used in applications such as LAN/WAN bridging). (See *Configuring the Express for V.25 bis In-band Dialing* on page 3-23.)
- When DTR is raised. Routers can be configured when bandwidth on their dedicated line is exceeded. In high-traffic times, this allows the Express to dial out over the ISDN for an extra 128 kbps of bandwidth-on-demand.

RECOMMENDED OPERATING PROTOCOLS

The Express supports a wide range of operating modes. Many combinations of circuit type, protocol, and data rate may be selected. The combinations shown in Table 1-1 on page 1-5 are recommended.

Table 1-1 shows that a given data rate may be achieved by more than one protocol/rate adaption selection. The table is organized so that selections with the least transport delay are closer to the top of the table for any given circuit type. Therefore, choose a protocol and rate closer to the top of the protocol rate list for a given circuit type.

Table 1-1. Recommended Operating Modes

Call Type	Protocol	Sync/ Async	Rates Supported (bps)											
			56000	64000	64000									
DIAL-64K	BONDING	Sync	56000	64000										
	Clear Chan	Sync	48000	56000	64000									
	PPP	Sync	2400	4800	9600	19200	38400	56000	64000					
	V.110	Sync	2400	4800	9600	19200	38400							
	V.120	Sync	9600	19200	38400	48000								
	PPP async- sync	Async	1200	2400	4800	9600	19200	38400	57600	115200 ^f	230400 ^f			
	BONDING	Async	2400	4800	9600	19200	38400	57600						
	V.110	Async	1200	2400	4800	9600	19200	38400						
	V.120	Async	1200	2400	4800	9600	19200	38400	57600	115200 ^f	230400 ^f			
	DIAL-56K	BONDING	Sync	56000										
Clear Chan		Sync	48000	56000										
PPP		Sync	2400	4800	9600	19200	38400	56000						
V.110		Sync	2400	4800	9600	19200								
V.120		Sync	9600	19200	38400	48000								
PPP async- sync		Async	1200	2400	4800	9600	19200	38400	57600	115200 ^f	230400 ^f			
BONDING		Async	2400	4800	9600	19200	38400	57600						
V.110		Async	1200	2400	4800	9600	19200							
V.120		Async	1200	2400	4800	9600	19200	38400	57600	115200 ^f	230400 ^f			
DIAL-64K*2		BONDING	Sync	128000										
	MPPP	Sync	128000											
	MPPP	Async	115200											
	BONDING	Async	115200											
DIAL-56K*2	BONDING	Sync	112000											
	MPPP	Sync	112000											
	MPPP	Async	115200											
	BONDING	Async	115200											
LEASED 64K	Clear Chan	Sync	48000	56000	64000									
	Clear Chan	Sync	128000											
LEASED 128K														



1. All asynchronous rates support flow control
2. All dial-up modes support front panel, DTR, AT command, and V.25 bis dialing methods.
3. Rates marked with *f* require flow control.
4. Given a choice between two protocols, pick the protocol closer to the top of the list for the circuit type.

Chapter 2 Installation

INSTALLING THE EXPRESS 3010/3110

This section describes how to connect the Express 3010/3110 to a computer. Figure 2-1 depicts the final hardware configuration (see also *Windows Installation Instructions* on page 2-3 and *Macintosh Installation Instructions* on page 2-4).

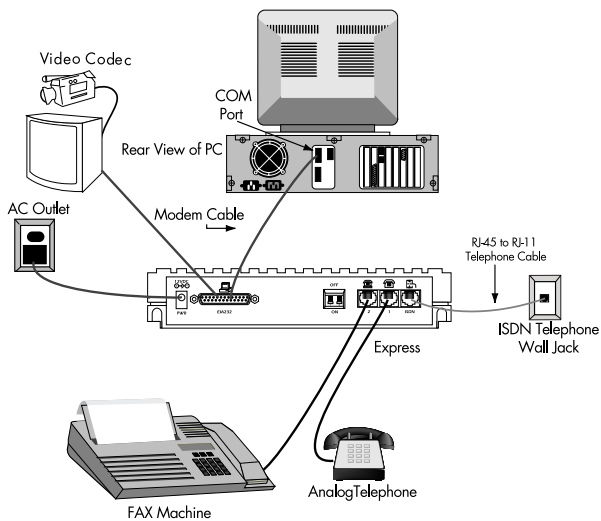


Figure 2-1. Standard ISDN Internet/Remote Access Application

Verify Switch Settings

Dip switches 1 and 2 located on the rear panel of the Express 3010/3110 allow you to physically configure certain settings. Figure 2-2 shows the location of the dip switches on the rear panel of the unit.

The factory default position for all switches is down (On) during initial installation.

SW 1: Off (Up) = 230.4 kbps
 On (Down) = Autobaud (speeds up to 115.2 kbps)

If switch 1 is set to the Off position, the unit is set to operate at a DTE rate of 230.4 kbps. A special COM port using a 16650 UART is required while in this mode. If switch 1 is set to the On position, the unit will automatically adapt to the DTE rate (up to 115.2 kbps).

SW 2: Off (Up) = Factory Default
 On (Down) = Normal (previous settings saved)

If switch 2 is set to the Off position (up), the unit continues to use the factory default settings until switch 2 is set to the On position (down). Also, area code, phone numbers, SPIDS, and stored numbers are cleared.

NOTE *If both switches are up, the unit is offline in Command Mode.*

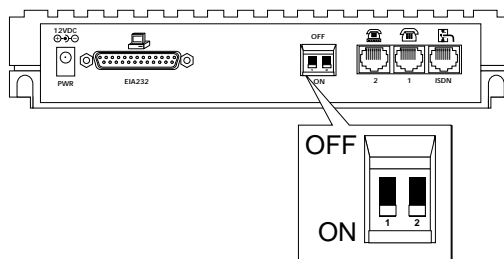


Figure 2-2. Dip Switches on Rear Panel

WINDOWS INSTALLATION INSTRUCTIONS

Hardware Installation

1. With the computer's power off, connect the **EIA232** serial port on the Express to an available COM port on the computer.
2. Plug the Express's AC power cord into the port labeled **PWR**. Plug the other end into a 120 V electrical outlet. The Express is now powered on.
3. Plug the RJ-45 connector (large end) of the RJ-45 to RJ-11 telephone cable into the jack labeled **ISDN** on the rear of the Express.
4. Plug the RJ-11 connector (small end) of the RJ-45 to RJ-11 telephone cable into the ISDN telephone wall jack.
5. Power on the computer.

Windows 95/98 Users

1. Windows 95/98 automatically detects and installs the necessary driver for the Express. Follow the on screen instructions.

Windows NT 4.0 Users

1. Double click on the **My Computer** icon, then on the **Control Panel** icon.
2. Double click on the **Modems** icon.
3. If there is no other modem installed on the computer, the **Install New Modem** window appears. If another modem is already installed on the computer, click the **Add** button to display the **Install New Modem** window.
4. Click the **Next** button and Windows NT will attempt to automatically detect the Express.
5. To complete the installation, follow the on screen instructions.


Windows NT 3.51 Users

1. Locate the **modem.inf** file. This file is normally located in the **c:\winnt35\system32\ras** directory. See the Windows NT documentation for instructions on installing the Remote Access Service.
2. To recover your files in case of a user mistake, create a backup of the **modem.inf** file.
3. Using Notepad, open the **adtran.inf** file (on the Express CD).
4. Copy the contents of the **adtran.inf** file into the Windows clipboard.
5. Open the **modem.inf** file.
6. Paste the contents of the clipboard (**adtran.inf**) to the end of the **modem.inf** file.
7. Save the new altered **modem.inf** and close the file.
8. Restart the system.

MACINTOSH INSTALLATION INSTRUCTIONS

Hardware Installation

1. With the Macintosh's power off, connect the **EIA232** serial port on the Express to an available communications port on the Macintosh.

 **NOTE** *Be sure to use a Macintosh high-speed modem cable. Macintosh high-speed modem cables are available at any electronics store that carries Macintosh equipment.*

2. Plug the Express's AC power cord into the port labeled **PWR**. Plug the other end into a 120 V electrical outlet. The Express is now powered on.
3. Plug the RJ-45 connector (large end) of the RJ-45-to-RJ-11 telephone cable into the jack labeled **ISDN** on the rear of the Express.
4. Plug the RJ-11 connector (small end) of the RJ-45 to the RJ-11 telephone cable into the ISDN telephone wall jack.
5. Power on the Macintosh.

BASIC TELEPHONE SERVICE

In addition to the computer connection, two analog devices such as a telephone, Fax, modem, answering machine, or caller ID box can be connected using the two POTS interfaces on the rear panel (RJ-11 jacks labeled **1** and **2** with an illustration of a telephone above the jack).

Supplementary Voice Services

Supplementary services such as call forwarding, caller ID, call return, call holding, three- or six-way conference calling, call transfer, call rejection, and call waiting are fully supported by the Express 3010/3110 on a touch-tone telephone. These services are available only if included in the ISDN line configuration and are implemented using the standard commands provided by the telephone company.

Call Waiting

Call Waiting permits one voice call to be placed on hold while answering another voice call. Use the flash-hook to place the active call on hold and answer an incoming call. Hanging up terminates both calls. The call waiting tone can be disabled and enabled on a per-call basis. To disable call waiting (using a touch-tone phone), press ***70**. To enable call waiting, hang up. (The Express defaults to call waiting.)

Conference Calling

Conference Calling (also known as three-way calling) permits a conversation between three parties, each at different locations.

After establishing a voice call, flash-hook to put the first party on hold and receive a second dial tone. Dial the second party. Flash-hook again to conference the two calls.

NOTE *When connecting to a National ISDN 1 switch, call conferencing, message waiting, and call transferring are assigned a unique feature identifier number. This number may not be the same in all areas. S-registers 90 through 93 contain the feature identifier numbers for conference and transfer. If these features do not work, contact your ISDN provider.*

Phone Number Allocation

The Express allocates ISDN phone number 1 to POTS port 1. Connect the primary telephone to POTS port 1 (see Figure 2-3).

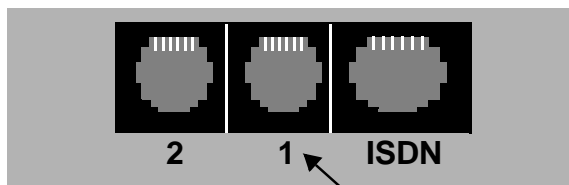


Figure 2-3. Telephone Connection Port

ISDN phone number 2 is shared by the EIA-232 port and POTS port 2; therefore only one port can be used at a time.

NOTE *ISDN data calls and external modem applications must be placed to ISDN phone number 2.*

Auto-Detect SPIDs/Switch Type (Expert ISDN) (Express 3010 Only)

Auto-detection of SPIDs and Switch Type greatly reduces the likelihood of time-consuming problems occurring during installation of the Express. It evaluates common SPID formats based on the area code and phone numbers and reports success after placing a test call.

The switch type and SPID numbers can be detected automatically through the Express interface by using the following steps:


1. Type **AT!V** to activate the VT 100 screen.
2. Type **Ctrl+C** to activate the Configuration menu.
3. Enter the area code and ISDN phone numbers given by the ISDN service provider.
4. Enter "Enabled" under the Auto-Detect SPIDS/switch selection.

After installation is complete, the Express 3010/3110 resets the ISDN line for a clean start. Therefore, the PWR/LINE LED may not be on solid (indicating link up) for a few more seconds. In the few cases where the procedure does not succeed, a window will pop up, prompting you to enter the SPIDs.

VT 100 TERMINAL EMULATION

The Express 3010/3110 can be configured using any communications package supporting VT 100 terminal emulation. Instructions for VT 100 configuration are given in *VT 100 Configuration* on page 2-8 and in Chapter 3, *Application Configuration*. The main branches of the VT 100 menu tree and their hot keys (the keys you press to go to a particular menu) are as follows:

Menu:	Hot Keys:
CONFIG	(Ctrl + C)
DIAL	(Ctrl + D)
STATUS	(Ctrl + V)
TEST	(Ctrl + T)

 *Ensure that the communications package is configured to pass these Control Sequences through to the Express.*

To exit a menu, you can press **Ctrl + X**. The **Ctrl + X** command also places the unit back on-line if a call is connected.

Some features in the Express 3010/3110 do not immediately take effect upon selection. This prevents unintentional reconfiguration of the Express 3010/3110 during an active call. Items such as **Protocol** and **Call Type** take effect *only* at the beginning of a new call.

VT 100 Configuration

After connecting a VT 100 terminal, press **AT!V** followed by **Enter**. The Configuration screen is the first screen displayed (see Figure 2-4).

```
Express 3010 Configuration Menu
1) Network Options = Dial Line      16) DSR Options = DSR Forced On
2) Area Code =                      17) Flow Control = No Flow Ctrl
3) ISDN Phone Number 1 = 5551000    18) Protocol = V.110
4) ISDN Phone Number 2 = 5553000    19) Profiles
5) Auto-Detect SPIDs/Switch = Disabled 20) Configure Remote Unit
6) Switch Type = National ISDN1     21) Remote Num. Password = 1111
7) Call Type = Data 64K
8) SPID 1 = 0555100001
9) SPID 2 = 0555300001
10) Auto Answer = Enabled
11) Call Screening = Answer Any
12) Call Routing = Speech/Audio->POTS
13) Dial options = AT commands
14) DTE options = Asynchronous
15) DTR Options = Ignore DTR

Select = _                               Enter SELECT   Esc NO CHANCE

Ct1-V STATUS  Ct1-T TEST  Ct1-C CONFIG  Ct1-D DIAL  Ct1-X EXIT
```

Figure 2-4. VT 100 Terminal Configuration Menu

Press the number corresponding to the item you want to configure. The possible settings display. Press the number of the setting you desire. See Chapter 3, *Application Configuration*, for details on configuration.

VT 100 Terminal Status Buffer

The status buffer can be displayed at any time after entering the menu structure. Pressing **Ctrl + V** displays the Express 3010/3110 Status menu. The last 20 status messages generated during the operation of the unit are displayed with relevant status items. See Figure 2-5 on page 2-9. Status messages provide information about call progress, ISDN link status and error conditions. The most recent status message appears as Status 1, with the remaining status messages appearing in descending order. The status buffer messages and their descriptions are listed in the appendix *Status Buffer Messages* on page C-1.

Press **Ctrl + C** to return to the Configuration menu.

```

Express 3010 Status Menu
UNIT/LOOP STATUS      STATUS BUFFER
Call Type              1 = NT WakeUpTone
                       2 = EMPTY
DTE Rate               3 = EMPTY
Self Test              4 = EMPTY
Software Rev           5 = EMPTY
Checksum               6 = EMPTY
Serial Number          7 = EMPTY
Loop Status            8 = EMPTY
Num Dialed             9 = EMPTY
RTS                    10 = EMPTY
CTS                    11 = EMPTY
DCD                    12 = EMPTY
DTR                    13 = EMPTY
                       14 = EMPTY
                       15 = EMPTY
                       16 = EMPTY
                       17 = EMPTY
                       18 = EMPTY
                       19 = EMPTY
                       20 = EMPTY

Ctl-V STATUS  Ctl-T TEST  Ctl-C CONFIG  Ctl-D DIAL  Ctl-X EXIT  00:03:59_

```

Figure 2-5. VT 100 Terminal Status Buffer Menu

Chapter 3 Application Configuration

There are two methods for configuring the Express 3100: (1) by VT 100 terminal or (2) by AT commands. Before configuring the Express for any application, the Express should be properly connected as described in the Chapter 2.

Technical notes, documents, and scripts can be found on the ADTRAN web home page at <http://www.adtran.com>. This documentation explains how to use ADTRAN products in specific applications on PC and Macintosh platforms.

CONFIGURING THE EXPRESS



*It is important to note that some features in the Express do not immediately take effect upon selection. This prevents unintentional reconfiguration of the Express during an active call. Items such as **Protocol** and **Call Type** take effect only at the beginning of a new call.*

Network Options

To place ISDN modem calls, the unit must be configured for **Dial Line**. Perform the following steps to configure for Dial Line operation:

1. Go to the Configuration screen.
2. Press the number corresponding to **Network Options** and press **Enter** to view the **Network Options** choices: **Dial Line** and **Leased Line**.
3. Press the number corresponding to **Dial Line** and press **Enter** to select **Dial Line**.

Area Code (Express 3010 only)

Enter the area code when using the AutoSPID/switch option.

ISDN Phone Number (Local Directory Number)

This option allows the entry of 0, 1, or 2 LDNs. The LDN is used when placing or receiving calls. The LDN is the local phone number assigned to the line.

LDN 1 = 5 5 5 1 2 1 2

LDN 2 = 5 5 5 1 2 1 2

Auto-Detect SPIDs/Switch (Express 3010 only)

This can be set to **Active** or **Disabled**. If set to **Active**, the SPID and switch type for your ISDN switch are automatically detected. If set to **Disabled**, no automatic detection takes place.

Switch Protocol

Find out what kind of ISDN switch your local CO is using by asking your telephone administrator or your telephone company representative. The Express can be configured for a Northern Telecom DMS-100, LUCENT 5ESS® CO switch, a switch conforming to the National ISDN-1 standard (usually an LUCENT 5ESS, NTI DMS-100™, or Siemens EWSD), or an NEC Switch.

Press the number corresponding to **Switch Protocol** and press **Enter** to display the **Switch Protocol** options: **LUCENT 5ESS, DMS-100, National ISDN1, NEC** (Express 3110), and **EuroISDN** (Express 3110). Press the number corresponding to the desired option and press **Enter** again.

Call Type

The Call type can be configured four different ways, depending on the type of service used. Press the number corresponding to **Call Type** and press **Enter** to display the Call Type options: **Speech, Audio, Data 56k**, and **Data 64k**. Press the number corresponding to the desired option, and then press **Enter**.

Service Profile ID (SPID)

The SPID is a sequence of digits used to identify ISDN terminal equipment to the ISDN switch. The SPID is assigned by the local phone company when the ISDN line is installed and it usually looks similar to the phone number. Obtain SPIDs from your telephone administrator or local telephone representative.

The number of SPIDs required (0, 1, or 2) depends on how your ISDN line is configured. For instance, a point-to-point line has no SPID. Multipoint lines may have one or two SPIDs. The Express uses the presence of SPID 1 to determine if the line is multipoint. If the line has only one SPID, then it must be entered in SPID 1. Outside of North America, the SPID format may not be used.

Example:

SPID 1 = 2 5 6 5 5 5 1 2 3 4 0 1 0 1

SPID 2 = 2 5 6 5 5 5 4 3 2 1 0 1 0 1

PREFIX

SUFFIX

National ISDN-1 switches require the addition of a two-digit terminal identifier (TID) at the end of the SPID.


NOTE

Disconnect the network interface from the unit before initially entering or altering the SPIDs and LDNs.

Press the number corresponding to SPID 1 and press **Enter** to display the field for entering or changing SPID1. Type the SPID and press **Enter**.

Press the number corresponding to SPID 2 and press **Enter** to display the field for entering or changing SPID2. Type the SPID and press **Enter**.

The switch type and SPID numbers can be detected automatically through the Express interface by doing the following:


NOTE

(1) Type AT!V to activate the VT 100 screen; (2) Type Ctrl+C to activate the Configuration menu; (3) Enter the area code and ISDN phone numbers given by the ISDN service provider; (4) Enter Enabled under the Auto-Detect SPIDS/switch selection.

Auto Answer

Press the number corresponding to **Auto Answer** and press **Enter** to view the **Auto Answer** options: **Disabled**, **Enabled**, and **Dump All Calls**. Press the number corresponding to the desired options; then press **Enter**.

Disabled

When **Disabled** is selected, the Express will not answer the call. An AT answer command (ATA) must be issued to the Express before it accepts the incoming call. The ringing call can be dumped using the **Hang up line** command.

Enabled

When **Enabled** is selected, the Express will accept an incoming data call on the primary phone number (SPID1, LDN1). If that call is a BONDING call, then another incoming call is accepted on the secondary phone number (SPID2, LDN2).

Dump all calls

When **Dump all calls** is selected, the Express will not accept any incoming calls, keeping the line clear for outgoing calls.

Call Screening

Call Screening allows the Express to answer all incoming calls (**1 Answer Any**) (default) or only calls originating from phone numbers stored in the **DIAL** menu as stored numbers SN0 through SN9 (**2 Answer if SN0 .. 9**).

When **Call Screening** is set to answer any numbers stored in SN0 through SN9, an incoming call is not answered if the Call ID received from the switch does not match a stored number. Depending on the switch type, the Call ID may be presented in either a seven- or ten-digit format. The Express displays the Call ID for all dumped calls in the Status buffer.

Because different switches handle calls and Call ID differently, use the following procedure to determine if your switch uses a seven- or ten-digit Call ID format or phone number.

1. Press the number corresponding to **Call Screening** and press **Enter** to view the **Call Screening** options.
2. Select **Ansr if SN0 . . 9**.
3. Store your seven-digit number in SN0.
4. Place a call to the Express with the stored number to see if it answers.
5. If the Express does not answer the call, look at the Call ID message in the Status buffer. More than likely, the Call ID number is a ten-digit number.
6. Re-store the number in SN0 as it is displayed in the Call ID message, and test **Call Screening** again.

Call Routing

These options specify how the Express is to route incoming voice calls. Press the number corresponding to **Call Routing** and press **Enter** to view the **Call Routing** options: **All Calls to DTE**, **Speech calls to POTS**, and **Speech/Audio calls to POTS**.

All Calls to DTE

This option routes all calls to the EIA-232 port, regardless of call type.

Speech calls to POTS

This option routes calls with a Speech Call Type to the POTS ports. Calls with Data 56k, Data 64k, and Audio are routed to the EIA-232 port.

Speech/Audio calls to POTS

This option routes calls with Speech and Audio Call Types to the POTS ports. Calls with Data 56k and Data 64k are routed to the EIA-232 port.

Dial Options

Press the number corresponding to **Dial Options** and press **Enter** to view the **Dial Options: AT Commands** and **V.25 bis**. Press the number corresponding to the desired option; then press **Enter**. The selected option will not take effect until exiting the VT 100 interface (**Ctrl+X**).

AT Commands

Configuring the Express for **AT commands** enables in-band dialing over the DTE interface using asynchronous AT commands. **AT commands** can be used to set up the Express as well as establish and end a call.

V.25 bis

Configuring the Express for **V.25 bis** enables in-band dialing over the DTE interface using asynchronous or synchronous V.25 bis commands. **V.25 bis** can be used to establish and end a call.

See the section *Configuring the Express for V.25 bis In-band Dialing* on page 3-23 for more information.

VT 100 TERMINAL DIALING OPTIONS

After starting the terminal emulation package, type **AT!V** and press **Enter**. Enter the Express Dial menu by pressing **Ctrl + D**.

Hang up line

Terminates current call.

Dial number

Allows a number to be entered and dialed. Pressing **Enter** after entering a number causes the Express to dial the number and save the dialed number in storage location 9 for redialing purposes.

Redial last number

Allows redial of the last number called or attempted. This number was saved in storage location 9 from the last attempted phone call.

Answer call

Allows selective answer of incoming calls when the Auto Answer is configured for disable. Auto Answer is described in the section *Auto Answer* on page 3-4.

Dial stored number

Allows the dialing of one of ten stored phone numbers.

Store/Review number

Permits entry and review of stored numbers.

OPTIONS FOR BOTH LEASED AND SWITCHED ISDN SERVICE

This section describes the options that apply to both leased digital service and dial operation. To access these options, first go to the Configuration menu.

DTE Options

Press the number corresponding to **DTE Options** and press **Enter** to display the **DTE** options: **Asynchronous** and **Synchronous**. Select the desired option.

Bit Rate

Press the number corresponding to **Bit Rate** and press **Enter** to display the **Bit Rate** options.

The **Bit Rate** can be set synchronously for 2400, 4800, 9600, 19200, 38400, 48000, 56000, 64000, 112000, and 128000 bps. The Express will autobaud to the asynchronous DTE rate.

Transmit Clock for Synchronous Data

Press the number corresponding to **Transmit Clock** and press **Enter** to display the **Transmit Clock** options: **Normal** and **External**. Select the desired option.

Selecting the **Normal** option causes the Express to be the synchronous DTE interface transmit timing source. Transmit data is timed from the transmit clock provided by the Express on the DTE connector. **Normal** clock is the normal mode of operation for the Express.

With the **External** option selected, the Express slaves to an external transmit timing source. The external clock is provided to the Express by the external transmit clock signal at the DTE. This signal is echoed by the Express to the transmit clock signal on the DTE port.

This option is provided for situations where equipment connected to the Express DTE connector cannot slave to the Express-provided clock. The Express uses the U-interface as the frequency standard when it must provide a synchronous receive or transmit clock. When using the Express in a Tail Circuit application, it may be necessary to add delay to accommodate clock jitter. Entering a number from **0-255** under **TxRxDelay** will yield the size of the delay buffer, which is approximately 8x the number selected in bytes.

DTR Options

Press the number corresponding to **DTR Options** and press **Enter** to display the **DTR** options.

Selecting **Ignore DTR** causes the Express to disregard the state of the data terminal ready (DTR) pin. **Cmd when Off** forces the unit into the AT command processor mode when DTR is not asserted. To return on-line, DTR must be asserted, followed by the AT0 command. **Idle when Off** forces the unit to end the current call when DTR is no longer asserted. **Off>On dial #0** allows one call attempt to be automatically established when the DTR signal goes from inactive to active. While DTR is active, dialing is also possible through the built-in menu system. When DTR goes inactive, any outgoing or incoming call present is disconnected. **Off>On dial #0** uses the phone number in stored number register 0 to establish the call. To store a number for automatic dialing, see the section *Configuring the Express for V.25 bis In-band Dialing* on page 3-23. Selecting **Dial #0 if On** allows calls to be automatically established when the DTR signal is in the active state. The unit attempts to establish a call using SN0 until the call is established or DTR goes inactive. Selecting **Answer if On** only allows the unit to answer an incoming call if the DTR signal is asserted.

Flow Control for Asynchronous Data

Press the number corresponding to **Flow Control** and press **Enter** to display the **Flow Control** options.

Selecting **Hardware Flow Control** allows RX data to be presented to the DTE interface only when RTS is asserted. **Software Flow** control uses XON/XOFF to control data transferred between the DTE and the Express. Selecting **No Flow Ctrl** disables flow control.

SETTING PROTOCOL OPTIONS

The Express communicates with many different types of telecommunication equipment including other Express units, ISDN terminal adapters, BONDING mode 1-compatible inverse multiplexers, and PPP-compatible bridges/routers.

Communicating between such diverse types of equipment requires the use of various rate adaptation protocols to support various bit rates and DTE settings. The Express supports the following rate adaptation protocols:

1. Clear Channel (no rate adaption protocol)
2. Point-to point protocol (PPP) asynchronous to synchronous conversion
3. BONDING mode 1 (Bandwidth on Demand Interoperability Group)
4. CCITT V.120
5. CCITT V.110
6. FALLBACK
7. PPP async-sync

The desired protocol may be selected with AT commands at the DTE port or from the Express built-in menu system. (With the built-in menu system, view these protocol choices by press the number corresponding to **Protocol** and pressing **Enter**.) A description of protocols follows.

See the section *Recommended Operating Protocols* on page 1-3 for more information on recommended modes of operation.

Setting PPP Mode

PPP Mode contains the available options for the PPP async-sync protocol:

1. Multilink PPP
2. PPP
3. PPP with compression

Clear Channel

Clear channel provides the entire bearer channel to the DTE without regard to data format or protocol. This provides a rate adaptation at or near the ISDN circuit rate. The primary usage for **Clear Channel** in the dial line mode is for 56 kbps and 64 kbps synchronous. It is useful when the DTE performs its own internal synchronous protocol/rate adaptation or the Express is calling a 4-wire Switched 56 DSU. In the leased line mode, **Clear Channel** can provide synchronous bit rates of 56 kbps, 64 kbps, 112 kbps, and 128 kbps.

Point-to-Point Protocol (PPP) Async-to-Sync

PPP provides a standard method for transporting multi-protocol datagrams over point-to-point links. The ADTRAN PPP async-sync protocol allows the Express and a PC or Macintosh® running PPP software, to communicate with a PPP-compatible bridge or router. The PPP async-sync protocol complies with Internet Engineering Task Force (IETF) RFC 1662.

The asynchronous control character map (ACCM) option is scanned during the negotiation. When the ACCM option is seen in a configure ACK link control packet, it is adopted by the Express. In addition, when the ACCM option is not seen in the configure-request packet from the network, the Express will spoof or add it to the packet.

BONDING Mode 1

The **BONDING mode 1** protocol allows the Express to communicate at bit rates in excess of 64 kbps to a maximum of 128 kbps. The protocol allows use of both synchronous and asynchronous bit rates. When the Express uses the **BONDING mode 1** protocol, it must make two separate ISDN phone calls to seize control of both ISDN bearer channels. The protocol corrects any delays existing between the two bearer channels and presents a single high-speed data channel to the DTE. For successful high-speed operation, both the near- and far-end DCE need to be configured to use the **BONDING mode 1** protocol. The **BONDING mode 1** protocol negotiation phase has numerous timers to allow transmission delays due to satellite hops, international calls, etc. The timers may be adjusted if necessary by entering into the **BONDING mode 1** submenu.

V.120

The **V.120** protocol is a CCITT- compliant rate adaption method which provides DTE service between the Express and other V.120 compliant devices at DTE rates less than the 64 kbps ISDN Bearer channel rate. V.120 supports synchronous and asynchronous DTE rates. See the section *Recommended Operating Protocols* on page 1-3 and Table 1-1 on page 1-4 for available V.120 rates.

V.110

The **V.110** protocol is a CCITT- compliant rate adaption method which provides DTE service between the Express and other V.110 compliant devices. V.110 supports synchronous and asynchronous DTE rates. See the section *Recommended Operating Protocols* on page 1-3 (in Chapter 1) and Table 1-1 on page 1-4 for available V.110 rates.

FALLBACK

The **FALLBACK** asynchronous rate-adaption protocol provides the capability to automatically establish calls with other ISDN terminal adapters, Switched 56 DSUs, PPP-compatible bridges/routers, as well

as other ISUs using a single configuration. This allows for integrating services without changing the configuration on the Express.

The Express must be optioned as follows for FALLBACK operation:

- Any asynchronous bit rate up to 115.2 kbps which is supported by the DTE.
- Flow control must be enabled and supported by the DTE.

FALLBACK supports the following protocols based on the call type: BONDING mode 1, V.120, and PPP async-sync. When answering calls, the Express uses the incoming call type to determine which rate adaption protocols to support.

When originating calls to unknown units, the ISU begins protocol selection based on the local call type. Data 64k is used for FALLBACK selected from the **Profiles** menu. Upon connection at 64k call type, BONDING, V.120, and PPP async-sync are attempted. If connection is not made at 64k, the Express attempts another call at 56k call type. If connection is made at 56k, V.120, and PPP async-sync are attempted.

Multilink Point-to-Point Protocol

This protocol allows the Express to dial a second number, establishing a second point-to-point link. Once the second PPP is established, multilink PPP is performed over both B-channels. The phone number for the second call should be placed in stored number 1 (SN1). If no number is stored in SN1, the same phone number dialed to establish the first link is used for the second link.

PPP and STAC Compression

When set up to do compression, the Express will negotiate the compression control protocol (CCP) with the network PPP peer. If STAC compression is successfully negotiated with the peer, data packets from the DTE are compressed before being sent out the network. Likewise, compressed packets from the network are decompressed before being transmitted out the DTE.

CONFIGURING THE EXPRESS USING PROFILES (QUICK SETUP)

To configure the DTE Options quickly and easily, use the **Profiles** menu to automatically set up the most common DTE configurations. Press the number corresponding to **Profiles** and press **Enter** to display the **Profiles** options:

Default	Dial V120 asyn
Dial 56k Sync	Dial Bond asyn
Dial 64k Sync	Internet 64k
Dial 112k Sync	Internet 128k
Dial 128k Sync	Remote 64k
Leased 128k (Express 3010 only)	Remote 128k
Ldm 128 Master (Express 3010 only)	Leased V.120 (Express 3010 only)

For fine-tuning a particular application and DTE settings, see the section *Options for both Leased and Switched ISDN Service* on page 3-8. This section provides detailed step-by-step processes for configuring the DTE Options.

Most Internet service providers supporting ISDN also support PPP protocol. If connecting to an Internet service provider using one B-channel, select **Internet 64K**, which sets the protocol to PPP. If arrangements have been made with the Internet service provider to use two B-channels, select **Internet 128K**, which uses multilink PPP protocol.


Loading a factory profile has no effect on any SPID(s), ISDN Phone Number(s), or Switch Type settings already configured. The settings that are altered when applying a profile are shown on the following pages.

Default (factory)

This option restores the Express to the following factory default setup:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	Data 64k
Call screening	Answer Any
Data protocol	Clear Channel
DTE mode	Synchronous
DTR option	Ignore DTR
DTE flow control	None

The Express can be reset to the factory default settings by setting switch 2 to the off (up) position. See the section *Verify Switch Settings* on page 3-1 for more information.

 **NOTE** *Factory default erases all stored phone numbers, SPIDs, and LDNs.*

Dial 56K sync

When the Express is configured for **Dial 56K sync** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	56 kbps data
Data protocol	Clear channel
DTE mode	Synchronous
DTE connector bit rate	56 kbps
DTE flow control	None
Transmit data clock	Normal

Dial 64K sync

When the Express is configured for **Dial 64K sync** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	Clear channel
DTE mode	Synchronous
DTE connector bit rate	64 kbps
DTE flow control	None
Transmit data clock	Normal

Dial 112K sync

When the Express is configured for **Dial 112K sync** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	56 kbps data
Data protocol	BONDING mode 1
DTE mode	Synchronous
DTE connector bit rate	112 kbps
DTE flow control	None
Transmit data clock	Normal

Dial 128K sync

When the Express is configured for **Dial 128K sync** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	BONDING mode 1
DTE mode	Synchronous
DTE connector bit rate	128 kbps
DTE flow control	None
Transmit data clock	Normal

Leased 128k (Express 3010 only)

When the Express is configured for **Leased 128k** service, the following parameters are automatically preset:

Service type	ISDN leased line
Automatic answering	Enabled
ISDN call type	Data 64k
Data Protocol	Clear Channel
DTE mode	Synchronous
DTR option	Ignore DTR
DTE flow control	No Flow Ctrl

Ldm 128 Master (Express 3010 only)

When the Express is configured for **Leased 128 Master** service, the following parameters are automatically preset:

Service type	ISDN leased line
Automatic answering	Enabled
ISDN call type	Data 64k
Data protocol	V.120
DTE mode	Asynchronous
DTR option	Ignore DTR
DTE flow control	Hardware

Dial V120 asyn

When the Express is configured for **Dial V120 asyn** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data Protocol	V.120
DTE mode	Asynchronous
DTE connector bit rate	Hardware
DTR option	Ignore DTR
DTE flow control	Hardware

Dial Bond asyn

When the Express is configured for **Dial Bond asyn** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	Data 64k
Data protocol	Bonding Mode 1
DTE mode	Asynchronous
DTR option	Ignore DTR
DTE flow control	Hardware

Internet 64K

When the Express is configured for **Internet 64K** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	PPP asyn-sync
PPP Mode	PPP
DTE mode	Asynchronous
DTR option	Ignore DTR
DTE flow control	Hardware

Internet 128K

When the Express is configured for **Internet 128K** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	PPP asyn-sync
PPP Mode	Multilink PPP
DTE mode	Asynchronous
DTR Options	Ignore DTR
DTE flow control	Hardware

Remote 64K

When the Express is configured for **Remote 64K** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	V.120
DTE mode	Asynchronous
DTR Options	Ignore DTR
DTE flow control	Hardware
Transmit data clock	Normal

Remote 128K

When the Express is configured for **Remote 128K** service, the following parameters are automatically preset:

Service type	ISDN dial line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	Bonding Mode 1
DTE mode	Asynchronous
DTR Options	Ignore DTR
DTE flow control	Hardware

Leased V120 (Express 3010 only)

When the Express is configured for **Remote 128K** service, the following parameters are automatically preset:

Service type	ISDN leased line
Automatic answering	Enabled
ISDN call type	64 kbps data
Data protocol	V.120
DTE mode	Asynchronous
DTR Options	Ignore DTR
DTE flow control	Hardware

CONFIGURING THE EXPRESS FOR V.25 BIS IN-BAND DIALING

V.25 bis dialing is used primarily by DTE with synchronous interfaces. The Express supports the following V.25 bis commands to control automatic calling and answering:

CRN	Call request (number in command)
CRS	Call request (using stored number)
PRN	Program stored number
RLN	List stored number
CIC	Connect incoming call
DIC	Disconnect incoming call



*When using stored numbers V.25 bis accesses stored numbers 1 through 9. See the section **VT 100 Terminal Dialing Options** on page 3-6.*

SYNC V.25 Dialing

V.25 bis specifies that the characters should be ASCII, 7 bits, with even parity, and one stop bit. However, for versatility the Express allows the data bits, parity, and stop bits to be changed as defined under **Data** format.

This setting allows for V.25 bis messages in asynchronous (start/stop) data format.



*In synchronous mode, the Express is an ISDN version of a synchronous modem. For configuration or troubleshooting, the unit requires connection to an async VT 100 terminal and the dial option must be set to AT Commands. After the unit is completely configured, set the dial option to V.25 bis and exit the VT 100 terminal interface. The unit is now ready to respond to V.25 bis dialing commands. If it is necessary to reenter the VT 100 interface for re-configuration, troubleshooting or to view the status buffer, perform the following steps: (1) power the unit off, (2) set dip switch 2 to off (up) for factory default AT commands, (3) power the unit back on, (4) set dip switch 2 to on (down), and (5) type **AT!V** to activate the terminal interface.*

SYNC V.25 HDLC Dialing

Although V.25 bis allows asynchronous data format, asynchronous DTE is more likely to support the AT command set than V.25 bis.

This setting provides V.25 bis messages in bit-synchronous format (for example, HDLC, SDLC, X.25). The bit-synchronous format is the most commonly used by V.25 bis.

This option specifies that the characters should be 7-bit ASCII, with the 8th bit ignored (it may be either 0 or 1).

The first byte of each packet contains all one bits (A = FF HEX), and the second byte of each packet (the C byte) is either 13 HEX or 03 HEX if not the final packet.



Select V.25 HDLC flags if your terminal equipment requires idle state flags.

SYNC V.25 BISYNC Dialing

This setting allows for V.25 bis messages in byte-synchronous format (BISYNC). V.25 bis specifies that the characters should be ASCII, 7 bits, and odd parity. This setting allows synchronous DTE which does not use HDLC to support serial in-band dialing.

THE STATUS BUFFER

The status buffer is discussed in the section *Configure the Express 3010* on page 3-4.

TEST OPTIONS

Press **Ctrl+T** to display the Express Test menu screen. The Express provides the following test options:

1. Test Remote
2. Loopback Protocol
3. Lpbk Proto Timeout=1 min
4. Loopback Disable = V54 Accepted
5. NEBE/FEBE

Press the number corresponding to the desired option and press **Enter** to select an option.

Test Remote

This test causes the Express to issue a V.54 inband loopback command to a far-end unit and BERT test the link using a built-in pattern generator/checker. This allows a circuit to be tested without any extra test equipment. To use this feature, both units must be configured for Clear Channel operation and the far-end unit must be able to respond to V.54 loopback commands. See the section *Setting Protocol Options* on page 3-10 to configure the unit for Clear Channel operation. The built-in 2047 pattern generator/checker displays the number of bytes transmitted on the top line and the number of errored bytes received on the lower line of the front panel display. Pressing **0** clears the counts. Pressing **Cancel** ends the test.

Loopback Protocol

This option allows data to be looped back toward the network after passing through a selected protocol such as BONDING. See Figure 3-1 for loopback points.



Figure 3-1. Express Loopback Points

Lpbk Proto Timeout = 1 min

This option sets the length of time for the loopback protocol test.

Loopback Disable = V54 Accepted

The Express responds to V.54 loopback commands.


Near-End Block Errors/Far-End Block Errors (NEBE/FEBE) (Express 3010)

Use this test to determine the quality of the network connection by viewing the number of near-end block errors (NEBE) and far-end block errors (FEBE) occurring on the ISDN U-interface. A large count indicates problems with network equipment.

Chapter 4 Upgrading Software

As features are added to the Express, software upgrades may be necessary. The Express has flash memory allowing the software to be upgraded from a file provided by ADTRAN. The current version of the software can be found on the Status menu in the VT 100 Terminal Emulation menus.

The software can be upgraded using HyperTerminal or any terminal emulation package supporting the XMODEM or XMODEM 1K protocols. Please proceed to the appropriate section for further instruction.

 *If a terminal emulation package other than HyperTerminal is selected, please see the instructions supplied with the package to set up an XMODEM or XMODEM 1K connection.*

Using HyperTerminal to Upgrade Software

1. Download the necessary upgrade files from the ADTRAN web site (www.adtran.com).
2. From the **Start** button, choose **Programs**; then choose **Accessories**, then **HyperTerminal**.
3. When the **Connection Description** window appears, type in a connection name, select an icon, and click **OK**.
4. In the **Connect To** window, select the COM port to which the Express is connected in the **Connect using** field and click **OK**.
5. The **COM port Properties** window appears next. Change the **Bits per second** field to **57600** and click **OK**.
6. You are now connected. Next type **AT!FLASHLOAD** to initiate the firmware update. The AT command will not be visible since echo is off by default. To enable echo, type **ATE1**.
7. Click on the **Transfer** menu; then click **Send File...**
8. Click **Browse** to locate the directory and file to download to the Express.

9. Change the **Protocol** to **1K Xmodem** and click **Send**.
10. Once the download is complete, exit HyperTerminal, saving the session if desired.

The software upgrade is now complete. If the PWR/LINE, B1 and B2 LEDs are flashing, the software upgrade failed. See *Troubleshooting* on page 6-1 if the software upgrade failed.

Chapter 5 Installing an Analog Modem

INTERNAL ANALOG MODEM APPLICATION

In order to connect an internal analog modem to the Express the following items are necessary:

- Internal analog modem
- RJ-11 to RJ-11 telephone cable

Figure 5-1 shows how to connect an internal modem to the Express.

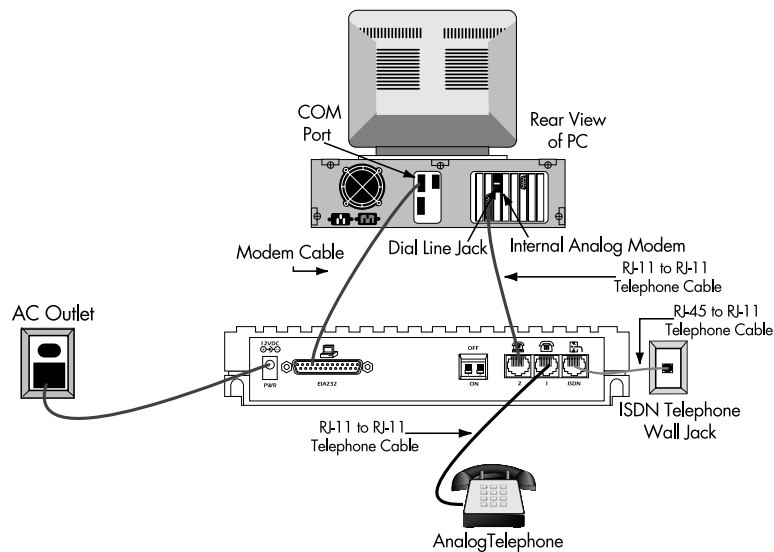


Figure 5-1. Internal Analog Modem Application

When using an internal analog modem and the Express, two COM ports are assigned on the PC. Both COM ports are configured independently. See the manufacturer's documentation for internal analog modem configuration.

Connecting an Internal Analog Modem

To connect an internal analog modem to the Express, use the following procedure:

1. Ensure the Express is connected to the PC.
2. Connect one end of the RJ-11 to RJ-11 telephone cable to the telephone jack labeled **2** on the Express. Positioned above the jack is an illustration of a telephone above a modem.
3. Connect the other end of the RJ-11 to RJ-11 telephone cable to the **Dial Line** or **Line jack** on the internal analog modem.



NOTE

*See the documentation for the internal analog modem to determine which jack on the internal analog modem is the **Dial Line** or **Line** jack.*

Chapter 6 Troubleshooting

TROUBLESHOOTING GUIDELINES

This section provides troubleshooting techniques to resolve problems that may be encountered while operating the Express. If problems persist contact ADTRAN technical support for assistance (see the inside back cover of this manual).

Power/Line LED is Off

This indicates a problem with the power to the unit. Verify the power cord is connected to the Express and is plugged into a working 120 volt AC electrical outlet.

Power/Line LED Flashes and 1 and 2 LEDs are Off

This indicates a problem with the physical connection of the ISDN line from the local telephone company to the Express.

1. Verify the large end of the RJ-45 to RJ-11 telephone cable (included with the Express) is connected to the ISDN connector on the rear panel of the Express.
2. Verify the small end of the RJ-45 to RJ-11 telephone cable is connected to the ISDN telephone wall jack installed with Basic Rate ISDN.
3. Contact the local telephone service provider.

Power/Line LED, 1, and 2 LEDs Flash Green

This indicates a configuration problem. Verify the following information is correct:

- Switch Type
- Service Profile Identifiers (SPIDs)
- ISDN Phone Numbers

This information can be viewed by using the Express Configuration program or the Configuration Screen in the VT 100 menu system. The Link Status should indicate **Link Up** if all configuration information is correct and the unit is properly connected. If the link status is good and calls still cannot be placed, review the section *Dial-Up Connection Problems* (below).

Auto-Detect can be enabled at the **Auto-Detect SPIDs/Switch** option in the Configuration screen of the VT 100 menus to automatically detect the SPIDs and the Switch Type.

Look for the following with the COM port setup:

- IRQ conflicts
- Wrong DTE speed



Power/Line LED, 1, and 2 LEDs flash green sequentially. After a software upgrade, if the Power/Line, 1 and 2 LEDs flash green in sequence, a problem occurred. Restart the download using the instructions in Chapter 4. If the download fails a second time, contact ADTRAN technical support.

Dial-Up Connection Problems

Many connection problems can be diagnosed by viewing the status buffer message returned from the ISDN network and the Express. These messages are accessed by choosing the **Status Buffer** button in the **Diagnostics** tab of the ADTRAN Express Configuration window.

The Status buffer can also be accessed using the key sequence **Ctrl+V** in the VT 100 menu system. Issue the AT command **AT!V** from a terminal emulation package such as HyperTerminal to invoke the VT 100 menu system.

Ensure the following to verify the correct protocol is selected:

- PPP or V.120 generally for Internet applications
- V.120 or Multilink PPP for work-at-home

Auto-detect Switch/SPIDs Remains at Link Down

The Link Down condition persisting for longer than five minutes indicates a problem with the ISDN line provided from the telephone company. The ISDN physical layer device has not been able to synchronize to the network. Ensure that the RJ-45 to RJ-11 telephone cable is correctly installed between the Express and the ISDN wall jack and that the Express is powered on. If the wall jack does not have ISDN installed on the two middle pins (tip, ring), the Express will never synchronize to the telephone switching equipment. Call the local telephone company and have them check the ISDN line for correct operation.

Express Not Detected

If the Express Configuration program cannot detect the Express, verify the following:

1. The Express is powered on.
2. No other applications are running that could be using the COM port to which the Express is attached. A Windows application does not have to be active to tie up a COM port. Be sure to check the Windows 95/98 Taskbar for any suspended applications (such as HyperTerminal) that may be using the COM port. If any are minimized, these must be closed before starting the Express Configuration program.
3. If you are operating at 230.4 kbps, Switch 1 to Off (up). Also, confirm that the computer has a 16650 UART.

Difficulty with 230.4 kbps Operation

If the Express does not work when the DTE rate is set to 230.4 kbps inside Windows, verify the following:

1. Verify that switch 1 on the back of the Express is set to Off (up).
2. Verify that a high speed serial card with a 16650 UART is being used and the software drivers to support the extended baud rate tables are installed.

Dial-Up Networking Difficulty

If Windows 95/98 Dial-Up Networking cannot talk to the Express, check the modem configuration for the Express. Ensure the bit rate for the DTE is set correctly. If the PC is not equipped with a 16650 UART, then the fastest DTE operation speed is 115.2 kbps. Ensure the speed is not higher than the PC and modem can support.

Appendix A AT Commands and S-Registers

While a call is not established, the DTE port accepts AT commands. During this time, the CD signal is inactive. When a call is established, the port is used for data. This data mode is indicated by the CD signal active. The Express can be configured and controlled with AT commands from a serial port similarly to analog modems.

To exit data mode and enter command mode, the serial port must transmit a proper escape sequence to the Express. A specified time delay must occur between the last data character and the first escape sequence character. This is the guard time delay, and it can be changed by writing a value to the S12 register. The default value for the guard time is one second. For a valid escape sequence to occur, the DTE must transmit the escape code character three times in succession with delay between each character being less than the guard time. The default escape sequence is +++.

Once command mode is entered, AT commands can be transmitted to the Express to configure most of the options, dial remote Expresses, or initiate tests to check the Express and the network connections. All command lines must begin with the AT character set in either capital or lower case letters. To return an active call to the on-line state type **ATO**.

Commands may be separated with spaces for readability. The maximum length for a command line is 40 characters. Each command line is executed by the Express upon receipt of a terminating character. The default terminating character is a carriage return (ASCII 013), but it can be changed by writing a different value to register S3. Before the terminating character is transmitted, the command line can be edited by using the backspace character (ASCII 008) to erase errors so the proper commands can be entered.

Using an AT Command

Type **AT** followed by the letter of the command and numeric value of the setting desired and then press **Enter**. The following command returns the software version of the unit:

```
ATI1
```

Using S-Registers

The configuration of the Express can be changed or reviewed with S-registers. See the section *S-Register List* on page A-9 for a description of each S-register and its corresponding range of values.

Reading an S-Register

Type **ATS** followed by the number of the S-register to be read followed by a question mark and press **Enter**.

```
ATS0?
```

Reading an S-Register String

The Express uses S-register strings to store strings of digits for stored phone numbers, SPIDs, etc. Type **ATSS**, followed by the number of the string S-register to be read, followed by a question mark, and press **Enter**.

```
ATSS80?
```

Changing an S-Register

Type **ATS**, followed by the number of the S-register to be changed, followed by an equal sign, followed by the numeric value to be assigned to the register, and press **Enter**.

```
ATS0=2
```


Changing a String S-Register

Type **ATSS**, followed by the number of the S-register to be changed, followed by an equal sign, followed by the numeric value to be assigned to the register, and press **Enter**.

```
ATSS80=5551212
```

Dialing a Call using the AT Command Processor

To dial a call using the DTE terminal and AT commands, type **ATD**, **AT-DT**, or **ATDP** and the telephone number on one line; then press **Enter**.

```
ATD5551212
```

To end an active call with the AT command processor, press the break in key sequence **+++** or the redefined key; then type **ATH** and press **Enter** to hang up the line.

Command	Function
A	Answer. Places the Express in answer mode.
AT!S	Displays Status Buffer.
AT!S1	Displays Link Status
AT!V	Configuration Menu
D	Dial. Precedes the telephone access number [ATD5551212].
DS	Dial a stored number [DS3].
H	Hang up. Disconnects the current call.
IO	Identify unit. Commands the unit to display model number.
I1	Identify software. Commands the unit to display software version.
O	On-line. Commands the unit to go back on line

S	S Register.
SS	S String register.
_Z	Reset. Resets the AT command processor.
&W	Save. Save current configuration to EEPROM.
_U	Resets ISDN interface.
!S	Dumps status buffer contents to the DTE port.
+++	Break in. Break in AT command processor during an active call. The break in key is defined in S2.

Carrier Detect (CD) Control Line Options

&C0	CD forced on.
&C1	CD normal.
&C2	CD off with local disconnect (LOCD)
&C3	CD off with link down.

Data Terminal Ready (DTR) Control Line Options

&D0	Ignore DTR
&D1	DTR off forces command.
&D2	Idle when off. DTR off forces idle (On allows auto answer).

Generic Unit Configurations

&F0	Default
&F1	Configures unit for Dial 56k sync
&F2	Configures unit for Dial 64k sync
&F3	Configures unit for Dial 112k sync
&F4	Configures unit for Dial 128k sync

&F5	Configures unit for Leased 128k (not in S/T unit)
&F6	Configures unit for Ldm 128k Master (not in S/T unit)
&F7	Configures unit for V120 async
&F8	Configures unit for Dial Bond async
&F9	Configures unit for Internet 64k
&F10	Configures unit for Internet 128k
&F11	Configures unit for Remote 64k
&F12	Configures unit for Remote 128k
&F13	Configures unit for Leased V120

Network Options

&L0	Dial network
&L1	Leased network (not in S/T unit)
&L2	Leased, backed up by dial network

Calling Number Identifiers

&N0	Number 1. Read far-end phone number 1 if service subscribed from telephone company.
&N1	Number 2. Read far-end phone number 2 if service subscribed from telephone company.

DTE Data Type Options

&Q0	DTE is async
&Q1	DTE is sync

Clear-To-Send (CTS) Control Line Options

&R0	Follows RTS
&R1	Forced CTS

Data Set Ready (DSR) Control Line Options

&S0	DSR forced on
&S1	DSR if call up
&S2	DSR off if link down
&S3	DSR off if dial up

DTE Connector Data Synchronous Data Clocking Options

&X0	Internal transmit clock
&X1	External transmit clock

Accessing Stored numbers for Dialing Options*

&Z0	Stored number 0
&Z1	Stored number 1
&Z2	Stored number 2
&Z3	Stored number 3
&Z4	Stored number 4
&Z5	Stored number 5
&Z6	Stored number 6
&Z7	Stored number 7
&Z8	Stored number 8
&Z9	Stored number 9

Local Echo Options

E0	Echo off. Does not allow command characters typed to be displayed on the screen.
E1	Echo on. Allows the command characters typed to be displayed on the screen.

Unit Identification

I0	Identifies unit. Commands the unit to display model number.
I1	Identifies software. Commands the unit to display software version.
I2	Identifies lists.

AT Command Response Message Options

AT Command Response Message Types

V0	Numeric response messages
V1	Verbal response messages

AT Command Connect Message Options

X0	Simple connect message
X1-7	Connect messages with bit rate

Ready-To-Send (RTS) Control Line Options

_D0	1 mS delay
_D1	18 mS delay

MakeBusy
Options

_B0	Make DTE port not busy (same as S135=0)
_B1	Make DTE port busy (same as S135=1)

Service Profile Identification (SPID) Options

_I0	Access SPID1 for DTE #1
_I1	Access SPID2 for DTE #2

Local Directory Number (LDN) Access Options

- _N0 Access LDN1 for DTE #1
- _N1 Access LDN2 for DTE #2

ISDN Switch Type Options

- _S0 5ESS
- _S1 DMS-100
- _S2 National ISDN-1
- _S3 NEC
- _S4 EuroISDN

ISDN U-interface Operational Mode Options

- _X0 Express timing slaves to network (NT mode)
- _X1 Express is U-interface timing master (LT mode)
- _Z Resets unit.

Data Flow Control Options

- \Q0 No flow control
- \Q1 Software flow control (XON/XOFF)
- \Q2 CTS only
- \Q3 Hardware flow control (RTS/CTS) factory default
- \Q4 Software from DCE only

S-REGISTER LIST



Defaults appear in bold type in the third column.

S0	AUTO ANSWER	Determines how the Express answers an incoming call. 0 = Disable (Express does not answer call). 1 = Enable (Express answers all calls). 2 = Dump all calls.
S2	ESCAPE CHARACTER	Determines which key or character (in ASCII code) defines the escape command. The standard escape character is a plus (+) sign (ASCII value of 43 decimal). To change the character set, set S2 to the desired ASCII value. Range = 0 to 127
S3	END OF LINE CHARACTER	Determines which key or character (in ASCII code) ends a command line. The standard end-of-line character is the carriage return (ASCII value of 13 decimal). Range = 0 to 127
S4	LINE FEED CHARACTER	Determines which key or character (in ASCII code) advances the cursor to the next line after ending a command line or after an Express message. The standard character is the line feed (ASCII value of 10 decimal). Range = 0 to 127
S5	BACK SPACE CHARACTER	Determines which key moves the cursor back one space to erase a character. The standard character is the backspace (ASCII value of 8 decimal). Range = 0 to 127
S7	CONNECT TIME	Determines how long the Express waits for an outgoing call to be answered. 15 = 15 seconds 30 = 30 seconds 60 = 1 minute 120 = 2 minutes 240 = 4 minutes

Appendix A. AT Commands and S-Registers

S12	ESCAPE TIME	Determines the delay required immediately before and after entering the escape command for the Express to recognize and execute the command. Range = 0 to 127 (Default = 50)
S13	AutoSpid Download	0 = Enabled 1 = Disabled
S14	MISC BITS	Miscellaneous bits (bit 8 is most significant bit). Bit 2 = 1:Enables on screen echo of AT commands. Bit 2 = 0:Disables on screen echo of AT commands. Bit 3 = 0:Enables AT responses from the Express. Bit 3 = 1:Disables AT responses from the Express. Bit 4 = 1:Enables AT responses to be displayed in text form. Bit 4 = 0:Enables AT responses to be displayed in numeric form. Bit 7 = 1:Disable PPP ACCM spoofing. Bit 7 = 0:Enable PPP ACCM spoofing. Bit 8 = 1:Ring indicator uses cadence. Bit 8 = 0:Ring indicator remains on.
S15	ASYNC BONDING	Asynchronous BONDING method. 0 = ADTRAN revision 0 (default) 1 = Multi-vendor option
S22	MSG BITS	Miscellaneous message bits (bit 8 is most significant bit). Bit 5= Bit 6 = Bit 7 = 1 Allows connect message with baud rate. Bit 5= Bit 6 = Bit 7 = 0 Connect message without baud rate.
S24	V120 LLC	Enables/disables V120 lower layer compatibility (LLC). 0 = Enabled 1 = Disabled

S25	DTR DETECT TIME	Determines time, in hundredths of a second, that must elapse before the Express recognizes a change in DTR. Range = 0 to 255 (Default = 5)
S26	VOICE DEFAULT	Determines the speed at which an audio call is received 0 = 56k speech/audio to DTE port 1 = 64k speech/audio to DTE port
S27	PPP MODE	Value determines whether or not PPP will be a single-link or multilink connection. 0 =Single-link operation (default) 1 =Multilink operation 2 =Use compression
S30	DTE CTS	Controls the operation of the DTE connector CTS line. 0 =Follows RTS 1 =Force CTS
S31	DTE RTS	Controls operation of the RTS line. 0 =1 ms delay 17 =18 ms delay
S32	DTE DSR	Controls the operation of the Data Set Ready signal on the DTE connectors. 0 =Force DSR on always 1 =DSR off OOS + Test 2 =DSR off Link Down
S33	DTE CD	Controls the operation of the Carrier Detect line on the DTE connectors. 0 =Force CD on always 1 =CD is active during a call (Normal Operation) 2 =Off with LOCD 3 =Off link down

Appendix A. AT Commands and S-Registers

S34	DTE DTR	Determines how the Express responds to changes in DTR. This is a bit-mapped register. 0 =Ignore DTR 1=Force AT command mode when DTR is off 2=Dump incoming call when DTR is off 4=Hang up incoming call when DTR is off 8=Hang up outgoing call when DTR is off 16=Answer incoming call when DTR is on 32=Dial SNO when DTR is on 64=Dial SNO when DTR transitions from off to on
S46	V25 MODE	Selects the type of V.25 bis dialing used. 0 =Asynchronous V.25 1=HDLC V.25 2=BISYNC V.25 3=HDLC with flags V.25
S50	LINE MODE	Selects the operating mode of the Express. 0 =Dial service (switched service) 1=Leased service (nonswitched service)
S51	LINE CLOCK	Selects the clock mode in leased mode. 0 =Slave (default) 1=Master (Leased line only, limited distance MODEM application only)
S52	SWITCH TYPE	Selects the network switch type for dial service. 0 =AT&T 5ESS 1=Northern Telecom DMS-100 2 =National ISDN-1 3=NEC 4=EuroISDN (BT) (3110 only)
S53	CALL TYPE	Call type (Dial service only). 0 =Speech 1=Audio 2=56 Kbps data 3 =64 Kbps data

S54	PROTOCOL TYPE	Rate adaption protocol type. 1=Clear Channel 2=Bonding 5=V.110 6=V.120 11 =Fallback 12=PPP
S55	DIAL MODE	Selects dialing interface. 0=None 2 =AT commands 3=V.25 bis dialing
S56	ECHO TONE	Enables an echo tone which suppresses the echo cancellers in a voice circuit. Can be used to trick the switch to allow sending data over a line optioned for voice ISDN service. 0 =None 1=Answer 2=Originate 3=Both
S58	CALL SCREENING	Allows the Express to screen incoming calls. 0 =Answer any call 1=Answer only calls from numbers matching those stored in SNO through SN9.
S59	CHANNEL RATE	Sets the available network bandwidth when the Express is in leased mode. 1 =64 kbps 2=128 kbps
SS60	SPID1 LOC	SPID string location.
SS61	SPID2 LOC	SPID string location.
SS62	LDN1 LOC	ISDN phone number string location.
SS63	LDN2 LOC	ISDN phone number string location
S65	AUTOSPID	Sets the AutoSpid determination feature. 0 =Disable (default) 1=Enable
SS67	AREA CODE	Area code location.

Appendix A. AT Commands and S-Registers

S70	DTE MODE	Selects asynchronous or synchronous mode on the DTE connector. 0=Asynchronous 1 =Synchronous
S71	DTE RATE	Selects the DTE connector bit rate. 3 = 1200 6 = 2400 8 = 4800 11 = 9600 15 = 19200 17= 38400 18 = 48000 19 = 56000 20 = 57600 21 = 64000 22 = 112000 23 = 115200 24 = 128000 25 = 230400
S72	DATA BITS	Selects the number of asynchronous data bits. 0 = 8 bits 1 = 7 bits
S73	DTE PARITY	Selects the number of asynchronous parity bits. 0 =None 1=Odd 2=Even
S74	DTE STOP	Selects the number of asynchronous parity bits. 0 =None 1=Odd 2=Even
S75	DTE FLOW	Selects asynchronous flow control. 0=None 1=XON/OFF from DTE controls DCE 2=XON/OFF from DCE controls DTE 3 =Hardware 12=Software

S76	DTE CLOCK	Selects DTE connector transmit clock timing source. 0=Normal (Express supplies timing) 1=External (DTE supplies timing)
S77	REMOTE NUMERIC PASSWORD	Numeric password string for remote configuration.
The following are the string locations for stored numbers 0 - 9:		
SS80	SN0 LOC	Stored number 0 string
SS81	SN1 LOC	Stored number 1 string. Used for second number dialed in a multilink connection.
SS82	SN2 LOC	Stored number 2 string
SS83	SN3 LOC	Stored number 3 string
SS84	SN4 LOC	Stored number 4 string
SS85	SN5 LOC	Stored number 5 string
SS86	SN6 LOC	Stored number 6 string
SS87	SN7 LOC	Stored number 7 string
SS88	SN8 LOC	Stored number 8 string
SS89	SN9 LOC	Stored number 9 string
S90	CONFERENCE ID	NI-1 feature identification number for conferencing. See the ISDN service provider for this ID.
S91	TRANSFER ID	NI-1 feature identification number for transferring. See the ISDN service provider for this ID.
S92	MESSAGE WAITING ID	NI-1 feature identification number for message waiting indicator. See the ISDN service provider for this ID.
S93	CALL TYPE ROUTING	Determines how incoming call is routed when connected to a point-to-point ISDN line. 0=Route all call types to DTE

S-REGISTER STRING LIST

SS60	SPID1 LOC	SPID string location.
SS61	SPID2 LOC	SPID string location.
SS62	LDN1 LOC	ISDN phone number string location.
SS63	LDN2 LOC	ISDN phone number string location
SS67	AREA CODE	Area code location.
SS77	REMOTE NUMERIC PASSWORD	Numeric password string for remote configuration.
SS80	SN0 LOC	Stored number 0 string
SS81	SN1 LOC	Stored number 1 string. Used for second number dialed in a multilink connection.
SS82	SN2 LOC	Stored number 2 string
SS83	SN3 LOC	Stored number 3 string
SS84	SN4 LOC	Stored number 4 string
SS85	SN5 LOC	Stored number 5 string
SS86	SN6 LOC	Stored number 6 string
SS87	SN7 LOC	Stored number 7 string
SS88	SN8 LOC	Stored number 8 string
SS89	SN9 LOC	Stored number 9 string
SS130	CR0 LOC	Call Reject List Number 0
SS131	CR1 LOC	Call Reject List Number 1
SS132	CR2 LOC	Call Reject List Number 2
SS133	CR3 LOC	Call Reject List Number 3
SS134	CR4 LOC	Call Reject List Number 4
SS135	CR5 LOC	Call Reject List Number 5
SS136	CR6 LOC	Call Reject List Number 6
SS137	CR7 LOC	Call Reject List Number 7
SS138	CR8 LOC	Call Reject List Number 8
SS139	CR9 LOC	Call Reject List Number 9

Appendix B LEDs

LEDS

The Express 3010 front panel contains five LEDs associated with the DTE port and the ISDN interface as shown in Figure B-1 and described below.

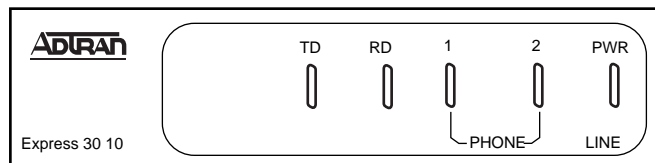


Figure B-1. Front Panel LEDs

LED	Color	Description
TD	Green	Transmit Data (TxD)
RD	Green	Received Data (RxD)
1 or 2	Slow Green Flash Fast Green Flash Solid Green Off Amber Flash Solid Amber	Attempting SPID registration. Attempting TEI registration. POTS 1 or 2 in use. Ready. No data traffic. B channel 1 or 2 passing data. Remote test originate.
PWR/ LINE	Green (On Solid) Off Flashing	Link Established. Calls can be placed. No Power. Link is not established. Calls cannot be placed.

Appendix B. LEDs

Appendix C **Status Buffer Messages**

2047 BERT orig

Test remote originated 2047 BERT (bit error rate test) pattern.

2047 loopbk ansr

Test remote answered 2047 BERT pattern.

Answer

The Express answered a call on either the first or second channel. The calling phone number is displayed if available.

ACCESS_INFO_DISCARDED

The network was unable to deliver access information to the far end.

Area Code Req'd

Area code required for Auto Spid determination.

AutoSpid Active

Unit is attempting automatic detection of switch type and SPID numbers.

AutoSpid Disable

The user has stopped the automatic SPID detection process.

AutoSpid Failed

Automatic determination of switch type and SPID numbers failed.

AutoSpid Passed

Automatic determination of switch type and SPID numbers succeeded.

AutoSwitch YYY

Switch type YYY detected during AutoSpid determination. (YYY can be DMS, NI-1, or AT&T.)

Back to online

Express went back online.

Bad async BPS

The Bonding protocol determined that the selected asynchronous bit rate is not supported.

Bad AT numeric

User issued an AT command with an argument that was out of range.

Bad call type

Express placed a call with an improper call type.

Bad DTE Baud

The DTE bit rate does not match a valid bit rate for the protocol selected.

BAD_INFO_ELEM

Call control error.

Bad phone number

Express 3010 attempted to call an invalid phone number.

BEAR_CAP_NOT_AVAIL

The bearer channel requested is not available.

BEARER_CAP_NOT_AUTH

Bearer capability requested is not authorized.

Bearer Mode?

Incoming call is not of a type the Express 3010 can accept.

Bearer Info Cap?

Incoming call information transfer capability is not known.

BONDING (+/-XXX)

The amount of bytes or corrected delay between the B2 and B1 Bearer channels (XXX can range from -8000 to +8128).

BPS mismatch

Bonding negotiation found a bit rate mismatch.

Break to AT cmd

User issued a break-in request.

Break ignored

User issued an extra break-in request.

BUSY

The called number is busy.

B-X disconnected

B-channel disconnected. X can be 1 or 2 representing the appropriate B-channel.

CallID 1 in use

The Express 3010 tried to place a call using SPID 1 when SPID 1 was already in use.

CallID 2 in use

The Express tried to place a call using SPID 2 when SPID 2 was already in use.

Call lost

Held call could not be retrieved.

Call not ringing

User executed an answer command (ATA) but there was not a call present.

CALL_REJECTED

The call has been rejected by the ISDN network.

Can't go online

Express 3010 cannot go back on line. Unknown AT command user issued an unknown AT command.

CHAN_DOES_NOT_EXIST

The user asked for a bearer channel that is not present.

CHAN_NOT_IMPLEMENTED

The network or far end does not support the bearer capability requested.

CHANNEL_UNACCEPTABLE

The channel requested has not been subscribed.

CID>0 rcvd

Received an incoming call from a third party during negotiations with a far-end BONDING unit on the use of the second Bearer channel.

Connect Timeout

Call attempt does not connect in x amount of time.

DEST NOT ISDN

The number called is not ISDN (warning only).

DEST_OUT_OF_ORDER

The called number is out of order.

Dial

The Express 3010 placed a call on either the first or second channel. The number called is displayed following the message.

Disconnect

The call on either the first or second channel was disconnected from the network. The far-end phone number is displayed if available. Ensure flow control setting match on both terminal adapters.

Disconnect Req

Far-end unit disconnected during BONDING negotiation.

DTR not up

Express 3010 tried to place a call in a dialing mode that requires DTR to be in an active state, but it is not.

Dump call

The Express 3010 could not accept an incoming call because it was already involved in a call.

Dump

An incoming call on either the first or second channel was discarded by the Express 3010. The calling number is displayed if available.

ED_MISMATCH

Call is connected to different end point device. Call ISP.

FACILITY_NOT_IMPLEMENT

The network does not support the requested supplementary service.

FACILITY_NOT_SUBSCRIBED

The channel type requested has not been subscribed.

FACILITY_REJECTED

A facility requested by the user cannot be provided by the network.

Factory Reset 0

Unit defaulted to factory configuration.

FlowCtl mismatch

Bonding negotiation determined a flow control mismatch.

FlowCtl required

Bonding negotiation determined that flow control needs to be optioned on.

Hangup

The call on either the first or second channel was disconnected by the Express 3010. The far-end phone number is also displayed.

Hold

Voice call is on hold.

ID = XXXX

Calling party number.

INCOMING_CALL_BARRED

The network will not allow an incoming call.

INCOMPATIBLE_DEST

The called number cannot accept the type of call that has been placed.

INTERWORKING_UNSPEC

A non-ISDN network sent an unspecified message.

Inv Password

Remote configuration failed due to incorrect password.

INVALID_CALL_REF

Call control error.

INVALID_ELEM_CONTENTS

Call control error.

INVALID_MSG_UNSPEC

Invalid message: protocol error.

INVALID_NUMBER_FORMAT

The dialed number has an invalid format.

L1 not up

The network interface is not active.

L2 not up

The data link layer interface is not active.

L3 not up

The call control interface is not active.

L2 #2 not up

The data link layer interface for a second call (BONDING) is not active.

L3 #2 not up

The call control layer interface for a second call (BONDING) is not active.

LDN TOO LONG

The local directory number entered has too many digits.

Login failed

Unable to connect to remote unit on remote configuration attempt.

MANDATORY_IE_LEN_ERR

Mandatory information element length error.

MANDATORY_IE_MISSING

Mandatory information element missing.

MULTILINK PPP UP

Unit connected with Multilink PPP.

Need 64K call

The BONDING protocol requires the Express 3010 to be configured for 64K data call types.

NETWORK BUSY

The ISDN switch is busy and unable to process a call.

NETWORK_CONGESTION

The phone network is currently congested.

NETWORK_OUT_OF_ORDER

The phone network is out of order.

No calling ID

Calling party number not provided.

NO_CIRCUIT_AVAILABLE

The requested bearer channel is not available.

NONEXISTENT_MSG

Nonexistent/undefined message received from network.

NO_ROUTE

NO_ROUTE_DEST

The phone network was unable to find a route to the destination number.

No Sreg number

Attempted to change an S-register but did not specify a specific S-register (example: ATS=1).

No Sreg value

Attempted to change an S-register but did not specify a value (example: ATS=).

No String Space

Stored number string space is full.

NO_USER_RESPONDING

The dialed number is not responding.

NORMAL_CLEARING

The network is disconnecting the current call.

NOT end2end ISDN

The path that the call was routed over is not ISDN from end-to-end (warning only).

NUMBER_CHANGED

The number dialed has been changed.

OUTGOING_CALL_BARRED

The network will not allow the outgoing call to be placed.

Phone # Req'd

Phone number required for AutoSpid determination.

PPP COMPRESSION UP

Unit connected with compression.

PPP LINK LOOPBACK

Network link is looped backed.

PPP Timeout

PPP negotiation failed.

PROTOCOL_ERROR

Call control error.

PUMPIO: dpump-quit

Rate adaption stopped due to DTE error.

Rcv Cause XXX

Undefined cause message received.

REQ_CHANNEL_NOT_AVAIL

The channel type requested is currently not available.

Remote not ISU

Bonding negotiation determined the far-end unit is not another ISU product.

RESOURCE_UNAVAIL

The requested resource is unavailable.

RESP_TO_STAT_ENQ

Response to status enquiry.

Restarting Rate

Unit restarts DTE rate.

Retrieve

Voice call is retrieved from a holding state.

Ring

An incoming call on either the first or second channel (third channel if call waiting) entered the Ring state. The calling phone number is displayed if available.

S cmd not = or ?

Proper syntax not used.

SERVICE_NOT_AVAIL

The requested service is not available.

SOURCE NOT ISDN

The incoming calling party is not ISDN (warning only).

TANULL expired

Bonding timer TANULL expired. Received call from non-BONDING equipment.

TEMPORARY_FAILURE

The network has temporarily failed; try the call again.

TIMER_EXPIRY

Call control error.

TXADD01 expired

Bonding timer TXADD01 expired.

TXDEQ expired

B-channel delay equalization during bonding failed.

TXFA1 expired

Bonding timer TXFA1 expired.

TXFA2 expired

Bonding timer TXFA2 expired.

TXINIT expired

Bonding timer TXINIT expired; called non-BONDING equipment.

UNASSIGNED_NUMBER

The phone number dialed does not exist.

Unknown AT cmd

User issued an unknown AT command.

USER_ALERT_NO_ANS

Ringing call is not answered.

USER_BUSY

The dialed number is busy.

V120 connected

The V.120 rate adaption successfully connected to the far-end unit.

V120 Timeout

V.120 negotiation failed.

WRONG_MESSAGE

Call control error.

WRONG_MSG_FOR_STATE

Call control error.

Appendix C. Status Buffer Messages

Appendix D Loop Status Messages

This appendix lists the status line messages and their definitions. Messages shown entirely in capital letters are generated by the ISDN network. Messages with lower case letters are generated by the Express 3010.

AutoSpid X

The SPID is being attempted by the AutoSpid determination. X starts at 0 and counts up for each SPID tried.

Call Connect B1

Bearer channel 1 is connected and is active.

Call Connect B2

Bearer channel 2 is connected and is active.

Call Connect B1/B2

Bearer channels 1 and 2 are active.

Disconnecting

The current phone call is being disconnected (hung up).

Getting TEI #1

The Express 3010 is receiving its first TEI from the network.

Getting TEI #2

The Express 3010 is receiving its second TEI from the network.

Link Down

The network interface is not in sync.

Network Loopback

The Express 3010 has been commanded to perform an ISDN loopback toward the network.

Ready

The unit is ready to make or accept a call.

Register SPID #1

The Express 3010 is registering its first SPID with the network.

Register SPID #2

The Express 3010 is registering its second SPID with the network.

Ringling

The phone number just dialed is ringing.

xxxxxx nnnn

A rate adaption is running at the bit rate specified by nnnn.

xxxxxx Quitting

A rate adaption protocol is turning off.

xxxxxx Ready

A rate adaption protocol is ready.

xxxxxx Setup

A rate adaption protocol is setting up.

YYYY

ISDN switch-type selected.

xxxxx can be any of the following:

Bonding

Bandwidth on demand industry users group protocol.

PPP

Point-to-point rate adaption protocol.

V120

V.120 rate adaption protocol.

Appendix D. Loop Status Messages

Appendix E Connector Pinouts

The EIA-232 interface is shown in Figure E-1.

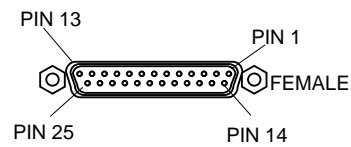


Figure E-1. EIA-232 Interface

Pin	Name	I/O	Description
1	Shield	I/O	Shield for cable
2	TD	I	Transmitted Data
3	RD	O	Received Data
4	RTS	I	Request to Send
5	CTS	O	Clear to Send
6	DSR	O	Data Set Ready
7	SG	I/O	Signal Ground
8	CD	O	Carrier Detect
15	TC	O	Transmit Clock
17	RC	O	Receive Clock
20	DTR	I	Data Terminal Ready
22	RI	O	Ring Indicator
24	ETC	I	External Transmit Clock

I = Input O = Output

The RJ-11 POTS ports apply to the Express only.

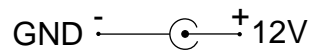
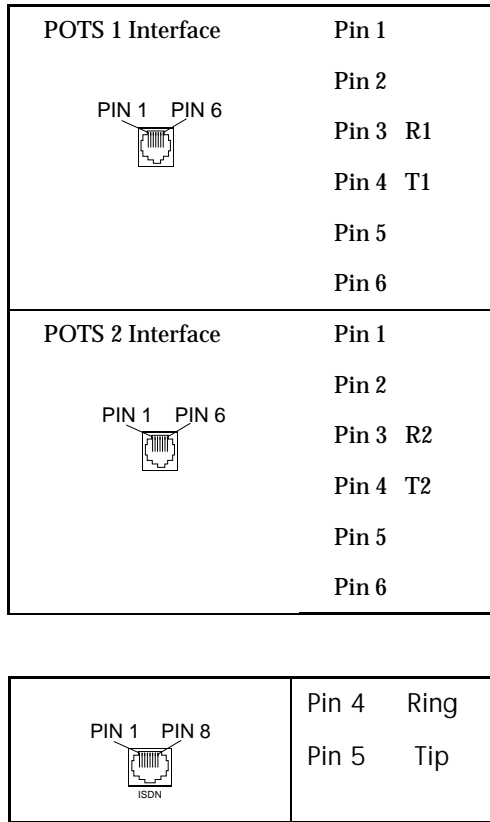


Figure E-2. Express 3010 Ground Pinouts

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Returning the unit to ADTRAN

ADTRAN will replace or repair this product within five years from the date of shipment if it does not meet its published specifications or fails while in service (refer to ADTRAN Equipment Warranty and Repair and Return Policy and Procedure).

For service, RMA requests, or further information, contact the ADTRAN Customer and Product Service (CAPS) Department.

A Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

Telephone numbers, addresses, and product support information are provided on the last page of this manual.

Product Support Information

Presales Inquiries and Applications Support
Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering	(800) 615-1176
Sales	(800) 827-0807

Post-Sale Support
Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

Technical Support	(888) 4ADTRAN
-------------------	---------------

Repair and Return
If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the ADTRAN Customer and Product Service (CAPS) Department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact CAPS directly at the following number:

CAPS Department	(256) 963-8722
-----------------	----------------

Identify the RMA number clearly on the package (below address), and return to the following address:

ADTRAN Customer and Product Service
6767 Old Madison Pike
Progress Center
Building #6 Suite 690
Huntsville, Alabama 35807

RMA # _____