Lucent Technologies
Bell Labs Innovations

AT&T 7400B Data Module

User's Guide

555-020-707
Issue 1
November 1989

TO ORDER COPIES OF THIS MANUAL

Call: AT&T Customer Information Center on 800-432-6600
In Canada Call 800-255-1242

Write: AT&T Customer Information Center
2855 North Franklin Road
P.O. Box 19901
Indianapolis, Indiana 46219

Order: Document No. 555-020-707 Issue 1, November 1989

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

While reasonable efforts were made to ensure that the information in this document was complete and accurate at the time of printing, AT&T can assume no responsibility for any errors.

Changes or corrections to the information contained in this document may be incorporated into future reissues.

CONTENTS

PREFACE: ABOUT THIS GUIDE

The purpose of this guide is to provide information for installing, operating, and maintaining the 7400B Data Module.

TYPOGRAPHICAL CONVENTIONS

Throughout this guide, command lines that you type are shown in typewriter-style characters, and responses that the 7400B Data Module returns are shown in italics. The following is an example.

```
at h [Enter]
```

OK

Note the following characteristics of the display representation:

- The first line is a command line as it should be typed. The [Enter] symbol, when shown, indicates that you must press the Enter or Return key to complete the command line.
- Spaces are used to separate commands in some examples shown in this guide. In actual use, the spaces may be typed, but they are not required.
- The second line in the example shows a typical response returned by the data module.

ORGANIZATION OF THIS GUIDE

The following paragraphs summarize the chapters and appendices contained in this guide.

Chapter 1: Introduction. Discusses the basic operating features of the AT&T 7400B Data Module and describes the external indicators and connectors.

Chapter 2: Installation. Describes the hardware and software required for installing the data module, and outlines procedures for preparing the data module for operation.

Chapter 3: First Time Users. Provides some basics on 7400B Data Module operation, describes how to use a few *AT* commands that are essential for most data communications operations, and then outlines a typical on-line session.

Chapter 4: Operation and Configuration. Describes how to change, store, and recall configuration parameters, outlines how to create and save custom, configuration profiles, and discusses more advanced command usage with example command lines.

Chapter 5: Troubleshooting. Describes procedures for troubleshooting problems that may be encountered while configuring and operating the 7400B Data Module.

Appendix A: AT Command Set. Contains an explanation of each AT command accepted by the 7400B Data Module.

Appendix B: S-Registers. Contains an explanation of each S-register used by the 7400B Data Module.

Appendix C: Application Notes. Contains notes on how to configure some popular PC data communications software packages for use with the 7400B Data Module, and provides a list of application notes that describe how to administer specific AT&T PBX systems for using the data module.

Appendix D: Quick-Reference Summaries. Contains quick-reference summaries of AT commands, S-registers, result codes, factory-default configuration settings, EIA-232-D connector pin-outs, ASCII character set.

A glossary and an index are provided at the rear of this guide.

RELATED DOCUMENTATION

The following is a list of other manuals that may provide helpful information while installing and using the 7400B Data Module. Since each user may have different equipment and software preferences or availability, only generic titles are given for the manuals.

If you are using a terminal device other than a PC:

User's guide for your terminal device. You may need information about the configuration and capabilities of your terminal device from this manual during the installation and preliminary operation of the 7400B Data Module.

If you are using a PC as your terminal:

User's guide for Microsoft® MS-DOS®. You may need this reference for explanations of commands used by your PC to install, configure, and run your data communications software.

User's guide for your data communications software. You may need this guide for information on how to configure your terminal emulation software to access the 7400B Data Module.

CHAPTER 1: INTRODUCTION

This chapter discusses the basic operating features of the 7400B Data Module and describes the external indicators and connectors.

The data module provides an asynchronous data service link between a Data Terminal Equipment (DTE) device and the following AT&T digital PBX equipment:

- DEFINITY™ Communications System Generic 1
- DEFINITY Communications System Generic 2
- System 75
- System 85

Note: Unless a specific DTE device is intended, the words *terminal device* shall be used throughout this guide to represent any applicable DTE device, including a dumb terminal, a printer, a plotter, or a personal computer (PC) with an appropriate data communications software package.

An EIA-232-D standard interface (formerly EIA recommended standard RS-232-C) connects the terminal device to the 7400B Data Module, and a standard Digital Communications Protocol (DCP) interface (using a type D8W modular telephone cord) connects the data module to the digital PBX.

An internal DIP-switch option allows the 7400B Data Module to be set for use either with or without a telephone. In without-telephone mode, the data module supports data service only, but in with-telephone mode the data module provides simultaneous data and voice service (requires an associated AT&T 7400-series DCP digital voice terminal).

Note: If a 7400-series voice terminal with data features is used with the 7400B Data Module, data service is provided by the 7400B Data Module and the data features of the voice terminal cannot be used.

The 7400B Data Module uses a subset of the industry-standard *AT* command set and supports transmission speeds of 300, 1200, 2400, 4800, 9600, and 19,200 bps.

Additional features of the 7400B Data Module, described in later chapters of this manual, include:

- non-volatile, read-write memory for storing two data options profiles and up to four telephone numbers
- automatic speed and parity adjustment

- data metering option
- programmable control characters
- self-test at start-up
- local and remote loopback tests
- test duration timers
- voice terminal powered by the PBX is not affected if ac power is removed from the 7400B Data Module

EXTERNAL FEATURES

The external features of the front and rear panels of the 7400B Data Module and the separate power supply unit are described in this section. The data module has a removable access panel on top of the unit, which is described further in the hardware installation section of Chapter 2, "Installation."

Front Panel

The front panel of the 7400B Data Module is shown in Figure 1-1, and the 10 LEDs on the front panel are described in Table 1-1. In addition to providing indications for normal operating modes, all of the LEDs are also used as status indicators when the 7400B Data Module is first powered on and the internal self-test is running.

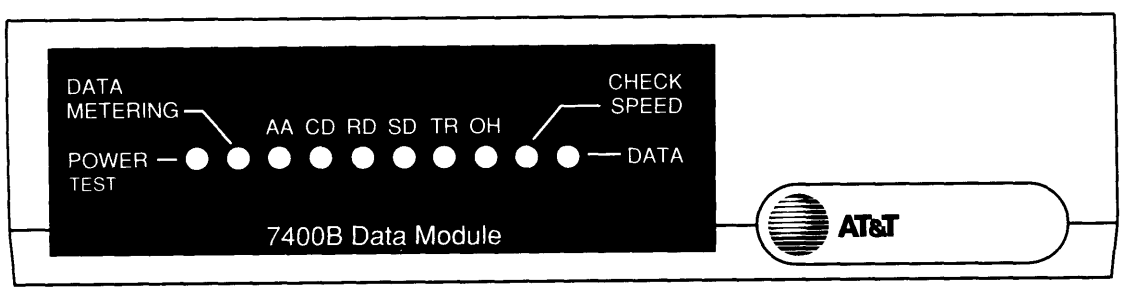


Figure 1-1. Front Panel

Connector	Description
POWER/ TEST	This red LED lights as long as power is applied to the data module. This LED flashes during any test mode, except the start-up self-test. It also flashes along with the *DATA* LED if the connection with the PBX is lost.
DATA METERING	This red LED lights to indicate the state of the CTS (Clear To Send) output lead when the Data Metering option is enabled.
AA	Automatic Answer. This red LED flashes to indicate an incoming call and lights continuously when the data module is operating in Automatic Answer mode.
CD	Carrier Detect. This red LED lights as long as communication is established with the far end device.
RD	Receive Data. This red LED lights when received data is being transferred from the 7400B Data Module to the local terminal device.
SD	Send Data. This red LED lights when transmitted data is being transferred from the local terminal device to the 7400B Data Module.
TR	Terminal Ready. If the `&d0` option is enabled, the red LED is on continuously; if either the `&d1` or `&d2` option is enabled, this LED indicates the state of the DTR lead (see description of `&d` command in Appendix A).
OH	Off Hook. This red LED lights continuously from the time a data communications call is initiated until the call is terminated.
CHECK SPEED	This red LED lights when a call set up fails because of an incompatibility between the configuration of the local terminal device and the far end device. The incompatibility will usually occur if a common operating speed cannot be achieved between the two endpoints. Chapter 5, "Troubleshooting," provides information about this and other conditions that may cause this LED to light.
DATA	This green LED lights to indicate that a data call is in progress. This LED flashes along with the *POWER/TEST* LED if the connection with the PBX is lost.

TABLE 1-1 Front Panel LED Indicator Descriptions

Rear Panel

The rear panel of the 7400B Data Module is shown in Figure 1-2, and the connectors located on the rear panel are described in Table 1-2.

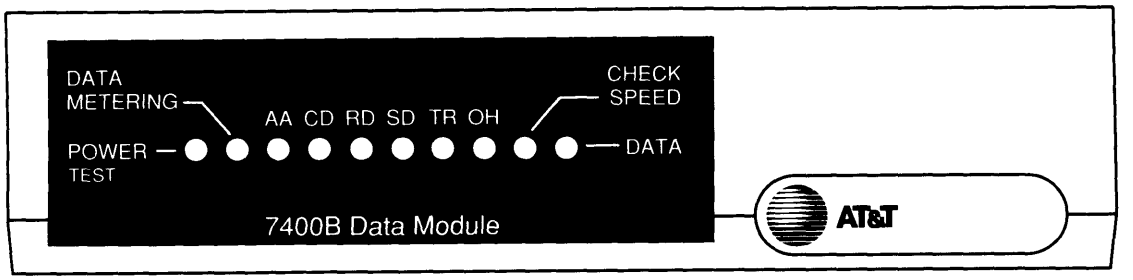


Figure 1-2. Rear Panel

Connector	Description
PHONE	This connector accepts one end of the D8W telephone line cord used to connect a telephone or voice terminal to the data module.
LINE	This connector accepts one end of the D8W telephone cord that connects between the data module and the PBX wall jack.
POWER	This connector accepts the output cable of the separate power supply unit used with the 7400B Data Module.
PORT 1	This connector accepts a male plug from the EIA-232-D (or RS-232-C) cable that connects between the data module and the terminal device.
PORT 2	Not used by the 7400B Data Module.

TABLE 1-2 Rear Panel Connector Descriptions

Power Supply Unit

A separate power supply unit is required with the 7400B Data Module. This unit connects between a grounded AC outlet and the "POWER" connector at the rear of the data module. This power supply unit provides the necessary operating voltages for the data module.

Caution: Make certain that the AC outlet to which you connect the power supply is unswitched (for example, not controlled by a wall switch or light dimmer).

Instructions for installing the power supply unit with an illustration are provided in the hardware installation section of Chapter 2, "Installation."

CHAPTER 2: INSTALLATION

This chapter describes the hardware and software required for installing the data module, and outlines procedures for preparing the data module for operation.

HARDWARE AND SOFTWARE REQUIREMENTS

In addition to the 7400B Data Module and the required separate power supply, you will need the following items:

- an asynchronous data terminal device or a personal computer (PC) with data communications software
- an EIA-232-D interface (formerly RS-232-C) cable to connect between the terminal device and the data module
- a type D8W telephone cord for Data Communications Protocol (DCP) connection between the Data Module "LINE" jack and the PBX wall jack
- (optional) an AT&T 7400-series DCP digital voice terminal (and associated adjunct equipment, if applicable)
- (optional) a second type D8W cord to connect between the data module "PHONE" jack and optional voice terminal (you may need an adjunct power supply, adapter, and D6AP cord, as applicable)

Figure 2-1 illustrates the needed hardware items for an arrangement without a telephone, Figure 2-2 shows the set up for using a telephone without adjunct equipment, and Figure 2-3 shows a similar setup with some typical adjunct equipment.

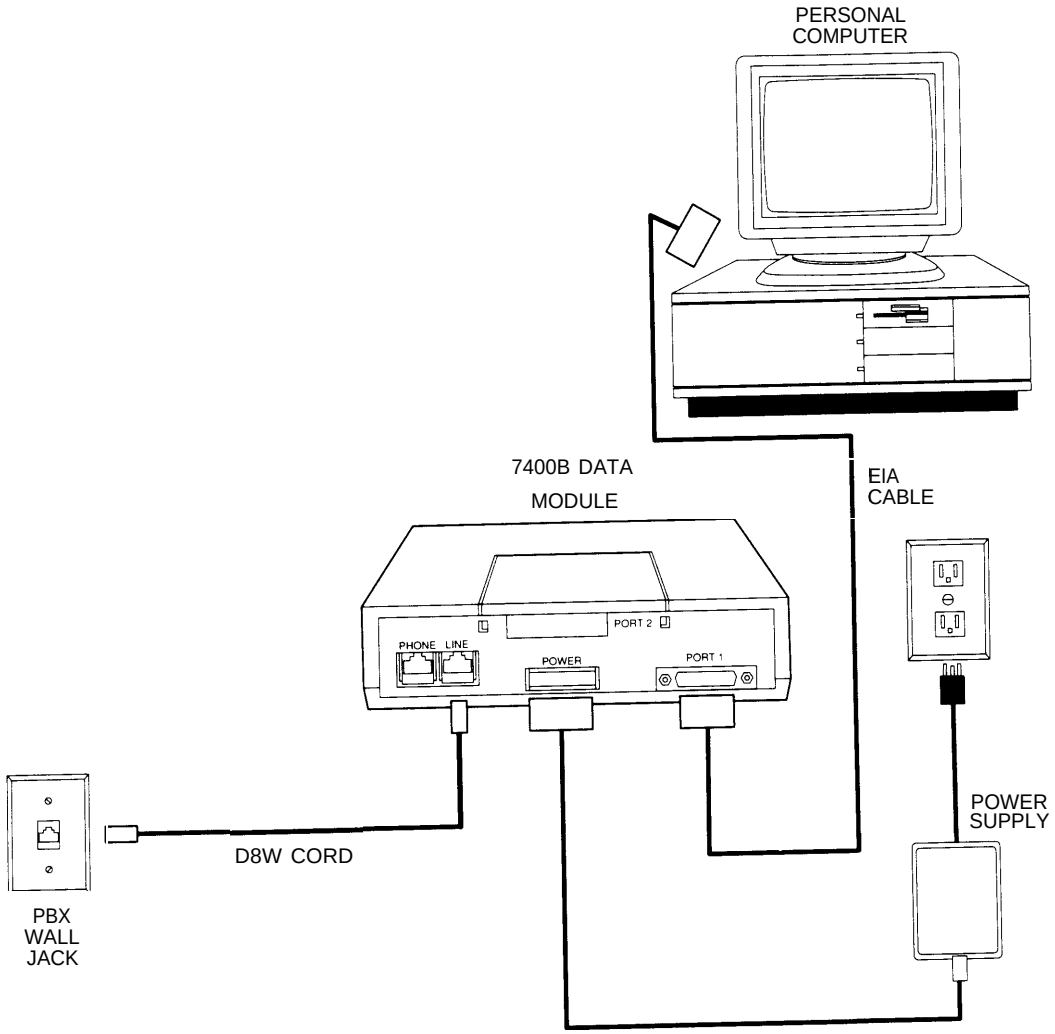


Figure 2-1. Typical Standalone Installation

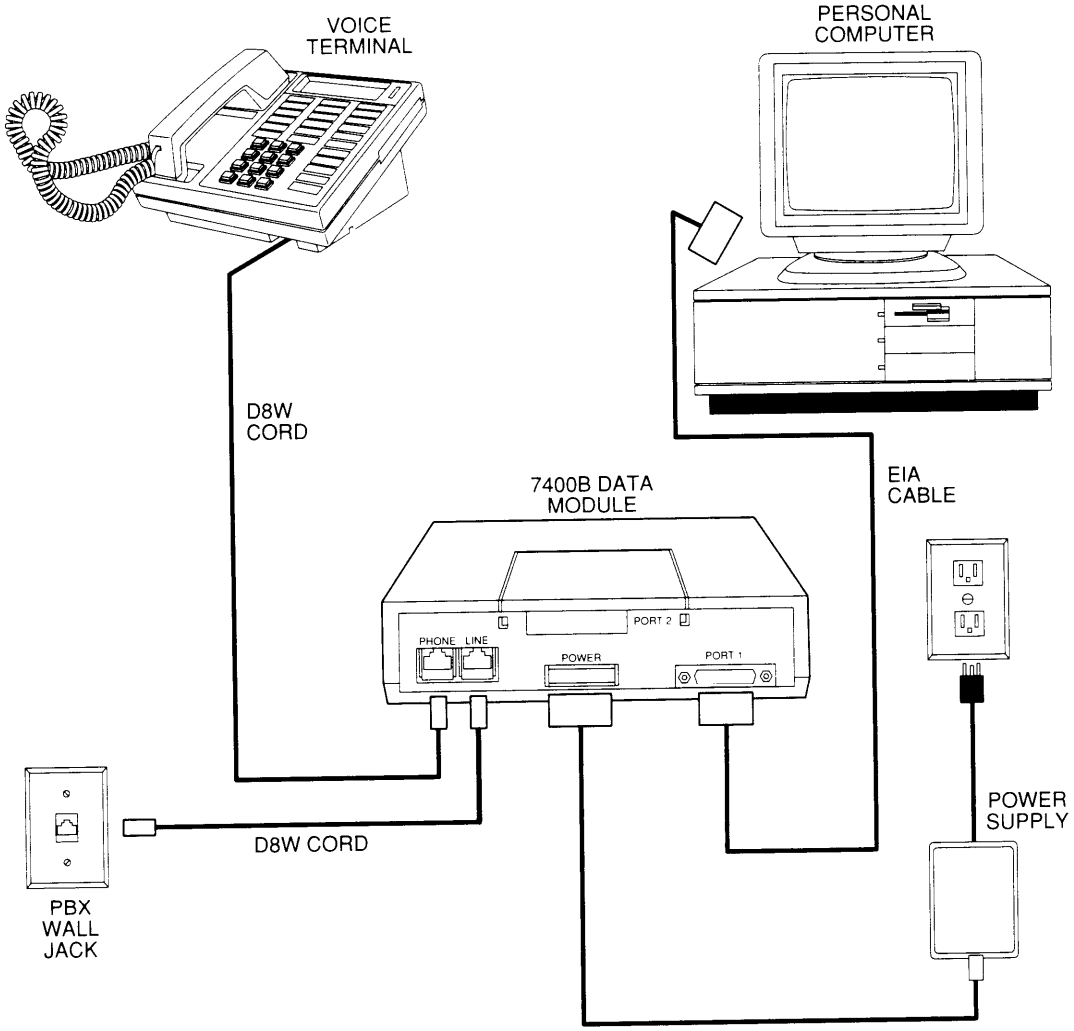


Figure 2-2. Typical Installation with Telephone

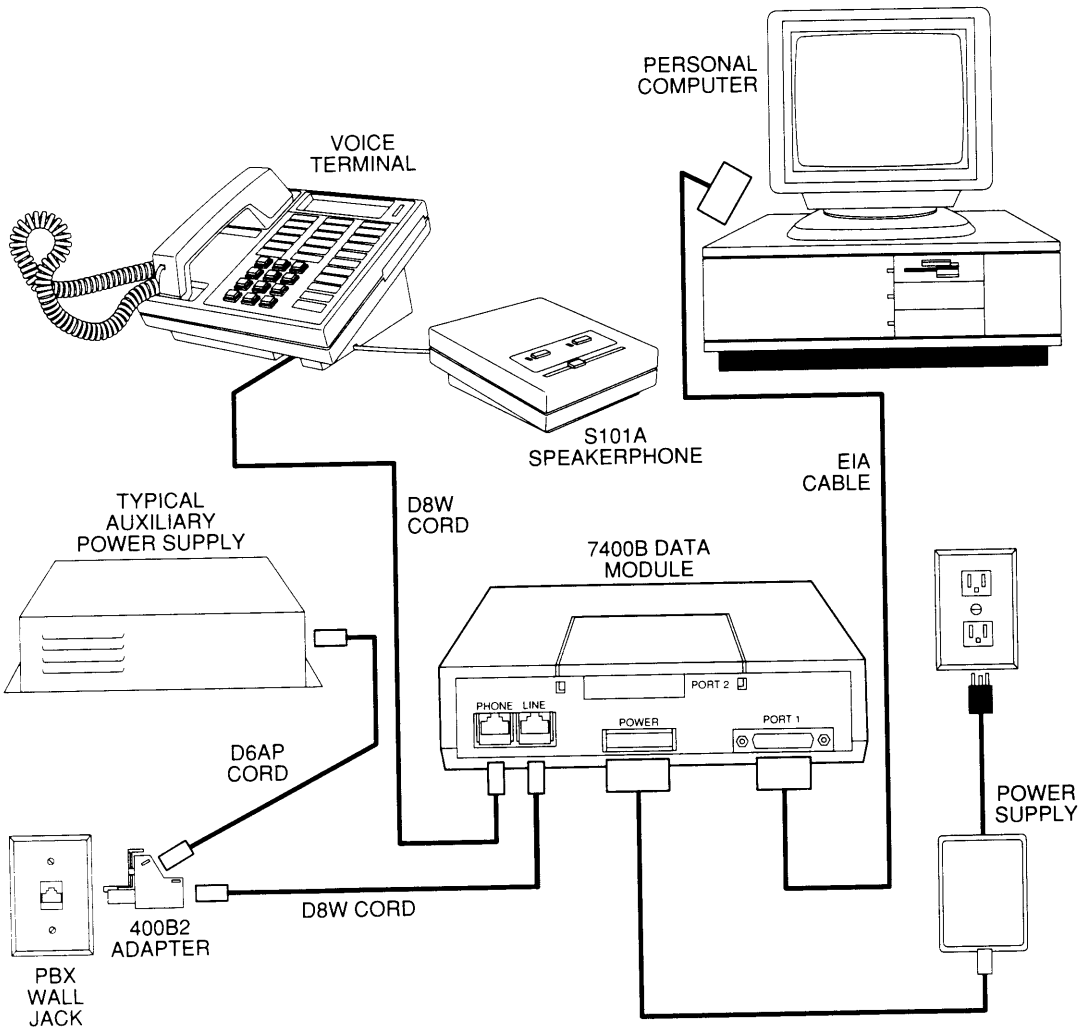


Figure 2-3. Typical Installation with Telephone and Adjunct Equipment Requiring Auxiliary Power

About the Terminal Device

The 7400B Data Module operates with any asynchronous data terminal device that has an EIA-232-D (or RS-232-C) serial port connector. If you are using a PC as your terminal, you will need a suitable data communications software package.

Also, you must set the appropriate configuration options *before* connecting the 7400B Data Module to a printer or plotter. To do this, connect a data terminal or PC to Port 1 of the data module, change the necessary configuration parameters, remove the data terminal or PC, and then connect the printer of plotter. The configuration parameters used for this type of operation are described in Chapter 4, "Operation and Configuration," in a section titled "Remote Site Use."

EIA-232-D cables and data communications software packages are described in the following paragraphs.

Selecting an EIA-232-D Cable

Select an EIA-232-D with a male connector at one end to mate with the Port 1 connector of the 7400B Data Module, and a connector of the appropriate "gender" at the other end to mate with the communications port of your terminal device.

Note: Cables with the earlier RS-232-C designation will also work.

The most common EIA-232-D cables are supplied with a male connector at both ends. If you have this type of cable and the EIA-232-D port on your terminal device is a male connector, you can use a cable adapter commonly referred to as a "gender changer". Otherwise, obtain an EIA-232-D cable that has the appropriate gender connector at each end to fit your application needs.

Selecting Data Communications Software

The purpose of data communications software is to allow your PC to operate as an asynchronous data communications terminal. Of the many software packages available, all perform essentially the same functions, but often in significantly different ways.

If you do not already have a communications software package, consult with an experienced user for advice on selecting software to suit your data communications needs. The following, though not required, are a few helpful features that you may wish to look for in the software you select:

- **Terminal mode.** Also called *local mode* or *chat mode*, this feature allows you to issue commands to the 7400B Data Module. The software that you select *must* have some form of terminal mode.
- **Dialing directory.** This feature allows you to store several frequently called numbers, often along with configuration of the data options needed for completing the connection.

- **Predefine data options profiles.** Some programs include completely defined data option profiles (also called configuration profiles) for popular modems. If available, select the options profile for the Hayes® Smartmodem 2400™.
- **Command files.** These files, also called *script files,* allow you to define a group of commands that may be executed for automatically logging into specific remote devices.

Appendix C, "Application Notes," provides guidelines for using a few of the more popular communications software packages with the 7400B Data Module.

Selecting DCP Cords

The 7400B Data Module is supplied with a 5-foot D8W cord. Use this, or obtain the appropriate length D8W telephone cord for DCP connection between the 7400B Data Module and the PBX wall jack. If you are using the with-telephone option, you will need a second D8W telephone cord to connect between the data module and your telephone or voice terminal.

Selecting DIP-Switch Options

Three hardware options may be selected by setting switches on an internal 8-position DIP switch (SW1). These options are described here, and procedures for setting the switches are provided in a later section titled "Setting the Hardware Option DIP Switches."

With/Without Telephone Option (SW1-1)

When this option is set for operation without an associated telephone (SW- 1 set to " WITHOUT PHONE"), the 7400B Data Module offers only data service between a terminal device and a remote system. Setting this option for operation with an associated voice terminal (SW-1 is set to "WITH PHONE") enables simultaneous data and voice service over the same line from the PBX.

When the 7400B Data Module is optioned for "WITH PHONE," an AT&T 7400-series DCP digital voice terminal is connected to the data module only for its voice service features; data service is provided directly from the 7400B Data Module, and any data features that the voice terminal may offer cannot be used.

Note: A change in the setting of this option becomes effective when the data module is powered on after being powered off. The setting of this option cannot be changed arbitrarily—it must agree with how the line is administered at the PBX. For information on how to administer the 7400B Data Module at the PBX for use with or without a telephone, refer to Appendix C, "Application Notes."

Data Metering Option (SW1-5)

When the data metering option is disabled (SW1-5 set to "OFF"), the transfer speed of the 7400B Data Module will adjust to match the transfer speed of the remote system. The *C0NNECT xxxx* message displayed when a connection is completed will always indicate the far end speed.

When this option is enabled (SW1-5 set to "ON"), it allows the user to set-up a call to a remote end device that is running at a lower speed than the local data module. The *CONNECT xxxx* message will always indicate the speed of the local data transfer. The data module performs the speed conversion and uses the CTS lead to flow-control the user's terminal if it is sending too much data too fast. During the data transfer, the *DATA METERING* LED indicates the state of the CTS lead.

Note: If you are using a PC with a data communications package, or a dedicated terminal that does not support CTS control, you cannot make file transfers with the data metering option enabled.

A change in the setting of this option becomes effective immediately when the data module is in the idle mode or as soon as it is returned to the idle mode. The data module is in idle mode any time that it is *not* in test mode or connected to an active data call.

Make Busy on Local Loop Option (SW1-8)

This option controls the make-busy feature of the 7400B Data Module. When the option is enabled (SW1-8 set to "ON"), the data module will busyout the DCP line when either the Local Loopback or Local Loopback/Self-Test mode is entered. The busyout condition is released when the test ends.

Note: A change in the setting of this option becomes effective immediately when the data module is in the idle mode or as soon as it is returned to the idle mode. The data module is in idle mode any time that it is *not* connected to an active data call.

HARDWARE INSTALLATION

This section outlines procedures for setting the hardware options DIP switches on the Data Module, connecting the EIA-232-D cable, installing the power supply, and connecting the D8W telephone cord(s).

Caution: To avoid possible shock hazards and damage to the equipment, you should perform the installation steps in the order given.

Setting the Hardware Option DIP Switches

Three hardware options are selected by setting switches on an internal 8-position DIP switch. Setting these switches is described in the following paragraph; however, for more information about using these options, refer to Chapter 4, "Operation and Configuration."

Note: The factory-default settings of these switches are correct for the vast majority of applications. Check the default settings shown in Table 2-1 to determine whether you need to make any changes.

Telephone	**SW1-1**
Without Phone	ON
With Phone *(factory-default)*	OFF
Data Metering	**SW1-5**
On—enabled	ON
Off—disabled *(factory-default)*	OFF
Busy Out on Local Loop	**SW1-8**
On—enabled	ON
Off—disabled *(factory-default)*	OFF

TABLE 2-1 Option DIP Switch Settings

To access and set the hardware option switches, refer to Figure 2-4 and perform the following:

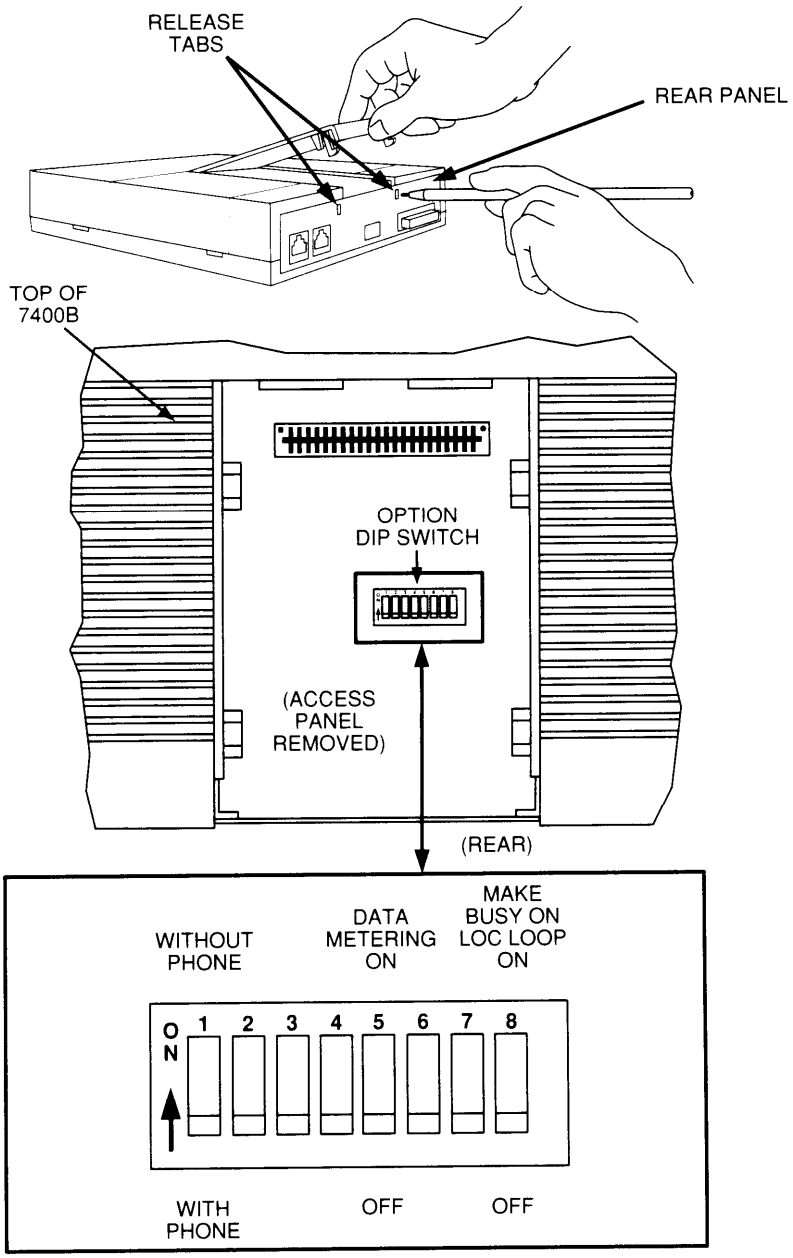


Figure 2-4. Accessing the Hardware Option Switches

Caution: Disconnect all cables and telephone cords attached at the rear of the unit. Failure to disconnect all cables and cords at this point could result in permanent damage to the 7400B Data Module.

1. Remove the top access panel of the data module as follows:
   a. While applying a gentle lifting pressure at the rear edge of the access panel, insert the tip of a ball-point pen or other suitable device into each of the two tab-lock holes in the rear panel to release the locking tabs.
   b. Lift and remove the access panel.
2. If a ROM board is installed just inside the access opening of the Data Module, grasp the edges of the ROM board inside the access opening and lift the board out of its socket.
3. Locate the 8-position DIP switch on the main circuit board, approximately in the center of the area exposed by the access opening.
4. Set the appropriate positions of this DIP switch as shown in the Table 2-1.
5. If a ROM board was removed in step 2, reinsert the board into its connector.
6. Replace the access panel by placing it into position and pressing down at the rear edge to engage the locking tabs.

Connecting the EIA-232-D Cable

Connect the EIA-232-D cable between the Data Module and the terminal device as follows:

1. Insert a male connector of the EIA-232-D cable into the connector labeled *PORT 1* on the rear panel of the Data Module. Tighten both connector retaining screws.
2. Insert the other end of the EIA-232-D cable into the communications port connector on the terminal device. Tighten all retaining screws.

   Note: Be sure to attach any required adapter as discussed previously in the paragraphs titled "Selecting the EIA-232-D Cable."

Connecting the DCP Cord

Attach the DCP type D8W telephone cord as follows:

1. Insert either end of the telephone cord into the connector on the rear panel of the Data Module labeled *LINE*.
2. Insert the other end of the telephone cord into the PBX wall jack.
3. If you are using the with-phone option of the 7400B Data Module (voice and data), install the second D8W telephone cord as follows:
   a. Insert one end of the second D8W cord into the jack on your 7400-series DCP voice terminal.
   b. Insert the other end of the second D8W cord into the jack on the rear panel of the Data Module labeled *PHONE*.

Note: An internal DIP-switch must be set correctly for this option to work (see "Setting the Hardware Option Switches" in this chapter). Also, if your voice terminal has data capabilities, the data features of the voice terminal are not supported while it is connected to the 7400B Data Module.

Connecting the Power supply

Connect the separate power supply unit to the 7400B Data Module as follows:

1. Insert the output connector of the power supply into the connector on the rear panel of the Data Module labeled "POWER."

Caution: Be sure that the side of the power supply cable connector labeled "TOP" is facing upward before inserting the connector.

2. Insert the AC connector of the power supply unit into an appropriate AC outlet.

Note: Since the 7400B Data Module does not have a power on/off switch, the unit will power on as soon as the power supply is connected to an active AC line.

Caution: Make certain that the AC outlet to which you connect the power supply is unswitched (for example, not controlled by a wall switch or light dimmer).

INITIAL SYSTEM CHECKS

This section describes procedures for initially checking out your hardware and any required software. It is assumed at this point that your hardware and data communications software have been properly installed and are ready for use.

Note: Data communications software is required only if you are using a PC as your terminal device. A dedicated data terminal does not need data communications software.

Power-Up Self-Test

When power is first applied to the 7400B Data Module, the unit performs a self-test to determine that it is in working order. The progression of the self-test is indicated by the sequential, left-to-right lighting of the 10 front-panel LEDs.

If the self-test finds no problems, the LEDs labeled *POWER/TEST* and *TR* will remain lit and all other LED lamps will go out.

Note: The operation of the LEDs described here assumes that the factory-default options are still in effect. Once certain options have been changed, the operation of the LEDs may differ from this description.

Your 7400B Data Module is now installed and ready for data communications operation.

IF YOU ARE USING A PC

Review the documentation for your PC and data communications software. Be sure that you understand both well enough to get the software running and place your PC in terminal mode.

Since there is such a diversity of functionality among the many packages available, refer to the user's manual of the software package for specific details of its use. Appendix C, "Application Notes" provides guidelines for using a few of the more popular packages with the 7400B Data Module.

IF YOU ARE USING A DEDICATED TERMINAL

To determine whether your terminal is communicating with the 7400B Data Module, type the following command line:

`AT` [Enter]

Note: The two characters of the "AT" command prefix must be typed as either both uppercase or both lowercase. That is, you can type either `at` or `AT`, but `At` or `aT` will not work.

If everything is operating properly, the command should appear on the screen as you type it, and the 7400B Data Module should respond with *OK*. Refer to Chapter 5,"Troubleshooting," for help if you are not getting these results.

CHAPTER 3: FIRST TIME USERS

This chapter provides some basics on 7400B Data Module operation, describes how to use a few *AT* commands that are essential for most data communications operations, and then outlines a typical on-line session.

Note: The commands for the data module are referred to as *AT* commands because you must type the letters "AT" as the first characters on the line for most commands.

OPERATING MODES

Except when the 7400B Data Module is in a test mode, it is always in one of two distinct operating states or modes: *command mode* and *on-line* or *data mode.*

In command mode, the data module tries to interpret everything you type on your keyboard as a command. In on-line mode, the data module passes everything on as data.

While in on-line mode, typing a specific character three times in quick succession (the factory-default escape sequence is 3 plus signs, or +++) causes the data module to go into command mode without disconnecting an active data call.

The operating modes, the escape sequence, and several *AT* commands are explained further in Chapter 4, "Operation and Configuration." All *AT* commands are described fully in Appendix A, "AT Commands."

Character Formats

In this context, character format refers to the form a character may take locally, between the 7400B Data Module and your terminal device. The elements that make up character format are often referred to as communication parameters. Formats supported by the 7400B Data Module are shown in Table 3-1.

Data Bits	Parity	Stop Bits
7	even or odd	1
7	mark or space	1
8	none	1

TABLE 3-1 CHARACTER FORMATS

All of these parameters may be changed on the local terminal device as needed. The 7400B Data Module will adjust to match the speed and parity of the local terminal device.

If you connect to a remote system and your screen shows a series of nonsense characters (also referred to as "garbage"), chances are that you need to adjust speed or parity.

For more information on configuration, see Chapter 4, "Operation and Configuration."

ESSENTIAL AT COMMANDS

Note: This section pertains mostly to dedicated terminals, since many data communications packages for PCs may not allow you to send AT commands directly to the data module.

This section provides a basic description of the most commonly used AT commands. These few commands are all you will need for completing many data communications tasks. In a later section titled "Sample On-Line Session," presented at the end of this chapter, you will enter the commands manually from your terminal keyboard.

Note: If you are using a PC with software that permits command or script files, you may create files to perform automatic log in for devices that you plan to communicate with frequently. In this case, the commands used are typically not direct AT commands, but function commands defined by the software package. For more information on PC software, refer to Appendix C, "Application Notes."

Table 3-2 describes the subset of AT commands you will need for the on-line session at the end of this chapter. For a complete description of all AT commands, refer to Appendix A.

Note: Except where otherwise noted, press [Enter] to complete all AT command lines.

AT Command	Description
AT	The command prefix that must be typed as the first two letters of all AT commands except +++ and A/. This prefix gets the *AT*tention of the data module. **Note:** The characters of the *AT* prefix must both be typed in either uppercase or lowercase letters *(AT* or *at* will work, but *At* or *aT* will not). Typing a space between the *AT* prefix and the next command on the line is optional, but do *not* separate the two letters "AT" with a space.
D	The Dial command. This command follows the AT and precedes the number that you wish your data module to dial. For example: atd71204 [Enter] **Note:** Other commands may precede the *D* command, but any characters following it will be interpreted as part of the number that is to be dialed.
A/	The redo or Again command. This is one of the two commands that does not require the AT prefix. To repeat the previous command line exactly, type A/ without pressing [Enter]. *(more)*

TABLE 3-2 AT Command Subset

AT Command	Description
+++	The *escape* character sequence. This is one of the two commands that does not require the AT prefix. Once you have connected to the remote device, your data module assumes the on-line mode of operation. If you need to return to the command mode, leave the keyboard idle for at least one second, and then type +++ without pressing [Enter]. Within a few seconds, the data module will respond with *OK*, signifying that it has entered the command mode and is waiting for you to type a command. Whether *OK* is returned or not depends on the setting of certain parameters. If the factory-default settings are in effect, *OK* should be returned.
O	The return to On-line command. After using the +++ escape sequence to enter command mode, you can type ato and press [Enter] to return to on-line mode. **Note:** This command will not work if you have disconnected the data call.
H	The hang up or disconnect command. After using the +++ escape sequence to enter command mode, you can type ath and press [Enter] to disconnect the data call.
&F	The return to Factory-default settings command. If an experimental change of your data module settings produces unexpected results — and you are not sure how to get out of the fix — type AT&F and press [Enter]. This will return all configuration parameters back to the factory-default settings.

TABLE 3-2 AT Command Subset (Contd.)

SAMPLE COMMAND LINES

This section presents a few sample AT command lines with explanations of the results they will produce.

EXAMPLE 1: Dialing a number.

```
at d 5551212 [ Enter ]
```

CONNECT 2400

In the first line of this example,

- *AT* is the required command prefix,
- *D* is the dial command,
- and the remainder of the line is the telephone number.

Note: The spaces between the commands and the telephone number are included only for readability and are not required. You may also insert hyphens (-) anywhere in the telephone number for increased readability.

In the second line of this example, the data module returns a response indicating that a connection with the remote end device has been successfully completed at 2400 bps.

EXAMPLE 2: Dialing a telephone number outside your PBX domain with a few other options thrown in.

```
at  &f  d  9-555-1212 [Enter]
BUSY
```

In the first line of this example,

- `at` is the required command prefix,
- `&f` tells the data module to restore the factory-default configuration parameters,
- `d` is the dial command,
- `9` represents the access code required to dial a number outside your PBX domain,
- and the remainder of the line is the telephone number.

In the second line of this example, the data module indicates that it detected a busy signal.

EXAMPLE 3: Using a time saver.

```
A/
```

The *A/* command tells the data module to repeat the last command line exactly. If, as in the previous example, you had issued the command to dial a number and the data module returned the message *BUSY*, you could type the `A/` command to try the number again.

Note: The `A/` command must be the only command on the command line, and you do *not* press [Enter] to complete the line.

EXAMPLE 4: Changing data options.

```
at el &d2 s0=5 [Enter]
```

This command line is a command sequence that sets up the 7400B Data Module to automatically answer incoming calls. The commands set the following parameters:

- *AT* is the required command prefix,
- `e1` causes characters entered from the keyboard to be echoed to the screen while in command mode
- `&d2` causes the data module to hang up the call when the local terminal turns off DTR
- `s0=5` causes the data module to enter automatic answer mode and answer incoming calls on the fifth ring.

A SAMPLE ON-LINE SESSION

This section outlines how to perform a simple on-line session using the **AT** commands described in this chapter. For more information about all `AT` commands, see Chapter 4, "Operation and Configuration" and Appendix A, "AT Command Set."

Starting the Session

The following is a sample data call to a fictitious bulletin board service. If you know the number of a "real" bulletin board service, you might try an actual log on by using that number and following the suggestions in this session.

```
at d 9-555-7575 [Enter]
```

CONNECT 1200

The `D` command is used to dial the number of the bulletin board. Since the connection was made successfully, the data module responded with a message that says the remote end connected at 1200 bps.

The remote end may do nothing until you press a particular key a few times, usually [Enter]. Typical of many data communications application programs, this sometimes required input lets the remote end determine whether you have connected with the correct communications parameters in effect.

Possible Display Problems

If the response from the remote end is unintelligible "garbage," chances are that the speed or parity bit selection is incorrect. In this case, assuming that your terminal device allows, the parameters may be corrected without disconnecting the call. Otherwise, you must disconnect, correct the parameters, and then try the call again.

Another possible problem is that the remote end response contains normal words mixed in with strange characters, many of which are left brackets ([). This usually indicates that the remote device is sending ANSI display control sequences, and your terminal does not recognize them (ANSI stands for American National Standards Institute).

On a PC, this can generally be remedied by first disconnecting the call, editing the PC's *CONFIG.SYS* file to include the line

```
DEVICE=ANSI.SYS
```

rebooting the PC, and then trying the call again. (For a log off procedure, see the alternative method under "Disconnecting a Data Call," below.)

Note: If the terminal device is not a PC, or the suggested remedy does not seem to solve the problem, and then you will need to consult the documentation for your dedicated terminal, or for your PC and any software involved.

Disconnecting a Data Call

Most remote systems will have a command or menu selection for logging off. When you select the appropriate means, the remote system will usually disconnect or hang up. The PBX will disconnect from the call and, after a moment, the data module will send the following message to your display:

NO CARRIER

Alternatively, you can use the following log off procedure:

Selection: `+++`

OK

The prompt *Selection:* is simply a representation of how the remote system might ask you for your next command or menu selection. Type the escape sequence (default is `+++`) but do *not* press [Enter].

When the data module responds with *OK*, type the command line:

`ath` [Enter]

The PBX will disconnect from the remote end device, and the 7400B will send the *OK* message to the terminal display.

CHAPTER 4: OPERATION AND CONFIGURATION

This chapter describes how to change, store, and recall configuration parameters, outlines how to create and save custom configuration profiles, and discusses more advanced command usage with example command lines.

CONFIGURATION PARAMETERS

Values for configuration parameters are selected by using **AT** commands to change values contained in the S-registers. The S-registers are a set of 8-bit memory locations that the data module reserves for storage of configuration settings. For a description of **AT** commands and S-registers used by the 7400B data module, refer to Appendix A, "AT Command Set," and Appendix B, "S-Registers."

Parameter Storage and Retrieval

Configuration parameter values include the option values selected by **AT** commands that require option values, and the values stored in the S-registers. A complete set of configuration parameter values is called a profile. The 7400B Data Module has four configuration profiles at any given time, one active, two stored, and one that permanently contains the factory-default values.

Unsaved changes to configuration parameters remain in effect until they are changed again, or until the data module is disconnected from the AC power source. Before making or storing any changes, or to check changes that you have made, you can issue an **AT** command to view the values that are currently in the active profile and the two stored profiles.

The active profile contains the parameter values that are currently in effect. All parameter values can be changed, and most changes can be stored to one of the two profile storage locations by issuing an **AT** command. Another **AT** command recalls values from one of the two stored profiles into the active profile.

Factory-default parameter values are a selection of values that are appropriate for a wide number of applications. These values are stored permanently in ROM and you can issue an **AT** command to recall them into the active profile at any time.

Commands to view, store, and recall configuration parameters are summarized in Table 4-1. The commands discussed in this section are described in greater detail in Appendix A, "AT Command Set. " To determine whether a configuration parameter that affects a particular S-register can be stored in memory, refer to Appendix B, "S- Registers."

Command Line:	Action:
at&v [Enter]	Display current **AT** command settings and S-register values in the active profile and the two stored profiles (also displays the four stored telephone numbers, which are described in a section of this chapter titled "Number Storage").
at&w*n* [Enter]	Store the configuration parameters in the active profile to one of the two storage locations, where *n* represents the desired location and may be 0 or 1.
atz*n* [Enter]	Immediately reset the data module and recall one of the two stored configuration profiles into active status, where *n* represents the desired profile and may be 0 or 1.
at&y*n* [Enter]	Recall one of the two stored configuration profiles into active status when the data module is powered on, where *n* represents the desired profile and may be 0 or 1.
at&f [Enter]	Recall the factory-default configuration settings into the active profile.

TABLE 4-1 Commands to Store, Recall and View Configuration Parameters

PC Software

Many data communications software packages for use with PCs provide the possibility of writing script or command files. These files can then be run to execute a sequence of commands that will configure your system, or even provide an automatic log on procedure for a particular remote end device.

Guidelines for use of some of the more popular software packages with the 7400B Data Module are provided in Appendix C, "Application Notes."

OPERATING MODES

Except when a test condition has been initiated, the 7400B Data Module is always in one of two states: command mode and on-line or data mode. When power is first applied, the data module initializes to command mode.

In command mode, the 7400B Data Module looks at everything you type on your keyboard. When you type in something that the data module recognizes as a valid command with a valid parameter (if required), it will execute the action requested. A valid command with an invalid parameter will produce the *ERROR* result code, and an invalid command is simply ignored.

In on-line mode, everything you type is passed as data without interpretation by the 7400B Data Module, except the *escape sequence.* The escape sequence, described in later paragraphs, provides a way of switching the data module back to command mode without disconnecting a data call.

ISSUING COMMANDS

The following paragraphs describe the elements of a command line and how the 7400B Data Module responds to a command line when it is issued.

Command Line Prefix

All commands issued to the 7400B Data Module, except the escape sequence and the repeat command, must begin with the letters "AT". This is called the command line prefix and must be entered as either both uppercase or both lowercase letters (that is, *at* and *AT* will work, but *aT* or *At* will not).

The **AT** prefix (also known as the **AT**tention command) alerts the data module to expect one or more commands to follow. Each time the **AT** prefix is sent, the data module adjusts its speed and parity to match your local terminal.

Command Buffer

As you type in a command, each character is saved in a 40-character buffer. The **AT** prefix, spaces, and the [Enter] at the end of the command line are not saved and do not add to the character count. If you try to type more than 40 countable characters on one line, the result code *ERROR* will be displayed on your terminal screen, and the command line will be ignored.

Command Line Set Up

A command line begins with the **AT** prefix, includes one or more commands, and finishes with a line termination, usually issued by pressing the [Enter] key. The factory-default line termination character is an ASCII carriage return, represented by the decimal number 013 stored in S-register S03.

Note: A special application may require choosing a different line terminating character, accomplished by issuing the command:

`ats3=`*ddd* [Enter]

where *ddd* is a 1- to 3-digit decimal representation of the ASCII character with a range of 0 through 127 (see ASCII Character Set in Appendix D).

Caution: Before changing this or any other default ASCII character, make certain that your terminal device will recognize the new character.

If you make an error while typing a command line, you can send the backspace character, usually issued by pressing the [Backspace] key, as often as needed to delete the error. However, as soon as you enter the **AT** prefix, the data module immediately reads it and sets up for a command to follow. Hence, you cannot delete the **AT** prefix once it is typed.

The factory-default backspace character is an ASCII backspace, represented by the decimal number 008 which is stored in S-register S05.

Note: A special application may require choosing a different backspace character, accomplished by issuing the command:

`ats5=`*ddd* [Enter]

where *ddd* is a 1- to 3-digit decimal representation of the ASCII character with a range of 0 through 127 (see ASCII Character Set in Appendix D).

Caution: Before changing this or any other default ASCII character, make certain that your terminal device will recognize the new character.

Once you complete a command line by pressing [Enter], the data module will try to interpret all characters on the command line as valid commands. If the data module finds a character that is not a valid command, it will ignore the erroneous character and any remaining characters on the command line; if it finds an incorrect parameter for a valid command, the data module will issue the *ERROR* result code and ignore any remaining characters.

Command Acknowledgement

Most commands are acted upon immediately and are acknowledged by the result code *OK*. This assumes that the result codes are configured in the verbose form (command `V1` is in effect), and are enabled (`Q0` in effect). Other options are the short or numeric form result code is set (`V0`), which would produce a *0* (zero) instead of the message *OK*, and no visible acknowledgement (`Q1`). Refer to Appendix A, "AT Command Set" for descriptions of the `V` and `Q` commands.

Several other result codes may appear on your terminal screen while the data module is completing a call. The option selected by the `X` command controls which of these result codes may appear on the screen of your terminal (the `X` command is described in Appendix A). All result codes that may be returned by the 7400B Data Module are shown in Table 4-2 and in Appendix D, "Quick-Reference Summaries."

Verbose Form	Numeric	Description
OK	0	Command accepted
CONNECT	1	Connection made at 300 bps **Note:** If command `X1` is in effect, CONNECT means connection made at whatever speed both ends of the call agreed upon.
RING	2	Ring signal detected
NO CARRIER	3	Carrier signal not detected or lost
ERROR	4	Error in command line
CONNECT 1200	5	Connection made at 1200 bps
NO DIALTONE	6	No dial tone detected
BUSY	7	Busy signal detected
CONNECT 2400	10	Connection made at 2400 bps
CONNECT 4800	11	Connection made at 4800 bps
CONNECT 9600	12	Connection made at 9600 bps
CONNECT 19200	14	Connection made at 19200 bps

TABLE 4-2 Result Codes

Multiple Characters

If you type in the `at` prefix and it displays on your screen as `aatt,` you may disable the command echo by typing the following command:

`ate0 [Enter]`

The command will appear as `aattee00` as you type it, but the data module will send the response code *OK* to your screen. The next command that you type should appear in single characters.

FROM DATA MODE TO COMMAND MODE AND BACK

A special *escape sequence* can be typed at any time during a data call to return temporarily to command mode. Your call does not disconnect, but data is not exchanged. Once you have "escaped" to command mode, the data module returns *OK* to acknowledge that it has entered command mode (see previous section titled "Command Acknowledgement").

At this point, you can issue commands to the data module. As long as the data call has not been disconnected, you can use the O command to return to on-line mode.

One other condition will cause the data module to switch from data mode to command mode. If the PBX senses that the remote device has disconnected, it will disconnect the call to the data module. The data module will turn off the *CD*, *OH*, and *DATA* LEDs (see note), display a result code message on your terminal screen (such as *NO CARRIER)*, and then return to command mode.

The escape sequence and all other commands discussed in this section are explained in Appendix A, "AT Commands."

DIALING A NUMBER

The dial command is issued to the 7400B Data Module in the form `atd`*nnn...n*, where *nnn...n* represents the number you wish to dial. The command line can hold up to 40 characters, so you can usually precede the `D` command with other commands on the same line, if you wish.

Note: Every character following the `D` command is regarded as part of the number to be dialed and is sent to the PBX; hence, the `D` command must be the last command in the command line.

The following is an example:

```
atd74768 [Enter]
```

In the example, the command will cause the data module to go off hook, dial the number, and then wait the period of time specified in S-register S7 for the call to be completed.

If the call is not completed, the data module will disconnect and send the result code *NO CARRIER* to your display screen. When a call is successfully completed, the data module will send the result code *CONNECT* nnnn to your screen, where nnnn represents the speed of the 7400B Data Module, (for example, 1200).

REPEATING A COMMAND

As mentioned earlier, the command buffer contains the last completed command line. If you wish to repeat the previous command line without retyping it, type A/ without the **AT** command prefix and without pressing [Enter].

This command is most useful when you have typed a command line to have the 7400B Data Module dial a number, and the data module returns the result code *BUSY*. Use the A/ command to redial the number as often as you wish.

STORING A TELEPHONE NUMBER

The 7400B Data Module is capable of storing up to four telephone numbers, each of which can contain up to 25 characters. Numbers stored in this way remain available indefinitely, even after the data module has been powered off and then on again.

Table 4-3 describes the command lines used to store a telephone number, delete a number from storage, and dial a stored number.

Note: Digits 0 through 9 and all letters "a" through "z" and "A" through "Z" may be part of the stored "number." Spaces and hyphens (-) may be used in the number when typing the command line. Spaces are not stored and do not add to the total count of characters in the stored number, but all other ASCII characters are stored and counted. Any ASCII character may be used, as long as it is acceptable to the PBX.

Command line:	Action:
at&z*m=nnn...n* [Enter]	Store number *nnn...n* in location *m*, which is one of four locations designated by the numbers 0 through 3. For example: at&z2=92015551212 [Enter] stores the number 92015551212 in number storage location 2.
at&z*m=* [Enter]	Delete any number stored in location *m*, which is one of four locations designated by the numbers 0 through 3. For example: at&z2= [Enter] deletes any number that may have been stored in number storage location 2.
atds=*m* [Enter]	Dial the number stored in location *m*, which is one of four locations designated by the numbers 0 through 3. For example: atds=2 [Enter] causes the data module to send whatever is contained in number storage location 2 to the PBX as a number to be dialed.

TABLE 4-3 Commands for Using Stored Telephone Numbers

AUTOMATIC ANSWERING

The 7400B Data Module can be set up to answer incoming data calls automatically. To initialize this option, type the command line:

ats0=*nnn* [Enter]

where *nnn* is a decimal number in the range of 1 through 255, representing the number of rings to wait before answering.

If *nnn* is 0 (the factory-default setting), the automatic answer feature is turned off. The red LED on the front of the data module labeled "AA" lights when the automatic feature is turned on.

REMOTE SITE USE

The 7400B Data Module can be used at a remote site as a dedicated service device to answer incoming data calls, send data to a remote end device, and then hang up. For example, you may wish to provide access to a printer from a remote site.

The following is a typical command line you might use for setting up this operation (spaces are used here for readability, but are not required):

```
at &c1 &d2 q1 s0=1 &w0 &y0  [Enter]
```

Following the `at` prefix, the commands in the example produce the following results:

- `&C1` sets the Data Carrier Detect (DCD) circuit of the data module to operate according to the EIA standard.
- `&D2` sets the data module to go on hook when an on-to-off transition is detected on the Data Terminal Ready (DTR) input, disconnecting the call
- `Q1` turns off the result codes that would be the normal responses of the data module to commands that it receives.
- `S0=1` turns on the automatic answer feature and causes the data module to answer an incoming data call on the first ring.
- `&W0` causes the current configuration to be stored in data profile storage location 0.
- `&Y0` selects the configuration stored in data profile storage location 0 to become the current configuration each time the data module is powered on

Refer to Appendix A, "AT Command Set," for a complete description of each command used in this section.

RESET AND CONFIGURATION RECALL

Two commands are available for recovering from various data communications problems. You can reset the 7400B Data Module and recall one of two stored data profiles as the current configuration. The form for this command is as follows:

```
atzn [Enter]
```

where *n* is the number 0 or 1, representing the data profile to be recalled.

A second command allows you to recall the factory-default configuration if, for instance, you loose track of changes you have made and need to start over. The form for this command is as follows:

at&f [Enter]

CHAPTER 5: TROUBLESHOOTING

This chapter describes procedures for troubleshooting most problems that may be encountered while installing, configuring, and operating the 7400B Data Module.

HOW TO USE THIS CHAPTER

Use the following guidelines to isolate and correct a problem:

1. Scan through the "Symptom" column in the chart to find the description that best describes the problem situation you have encountered.
2. In the "Problem" column, one or more problem descriptions is offered. Select the one that best describes the observable condition, or try each suggestion in turn until the trouble has been corrected.
3. Perform the task described in the "Solution" column. In cases where you are directed to type an AT command to correct the problem and the 7400B Data Module is in the command mode, simply type the command; from data mode, do the following:
   a. Type the escape sequence `(+++)` to enter command mode; the data module will respond with *OK* or *0* (unless the `Q1` option has been set to disable result codes).
   b. Type the suggested command line (if the solution suggests disconnecting the call, type the command line `ath` [Enter]).
4. To return to data mode after using the escape sequence to enter command mode, type the command line `ato` [Enter].

Symptom	Problem	Solution
All LEDs are off.	Power is off.	Check that the AC outlet is live. Check that the power supply unit is connected to the 7400B Data Module and to the AC outlet.
POWER/TEST and *DATA* LEDs flash together.	The data module has lost communications with the PBX.	Check that the D8W cord is connected between the *LINE* connector of the data module and a PBX wall jack. Note also that the line from the PBX must be properly administered for the 7400B Data Module.
Characters typed on keyboard are not displayed on the screen of the terminal device.	If the *SD* LED does not flash when keys on the terminal are pressed, the EIA-232-D cable is not connected or not properly wired.	Connect or replace the EIA-232-D cable between the data module and the local terminal device.
	If the *SD* LED flashes but the *RD* LED does not flash, the command echo option is turned off.	Press [Enter] to start a new command line, and then type `atel` [Enter] to turn on the command echo.
	The *SD* and *RD* LEDs flash, but certain EIA signal leads are turned off.	Press [Enter] to start a new command line, and then type `at&s0&c0` [Enter] to ensure that the appropriate EIA signal leads are turned on.

Symptom	Problem	Solution
Call disconnects immediately after an attempt to connect; *NO CARRIER* may be displayed on the local terminal device; *CHECK SPEED* LED lights.	The speed of the far end device is higher than the speed of the local terminal device.	Change the speed of the local terminal device to match that of the far end device. If the speed of the far end device is not known, set the local terminal device to the highest speed available.
	The far end device is set up for half-duplex or synchronous operation.	The 7400B Data Module cannot communicate with a far end device that is operating half-duplex or synchronous. This problem can be resolved only if the far end device can be reconfigured for full-duplex, asynchronous operation.
Call disconnects immediately after an attempt to connect; *BUSY* may be displayed on the local terminal device; *CHECK SPEED* LED does not light.	The far end device is busy with another call.	Try the call again.
	The telephone number was dialed incorrectly.	Check the number of the far end device that you wish to call and try the call again.
	The far end device is not busy, but the PBX has restricted access to the called device.	This situation can only be resolved by having the PBX readministered to remove the access restriction.

Symptom	Problem	Solution
The PC communications software indicates that the call has been disconnected, but the *DATA* LED remains lit.	The data module has ignored the on-to-off transition of the DTR lead.	From command mode, type the command `at&d2 [Enter]` to set the DTR lead option to disconnect on DTR lead transition from on-to-off. Alternatively, determine and use the command provided by the communications software to implement this change.
	The data module has ignored the `H` (hang-up) command.	Ensure that after the escape sequence `(+++)` has been entered to switch the data module to command mode, an adequate pause is allowed before issuing the `H` command. In escaping to command mode with the result codes enabled, the data module must be given time to return *OK* or *0* before it is ready to accept a command.

Symptom	Problem	Solution
The *AA* LED flashes but the data module does not automatically answer the incoming call.	The automatic answer option is not enabled; when there is no incoming call, the *AA* LED is off.	From the command mode, type `ats0=1 [Enter]` to turn on the automatic answer feature. Set the value following the equal sign (1 in the example) to the ring number on which you want the data module to answer an incoming call. The automatic answer feature is turned off by setting this value to 0.
	The automatic answer option is enabled; the *AA* LED is on when there is no incoming call, but the terminal device is not ready *(TR* LED is off).	If the local terminal is a PC, configure the communications software to turn on the DTR lead, or set the data module to ignore the DTR lead by typing `at&d0 [Enter]`
	The automatic answer option is enabled; the *AA* and *TR* LEDs are lit, but the *POWER/TEST* lamp is flashing, indicating that the data module is in a local loopback test mode.	Terminate the local loopback test by typing `at&t0 [Enter]`

Symptom	Problem	Solution
Transmitted and/or received data contains errors.	Speed settings of the terminal device and the data module are not the same.	Change terminal device speed to agree with the speed that was indicated in the *C0NNECT* `nnnn` message.
	The local terminal device and the far end device are configured for different parity settings.	Change the parity setting of the local terminal device to match that of the far end device.
	Far end data errors only during file transfer with PC data communication software.	Disconnect the call, set the data metering option to off (see "Setting the Hardware Option DIP Switches" in Chapter 2), re-establish the call, and try the file transfer again.
The *DATA* LED is lit, but a *CONNECT* `xxxx` message or numeric result code was not displayed.	The display result codes option is turned off.	Turn on the display result codes option by typing `atq0 o [Enter]` The `O` command at the end of the above command line will cause the data module to return to the on-line mode and send the *CONNECT xxxx* message, or an equivalent numeric code, to the terminal display (see "Result Codes" in Appendix D).
Numeric code returned when `CONNECT` *xxxx* message is preferred.	The result code format option is set to numeric form.	Change the result code format option to message form by typing `atv1 [Enter]`

Symptom	Problem	Solution
Commands are displayed without error as they are typed (echoed), but the data module does not respond to any command.	The local terminal device is set to a speed not supported by the 7400B Data Module.	Set the terminal device for one of the supported speeds: 300, 1200, 2400, 4800, 9600, or 19200 bps.
The *CONNECT* message is sent without a speed indication, but the far end device is not set at 300 bps.	The data module is configured to display only the basic set of result codes (option `x0).`	Configure the data module to send *CONNECT* `nnnn` messages for all speeds except 300 bps by typing `atx4` [Enter]
The terminal device has its DTR lead turned on, but the *TR* LED is off.	A defective or non-standard (null-modem) EIA-232-D cable is in use.	Replace the EIA-232-D cable with one that is wired correctly.

APPENDIX A: AT COMMAND SET

This appendix contains an explanation of each AT command accepted by the 7400B Data Module. Labels used in the descriptions are defined as follows:

Label	Description
Command:	The command is shown as it should be typed. The command may be typed in uppercase or lowercase. Spaces may be typed between multiple commands on the same command line for readability, but the spaces are ignored by the 7400B Data Module.
Function:	A brief, functional description of the command is provided here.
Type:	Type may be *immediate* or *configuration.* An immediate command causes the data module to perform an action as soon as the command is sent (for example, go off-hook or dial a number). A configuration command modifies a configuration parameter during the current session.
Arguments:	Many commands accept or require a numerical argument. Whether an argument is required and the range of acceptable values for the argument is shown here.
S-Register:	The S-registers consist of 28 1-byte memory locations in the data module, designated as S0 through S27. The S-registers hold values for defining the current configuration of the data module. Some commands modify a specific S-register, and some commands perform an action based on the current value stored in an S-register. Whether an S-register is modified or read by the current command is explained here.

(more)

Label	Description
	(Contd.)
Example:	A sample command line follows this label to demonstrate how the command may be used.
Comments:	An explanation of the example and any other information about the command not provided elsewhere is provided here. Additional commands may be typed on the same command line with the command currently under discussion, unless noted otherwise.
See Also:	Following this label are suggestions on where to look for more information about the current command and a listing of any other commands that may be used with or affect the use of the current command.

Command:	+++
Function:	Escape sequence.
Type:	immediate
Arguments:	none
S-Register:	none
Example:	+++
Comments:	The purpose of the +++ command is to provide a way to switch the data module from on-line or data mode to command mode without disconnecting a data call that is in progress. As long as the call is not disconnected, you can return to the on-line mode with the O command. This is one of the two commands that does not require the **AT** prefix (A/ is the other one), and it is never followed by pressing [Enter]. The value in S12 determines how long your keyboard should remain idle before entering the escape sequence, as well as the maximum allowable time between entering each character of the sequence. The character used in the escape sequence is determined by the value in S2 (default is ASCII 43, the plus sign).
See Also:	Chapter 3, "First Time Users," Chapter 4, "Operation and Configuration"; the O command in this appendix; S2 and S12 in Appendix B.

Command: A

Function: Go off-hook in Answer mode.

Type: immediate

Arguments: none

S-Register: Bit 7 of S14 is set to 0.

Example: ata [Enter]

Comments: The A command causes the data module to go off-hook in answer mode and attempt to answer an incoming call. The option set by the &D command and the contents of S0 and S1 are ignored when this command is issued.

See Also: Command &D; Chapter 3, “First Time Users,” Chapter 4, “Operation and Configuration”; Appendix B, “S- Registers.”

Command: A/

Function: Re-execute the last valid command line.

Type: immediate

Arguments: none

S-Register: none

Example: a/

Comments: This is one of the two commands that does not require the **AT** prefix (+++ is the other one). To repeat the previously executed command line exactly, type A/ without pressing the Return or Enter key. This command must be typed at the beginning of a new line and cannot be combined with any other command.

See Also: Chapter 3, "First Time Users."

Command: D

Function: Dial a telephone number.

Type: immediate

Arguments: The D command requires an ASCII character string, which is sent by the data module to the PBX. The string may include any ASCII character, with the following restrictions:

- If the letters "t" or "p" (uppercase or lowercase) are typed as the first character following the D command, the data module will delete either character.

  For example, if you want your dial string to be the mnemonic "TEXAS," you must type the "T" twice (the first "t" may be uppercase or lowercase), producing the command line:

  atdtTEXAS [Enter]

  The "t" following the D command will be discarded and the string "TEXAS" will be sent to the PBX as a dial mnemonic (the PBX must be administered to recognize this mnemonic as the representation of a number to be dialed).

- The PBX may interpret certain non-alphanumeric characters as commands and perform an unexpected action, if you did not intend to send the command to the PBX. Consult the documentation for your PBX to determine which characters may be interpreted as commands.

- The string (or AT command) S=*n*, where *n* may be a number from 0 through 3, will cause the data module to send the contents of its respective telephone number storage location to the PBX as the telephone number. For details on how to use this feature, refer to "Storing a Telephone Number" in Chapter 4, "Operation and Configuration."

(more)

Command: D *(Contd.)*

S-Register: Bit 7 of S14 is set to 1.

Example 1: `atd555-1212 [Enter]`

Example 2: `atds=1 [Enter]`

Comments: In example 1, the number 555-1212 is dialed. The hyphen (-) is optional and may be used for easier reading of the command line. In example 2, the number stored in telephone number location 1 is dialed. The maximum length of the ASCII string is 39 characters; the **AT** prefix, the carriage return, and spaces used for readability do not add to the character count for the line.

Note: Other commands should not be issued following the dial string until the call is either completed or fails. If *anything* is typed before the call is completed, the call will fail.

See Also: Chapter 3, "First Time Users," Chapter 4, "Operation and Configuration."

Command: E

Function: Turn the command echo on or off.

Type: configuration

Arguments: No argument or an argument of 0 disables echo and an argument of 1 enables echo. The factory-default is 1.

S-Register: Bit 1 of S14 is set according to the argument of the command.

Example: `ate1 [Enter]`

Comments: Typically, for a display terminal operating in full-duplex mode, use the 1 argument if you wish to see the **AT** commands on the screen as you type them. If your display terminal is operating in half-duplex mode, use the 0 argument (the 1 argument would cause characters typed to appear on the screen like `tthhiiss).`

See Also: Chapter 4, "Operation and Configuration."

Command: H

Function: Switch hook control.

Type: immediate

Arguments: No argument or an argument of 0 causes the data module to go on-hook.

S-Register: none

Example: ath [Enter]

Comments: The H command with no argument can be used during a data call to cause the 7400B Data Module to go on-hook (hang up) after using the escape sequence (+++) to return to command mode. An argument of 0 produces the same result, and an argument of 1 is accepted but causes no action.

See Also: The escape sequence command (+++); Chapter 4, "Operation and Configuration."

Command: I

Function: Request product code or ROM checksum.

Type: immediate

Arguments: The I command accepts one of three arguments as follows:

0 - The data module displays the decimal number 249, followed by a carriage return and line feed.

1 - The data module displays the ROM checksum as two four-digit hexadecimal values, followed by a carriage return and line feed.

2 - The data module displays *OK*, followed by a carriage return and line feed.

S-Register: none

Example: ati0 [Enter]

Comments: In the example, the 7400B Data Module will return its product ID code as the value *249*.

See Also: none

Command: O

Function: Return to the on-line mode.

Type: immediate

Arguments: No argument or an argument of 0 (zero) causes the data module to return from command mode to on-line mode, if a data call is still active.

S-Register: none

Example: ato [Enter]

Comments: The 7400B Data Module accepts an argument of 1 but treats it the same as no argument or an argument of 0.

See Also: Chapter 4, "Operation and Configuration"; the +++ command in this appendix.

Command: Q

Function: Turn the display of result codes on or off.

Type: configuration

Arguments: No argument or an argument of 0 enables the display of result codes; an argument of 1 disables the display of result codes. The factory-default is result codes enabled.

S-Register: Bit 2 of S14 is set according to the argument used with the Q command.

Example: atq1 [Enter]

Comments: In the example, the result codes are disabled. Use this option only if you wish to prevent the data module from returning result codes after an **AT** command is issued.

See Also: Chapter 4, "Operation and Configuration;" result codes in either Chapter 4 or Appendix D, "Summary Tables;" the V and X commands in this appendix.

Command: V

Function: Select format for result codes.

Type: configuration

Arguments: No argument or an argument of 0 causes the data module to return the short form or numeric result codes; an argument of 1 causes the data module to return the verbose form or text message result codes. The factory-default setting is the verbose form.

S-Register: Bit 3 of S14 is set according to the argument used with the V command.

Example: atv [Enter]

Comments: The example would set the short form or numeric result code format.

See Also: Chapter 4, "Operation and Configuration"; result codes in either Chapter 4 or Appendix D, "Summary Tables;" the Q and X commands in this appendix.

Command: X

Function: Control the extended result code set and dialing capabilities.

Type: configuration

Arguments: The X command accepts one of 5 arguments as follows:

0 - The basic result code set (0—4) is enabled. No dial tone or busy signal detection. No speed indication on connect.

1 - Result codes 0—5, 10—12, and 14 are enabled. No dial tone or busy signal detection. Speed indication on connect.

2 - Result codes 0—6, 10—12, and 14 are enabled. Wait for dial tone before dialing. Call is aborted if dial tone is not detected within length of time in S7. No busy signal detection. Speed indication on connect.

3 - Result codes 0—5, 7, 10—12, and 14 are enabled. No dial tone detection. Busy signal detection enabled. Speed indication on connect.

4 - Result codes 0 - 7, 10 - 12, and 14 are enabled. Blind dialing capability is disabled. Speed indication is provided when a connection is established. Busy signal detection and dial tone detection are enabled (see comments). This is the factory-default setting.

S-Register: Bits 4, 5, and 6 of S22 are set according to the argument given with the x command.

Example: atx2 [Enter]

Comments: In the example, the results described under argument value 2 are implemented. Regardless of which argument is used, the data module will wait until the call is completed, or the time set in register S7 expires. All arguments do change the appropriate bits in S22 and affect the result codes returned.

See Also: Chapter 4, "Operation and Configuration"; result codes in either Chapter 4 or Appendix D, "Summary Tables;" the Q and V commands in this appendix.

Command:	Z
Function:	Reset and recall a stored profile.
Type:	immediate
Arguments:	No argument or an argument of 0 recalls the configuration profile stored in location 0; an argument of 1 recalls the configuration profile stored in location 1.
S-Register:	none
Example:	atz1 [Enter]
Comments:	In the example, the z command causes the 7400B Data Module to reset, and then loads the configuration profile stored in location 1 into the active location.
See Also:	Chapter 4, "Operation and Configuration."

Command: &C

Function: Data Carrier Detect (DCD) options.

Type: configuration

Arguments: The &C command accepts one of two arguments as follows:

0 - (or no argument) maintain the DCD circuit *on* at all times (factory-default setting)

1 - the DCD circuit operates according to the EIA-232-D standard

S-Register: Bit 5 of S21 is set according to the argument used with the &C command.

Example: at&c1 [Enter]

Comments: In the example, the DCD circuit operates according to the EIA-232-D standard. This would be an appropriate setting for when the 7400B Data Module is used at a remote site.

Regardless of which option is currently in effect, the DCD circuit of the 7400B Data Module is always off during self-test, and turns off for 0.5 second during a disconnect sequence.

See Also: Chapter 4, "Operation and Configuration"; Appendix B, "S-Registers."

Command: &D

Function: Data Terminal Ready (DTR) options.

Type: configuration

Arguments: The &D command accepts one of four arguments as follows:

0 - ignore the DTR interchange circuit (factory-default setting).

1 - return to the command state if an on-to-off transition is detected on the DTR input; an active data call is *not* disconnected.

2 - go on hook when an on-to-off transition is detected on the DTR input (EIA-232-D standard); an active data call *is* disconnected.

3 - perform a reset if an on-to-off transition is detected on the DTR input; an active data call is disconnected.

S-Register: Bits 3 and 4 of S21 are set according to the option used with the &D command.

Example: at&d2 [Enter]

Comments: In the example, the DTR circuit is set according to the EIA-232-D standard. This would be an appropriate setting for when the 7400B Data Module is used at a remote site as a dedicated device to automatically answer an incoming data call.

For the 0 option, the front panel DTR indicator (TR LED) is always on, regardless of the state of the DTR input; for all other options the indicator follows the state of the DTR input.

If the change of state for the DTR circuit persists for a time shorter than specified in S25, the change is ignored.

See Also: Chapter 4, "Operation and Configuration", Appendix B, "S-Registers."

Command: &F

Function: Load the factory-default configuration.

Type: immediate

Arguments: none

S-Register: none

Example: at&f [Enter]

Comments: The factory-default configuration values are permanently stored in ROM and can be recalled at any time. No reset or self-test is initiated by issuing the &F command.

See Also: Chapter 4, "Operation and Configuration."

Command: &S

Function: Data Set Ready (DSR) options.

Type: configuration

Arguments: The &S command accepts one of two arguments as follows:

0 - (or no argument) the DSR circuit is maintained on at all times (factory-default setting)

1 - the DSR circuit operates according to the EIA-232-D standard.

S-Register: Bit 6 of S21 is set according to the argument used with the &S command.

Example: at&s1 [Enter]

Comments: In the example, the DSR circuit is configured to operate according to the EIA-232-D standard. Regardless of which option is currently in effect, the DSR circuit of the 7400B Data Module is always off during self-test, and turns off for 0.5 second during a disconnect sequence.

See Also: Chapter 4, "Operation and Configuration."

Command: &T

Function: Control diagnostic and test facilities.

Type: immediate

Arguments: The &T command accepts one of eight arguments (see comment 2) as follows:

0 - (or no option) terminate any test in progress (see comment 3)

1 - initiate local digital loopback test

2 - same as 1

3 - initiate local data loopback test

4 - allow remote digital loopback requests from the remote system (factory-default selection)

5 - deny remote digital loopback requests from the remote system

6 - initiate remote digital loopback test

7 - initiate remote digital loopback test with self-test

8 - initiate local digital loopback test with self-test

S-Register: Bits 0 and 2—6 of S16 are set according to the argument used with the &T command.

Example: at&t3 [Enter] *(see comment 1)*

Comments

1. In the example, a local data loopback test is initiated.
2. All argument values in the range of 0—8 are valid. All of the options selected by the command arguments described above are accepted and implemented by the 7400B Data Module, but they are *named* differently than in the EIA-232-D standard.
3. If the local digital loopback or remote digital loopback tests are in progress, it is necessary to issue the escape sequence to return to command mode before the &T0 command can be used to terminate these tests. The test timer value stored in S18 can also be set to halt automatically any locally initiated test in progress.

See Also: Chapter 4, "Operation and Configuration;" Appendix B, "S-Registers."

Command: &V

Function: View the active configuration and stored profiles.

Type: immediate

Arguments: The &V command does not take an argument.

S-Register: none

Example: at&v [Enter]

Comments: The &V command displays all active and stored configuration data as follows (see sample screen below):

- command and S-register settings for the active configuration profile
- command and S-register settings saved in configuration profile locations 0 and 1
- contents of the four telephone number storage locations

See Also: Chapter 4, "Operation and Configuration."

```
ACTIVE PROFILE:
B1 E1 L2 M1 Q0 V1 X4 Y0 &C0 &D0 &G0 &J0 &L0 &P0 &Q0 &R0 &S0 &X0 &Y0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:060
S08:002 S09:006 S10:014 S12:050 S14:AAH S16:00H S18:000 S21:00H
S22: 76F S23:0BH S25:005 S26:001 S27:40H

STORE PROFILE 0:
B1 E1 L2 M1 Q0 V1 X1 Y0 &C0 &D0 &G0 &J0 &L0 &P0 &Q0 &R0 &S0 &X0
S00:000 S14:AAH S18:000 S21:00H S22:46H S23:OBH S25:005 S26:001
S27:40H

STORED PROFILE 1:
B1 E1 L2 M1 Q0 V1 X4 Y0 &C0 &D0 &G0 &J0 &L0 &P0 &Q0 &R0 &S0 &X0
S00:000 S14:AAH S18:000 S21:7H 001
S27:40H

Telephone Numbers:
&Z0= 34017
&Z1= 95551212
&Z2= 74802
&Z3= PPARIS

OK
```

Command: &W

Function: Store the active configuration profile.

Type: immediate

Arguments: No argument or an argument of 0 stores to location 0, an argument of 1 stores to location 1.

S-Register: none

Example: at&w0 [Enter]

Comments: In the example, the currently active configuration profile is stored to memory location 0. Only a subset of the configuration parameters are actually stored.

See Also: Chapter 4, "Operation and Configuration"; Appendix B, "S-Registers."

Command: &Y

Function: Designate the default configuration profile.

Type: configuration

Arguments: An argument of 0 will recall stored profile 0; an argument of 1 will recall stored profile 1. Factory-default selection is stored profile 0.

S-Register: none

Example: at&y1 [Enter]

Comments: In the example, the configuration profile stored in location 1 will be recalled the next time that the 7400B Data Module is powered on. When the &Y command is issued, the currently active profile does *not* change until the data module is powered off and then on again.

See Also: Chapter 4, "Operation and Configuration."

Command: &Z

Function: Store a telephone number.

Type: immediate

Arguments: The &Z command accepts one of four arguments (0 through 3), which designates the memory location in which the dialing string that follows the command will be stored.

S-Register: none

Example: at&z2=555-1212 [Enter]

Comments: In the example, the dial string *555-1212* is stored in memory location 2. Each of the four number storage locations can store a maximum of 25 characters.

See Also: Chapter 4, "Operation and Configuration."

APPENDIX B: S-REGISTERS

This appendix contains an explanation of each S-register used by the 7400B Data Module. An S-register is an 8-bit location in non-volatile memory that is used for storing the value of one or more configuration parameters. When the data module is first powered on, the values that were last stored in the S-registers are the values in effect until **AT** commands are issued to change them.

You can check the current value stored in all S-registers with the &V command (see description in Appendix A, "AT Command Set"). To look at the contents on just one register, use the command S*mm*?, where *mm* is the number of the S-register.

To change the value in any one S-register directly, use the command S*mm*=*nnn*, where *mm* is the number of the S-register and *nnn* is the number you wish to place in the register. The following dialog illustrates the use of the S command to read and change the value contained in an S-register:

```
ats18? [Enter]
055

OK
ats18=120 [Enter]
OK
```

The first command request the value stored in register S18. The data module returns the value *055*, followed by *OK*. The next command changes the value in register S18 to *120*, and the data responds with *OK*. You could enter the first command a second time to verify that the value was changed correctly.

More information is provided in the following definitions of the labels used in the S-register descriptions.

Label	Description
Register:	The S-register is identified following this label. Note that the names for S-registers 1 through 9 may be typed as two-digit numbers with leading zeros, if desired, for readability (e.g., S01 is equivalent to S1).
Description:	The purpose and use for the S-register is explained following this label.
Range of Values:	The range of values that may be assigned to the register is explained following this label. The units for the value may be as follows: • *decimal*—a one- to three-digit decimal number. Decimal numbers are typically used to represent a count, seconds, or fractions of a second. • *ASCII*—a one- to three-digit decimal number that represents the decimal equivalent for an ASCII character (see ASCII Character Table in Appendix D, "Quick-Reference Summaries"). • *hexadecimal*—a two-digit hexadecimal number used to represent the contents of a bit-mapped S-register. Bit-mapped S-registers are not usually set by entering a complete value for the register, but are set one or more bits at a time by various **AT** commands. Hexadecimal digits include the decimal digits 0 through 9, and the letters A through F. **Notes:** *1.* A value typed as a decimal or ASCII argument to a command may be entered as a one, two, or three digit number, as required, but will always be displayed as a three digit number (for example, you type the command `ATS0=3` to set automatic answer feature to answer an incoming call on the third ring, and then type the `AT&V` command to verify the value, which is displayed as `S00:003).` 2. The `&V` command, which displays the contents of all S-registers, presents the contents of bit-mapped registers as two hexadecimal digits followed by an uppercase letter `H` (for example, assuming that S-register S14 contains the value AA hexadecimal, the `AT&V` command displays `S14:AAH).`

(more)

Label	Description
	(Contd.)
Storable:	A *yes* after this label indicates that the contents of this S-register will be written when the current configuration profile is saved to one of the two configuration profile storage locations. A *no* here indicates that the contents of the S-register will *not* be written to storage. **Note:** Any changes to non-storable S-registers are lost when power is removed from the Data Module; however, the &Y command can be set to load a specific stored configuration profile at start up, and the values set by **AT** command arguments in the recalled profile will be placed into effect.
Comments:	Additional information about the S-register is presented following this label.
See Also:	Following this label are references to other parts of this manual where you will find more information, and/or a list of other S-registers or **AT** commands that are associated with this S-register.

Register: S0

Description: The value in this S-register represents the ring number on which an incoming call will be automatically answered.

Range of Values: The value may be 000 through 255 rings. The factory-default setting is 000 rings.

Storable: yes

Comments: Setting S-register S0 to any value from 001 through 255 enables automatic answer; a value of 000 disables automatic answering. The count of incoming rings is stored in S-register S1.

See Also: Chapter 4, "Operation and Configuration"; S-register S1.

Register: S1

Description: The number of incoming rings detected. Incremented each time a ring is detected. It is cleared if no rings are detected for eight seconds.

Range of Values: The value may be 000 through 255 rings. The factory-default setting is 000 rings.

Storable: no

Comments: In the 7400B, incoming rings are not detected as such. The PBX notifies the 7400B of an incoming call and a ring cycle (RI lead) is generated internally. The register is incremented after each ring cycle.

See Also: Chapter 4, "Operation and Configuration"; S-register S0.

Register:	S2
Description:	This S-register stores the ASCII value of the escape sequence character.
Range of Values:	Value may be 000 through 127 (see comments); factory-default setting is 043, the ASCII code for a plus sign (+).
Storable:	no
Comments:	Setting the value greater than 127 will disable escape sequence detection, in which case the escape sequence cannot be used to move to command mode. The operation of the Data Terminal Ready (DTR) circuit, set by the &D command, can still be used to move to command state without disconnecting the call.
See Also:	Chapter 4, "Operation and Configuration"; **AT** command &D in Appendix A.

Register:	S3
Description:	This S-register stores the ASCII value of the carriage return character.
Range of Values:	Value may be 000 through 127; factory-default setting is 013, usually output by the **Enter** or **Return** key or the **Ctrl-M** key combination from a data terminal.
Storable:	no
Comments:	This character serves as the command terminator on an **AT** command line. It is also output following all result codes.
See Also:	Chapter 4, "Operation and Configuration."

Register: S4

Description: This S-register holds the ASCII value for the line feed character.

Range of Values: Value may be 000 through 127; factory default setting is 010, usually output by the **Ctrl-J** key combination from a display terminal.

Storable: no

Comments: none

See Also: Chapter 4, "Operation and Configuration."

Register: S5

Description: This S-register holds the ASCII value for the backspace character.

Range of Values: Value may be 000 through 032 and 127; factory-default value is 008, usually output by the **Backspace** key of a data terminal.

Storable: no

Comments: The operation of the backspace character is to move the cursor left one character space and (on a command line) erase the character moved to. If command echo is enabled **(AT** command E1), the output of the backspace character is actually three characters: backspace, space, backspace.

See Also: Chapter 4, "Operation and Configuration."

Register: S6 — not used

Register: S7

Description: Wait time for line signal or dial tone. If line signal is not detected within this time, the call will be disconnected.

Range of Values: Value may be 001 through 055 seconds; factory-default value is 030 seconds.

Storable: no

Comments: This register will affect only the wait time for line signal detection. The 7400B always waits the length of time in register S7 for the equivalent of a dial tone from the PBX.

See Also: Chapter 4, "Operation and Configuration."

Register: S8 — not used

Register: S9 — not used

Register: S10

Description: The value in this S-register determines how long the 7400B Data Module will wait after loss of line signal is detected before disconnecting.

Range of Values: Value may be 000 through 255 tenths (0.1) of a second; factory-default value is 014 tenths of a second (1.4 sec.).

Storable: no

Comments: The delay set by this S-register allows the receive line signal to disappear momentarily without causing a disconnect (hang-up). Setting this S-register to the maximum value (255) causes the Data Module to ignore receive line signal status and not disconnect the data call if line signal is lost.

See Also: Chapter 4, "Operation and Configuration."

Register: S11 — not used

Register: S12

Description: The value in this S-register determines the minimum delay required immediately before and after entering the escape sequence (guard time). It also determines the maximum interval allowed between entering each of the three consecutive characters of the sequence.

Range of Values: Value may be 000 through 255 fiftieths (0.02) of a second; factory-default value is 050 fiftieths of a second (1 sec.).

Storable: no

Comments: If the value in this S-register is set to 0, timing is not a factor in escape sequence recognition.

See Also: Chapter 4, "Operation and Configuration."

Register: S13 — not used

Register: S14

Description: This S-register is used to store the status of bit-mapped options as follows:

bit 0 — not used (always set to 0)

bit 1 — 0 = command echo disabled, 1 = command echo enabled (default = 1, see E command)

bit 2 — 0 = result codes enabled, 1 = result codes disabled (default = 0, see Q command)

bit 3 — 0 = short result codes, 1 = verbose result codes (default = 1, see V command)

bit 4 — not used (always set to 0)

bit 5 — 0 =not used (see comment 1)

bit 6 — not used (always set to 0)

bit 7 — 0 = originate mode, 1 = answer mode (default = 1, see A and D commands)

Range of Values: Value may be 00 to FF hexadecimal; factory-default settings produce a value of AA (see comment 2).

Storable: yes

Comments:

1. In the DCP operating environment of the 7400B Data Module, tone and pulse dialing have no meaning. If the T or P dial modifiers are used, bit 5 is changed accordingly, but the data module performs no other action.
2. Refer to the explanation of hexadecimal values under the **Range of Values** label description at the beginning of this appendix.

See Also: Chapter 4, "Operation and Configuration"; refer to the indicated **AT** commands in Appendix A, "AT Command Set."

Register: S15 — not used

Register: S16

Description: This S-register stores test function status in a bit-mapped format as follows:

bit 0 — local digital loop test; 0 = test disabled, 1 = test in progress (default = 0, see the &T1 and &T2 commands)

bit 1 — not used (always set to 0)

bit 2 — local data loop test; 0 = disabled, 1 = test in progress (default = 0, see &T3 command)

bit 3 — status bit for remote digital loop initiated by remote system; 0 = off, 1 = in progress (default = 0, see &T4 and &T5 commands)

bit 4 — remote digital loop; 0 = disabled, 1 = in progress (default = 0, see &T6 command)

bit 5 — remote digital loop with self-test 0 = disabled, 1 = in progress (default = 0, see &T7 command)

bit 6 — local digital loop with self-test; 0 = disabled, 1 = in progress (default = 0, see &T8 command)

bit 7 — not used (always set to 0)

Range of Values: Value may be 00 to FF hexadecimal; factory-default settings produce a value of 00 (see comment 1).

Storable: no

Comments:

1. Only one of the tests may be in progress at any time. The T0 command terminates any locally initiated test in progress and sets S-register 16 to 00.
2. Refer to the explanation of hexadecimal values under the **Range of Values** label description at the beginning of this appendix.

See Also: Chapter 4, "Operation and Configuration"; refer to the indicated **AT** command in Appendix A, "AT Command Set."

Register: S17 — not used

Register:	S18
Description:	The value in this S-register establishes the duration of diagnostic tests initiated by the &T command.
Range of Values:	Value may be 000 through 255 seconds. The factory-default value is 0.
Storable:	yes
Comments:	Any locally initialized test in progress is automatically terminated when the time specified in S-register 18 has elapsed. If S-register 18 is set to 0, a test initiated by the &T command must be terminated manually. Issuing the &T0 command terminates any locally initiated test immediately, regardless of the value in S-register 18.
See Also:	Chapter 4, "Operation and Configuration"; Appendix A, "AT Command Set."

Register:	S19 — not used

Register:	S20 — not used

Register: S21

Description: This S-register is used to store the status of bit-mapped options as follows:

bit 0 — not used (default = 0, see comment 1)

bit 1 — not used (always set to 0)

bit 2 — not used (default = 0, see comment 1)

bits 3 and 4 — DTR options; value depends on argument of DTR option command (default = 00, see &D command)

bit 5 — DCD options; 0 = always on, 1 = EIA-232-D standard (default = 0, see &C command)

bit 6 — DSR options; 0 = always on, 1 = EIA-232-D standard (default = 0, see &S command)

bit 7 — not used (default = 0 see comment 1)

Range of Values: Value may be 00 to FF hexadecimal; factory-default settings produce a value of 00 (see comment 2).

Storable: yes

Comments:

1. For the 7400B Data Module, bits 0, 2, and 7 will be set by the appropriate command, however, there will be no other effect.
2. Refer to the explanation of hexadecimal values under the **Range of Values** label description at the beginning of this appendix.

See Also: Chapter 4, "Operation and Configuration"; refer to the indicated **AT** command in Appendix A, "AT Command Set."

Register: S22

Description: This S-register is used to store the status of bit-mapped options as follows:

bits 0 and 1 — not used (default = 2, see comment 1)

bits 2 and 3 — not used (default = 1, see comment 1)

bits 4, 5 and 6 — result codes; value depends on argument of result code options command (default = 0, see X command)

bit 7 — not used (default = 0, see comment 1)

Range of Values: Value may be 00 to FF hexadecimal; factory-default settings produce a value of 76 hexadecimal (see comment 2).

Storable: yes

Comments:

1. For the 7400B Data Module, bits 0 through 3 and bit 7 will be set by the appropriate command, however, there will be no other effect.
2. Refer to the explanation of hexadecimal values under the **Range of Values** label description at the beginning of this appendix.

See Also: Chapter 4, "Operation and Configuration"; refer to the indicated **AT** command in Appendix A, "AT Command Set."

Register: S23

Description: This S-register is used to store the status of bit-mapped options as follows:

bit 0 — allow remote loop request from remote system; 0 = disabled, 1 = enabled (default = 1, see &T command)

bits 1, 2, and 3 — local communications speed (see comment 1)

0 = 300 bps
1 = not used
2 = 1200 bps
3 = 2400 bps (factory-set default)
4 = 4800 bps
5 = 9600 bps
6 = 19200 bps
7 = not used

bits 4 and 5 — local parity setting; 0 = even, 1 = space, 2 = odd, and 3 = mark/none (default = 0)

bit 6 and 7 — not used (see comment 2)

Range of Values: Value may be 00 to FF hexadecimal; factory-default settings produce a value of 07 hexadecimal (see comment 3).

Storable: yes

Comments:

1. Hayes compatible modems use only bits 0, 1 and 2 for speeds up to 2400 bps. The 7400B Data Module uses bit 3 to support speeds above 2400 bps.
2. Bits 6 and 7 are set by the appropriate command, but there will be no other effect.
3. Refer to the explanation of hexadecimal values under the **Range of Values** label description at the beginning of this appendix.

See Also: Chapter 4, "Operation and Configuration"; refer to the indicated **AT** command in Appendix A, "AT Command Set."

Register: S24 — not used

Register:	S25
Description:	The value in this S-register determines how long a change of state (OFF to ON or ON to OFF) on the Data Terminal Ready (DTR) lead must persist before it is acknowledged. If the change of state persists for a shorter time than is specified in S-register 25 it is ignored.
Range of Values:	Values may be 000 through 255 hundreds of a second (0.01 sec.). The factory-default setting is 5 (0.05 sec.).
Storable:	yes
Comments:	none
See Also:	Chapter 4, "Operation and Configuration."

Register:	S26 — not used

Register:	S27 — not used

APPENDIX C: APPLICATION NOTES

This appendix provides a list of application notes that describe how to administer specific AT&T PBX systems for using the data module and describes how to configure some popular PC data communications software packages for use with the 7400B Data Module.

PBX APPLICATION NOTES

The following application notes are used for administering AT&T PBX systems to recognize the 7400B Data Module:

AT&T DEFINITY Communications System Generic 1 and System 75 7400B Data Module Application Notes, ordering number 555-207-017

PC APPLICATIONS GUIDE

Application notes for using several popular PC data communications software packages with the 7400B Data Module are also available. This document contains information on several more packages than are contained in this Appendix.

AT&T 7400B Data Module PC Application Guide, ordering number 555-035-023.

PROCOMM PLUS

Procomm Plus is a data communications software package produced by Datastorm Technologies, Inc. The following procedures are based on version 1.1B of the software package.

Configuring the Software

Note: If Procomm Plus is being installed for the first time select Hayes 2400 as the modem type.

1. To begin Procomm Plus, at the DOS prompt type

   `pcplus [Enter]`

2. Press any key to display the Terminal Mode screen.
3. Press [Alt] [s] to display the *SETUP FACILITY* menu.
4. Select *Modem Options.*
5. Check that the options displayed on your screen match those in the menu below. Change any options that do not match.

```
 PROCOMM PLUS SETUP UTILITY                          MODEM OPTIONS

A -  Initialization command . . ATE1V1X4Q0&C1&D2 S7=255 s0=0^M
B -  Dialing command . . . . . . . . ATDT
C -  Dialing command suffix . . ^M
D -  Hangup command . . . . . . . . . . ~~~+++~~~ATH0^M
E -  Auto answer command . . . . . ~~~+++~~~ATS0=1^M
F -  Wait for connection . . . . . 45 seconds
G -  Pause between calls . . . . . 4 seconds
H -  Auto baud detect . . . . . . . . ON
I -  Drop DTR to hangup . . . . . YES
J -  Send init if CD high . . . . YES

Alt-z:  Help | Press the letter of the option to change: | Esc: Exit
```

6. When you are finished, press [Esc] to return the *SETUP UTILITY* menu.
7. Select *Result Messages.*
8. Check that the options displayed on your screen match those in the menu below. Add the messages for options D, E, and F.

```
   PROCOMM PLUS SETUP UTILITY          MODEM RESULT MESSAGES

A - 300 baud connect message . . . . . CONNECT
B - 1200 baud connect message . . . . . CONNECT 1200
C - 2400 baud connect message . . . . . CONNECT 2400
D - 4800 baud connect message . . . . . CONNECT 4800
E - 9600 baud connect message . . . . . CONNECT 9600
F - 19200 baud connect message . . . . CONNECT 19200
G - No connect message 1 . . . . . NO CARRIER
H - No connect message 2 . . . . . BUSY
I - No connect message 3 . . . . . NO DIALTONE
J - No connect message 4 . . . . . ERROR

Alt-z: Help | Press the letter of the option to change: | Esc: Exit
```

9. When you are finished, press [Esc] twice to return to the *MAIN MENU* of the *PROCOMM PLUS SETUP UTILITY.*
10. Select *Save Setup Options.*
11. Press [Esc] to return to the Terminal Mode screen.
12. Press [Alt] [x] to exit from Procomm Plus.

    Note: You must exit and restart Procomm Plus to implement the changes to the software that affect the configuration of the 7400B Data Module.

13. To restart Procomm Plus, at the DOS prompt type

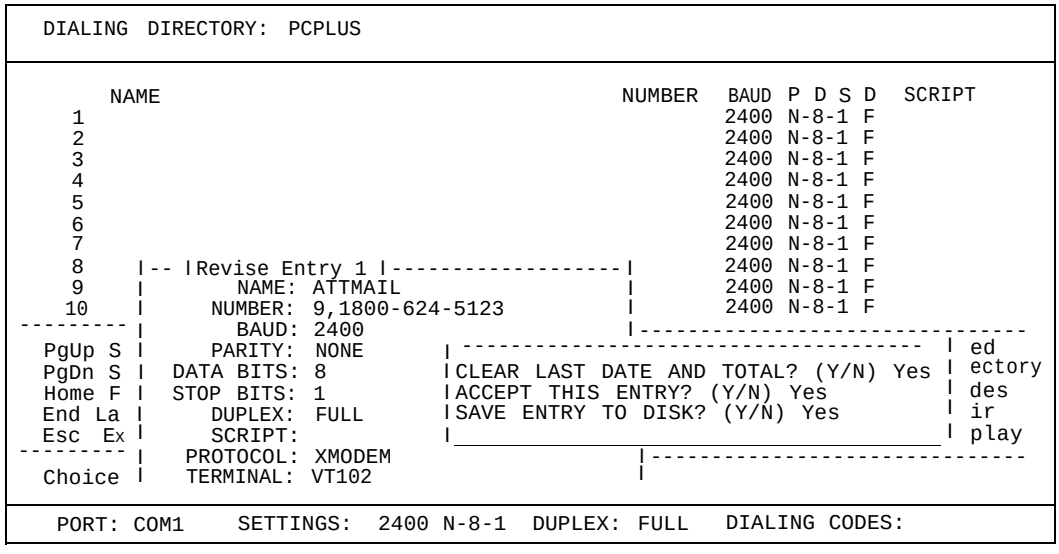
    `pcplus [Enter]`

Placing a Call

This example uses *ATTMAIL* as the system to be called.

1. From the Terminal Mode Screen, press [Alt] [d] to display the *DIALING DIRECTORY* shown below.

   Note: The screen shown includes the overlay windows for revising a selected entry and saving the revisions to the PC hard disk.



2. Use the up and down arrow keys to select an unused entry line.
3. Press *R* to select *Revise Entry*.
4. Following the example in the *Revise Entry* window of the *DIALING DIRECTORY* screen shown, type the required data.
5. Press [Enter] to save the entry to the PC hard disk.
6. Press [Enter] again to dial ATTMAIL.

   Note: Once a connection is established, *CONNECT 2400* flashes on the screen and the Terminal Mode Screen returns automatically. The connect message indicates that the data call was connected at 2400 bps, which is correct for the example.

7. Press [Enter] once more to display the ATTMAIL login prompt.

Disconnecting Call

1. To disconnect (hang-up) a data call, press [Alt] [h].
2. When the call is disconnected, press [Alt] [d] to return to the *DIALING DIRECTORY,* or press [Alt] [x] to exit to DOS.

RELAY GOLD

Relay Gold is a data communications software package produced by Relay Communications, Inc. The following procedures are based on release 3.0 of the software package.

Configuring the Software

1. At the DOS prompt, type

   `install [Enter]`

2. Enter your personal computer ID.
3. Select the letter that corresponds to the *Hayes Smartmodem 2400 or compatible* for port COM1.

   Note: Most of the default configuration values for the Hayes Smartmodem 2400 are appropriate for the 7400B Data Module.

4. Select the default communication port and speed that will be used most frequently.
5. Enter a selection for 3270 emulation board type or leave it at the default of *NONE.*
6. Enter a selection for the video display adapter used in your PC.
7. Press [Enter] to start Relay Gold.

Placing a Call Directly

1. With the *OFF LINE* menu displayed as shown below, press [F1] to select *Call a Host.*

```
RELAY Gold  (c) Copyright 1985, 88 RELAY Communications, Inc. OFFLINE
                          Your PC ID is:
                    F1 = Call a HOST
                    F2 = Answer a Call From A PC
                    F3 = Review the Directory of Computers
                    F4 = Set Personal Computer Options
                    F6 = Edit a File
                    F7 = Print Files
                    F8 = Run a Program
                    F9 = Stop Printer or Script

              Esc = Exit     F10 = HELP      Alt K = More Keys
```

2. Type the telephone number of the system you want to call, and Relay Gold sends the number to the 7400B Data Module to dial the system.

Placing a Call Through the Directory

This example uses *ATTMAIL* as the system to be called.

1. At the *OFF LINE* menu, press [F3] to select the *Review the Directory of Computers* option.
2. At the *name* field, type

   ATTMAIL

3. Press [Tab] to move to the *number* field, and then type

   `9,18006245123`

   Note: The values used in this example are typical, not actual.

4. Press [Tab] to move to the *speed* field, and type

   `2400`

5. Press [Tab] to move to the *type* field, and type

   `vt100`

6. Press [F4] to display the *Review Connect Options for Computer Named* screen, as shown below.

```
          Review Connect Options for Computer Named: ATTMAIL
COMn Port Number? 1     (1-15)          Logon Script Filename?

File Protocol?    RL     (R-,N,K,X,XC)  Function Key Filename?   IBM3101

Parity Code?      I  (I,N,E,O,M,S,7,8)  Translation Filename?

Local Echo?       N (Y, N)              Full or Half Duplex?     F (F, H)

Auto Linefeed?    N (Y,N,X)             Flow Control (XON/XOFF)? N (Y,N,R,X,H)

Stop Bits?        1 (1,2)               Turnaround Character?    11 (00-FF)

Answerback Char?  00 (00-FF)            Script Control Char?     00 (00-FF)

Send LF with CR?  N (Y,N)               Show Control Characters? N (Y,N,D)

Delay After Line? 0 (0-99)              Wrap at End of Line?     N (Y, N)

            RELAY/3270 Model Number: 2  (press F10 for list)


                        Esc = Quit      F10 = HELP
```

7. Make any necessary changes in the appropriate fields.
8. Press [Enter] to save changes to the PC hard disk and display the *Directory of Computers* screen.
9. Use the up and down arrow keys to select the system that you want to call.
10. Press [F1] to call the system located next to the cursor. Relay Gold sends the number to the 7400B Data Module to dial the system.

Disconnecting a Call

1. Press [Esc] to return to the *ONLINE* menu as shown below.

```
RELAY Gold            Your PC ID is:  relay.gold              ONLINE

                    F1 = Return to Terminal Screen
                Alt F1 = Redial or Reanswer the Telephone
                Alt F2 = Hang up and Return to Main Offline Menu
                    F3 = Send Files to Another Computer
                    F4 = Receive Files to Your PC
                    F5 = Set Current Connect Options
                    F6 = Edit a File
                    F7 = Print Files
                    F8 = Run a Program
                    F9 = Stop Printer, File Transfer, or Script
            Esc = Return     F10 = HELP     Alt K = More Keys
```

2. Press [Alt] [F2] to disconnect (hang-up) the data call and return to the *OFFLINE* menu.
3. Press [F1] or [F3] to place another call, or press [Esc] to exit to DOS.

CROSSTALK XVI

Crosstalk XVI is a data communications software package produced by Digital Communications Associates.

Configuring the Software

1. At the DOS prompt, type

   `xtalk [Enter]`

   A title screen is displayed for a few seconds, followed by the *Status Screen* as shown below.

```
                -------  CROSSTALK - XVI Status Screen  -------
                |                                              |
 NAme   CROSSTALK defaults (Hayes 2400)          LOaded  STD
 NUmber                                          CApture Off

--------- Communications  parameters --------    ------- Filter settings -------
|                                          |    |                                 |
 SPeed 2400    PArity None    DUplex  Full       DEbug     Off    LFauto   Off
 DAta  8       S Top 1        EMulate None       TAbex     Off    BLankex  Off
 POrt  1                      MOde    Call       INfilter  On     OUtfiltr On

---------------  Key  settings  -------------    -----SEnd control settings ----
|                                          |    |                                 |
 ATten   Esc                  COmmand ETX (^C)    CWait     None
 SWitch  Home                 BReak   End         LWait     None

------ ------- --------------  Available command files --------------------------
|                                                                               |
 1) AT&T          2) NEWUSER      3) SETUP       4) STD
```

2. Choose the number next to the command file *SETUP* shown on your Status screen or press the number for Setup and [Enter] again to access the command line, then type *LOad SETUP*.
3. To continue the *SETUP* program press [Enter].
4. Select the letter next to *Hayes Smartmodem (all models).*
5. Select the letter next to *Hayes Smartmodem 2400.*
6. Select the COMmunication port to which your data module is connected (typically COM 1).
7. Press [Enter], and then wait a few seconds as Crosstalk sets up the 7400B Data Module.

8. Select the baud rate that you will use most often.*
9. Select the type of video display used in your PC.*
10. Press [Y] to save the new configuration settings to the hard disk of the PC.
11. Press [Enter] to return to the Status Screen.

Placing a Call

To create a command file for a computer system that you want to call for the first time, use the *NEWUSER* script file.

1. Enter the number next to the command file *NEWUSER* shown on your Status screen.
2. Enter the letter next to the service you want to call or enter *O* for "Other Service not listed above." See the sample screen below.

```
        Choose a service to set up:

        A -  AT&T Mail
        B -  CompuServe
        C -  Delphi
        D -  Dow Jones News / Retrieval
        E -  LEXIS/NEXIS
        F -  MCI MAIL
        G -  Newsnet
        H -  Official Airline Guide
        I -  Source
        J -  VU/TEXT
        K -  A system running Remote2 Host or R2LAN Host
        L -  Another PC running Crosstalk or Transporter

        O -  Other service not listed above

        X -  Exit from this program




Please choose a service:_
```

* These options may not be available on earlier versions of Crosstalk.

3. For a listed service:
   a. Enter the telephone number (for example, 5551234 or 9,5551234).
   b. Enter the baud rate (for example, 300, 1200, 2400).
   c. Enter any other parameters required for that specific service (such as login, password, account number).
   d. Enter [Y] when you are asked to make the call.

4. For a service not listed:
   a. Enter the telephone number (for example, 18006245123 or 9,18006245123).
   b. Enter the system name you are calling (for example, ATTMAIL).
   c. Enter the baud rate (for example, 300, 1200, 2400).
   d. Enter [Y] to save this setup to the hard disk on the PC for future use.
   e. Enter a filename for this setup (typically, the system you are calling).
   f. Enter [Y] when asked to make the call.
   g. Press [Enter]; Crosstalk sends the number to the 7400B Data Module to dial the system.

Disconnecting a Call

1. Press [Esc].
2. At the *Command?* line, type

   bye [Enter]

   to disconnect from the other computer.
3. At the *Command?* line, type

   quit [Enter]

   to exit Crosstalk and return to DOS.

APPENDIX D: QUICK-REFERENCE SUMMARIES

This appendix contains quick-reference summaries for the following data:

- AT Command Set
- S-Registers
- Result Codes
- Factory-Default Configuration
- EIA-232-D Pin Assignments
- ASCII Character Set

Command	Description
AT	Command prefix—precedes most commands.
A	Go off hook and remain in command state.
A/	Repeat the last command line.
D	Enter originate mode and dial number that follows.
E0	Inhibit command state echo.
E1	Enable command state echo.
H0	Go on-hook (hang up).
H1	Accepted but causes no action.
I0	Returns decimal number 249 to data terminal.
I1	Returns ROM checksum as two 4-digit hexadecimal numbers.
I2	Returns *OK*.
O	Return to on-line mode.
Q0	Enable display of result codes.
Q1	Disable display of result codes.
S*r*	Set pointer to S-register *r*.
S*r*=*n*	Set S-register *r* to value *n*.
S*r*?	Display value stored in S-register *r*.
V0	Display short form (numeric) result codes.
V1	Display verbose form (text) result codes.
X1	Enables features of result codes 0-4.
X2	Enables features of result codes 0-5, 10-12, 14.
X3	Enables features of result codes 0-6, 10-12, 14.
X4	Enables features of result codes 0-7, 10-12, 14.
Z0	Reset and recall stored configuration profile 0.
Z1	Reset and recall stored configuration profile 1.

(more)

TABLE D-1 AT COMMAND SET

Command	Description
&C0	Maintain DCD circuit in ON state.
&C1	DCD circuit operates according to EIA-232-D specification.
&D0	Ignore DTR signal.
&D1	Return to command mode if ON/OFF transition of DTR is detected; active call is *not* disconnected.
&D2	Return to command mode if ON/OFF transition of DTR is detected; active call is disconnected.
&D3	Perform reset if ON/OFF transition of DTR is detected.
&F	Recall factory-default configuration profile.
&S0	Maintain DSR circuit in on state.
&S1	DSR circuit operates according to EIA-232-D specification.
&T0	Terminate any test in progress.
&T1	Initiate local digital loopback test.
&T2	Same as &T1.
&T3	Initiate local data loopback test.
&T4	Allow remote digital loopback request from remote endpoint.
&T5	Deny remote digital loopback requests from remote endpoint.
&T6	Initiate remote digital loopback test.
&T7	Initiate remote digital loopback test with self-test.
&T8	Initiate local digital loopback test with self-test.
&V	Display active and stored configuration profiles.
&W0	Store active configuration profile in location 0.
&W1	Store active configuration profile in location 1.
&Y0	Recall configuration profile stored in location 0 at start-up.
&Y1	Recall configuration profile stored in location 1 at start-up.
&Z0	Store the following telephone number in location 0.
&Z1	Store the following telephone number in location 1.
&Z2	Store the following telephone number in location 2.
&Z3	Store the following telephone number in location 3.

TABLE D-1 AT COMMAND SET (Contd.)

Register	Description	Range/Unit
S0	Ring to answer on.	000-255 count
S1	Incoming ring count.	000-255 count
S2	Escape sequence character.	000-127 ASCII
S3	Carriage return character.	000-127 ASCII
S4	Line feed character.	000-127 ASCII
S5	Back space character.	000-032, 127 ASCII
S6	Not used.	—
S7	Wait time for call completion.	001-055 sec.
S8	Not used.	—
S9	Not used.	—
S10	Delay between lost line signal and hang up.	000-255 0.1 sec.
S11	Not used.	—
S12	Escape sequence guard time.	000-255 0.02 sec.
S13	Not used.	—
S14	Bit mapped options (see Appendix B).	00-FF hex.
S15	Not used.	—
S16	Test function status (see Appendix B).	00-FF hex.
S17	Not used.	—
S18	Diagnostic test duration timer.	000-255 sec.
S19	Not used.	—
S20	Not used.	—
S21	Bit mapped options (see Appendix B).	00-FF hex.
S22	Bit mapped options (see Appendix B).	00-FF hex.
S23	Bit mapped options (see Appendix B).	00-FF hex.
S24	Not used.	—
S25	DTR change detect time.	000-255 0.01 sec.
S26	Not used.	—
S27	Not used.	—

TABLE D-2 S-REGISTER SUMMARY

Verbose Form	Numeric	Description
OK	0	Command accepted
CONNECTED	1	Connection made at 300 bps **Note:** If command `X1` is in effect, CONNECT means connection made at whatever speed both ends of the call agreed upon.
RING	2	Ring signal detected
NO CARRIER	3	Carrier signal not detected or lost
ERROR	4	Error in command line
CONNECT 1200	5	Connection made at 1200 bps
NO DIALTONE	6	No dial tone detected
BUSY	7	Busy signal detected
CONNECT 2400	10	Connection made at 2400 bps
CONNECT 4800	11	Connection made at 4800 bps
CONNECT 9600	12	Connection made at 9600 bps
CONNECT 19200	14	Connection made at 19200 bps

TABLE D-3 RESULT CODES

Parameter	Value	AT Command
Command state echo	enabled	E1
Communication mode	asynchronous	&M0/&Q0
Default user profile	profile 0	&Y0
DCD circuit option	always on	&C0
DSR circuit option	always on	&S0
DTR circuit option	DTR ignored	&D0
Not used by 7400B Data Module	—	&G0
Not used by 7400B Data Module	—	Y0
Not used by 7400B Data Module	—	&P0
RDL request	granted	&T4
Result codes	enabled	Q0
Result code format	text	V1
Result code subset	0-7,10-12,14	X4
Not used by 7400B Data Module	—	&R0
Not used by 7400B Data Module	—	M1
Not used by 7400B Data Module	—	L2
Not used by 7400B Data Module	—	B1
Not used by 7400B Data Module	—	&J0

(more)

TABLE D-4 FACTORY-DEFAULT CONFIGURATION

Parameter	Value	S-Register
Auto-answer on ring	disabled	S0=0
Backspace character	ASCII 8	S5=8
Carriage return character	ASCII 13	S3=13
Not used by 7400B Data Module	—	S9=6
Not used by 7400B Data Module	—	S8=2
Not used by 7400B Data Module	—	S11=95
DTR detection	0.05 sec.	S25=5
Escape sequence character	ASCII 43	S2=43
Escape sequence guard time	1 sec.	S12=50
Hang up after lost carrier	1.4 sec.	S10=14
Line feed character	ASCII 10	S4=10
Ring count	0 rings	S 18=0
Not used by 7400B Data Module	—	S26=1
Test timer duration	0 sec.	S18=0
Wait for call completion	30 sec.	S7=30
Not used by 7400B Data Module	—	S6=2

TABLE D-4 FACTORY-DEFAULT CONFIGURATION (Contd.)

Pin	Circuit	Direction	Function
1	—	—	not used
2	BA (SD)	to 7400B	transmit data
3	BB (RD)	from 7400B	receive data
4	CA (RTS)	to 7400B	request to send
5	CB (CTS)	from 7400B	clear to send
6	CC (DSR)	from 7400B	data set ready
7	AB (SG)	common	signal ground
8	CF (RLSD)	from 7400B	receive line signal detector
9	—	—	not used
10	—	—	not used
11	—	—	not used
12*	CI	from 7400B	data signal rate select
13	—	—	not used
14	—	—	not used
15	—	—	not used
16	—	—	not used
17	—	—	not used
18	—	—	not used
19	—	—	not used
20	CD (DTR)	to 7400B	data terminal equipment ready
21	—	—	not used
22	CE (RI)	from 7400B	ring indicator
23*	CI	from 7400B	data signal rate select
24	—	—	not used
25	—	—	not used

*CI on pin 12 is Bell 212A, on pin 23 is EIA-232-D

TABLE D-5 EIA-232-D PIN ASSIGNMENTS

ASCII VALUE	CONTROL CHARACTER	KEY	ASCII VALUE	CONTROL CHARACTER	KEY
000	NUL	Ctrl-@	032		spacebar
001	SOH	Ctrl-A	033		!
002	STX	Ctrl-B	034		"
003	ETX	Ctrl-C	035		#
004	EOT	Ctrl-D	036		$
005	ENQ	Ctrl-E	037		%
006	ACK	Ctrl-F	038		&
007	BEL	Ctrl-G	039		'
008	BS	Ctrl-H	040		(
009	HT	Ctrl-I	041		)
010	LF	Ctrl-J	042		*
011	VT	Ctrl-K	043		+
012	FF	Ctrl-L	044		,
013	CR	Ctrl-M	045		-
014	SO	Ctrl-N	046		.
015	SI	Ctrl-O	047		/
016	DLE	Ctrl-P	048		0
017	DC1	Ctrl-Q	049		1
018	DC2	Ctrl-R	050		2
019	DC3	Ctrl-S	051		3
020	DC4	Ctrl-T	052		4
021	NAK	Ctrl-U	053		5
022	SYN	Ctrl-V	054		6
023	ETB	Ctrl-W	055		7
024	CAN	Ctrl-X	056		8
025	EM	Ctrl-Y	057		9
026	SUB	Ctrl-Z	058		:
027	ESC	Ctrl-[	059		;
028	FS	Ctrl-\	060		<
029	GS	Ctrl-]	061		=
030	RS	Ctrl-^	062		>
031	US	Ctrl-_	063		?

(more)

TABLE D-6 ASCII CHARACTER SET

ASCII VALUE	CONTROL CHARACTER	KEY	ASCII VALUE	CONTROL CHARACTER	KEY
064		@	096		‘
065		A	097		a
066		B	098		b
067		C	099		c
068		D	100		d
069		E	101		e
070		F	102		f
071		G	103		g
072		H	104		h
073		I	105		i
074		J	106		j
075		K	107		k
076		L	108		l
077		M	109		m
078		N	110		n
079		O	111		o
080		P	112		p
081		Q	113		q
082		R	114		r
083		S	115		s
084		T	116		t
085		U	117		u
086		V	118		v
087		W	119		w
088		X	120		x
089		Y	121		y
090		Z	122		z
091		[	123		{
092		\	124		l
093		]	125		}
094		^	126		~
095		_	127	DEL	Delete

TABLE D-6 ASCII CHARACTER SET (Contd.)

GLOSSARY

ANSI display protocol. A standard set of escape sequences, established by ANSI (the American National Standards Institute), used by many display terminal devices to transmit or receive display control functions, such as cursor movement and color or graphics configuration parameters.

Asynchronous data communications. A method of communicating data in which each "character" (a 7 or 8 bit data word) is sent or received separately at a selectable data transfer rate, and is framed by extra bits preceding and following the character. Various error-checking methods use the total bit-count to determine whether the character received at one end of the data path is the same as the one sent at the other end. Also called asynchronous mode, this method, as opposed to synchronous mode, does not use a clock signal to meter data. (Since the 7400B Data Module operates only in asynchronous mode, synchronous mode is not defined in this glossary.) *See also* data options.

AT command set. A de facto industry-standard set of commands used for configuration and operation of DCE devices or modems. The AT (Attention) command set originated with Hayes Microcomputer Products, Inc. The AT&T 7400B Data Module uses a subset of the full AT command set.

Command files. Files created for or by data communications software running on a PC that can be used to execute a sequence of commands to complete a task, such as performing an automatic log in to a specific remote device. Also called script files.

Command line. A string of one or more valid and compatible AT commands typed on one line with any applicable arguments. Most command lines begin with the *AT* prefix and end with a carriage return (issued by pressing [Enter]).

Command mode. An operating mode in which the 7400B Data Module looks at all characters coming from its associated terminal device and attempts to interpret them as commands. *See also* on-line mode.

Communications parameters. *See* data options.

Configuration profiles. *See* option profiles.

Data Communications Equipment. (DCE, also Data Circuit-terminating Equipment) The equipment that provides the functions required to establish, maintain and terminate a data communications connection. The DCE also provides any required signal conversion for communication between the data terminal equipment (DTE) and the telephone line or data circuit.

Data metering. A selectable feature of the 7400B Data Module that allows the device and its associated terminal to operate at a higher speed than the remote system to which it is connected.

Data mode. *See* on-line mode.

Data options. For asynchronous data communications, these parameters include data transfer speed (expressed in bits/second or bps, and sometimes called baud rate), parity, data word size (or data bits), and stop bits. Generally, these parameters must be set to match at both ends of the communication line. Except when the data metering option is enabled, the 7400B data module attempts to adjust to match the speed of the remote device. Also called communications parameters. *See also* asynchronous data communications *and* data metering.

Data Terminal Equipment. (DTE) A device that sends and/or receives data over a communication line via a DCE. Examples of DTE devices are a display terminal, a PC running appropriate data communications software, or a printer or plotter.

DCE. *See* Data Communications Equipment.

DCP. *See* Digital Communications Protocol.

Dial modifier. Any character that may be inserted in a command line following the *D* (dial) command. *See* D command *in* Appendix A, "AT Command Set," *for a description of valid dial modifiers.*

Digital Communications Protocol (DCP). A proprietary digital protocol used by AT&T PBX equipment to communicate with AT&T voice terminals and data modules. DCP supports simultaneous voice and data services over the same line.

DTE. *See* Data Terminal Equipment.

D8W. A standard modular telephone cord used to connect DCP devices to a PBX wall jack.

EIA-232-D. A US industry standard interface for digital data communications equipment, established by EIA (the Electronics Institute of America). The standard defines the cabling, connectors, and lead signal assignments used in the interface. Formerly referred to as the EIA Recommended Standard RS-232-C.

Hayes compatible. Of a DCE device, using the *AT command set* and performing in close compliance with the configuration and operating standards established by Hayes Microcomputer Products, Inc. *See also* AT command set.

Idle mode. An operational mode in which the 7400B Data Module is onhook waiting either for an incoming call or to originate a call.

Linked mode. A DIP-switch selected operating mode in which the 7400B Data Module supports both data and voice services.

On-line mode. An operating mode in which the 7400B Data Module transmits all characters coming from its associated terminal device and does not attempt to interpret them as commands. Also called data mode. *See also* command mode.

Option profiles. *See* configuration profiles.

Script files. *See* command files.

Standalone mode. A DIP-switch selected operating mode in which the 7400B Data Module supports only data services.

Terminal mode. Of data communications software, the operating mode of the software in which your PC is emulating a data terminal. In this operating mode, you may be communicating with either the data module or a remote device, such as a host computer. *See also* standalone mode *and* on-line mode.

INDEX

R

S

T

V

AT&T

AT&T Bell Laboratories

subject: **Errata Sheets for 7400B Data Module User's Guide**

date: **December 11, 1990**

from: **Sandra Talarico**
MT XGPK20000
2E-401 x957-6072

The attached five errata sheets contain modifications to the *7400B Data Module User's Guide,* order number 555-020-707 Issue 1 November 1989.

Please disregard the earlier memo containing errata sheets for the same document. The sheets attached to this memo replace any and all errata sheets.

The attached errata sheets contain:

- U.L. Safety Instructions. These instructions are very important and must be read carefully and immediately.
- Replacement of page 1-4. This page illustrates the correct version of the data module's rear panel.

Please clip these replacement pages to your original copy of the document.

Sandra Talarico

Sandra Talarico

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, including the following:

- Read and understand all instructions.
- Follow all warnings and instructions marked on the product.
- This product can be hazardous if immersed in water. To avoid the possibility of electric shock, do not use when you are wet. If you accidentally drop it into water, do not retrieve it until you have first unplugged the line cord from the modular wall jack. Do not plug the telephone back in until it has dried thoroughly.
- Avoid using the telephone (other than a cordless type) during electrical storms in your immediate area. There is a remote risk of electric shock from the lightning. Urgent calls should be brief. Even though your telephone company may be using protective measures to limit electrical surges from entering your building, absolute protection from lightning is impossible.
- If you suspect a gas leak, report it immediately, but use a telephone away from the area in question. The telephone's electrical contacts could generate a tiny spark. While unlikely, it is possible that this spark could ignite heavy concentrations of gas.
- Never push objects of any kind into this telephone through housing slots as they may touch hazardous voltage points or short out parts that could result in a risk of electric shock. Never spill liquid of any kind on the telephone.
- To reduce the risk of electric shock, do not disassemble this product. There are no user serviceable parts inside. Opening or removing covers may expose you to hazardous voltages. Incorrect reassembly can cause electric shock when the telephone is subsequently used.
- Disconnect the cords on this product before cleaning. Do not use liquid cleaners or aerosol cleaner. Use a damp cloth for cleaning.
- Slots and openings in the housing and the back or bottom are provided for ventilation to protect it from overheating, these openings must not be blocked or covered. The opening should never be blocked by placing the product on a sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
- This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply being used, contact a qualified service person.

- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by people walking on it.
- Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
- Disconnect the cords on this product and refer servicing to qualified service personnel under the following conditions:

  A. When the power supply cord or plug is damaged or frayed.

  B. If liquid has been spilled into the product.

  C. If the product has been exposed to rain or water.

  D. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

  E. If the product has been dropped or the housing has been damaged.

  F. If the product exhibits a distinct change in performance.

⚠ SAVE THESE INSTRUCTIONS

When you see this symbol on the product refer to the instruction booklet packed with the product for more information before proceeding.

IMPORTANT INSTALLATION SAFETY INSTRUCTIONS

WARNING

When this product is located in a separate building from the telephone communications system, a line current protector MUST be installed at the entry/exit points of ALL buildings through which the line passes.

The following are the ONLY acceptable devices for use in this application:

- AT&T 4-type procetors
- ITW LINX™ LP-type protectors

Never install telephone wiring during a lightning storm.

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

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

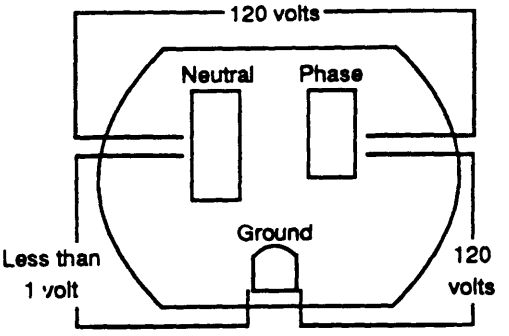
Use caution when installing or modifying telephone lines.

WARNING

RISK OF ELECTRIC SHOCK
EQUIPMENT MUST BE PROPERLY GROUNDED

Your AT&T equipment requires a properly grounded 3-prong AC power receptacle for safe operation. Do not cut or remove the third (ground) prong from the AT&T power cord. Do not use 2 wire extension cords or adapters to defeat the safety features of your equipment. If you have a 2-prong receptacle, it is very important to have it replaced with a 3-prong receptacle, installed by a qualified electrician.

Before equipment installation, a qualified technician should use an outlet tester or voltmeter to check the AC receptacle for the presence of ground as shown in the figure below.



1. The voltage measured from Phase to Neutral should be 110 to 125 VAC.
2. The voltage measured from Phase to Ground should be 110 to 125 VAC.
3. The voltage measured from Neutral to Ground should be less than 1 VAC.

If the receptacle is not a properly grounded 3-prong type, stop the installation. Installation can only be completed after a qualified electrician corrects the problem.