Strata® DK

Digital Business Telephone Systems

Personal Computer/Data Interface User Guide

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Introduction

This guide provides instructions for the use of the Strata DK Personal Computer (RCPI-DI) and Data Interface Unit (PDIU-DS) features for the Strata DK systems. These systems include:

- DK14
- DK16e/16
- DK40i/DK40
- DK424/DK280 (Release 3.0 or higher)

All the features in this guide have practical applications for diverse office environments. Instructions are provided on how to use the RCPIs and DIUs to connect Personal Computers (PCs) together to exchange files, to share a printer or a modem, to access a mainframe, and more.

This user guide is not needed to use a TAPI software application. See the user guide for the software application program being used.

Organization

This user guide is divided as follows:

- **Chapter 1 – The Grand Tour** provides an overview of DIU hardware: their function, controls, and applicable indicators.
- **Chapter 2 – User Instructions** provides descriptions and instructions for each type of voice and data transmission made from the DIUs.
- **Chapter 3 – Mode Definitions** contains information on various advanced communication modes.

Conventions

Note Elaborates specific items or references other information.

Important! *Calls attention to important instructions or information.*

Letters in [brackets] represent buttons which have Directory Numbers on them. For example:

[PDN]	represents a Primary Directory Number (also known as an Extension Number for your telephone).
[SDN]	represents a Secondary appearance of a [PDN]. A [PDN] which appears on another telephone is considered an [SDN].
[PhDN]	represents a Phantom Directory Number button (an additional Directory Number).
[DN]	represents a Directory Number button (also known as an Extension or Intercom Number). Whenever [DN] is used in this guide, it means the user can use any [PDN], [SDN], or [PhDN].
[DSS]	represents the directory number of another station which is accessed from a DADM or DSS Console when this button is pressed.
Extra bold	represents buttons on a telephone.
~	means “through”
+	is used for multiple key entries.
➤	denotes the step in a one-step procedure.
`ATDDYYY` `CONNECTXXXX`	represents text that appears on a PC or terminal screen.

Note Throughout this guide, RPCI-DI-equipped digital telephones that are connected to ASCII terminals or PCs are referred to as data telephones.

Mnemonics

Mnemonics appearing in this user guide are defined below:

BPS	Bits Per Second
DIU	Data Interface Unit
LCD	Liquid Crystal Display
LED	Light Emitting Diode
PC	Personal Computer
DPIU-DS	Stand-alone Data Interface Unit
RPCI-DI	Personal Computer/Data Interface Unit

Related Documents

The following user guides are available for Strata DK telephones:

- *Strata DK Digital Telephone User Guide*, which includes instructions for LCD Telephones, Add-on Modules, and Digital Direct Station Selection (DDSS) Consoles.
- *Strata DK Installation and Maintenance Manual* provides installation instructions and requirements for RPCI-DIs and Data Interface Units connecting to a Strata DK system. See the chapter on Peripherals.
- *Strata DK Programming Manual* provides programming instructions and record sheets for RPCI-DIs and Data Interface Units.

The Grand Tour 1

Toshiba provides two interface units that integrate the Strata DK telephone system with PCs, printers, and modems for a variety of applications.

The Stand-alone Data Interface Units (PDIU-DS) normally connects to printers and modems so that they can be shared by all users via data calls through the DK telephone system.

The telephone PC Interface Unit (RPCI-DI) is built into the base of the digital telephone and connects to the COM port of a PC. There are two operating modes:

- Telephone Application Program Interface (TAPI) mode
- Data communication mode

The PC TAPI software program automatically controls the operation mode (TAPI or Data Communications) of the RPCI.

A 2B+D ISDN-type digital link in conjunction with the RCPIs and DIUs enable digital telephones to participate in simultaneous voice and data calls. Voice and data calls are transmitted over the same digital telephone wire pair. This offers you several calling options. For example, a digital telephone user can place a voice call while in the middle of a data call to a printer or host computer, etc.

This chapter lists all the equipment required to originate or receive a data call. In addition, it explains the function and configuration of the Data Interface Units (DIUs), both the RPCI-DI and PDIU-DS types.

Hardware Requirements

The following hardware is required to originate a data call:

- A RPCI-DI (replaces digital telephone base)
- A PC or ASCII Terminal
- One of the following Toshiba 2000- or 1000-Series Digital Telephones:
  - DKT2010-H (10-button model)
  - DKT2010-SD (10-button model with a LCD and speakerphone)
  - DKT2020-S (20-button model)
  - DKT2020-SD (10-button model equipped with LCD and speakerphone)
  - DKT1010-H (10-button model)
  - DKT1020-SD (10-button model equipped with LCD and speakerphone)

A data call can be made to a device connected to a DIU (RPCI-DI or PDIU-DS), such as mainframe computers, printers, modems, PCs, and ASCII terminals.

Integrated Data Interface Unit (RPCI-DI)

A telephone within the Strata DK system that participates in a data call must be a Toshiba digital telephone equipped with an integrated DIU (RPCI-DI). A label reading “MODEL RPCI-DI” on the bottom of the telephone and an RS-232 connector on the back of the telephone both indicate that a telephone is equipped with a RPCI-DI. See Figure 1.

Note Throughout this guide, RPCI-DI-equipped digital telephones that are connected to ASCII terminals or PCs are referred to as data telephones.

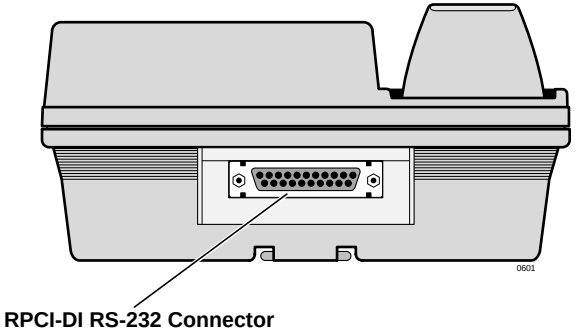

Figure 1 Data Telephone (Integrated DIU) Connector

RPCI-DI Buttons and LEDs

In system programming, the data telephone can be assigned data feature buttons shown below.

Table 1 Data Feature Buttons

Button	Description
Data Call	Enables a connection between the digital telephone's RPCI-DI to another DIU in the system when manually dialing from the telephone. When **Data Call** is pressed on an idle data telephone, the system sends intercom dial tone to the telephone to prompt dialing. **Data Call** also can be used to switch data telephones and CO lines from voice to data on external calls. The Data Call LED lights when you receive a data call from another data telephone or when you make a call from your data telephone, PC, or ASCII terminal. The Data Call LED is always red when ON.
Data Release	Terminates data calls. The Data Release LED never illuminates.
Modem	Reserves a system modem for 60 seconds. If a modem is not accessed within this time limit, press this button again to reserve for another 60 seconds. A flashing Modem LED indicates that a modem is currently reserved for your telephone; a continuously lit LED indicates that you have accessed a modem or that all modems are busy. The Modem LED is always red when ON or flashing.

RPCI-DI Data Connections

See the *Strata DK I&M Manual* for detailed installation instructions.

If a data terminal is connected to a data telephone, the terminal must be an ASCII type with a standard keyboard and a display screen or printer display.

If a PC is connected to a data telephone, the PC must be running at least one of the following types of programs: word processor, desk organizer dialer, or communications software. Also, the PC must be active (on-line) on its COM port connected to the data telephone's RPCI-DI.

Note It is not possible to establish data call connections from your PC DOS prompt.

The data telephone is connected to the PC serial communications port (COMX, where X = 1, 2, 3, or 4) or terminal with an RS-232 cable and connector. It is connected to the Strata DK system like any other digital telephone with a modular cord.

Stand-alone Data Interface Unit (PDIU-DS) Connections

Data devices, such as printers, modems, mainframe computers, etc., must be connected to a PDIU-DS with an RS-232 cable and connector. An RS-232 connector is below (see Figure 2).

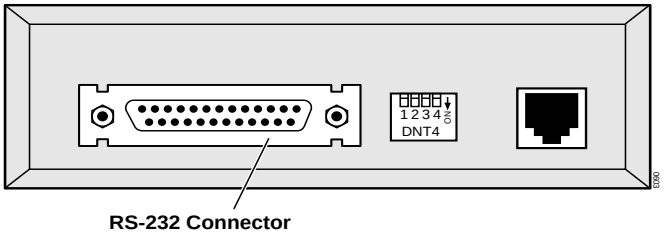

Figure 2 Stand-alone DIU Connector

See the *Strata DK I&M Manual* for detailed installation instructions.

Note

- The PDIU-DS must be connected to the Strata DK system with a modular cord. Similar to a regular station, the PDIU-DS is assigned a station number.
- Toshiba recommends connecting the line sides of the modems to standard telephone ports to ensure access to the complete set of modem pooling features. Connecting the modems to a dedicated CO line may not allow access to the whole set.

PDIU-DS LEDs

The PDIU-DS has three green LEDS on its front panel which indicate transmission status (See below).

Table 2 PDIU-DS LED Status

LED	Description
Power LED	When the PDIU-DS is connected to the Strata DK system with a modular cord, the Power LED is ON (lit).
Ready LED	The Ready LED is ON (lit) when the PDIU-DS is connected to a device that is turned ON and ready to exchange data.
Connect LED	When a data call is established (ringing or answered), the Connect LED is ON (lit).

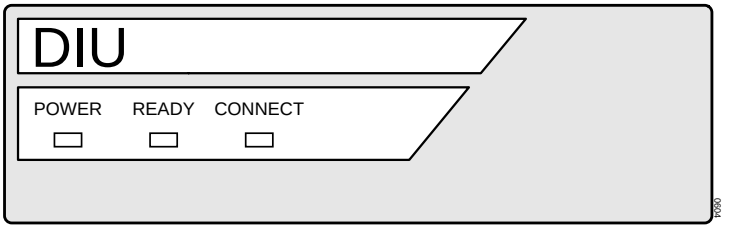

Figure 3 PDIU-DS LEDs

Communication Parameters

Before a data connection is established, the communication parameters—data speed (baud rate or bps), parity, data bits, stop bits—of the terminal or PC must be the same as the data device that is calling or being called. The PC communication parameters are set with MS-DOS MODE commands.

➤ **To set the PC Communication parameters**

➤ Enter MODE LPTx:=COMx (x = 1, 2, 3, or 4) ...or MODE COMx: baud rate, parity, data bits, stop bits	Use this parameter, if you connect to your printer via an RPCI to DIU-DS data call connection. **Notes** • Toshiba recommends entering these MODE command lines into the DOS AUTOEXEC.BAT file, in most cases. • The COM port number and communication parameters must be set to allow proper operation of data calls in most communications, desktop, and word processor software.

Communication parameter options are shown in Table 3.

Table 3 Communication Parameter Options

Option	Legal Values	Meaning
Baud Rate	110 150 300 600 1200 (default) 2400 4800 9600	Transmission speed in bits per second
Parity	N (default) O E	No parity Odd parity Even parity
Data Bits	7 8 (default)	
Stop Bits	1 (default)	

Features 2

This chapter explains how to use your data telephone to connect to other data devices, such as an internal printer, modem pool, or mainframe computer. It also explains how to originate and answer simultaneous voice and data transmissions from your telephone or another telephone.

Data Call to Internal Printer or Other Data Device

If using a PC, data calls to printers can be connected anytime while running a word processor, spread sheet, or database program. This procedure can also be used to make data calls to other internal data devices, such as modems or mainframe computers, that are connected to stand-alone DIUs. A communications software program is generally required for these types of internal data calls.

Before making your call, verify that the communication parameters of your PC or terminal match those of the printer or data device you are calling.

➤ **To call a data device**

1. Press **Data Call** on your data telephone.	The Data Call, Spkr, and Mic (see note) LEDs turn ON (red); and the [DN] LED turns ON (green). The data telephone receives internal dial tone. **Note** Depending on system programming, the Mic LED may or may not turn ON.
2. Enter the station number of the DIU connected to the printer.	The Spkr, Mic, and [DN] LEDs turn OFF; the Data Call LED remains ON (red). If busy, press **Data Release** and try again; if busy tone is not received, the call is connected.
3. Print the data.	The data can be printed using your terminal or PC software program.

➤ **To terminate the call**

➤ Press **Data Release** on your data telephone.	The Data Call LED turns OFF and the call is terminated.

Data Call to Another Internal Data Telephone's PC or Terminal

PCs involved in this call must be running a communications software program.

Before making this call, verify that the communication parameters of your PC or terminal match those of the PC or terminal that you are calling.

The following instructions work with typical communications software programs. Higher-level software may integrate these low-level communications dialing commands to provide more automated operation.

➤ To verify communications from your PC or terminal

➤ Type **AT** and then press **Enter** on your PC or terminal. Type AT commands as capital letters (use caps lock).	AT commands appear on your PC or terminal as you type them. Wait for this display: **AT** **OK** The above display verifies that communications exist between your PC or terminal and your data telephone. The Data Call LED turns ON (red) after you press **Enter**.

➤ To call from your PC or terminal

1. Type **ATDD**, the [PDN] of the other data telephone, and then press **Enter**. If "BUSY" displays on your screen, the call automatically terminates. You can then try again.	Wait for this display: **ATDDYYY** **CONNECTXXXX** This display indicates that a connection has been established between the called and calling terminals and/or PCs. XXXX = data transmission speed YYY = called data telephone number The [DN] of a data telephone's RPCI-DI is the same as its voice [PDN]. Example: If the other data telephone's [PDN] is 209, type **ATDD209** and press **Enter**. (**ATDD** is the DIU command for data call dialing, and **209** represents the [PDN] of the other data telephone).
2. Exchange data.	The data can be exchanged using your terminal or PC software program as required.

➤ **To call from your data telephone**

1. Press **Data Call**.	The Data Call, Spkr, and Mic (see note) LEDs turn ON (red); and the [PDN] LED turns ON (green). The data telephone receives an internal dial tone. **Note** Depending on system programming, the Mic LED may or may not turn ON.
2. Dial the [PDN] of the other data telephone.	The Spkr, Mic, and [PDN] LEDs turn off. The Data Call LED remains ON (red). Wait for this display: **CONNECTXXXX**
3. Press **Data Release** again, if the called number is busy.	The above message appears at both the sending and destination locations, indicating that a connection has been established. XXXX = data transmission speed.
4. Exchange the data.	The data can be exchanged using your terminal or PC software program, as required. Either the calling or called user can terminate the data call using the following procedures.

➤ **To terminate the call from your PC or terminal**

1. Hold the **Shift** key down and type **+++**.	Wait for this display: **+++** **OK** The above display indicates that the RPCI-DI connected to your terminal or PC is now in the command mode and can accept AT commands. The following screen displays on the other PC or terminal screen. **+++** The Data Call LED on both data telephones turns OFF.
2. Type **ATH**, and then press **Enter**.	Wait for this display: **ATH** **OK** This display indicates that the call is terminated.

➤ **To terminate the call from either data telephone**

➤ Press **Data Release**.	The Data Call LED on both data telephones turns OFF. Wait for the following screen to display on both PCs and/or terminal screens. **NO CARRIER** This display indicates that the call is terminated.

Simultaneous Voice and Data Calls

Voice Call While On Data Call

You can make a simultaneous voice and data call between the same or different telephones.

While on a data call, a data telephone can originate, answer, and disconnect any type of voice call without interrupting the data call. For example, Phone 1 can be on a voice call with Phone 2, and during the call, Phone 1 can also send data to Phone 2.

➤ **To make a voice call while on a data call**

➤ Make a voice call in the normal manner, while on a data call.

See "Data Call to Internal Printer or Other Data Device" on Page 9 or "Data Call to Another Internal Data Telephone's PC or Terminal"on Page 10 for additional information on making data calls.

Data Call While On a Voice Call

You can make a simultaneous voice and data transmission between the same data telephones.

Without interrupting their voice conversation, two data telephones can establish a data call between each other.

➤ **To make a data call while on a voice call**

1. Press **Data Call** while on a voice call with another data telephone.	The Data Call LED turns ON (red). A data path is automatically established between the PCs and/or terminals connected to the two data telephones. The voice call continues uninterrupted.
2. Exchange the data.	The data can be exchanges using your terminal or PC software program as required. While data is being exchanged, the voice call continues uninterrupted.

Data Call to Data Telephone While on a Voice Call to Another Telephone

You can make a simultaneous voice and data transmission to different data telephones.

While established on an internal or external voice call, a data telephone can make a data call to another internal or external data telephone or data device. For example, Phone 1 can be on a voice call to Phone 2. At the same time, Phone 1 can also be transmitting data to Phone 3.

➤ **To make a data call while on a voice call**

1. Press **Hold** on your data telephone, while on a voice call.	The voice call is placed on hold.
2. Make a data call to a different data telephone or data device.	For more information, see "Data Call to Internal Printer or Other Data Device"on Page 9 or "Data Call to Another Internal Data Telephone's PC or Terminal"on Page 10.
3. Exchange the data.	The data can be exchanged using your terminal or PC software program as required.

➤ **To return to the voice call**

➤ Press the held CO **Line** or [DN] button on your data telephone.	The voice call is re-established and the data call continues uninterrupted.

➤ **To terminate voice or data calls**

➤ Press **Data Release** on your data telephone	The data call terminates; the voice call, if not terminated earlier, continues.
...or **Spkr** on your data telephone or hang up.	The voice call terminates; the data call, if not terminated earlier, continues.

Outgoing Data Call

Dialing Through the System Modem Pool

A PC involved in this type of call must be running a communications software program. Before making this call, verify that the communication parameters of your PC or terminal match those of the device that your are calling.

To place the RPCI-DI into the command mode while keeping the modem in the communications mode, Toshiba recommends that the RPCI-DI escape sequence be changed from **+++** to some other sequence before beginning. For example: Using the ATS2 command, send **ATS2=36** to the RPCI-DI to change its escape sequence to $$$. Store these commands in the PC communication software modem initialization sequence - this sets the RPCI-DI escape sequence each time the communication software is run.

➤ **To verify communications from your PC or terminal**

➤ Type **AT**, and press **Enter** on your PC or terminal.	Wait for the following to display on your PC or terminal screen. **AT** **OK** This display verifies that communications exist between your PC or terminal and your data telephone. **Note** AT commands must be typed as capital letters (use caps lock), and they appear on your PC or terminal screen as you type them.

➤ To dial an internal modem from your PC or terminal

➤ Type **ATDD**, the [PDN] of the DIU connected to the system modem (pool), and then press **Enter**.	The Data Call and Modem LEDs turn ON (red) after you press **Enter**. Wait for this display: **ATDDYYY** **CONNECTXXXX** The above display indicates that a connection has been established between your PC or terminal and the PDIU-DS connected to the system modem (pool). XXXX = data transmission speed YYY = [PDN] of the PDIU-DS connected to the system modem (pool) The system DIUs at this time are transparent and in the communication mode, ready to pass data. The system modem is in the command mode, ready to receive AT dialing commands. Entry Example: If the station number of the DIU connected to the system modem is 208, type **ATDD208** and press **Enter**. (ATDD is the DIU command for data call dialing, and 208 is the station number of the DIU connected to the system modem).

➤ **To issue commands to the modem**

1. Type **ATDT** (a system CO line access code, the telephone number of the external modem, or data service) from your PC or terminal keyboard, and then press **Enter**.	Wait 5~30 seconds for the following screen to display on your PC or terminal screen. **ATDTYYYYYYYYYYYYYY** **CONNECTXXXX** This display indicates that a connection has been established between the Strata DK system modem and the external modem. XXXX = data transmission speed YYYYYYYYYYYYYY = external telephone number (CO line access code, see Table 4 on Page 28 CO line access codes) The commands issued and the telephone number dialed in this step are sent to the system modem transparently through the system DIUs. **Note** If the modem seizes a CO line that appears on your data telephone, the CO line LED turns ON and is red. Entry Example: If the telephone number is (714) 837-4408 and the call is made on CO line 1, type **ATDT80117148374408** and press **Enter**. (**ATDT** is the modem dial command; 801 is the access code for system CO line Group 1; and 7148374408 is the telephone number.)
2. Exchange the data.	The data can be exchanges by using your terminal or PC software program.

Terminating a Call to an Internal Modem from a Terminal or PC

This sequence should only be used if your modem is connected to a system station port. This sequence should not be used if your modem is connected directly to a CO line.

1. Hold down the **Shift** key and type **+++**.	The following screen displays on your PC or terminal screen. **+++** **OK** The Data and Modem LEDs turn OFF.
2. Type **ATH**, and then press **Enter**.	The following screen displays on your PC or terminal screen. **ATH** **OK** This display indicates that the call is terminated.

➤ **To terminate the call from your data telephone**

➤ Press **Data Release**.	If your modem is connected to a system station port directly to an outside line. The Data Call and Modem LEDs turn OFF. The following screen displays on your PC or terminal screen. **NO CARRIER** This display indicates that the call is terminated.

Incoming Data Call (External)

An external data call (from the outside) can be made to the Strata DK system. Before making the call, verify that the communication parameters of the external PC or terminal and modem match those of the internal device (PC, terminal, or host computer, and modem) that you are calling.

PCs involved in this call must be running a communications software program.

➤ **To verify communications from your external PC or terminal**

➤ Type **AT** from the external PC or terminal, and press **Enter**.	The following screen displays on your (external) PC or terminal screen. **AT** **OK** This display verifies that communications exist between your PC or terminal and your modem. **Note** AT commands must be typed as capital letters (use caps lock), and they appear on your PC or terminal screen as you type them.

➤ **To make the call from the external PC or terminal**

1. Type **ATDT**, the number of the CO line that rings the DK system internal modem, and then press **Enter** on the external PC or terminal.	The internal modem rings and auto answers. Wait 5~30 seconds for the following screen to display on your (external) PC or terminal screen. **ATDTYYYYYYY** **CONNECTXXXX** This display indicates that the external and internal modems are connected and in the communication mode. XXXX = data transmission speed YYYYYYY = telephone number of the internal modem The PDIU-DS connected to the internal modem is in the command mode, ready to accept AT commands from the external PC or terminal. The internal and external modems are in the communication mode, ready to pass data. Entry example: If the telephone number is 1213-4567, type **ATDT12134567** and press **Enter**. (ATDT is the dial command, and 12134567 is the telephone number.)

2. Type **ATDD**, the [PDN] of the PDIU-DS or data telephone connected to the internal device you wish to connect to, and then press **Enter** on the external PC or terminal.	Wait for the following screen to display on your (external) PC or terminal screen. **ATDDYYY** **CONNECTXXXX** This display indicates that the external PC or terminal and the internal data device are connected. XXXX = data transmission speed YYY = station number of the DIU If calling a device connected to a PDIU-DS, the CONNECT LED turns ON; if calling a device connected to a data telephone, the Data Call LED turns ON (red). Entry example: If the station number of the DIU is 210, type **ATDD210** and press **Enter**. (ATDD is the DIU command for data dialing, and 210 is the number of the DIU.)
3. Exchange the data.	The data can be exchanged by using your terminal or PC software program.

➤ **To terminate the call from the external PC or terminal**

1. Hold down the **Shift** key and type **+++** on the external PC or terminal.	The following screen displays on your (external) PC or terminal screen. **+++** **OK**

2. Type **ATH** and then press **Enter** on the external PC or terminal.

The following screen displays on your (external) PC or terminal screen.

```
ATH
OK
```

This display indicates that the call is terminated.

Note Always terminate incoming data calls from the external PC or terminal.

Switch From Outside Voice Call to Data Call

While on a CO line voice call, an internal (Strata DK system) data telephone can switch to a data call on the same line.

Before making the call, verify that the communication parameters of your internal PC or terminal match those of the external modem and PC or terminal. PCs involved in this call must be running a communications software program.

The external telephone must share its CO line with a modem connected to a PC or terminal. The external CO line must be plugged into the external modem jack labeled “LINE”, and the external telephone must be plugged into the modem jack labeled “PHONE”. The internal modem must be installed and programmed in the system modem pool configuration (i.e., the modem is connected to a system standard telephone port, not a CO line).

1. Verify communications from your PC or terminal by typing **AT** and pressing **Enter** on your PC or terminal.	The following screen displays on your PC or terminal screen. **AT** **OK** This display verifies that communications exist between your PC or terminal and your data telephone. **Note** AT commands must be typed as capital letters (use caps lock), and they appear on your PC or terminal screen as you type them.
2. Establish an external voice call.	The normal method establishes your voice call. You can do this before verifying communications.
3. Press **Modem** on your data telephone.	The Modem LED flashes red. This flash indicates that a system modem is reserved. The modem is reserved for 60 seconds. The voice call continues during this time.
4. Press the **Modem** button again.	If the LED turns OFF before a modem is accessed, this reserves another 60 seconds. The voice call continues during this time.
5. Press **Data Call** on your data telephone.	The Data Call LED lights red. The Modem LED stops flashing and stays red. The CO line you were talking on is picked up by the internal modem. The CO line LED blinks and changes from green to red, or if the call was on [DN], the [DN] LED turns OFF.

6. Type **ATD#42** from your PC or terminal, and then press **Enter**.	The following screen displays on your PC or terminal screen. **ATD42** **CONNECTXXXX** This display indicates that the internal modem has gone off-key and originated. XXXX indicates the data transmission speed.
7. Type **ATA** from the external terminal or PC, and then press **Enter** (do not hang up the external telephone).	The external modem answers. Wait 3~20 seconds the following screen to display on the external PC or terminal screen. **ATA** **CONNECTXXXX**
8. Exchange the data.	This display indicates that a data path has been established. XXXX indicates the data transmission speed. Exchange data using your terminal or PC software program. The voice call is on-hold during the data exchange. The external telephone can be placed on-hook or remain off-hook during data transmission.

Switch Back to the Voice Call Using Privacy Override

To perform this function, your data telephone must have Privacy Override assigned in system programming.

1. Make sure that the external telephone is off-hook.	If the voice call is on a CO Line that appears on your [DN] button, refer to the following procedure, “To switch back to the voice call using Executive Override.”

2. Press the busy CO **Line** button on the data telephone.	The Data and Modem LEDs turn OFF, and the CO line LED changes from red to green. The following screen displays on both PC and/or terminal screens. **NO CARRIER** The system modem is dropped, and the CO line is transferred to the voice path. The external modem goes on-hook, and the voice path connects to the external telephone.

Switch Back to the Voice Call Using Executive Override

If you are on a data call, you can switch back to a voice call from a data call using Privacy or Executive Override, but the data telephone must have Privacy or Executive Override assigned in system programming.

1. Make sure that the external telephone is off-hook. If the voice call did not appear on your [DN] button, see the previous section, "Switch Back to the Voice Call Using Privacy Override"on Page 25.	

2. Press a [DN] on the data telephone, dial the modem's standard telephone port number. 3. Press **3** when you hear busy tone.	The Data and Modem LEDs turns OFF, and the CO line LED changes from red to green. The following screen displays on both PC and/or terminal screens. `NO CARRIER` The system modem is dropped, and the CO line is transferred to the voice path. The external modem goes on-hook, and the voice path connects to the external telephone.

➤ **To terminate the call when in the voice connection state**

➤ Press **Spkr** on your data telephone or go on-hook.	The CO line or [DN] LED turns OFF and the voice call terminates.

➤ **To terminate the call if in the data connection state**

➤ Press **Data Release** on your data telephone.	The Data, Modem, and CO line LEDs turn off and the data call terminates.

Personal Computer Dialing of Voice Calls

A PC which contains a software package and provides a dialing feature can be used to place outgoing voice calls. Typically, Personal Information Management or Appointment type software packages contain dialing programs. The dialing program must be Hayes modem compatible; however, when using the Toshiba Data Telephone, a modem or special line is not required.

Dialing programs vary, but most require that you enter the telephone number to be called in a designated field or space. When using a Toshiba Data Telephone you must also enter the outgoing call access code in front of the telephone number to be called.

Example: If the telephone number is 1-714-583-3700, the following sequence should be entered in the telephone number field:

CO Line Access Code + 17145833700

Table 4 CO Line Access Codes

System	CO Line Access
DK14	**81~84** or **#7001~#7004**
DK16e and DK16	**81~88** or **#7001~#7008**
DK40i and DK40	**81~88** or **#7001~#7012**
DK424 (RCTUA)	**801~808** or **#7001~#7016**
DK424 (RCTUBA/BB)	**801~812** or **#7001~#7048**
DK424 (RCTUC/D)	**801~816** or **#7001~#7144**
DK424 (RCTUE/F)	**801~816** or **#7001~#7200**

When the CO line access code and telephone number is entered into the dialing field properly and the computer software dialing is initiated, the PC automatically sends the following sequence to the Data Telephone:

ATDT + CO Line Access Code + **17145833700**

Note ATDT is the Hayes modem dialing command automatically inserted by the computer dialing software.

When the Data Telephone receives the above dialing command, it automatically accesses an outgoing CO line and dials **17145833700**. The Data Telephone's [DN] or CO line button LED turns ON (green), and its LCD (if equipped) displays the dialed digits.

Mode Definitions 3

This chapter contains advanced information for the sophisticated data communication user. The contents are not required for typical operation.

Data Communications Mode

When in the Data Communications mode, the RPCI and DIU can operate in either the Command Mode or the Communication Mode. All the dialing, answering, and disconnecting activities related to a data call take place during the command mode using standard Hayes “AT” commands. The actual data operation—file transferring, printing, etc.—takes place during the communication mode.

Switching Between Data Communications and TAPI Modes

The PC software normally controls the RPCI operating mode (TAPI or DATA). To switch between modes, the PC software or manual keyboard must send the following chapters to the RPCI:

- When in the TAPI mode, send the HEX (FØ), decimal 240, or the ∫ (ASCII character) to the RPCI to switch it to the Data Communications mode. (Unplugging the telephone cord and then reconnecting it also resets the RPCI to the Data Communications mode.)

- When in the Data Communications mode, send (ATCØ) to the RPCI to switch it to the TAPI mode.
- RPCI mode switching should be performed automatically by the application programs running on the PC connected to the RPCI-DI.

Data Communications Command Mode

A RPCI or DIU must be told what number to dial, whether to answer, or whether to disconnect. These instructions, when typed from the keyboard of a PC or terminal, are called AT commands. A complete list of RPCI or DIU-supported AT commands is provided in Table 4 on Page 28. RPCIs or DIUs remain in or enter into the Command Mode when any of the following actions occur.

- The RPCI and DIU are powered up by connecting it to the Strata DK system via the modular jack/cord. The RPCI powers up in the Data Communications mode as opposed to the TAPI mode.
- The reset (Z) AT command is issued.
- No carrier is detected while originating or answering a data call.
- The carrier signal from a remote DIU or modem is lost.
- A semicolon (;) is entered at the end of the dial (D) command.
- The escape sequence (**+++**) is entered while the RPCI or DIU is in the Communication Mode (on-line mode).

Note Always change the escape sequence of a RPCI-DI connected to your PC to avoid operation conflicts. Consult the documentation provided by the modem manufacturer for documentation on the ATS2 command.

Other Command Mode features—Result Codes, Dialing Modifiers, and S-Registers—are explained below.

Result Codes: Displayed on the terminal or PC screen, Result Codes are RPCI and DIU responses to AT commands and end-to-end connections and disconnections. DIUs support the Result Codes in Table 6 on Page 35.

Dialing Modifiers: Dialing Modifiers do exactly what their name indicates. They can be issued anywhere in the dialing string and provide additional dialing instructions.

Dialing Modifiers can be used for a variety of applications, including tone dialing, dial pulse dialing, and pause and flash inserting. DIUs support the Dialing Modifiers listed in Table 9 on Page 36.

S-Registers: RPCIs and DIUs can be configured for specific applications with S-Registers, which can only be changed or checked during the Command Mode. When power is first applied to it and whenever its modular line cord is temporarily disconnected and then reconnected, the RPCI and DIU initializes the S-Registers to the default values and enters the Command Mode. DIUs support the S-Registers listed in Table 7 on Page 35. To check or change an S-Register, refer to the following procedure:

➤ **To check the value of an S-Register**

➤ Type **ATSX?** and press **Enter** (X is the S-Register you want to check).	The value along with the "OK" Result Code is displayed.

➤ **To change the value of an S-Register**

➤ Type **ATSX=Y** and press **Enter** (X is the S-Register you want to change and Y is its value).	The S-Register value is now changed, and the screen displays "OK". (If the entry is invalid, "ERROR" is displayed in most cases.)

Notes

- A PC must be running communications software or a desk organizer dialing program (be on-line) to issue AT commands. AT commands cannot be inputted from a data telephone's dial pad, a PC DOS prompt, word processor, database, or spread sheet-type programs.
- AT commands are executed by the DIUs only after the carriage return key is pressed. The carriage return is referred to as **Enter** in this guide. On some keyboards, though, this key may have a different designation, such as **RETURN**, <**CR**>, **ENTER**, etc.
- All AT commands must be typed as capital letters.

- DIUs can operate at up to 19,200 bps with manual dialing from a data telephone. If keyboard dialing with AT commands, the DIUs can operate at up to 9600 bps.

Data Communications Mode (On-line state)

A PDIU-DI automatically enters the communication mode when its call to another DIU is answered. At this point, the desired data operation—file transfer, printing, etc., can begin. DIUs remain in the Communications Mode until the data operation is manually terminated or the escape sequence (see "Switching Between Data Communication Modes"on Page 32) is issued. A calling PDIU-DI switches to the Communication Mode from the Command Mode when the following sequences occur:

- When the **ATD** or **ATDD** command strings are typed and **Enter** is pressed, the called DIU answers (manually or automatically).
- When the **ATO** command string is typed and **Enter** is pressed, a DIU-to-DIU data connection is established (see "Switching Between Data Communication Modes"on Page 32).
- When a remote modem issues the ATA command string after the calling DIU issues the ATD42 command string, a CO line voice call is switched to a data call using the system modem pool.

Note A called DIU switches to the Communication Mode when it answers, automatically or manually.

Switching Between Data Communication Modes

Once a PRCI or DIU is connected to another RPCI or DIU and in the Communication Mode, it can be switched back to the Command Mode with the escape sequence and then back again to the Communication Mode with the re-enter command. This feature is helpful when you change a parameter after establishing a data call. Parameters can only be changed while in the Command Mode.

- Escape Sequence: To escape from the Communication Mode, hold down the **Shift** key and type **+++** (it is not necessary to press **Enter**).
- Re-enter Sequence: To re-enter the Communication Mode, type **ATO** and press **Enter**.

RPCI/DIU Data Speed (Baud Rate)

DIUs pass data at a baud rate of up to 19,200 bits per second (bps), if the call was established by manually dialing from a data telephone. If the call was established with AT commands from a PC or terminal, the DIU passes data at up to 9600 bps. The baud rate of a DIU is transparent when originating calls with the data telephone or when receiving data calls, manually and automatically. When originating data calls with AT commands from a PC or terminal, the DIU speed is the same as the rate of the first AT command. When answering data calls with the ATA command string, the DIU baud rate is the same as the command string; the AT command baud rate is determined by software running the terminal or PC.

RPCI/DIU Default Communication Parameters

Default parameters for the DIUs are shown below; however, they are transparent or changed by the first AT commands issued, as described above. A DIU assumes these default parameters when power is initially applied to it, or after the modular cord is disconnected and then reconnected.

- Baud rate: 1200 bps
- Data bits: 8 bits
- Parity: none
- Stop bits: 1 stop bit

Table 5 DIU AT Command Set

Command	Description
AT	Command prefix
ATDY...Y	Voice call to telephone number (Y…Y = any number of digits), internal or external
ATDDXXXX	Data call to DIU station number XXXX (1~4 digits)
Enter	Carriage return character
A	Go into the answer mode; attempt to go to Communication Mode
A/	Re-execute previous command line; not preceded with AT nor followed by **Enter**
D	Go into originate mode; dial number that follows; attempt to go to on-line state

Table 5 DIU AT Command Set *(continued)*

Command	Description
E0	Disable character echo in Command Mode
E1	Enable character echo in Command Mode
H0	Go on-hook (hang up)
H1	Go off-hook
O	Go to Communication Mode
Q0	DIU returns Result Codes
Q1	DIU does not return Result Codes
SR = n	Set Register “R” to value “n” (R = 0~12)
SR?	Display value stored in Register “R” (R = 0~12)
V0	Display Result Codes in numeric form
V1	Display Result Codes in words
X0	Enable features represented by Result Codes 0~4
X1	Enable features represented by Result Codes 0~7, 10~12
X2	Enable features represented by Result Codes 0 ~ 5, 10 ~ 12
X3	Enable features represented by Result Codes 0~7, 10~12
X4	Enable features represented by Result Codes 0~7, 10~12

Note A DIU assumes the V1 default value when power is initially applied to it or when the modular line cord is disconnected and then reconnected.

Table 6 DIU Result Code Set

No.	Word	Description
0	OK	Command executed
1	Connect	Connection at 0 to 300 bps
2	Ring	Ring Signal Detected
3	No Carrier	Carrier signal not detected, or lost
4	Error	Invalid command, checksum. Error in command line, or command line exceeds 255 characters
5	Connect 1200	Connection at 1200 bps
7	Busy	Busy signal detected
10	Connect 2400	Connection at 2400 bps
11	Connect 4800	Connection at 4800 bps
12	Connect 9600	Connection at 9600 bps

Table 7 DIU S-Register Set

Register	Range	Description
S0	0~255 rings	Select ring to answer on specific number of rings
S1	0~255 rings	Ring count (increment with each ring)
S2	0~127 ASCII	Define escape sequence character
S3	0~127 ASCII	Define carriage return character
S4	0~127 ASCII	Define line feed character
S5	0~32, 0~127 ASCII	Define back space character
S7	1~255 sec.	Select wait time for carrier/dial tone
S9	1~255 sec.	Select carrier detect response time
S10	1~255 sec.	Select-delay between carrier loss/hang-up
S12	0~255 sec.	Define escape sequence guard time

Table 8 Default Values

Register	Value	S-Register Control
S0	Auto ring enabled	S0 = 1
S1	0 rings	S1 = 0
S2	ASCII 43	S2 = 43
S3	ASCII 13	S3 = 13
S4	ASCII 10	S4 = 10
S5	ASCII 08	S5 = 8
S7	30 sec.	S7 = 30
S9	0.6 sec.	S9 = 6
S10	0.7 sec.	S10 = 7
S12	1 sec.	S12 = 50

Note A DIU assumes these default values when power is initially applied to it or when the modular line cord is disconnected and then reconnected.

Table 9 DIU Dialing Modifier Set

Modifier	Description
0~9*#	Digits/characters for dialing
ABCD	Digits/characters for dialing
P	Pulse dial
T	Tone dial
,	Delay processing of next character (1 second)
!	Hookflash
;	Return to Command Mode after dialing

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