

DASCard-232/422/485

USER'S GUIDE

DASCard-232/422/485

User's Guide

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Preface

The *DASCard-232/422/485 User's Guide* provides the information needed to install and use the DASCard-232 and the DASCard-422/485. While the DASCard-232 and the DASCard-422/485 are two separate cards, this manual refers to the two cards collectively as the DASCard-232/422/485.

The manual is intended for technicians, scientists, and other users responsible for installing, starting up, and connecting serial devices to a DASCard-232/422/485. Users are assumed to be familiar with data communication principles, with their computers, and with their applications.

The *DASCard-232/422/485 User's Guide* is organized as follows:

- Chapter 1 provides an overview of the features of a DASCard-232/422/485 and a description of supporting software.
- Chapter 2 describes how to unpack, install, and start up a DASCard-232/422/485.
- Chapter 3 describes cabling and wiring between the DASCard-232/422/485 and serial devices.
- Chapter 4 provides troubleshooting information.
- Appendix A lists the specifications for a DASCard-232/422/485.
- Appendix B lists the connector pin assignments for a DASCard-232/422/485.
- An index completes this manual.

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1

Overview

The DASCARD-232 and DASCARD-422/485 are serial adapter PC Cards you can use with any notebook or desktop computer that contains a Type II or III, PCMCIA (Personal Computer Memory Card International Association) socket. This chapter describes the features and supporting software for these cards.

DASCARD-232 Features

A DASCARD-232 provides a single, asynchronous, full-duplex (can transmit and receive simultaneously) RS-232 port through a 9-pin, male cable connector (see Figure 3-1 on page 3-1). You can use the port for single-ended, point-to-point communication over distances of up to 50 feet (15.2 meters).

The card can operate as an I/O port or a COM port, depending on the base address. You can set the following operating options through a communications software package or through the Windows™ Control Panel (if the card is configured as a COM port):

- Odd, even, or no parity
- Seven or eight data bits
- One, one and a half, or two stop bits.
- A baud rate of 50, 75, 110, 134.5, 150, 300, 600, 1200, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 56000, or 115200 baud.

A 16C550 Universal Asynchronous Receiver/Transmitter (UART) with two 16-byte, first-in, first-out (FIFO) memory buffers (one for transmitting and one for receiving) enables the card to operate in multitasking environments at high data rates.

A DASCARD-232 is configured as Data Terminal Equipment (DTE) and can communicate directly with Data Communication Equipment (DCE), such as modems and printers. If you want to communicate with another DTE device, you must use a null modem cable; refer to page 3-5 for more information.

DASCARD-422/485 Features

A DASCARD-422/485 operates in either RS-422 mode or RS-485 mode through a 9-pin, female cable connector (see Figure 3-2 on page 3-2). You change the card's mode with external wiring; refer to "Making COM Port Settings from Windows" on page 2-14 for more information. Differences between the two mode types are as follows:

- **RS-422 mode** - In RS-422 mode, the card provides an asynchronous, full-duplex (can transmit and receive simultaneously), differential port; a single transmitter communicates with multiple receivers. In RS-422 mode, the card can also be configured through software for half-duplex (cannot transmit and receive simultaneously; uses separate lines for transmitting and receiving) operation. Communication through this port can extend over distances of up to 4,000 feet (1220 meters).
- **RS-485 mode** - In RS-485 mode, the card provides an asynchronous, half-duplex (cannot transmit and receive simultaneously; uses same lines for transmitting and receiving), differential port; multiple transmitters communicate with multiple receivers. Communication through this port can extend over distances of up to 4,000 feet (1220 meters).

The card can operate as an I/O port or a COM port, depending on the base address. You can set the following operating options through your application program (if the card is configured as an I/O port) or through a communications software package or Windows Control Panel (if the card is configured as a COM port):

- Odd, even, or no parity
- Five, six, seven, or eight data bits
- One, one and a half, or two stop bits

- A baud rate of 50, 75, 110, 134.5, 150, 300, 600, 1200, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 56000, or 115200 baud.

A 16C550 UART with two 16-byte, FIFO memory buffers (one for transmitting and one for receiving) enables the card to operate in multitasking environments at high data rates. The card can also operate in electrically noisy environments.

The DASCARD-422/485 is configured as Data Terminal Equipment (DTE) and can communicate directly with Data Communication Equipment (DCE), such as modems and printers or with other Data Terminal Equipment.

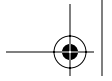
The DASCARD-422/485 features a Request-To-Send and Clear-To-Send (RTS-CTS) handshake capability that allows communication between the card and a peripheral device. This feature is useful when using a modem or when the serial device is trying to send data faster than the host computer can request data. You can enable/disable the RTS-CTS handshake using software; refer to “Loading the Handshake Enable/Disable Utility (for the DASCARD-422/485 Only)” on page 2-10 for more information.

A DASCARD-422/485 does not contain transmission line termination resistors. For information on installing your own termination resistors, refer to “Connecting One or More Devices to a DASCARD-422/485” on page 3-2.

Supporting Software

Keithley MetraByte supplies the following software with your DASCARD-232/422/485:

- **Keithley MetraByte Enabler utility** - The Enabler utility (KMENABLE.EXE) runs under DOS and requests system resources for your DASCARD-232/422/485. Refer to page 2-4 for more information.
- **Keithley MetraByte diagnostics utility** - The diagnostics utility allows you to check the status of your DASCARD-232/422/485 installed in a PCMCIA socket. Two versions of the diagnostics utility are available: KMINFO.EXE runs under DOS and KMINFOW.EXE runs under Windows. Refer to page 2-13 for more information.
- **Keithley MetraByte handshake enable/disable utility** - The handshake utility (KMHSKAKE.EXE) runs under DOS and enables/disables hardware handshaking on your DASCARD-422/485. Refer to page 2-10 for more information.



2

Setup and Installation

This chapter contains the information you need to install and use your DASCard-232/422/485.

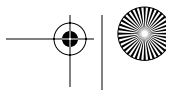
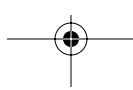
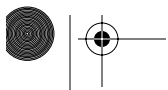
Assembling Your System

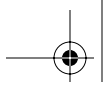
For proper operation of a DASCard-232/422/485, your system may require the following items:

- A notebook or desktop computer with a Type II or III, PCMCIA socket.
- DOS, Version 5.0 or higher.
- CardSoft™, CardWare™, CardTalk™, Phoenix® CARD Manager Plus, or any other PCMCIA Card and Socket Services (PCMCIA standard 2.10 or higher). Each of these packages allows a DASCard-232/422/485 to work in your computer and is typically a DOS-based, terminate-and-stay-resident (TSR) program loaded from your CONFIG.SYS file.

Many notebook computers are shipped with PCMCIA Card and Socket Services already installed. Check your computer documentation or software package for the name of the services and for compliance with PCMCIA standard 2.10 or higher. If you cannot establish this compliance, you should obtain and install one of the PCMCIA Card and Socket Services listed above.

- A Keithley MetraByte Enabler utility (KMENABLE.EXE for DOS), a Keithley MetraByte diagnostics utility (KMINFO.EXE for DOS and KMINFOW.EXE for Windows), and a Keithley MetraByte handshake enable/disable utility (KMHSKAKE.EXE for DOS).





- A memory manager if you wish to load the handshake utility into upper memory.

Unpacking and Inspecting Your Card

After opening the shipping carton, perform the following steps to unpack and inspect your DASCard-232/422/485:

1. Carefully remove the card from its plastic case. (Keep the plastic case for future storage needs.)
2. Inspect the card for signs of damage. Arrange to return a damaged card to the factory; refer to page 4-4 for more information.
3. Make sure you have received the proper cable with your card. The DASCard-232 cable should have a 9-pin, male connector; the DASCard-422/485 cable should have a 9-pin, female connector.
4. Check the remaining contents of your package against the packing list. Report any missing items immediately.
5. If the card and package are acceptable, you can set up the software and the card. Refer to the following sections for information.

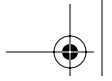
Overview of Installation and Startup

To install and start a DASCard-232/422/485, perform the following tasks:

1. Install PCMCIA Card and Socket services, if required. Refer to the manufacturer's installation instructions.
2. Prepare the DASCard-232/422/485 software. Refer to page 2-3 for information.
3. Unless you intend to use the generic enabler, load the Keithley MetraByte Enabler. Refer to page 2-4 for information.

Note: After starting up the computer, you must load the Keithley MetraByte Enabler *before* you load Windows and *before* you install the card.





4. Install the DASCARD-232/422/485. Refer to page 2-9 for information.
5. Load the Keithley MetraByte handshake enable/disable utility (for DASCARD-422/485 only), if required. Refer to page 2-10 for more information.

Note: To use the Keithley MetraByte handshake utility, you must first load the Keithley MetraByte Enabler; the handshake utility does not function with any other enabler.

6. Check the installation of the DASCARD-232/422/485 using the Keithley MetraByte diagnostics utility. Refer to page 2-13 for information.
7. Connect a serial device to your DASCARD-232/422/485. Refer to page 3-1 for more information.

Preparing the Software



The standard operating software for your DASCARD-232/422/485 is contained on a disk that is included in your card package. You can operate the software from a disk or from your hard drive.

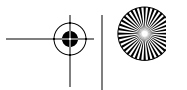
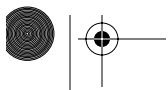
If you prefer to operate the software from a disk, make a copy of the supplied disk. Use the copy as your working disk and store the supplied disk as a backup.

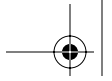
If you prefer to operate the software from your computer's hard drive, perform the following steps:

1. Insert the supplied disk into a disk drive.
2. Make a new directory on the hard drive to contain the software.
3. Copy all the files from the supplied disk to the new directory on the hard drive.

Before you use the software, review the following files:

- FILES.TXT, a text file listing and describing all the files in the standard software.





- README.TXT, a text file containing information that was not available when this manual was printed.

Enabling the Card

A PC Card enabler is a TSR whose overall function is to link the card and the computer by requesting PCMCIA Card Services to allocate certain resources for the card. For the DASCARD-232/422/485, these resources include a base address, an interrupt level, and the address of a memory segment used for handshake control.

Most computers equipped to accept PC Cards use a generic enabler that loads automatically upon startup. However, PC Card manufacturers often provide customized enablers to perform tasks a generic enabler might be unable to handle. Keithley MetraByte provides KMENABLE.EXE, a customized enabler designed to recognize and respond specifically to Keithley MetraByte PC Cards. Whether you use the generic enabler or the Keithley MetraByte Enabler depends on your card and application, as described in the following subsections.



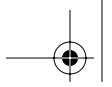
Enabling the DASCARD-232

A DASCARD-232 can function as an I/O port or a COM port, depending on the base-address/interrupt-level combination assigned to the card. A non-COM port base-address/interrupt-level combination makes the card an I/O port, while a COM port base-address/interrupt-level combination (see Table 2-1) makes the card a COM port.

This card works with most generic enablers as a COM port; the generic enabler automatically assigns the first available COM port base address to the card. If your DASCARD-232 fails to work with a generic enabler, remove the card from its socket and load the Keithley MetraByte Enabler with switch options set for a base-address/interrupt-level combination that assigns one of the COM ports listed in Table 2-1. For example, to enable a card in socket 0 for COM3, use the following command:

```
KMENABLE /BA0:&h3E8 /I0:4
```





After loading the Enabler, return the card to its socket and run the diagnostics utility (see “Controlling Data Flow during Half-Duplex Operation (DASCard-485 Only)” on page 2-13).

Table 2-1. Typical Base Addresses and Interrupt Levels for COM Ports

Base Address	Interrupt Level	Port Assignment
3F8h	4	COM1
2F8h	3	COM2
3E8h	4	COM3
2E8h	3	COM4

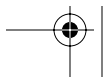
To use the DASCard-232 as an I/O port, load the Keithley MetraByte Enabler either with no switch options (to use the default values in Table 2-2 on page 2-7, if they are available) or with switch options set for a base-address/interrupt-level combination other than those shown in Table 2-1.

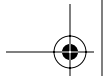


Enabling the DASCard-422/485

A DASCard-422/485 can function as an I/O port or a COM port, depending on the base address/interrupt level assigned to the card. A non-COM port base-address/interrupt-level combination makes the card an I/O port, while a COM port base-address/interrupt-level combination (see Table 2-1) makes the card a COM port.

To use the DASCard-422/485 as an I/O port, use the Keithley MetraByte Enabler either without switch options (if the default values in Table 2-2 are available) or with switch options set for a base-address/interrupt-level combination other than those shown in Table 2-1 (if the default values in Table 2-2 are unavailable).





To use the DASCARD-422/485 as a COM port, use the Keithley MetraByte Enabler to specify the base address and interrupt level for one of the port assignments shown in Table 2-1. For example, to enable a card in socket 0 for COM3, use the following command:

```
KMENABLE /BA0:&h3E8 /IO:4
```

Do not assign a COM port in use by another card or device. You can release a COM port assigned to a card by removing the card from its socket or by unloading the Enabler.

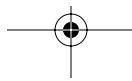
You can also use a generic enabler to make the DASCARD-422/485 an I/O port. However, generic enablers do not have the switch options offered by the Keithley MetraByte Enabler, and some generic enablers cannot enable the card to respond to the handshake utility. If your application requires handshaking, use the Keithley MetraByte Enabler.

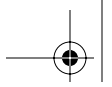
Loading the Keithley MetraByte Enabler Utility

To obtain a base address and interrupt level that are not in use by another device in your system, perform the following steps for loading the Keithley MetraByte Enabler:

Note: If your DASCARD-232/422/485 is already installed, remove it from its socket. To prevent conflicts with the generic enabler or with Windows, do not install your card or load Windows until after you load the Keithley MetraByte Enabler.

1. Turn power to your computer on.
2. If your PCMCIA Card Services allow you to exclude resources from resource allocation, make sure you exclude any base addresses and interrupt levels in use by other devices in your system.
3. If your PCMCIA Card Services allow you to reserve system resources, make sure that you reserve a base address and interrupt level not in use by other devices in your system.
4. Table 2-2 is a list of command-line switch options for use with the Enabler. Use these switch options when there is a conflict with the default values for base address and interrupt level or when you want to use your card as a COM port.





5. If the default base addresses and interrupt levels shown in Table 2-2 are available, go to step 9.
6. If the default base addresses and interrupt levels shown in Table 2-2 are unavailable, go to step 10.
7. Load the Keithley MetraByte Enabler by entering the following statement at the DOS prompt:

KMENABLE

To continue, go to step 11.

Note: If you prefer to start the Keithley MetraByte Enabler automatically upon power-up, enter the KMENABLE command in your computer's AUTOEXEC.BAT file. Remember, though, to remove your card before power-up.

8. Load the Keithley MetraByte Enabler using the necessary command-line switch options listed in Table 2-2.

Table 2-2. Switch Options for the Keithley MetraByte Enabler

Switch Syntax	Description
/?	Displays syntax information.
/BA0: <i>baseaddress</i>	Uses the value you enter for <i>baseaddress</i> to specify a base address for card 0. Make sure that &H precedes hexadecimal numbers. If you do not use this switch, the Enabler tries to use a default base address of 300h.
/BA1: <i>baseaddress</i>	Uses the value you enter for <i>baseaddress</i> to specify a base address for card 1. Make sure that &H precedes hexadecimal numbers. If you do not use this switch, the Enabler tries to use a default base address of 308h.
/I0: <i>intlevel</i>	Uses the value you enter for <i>intlevel</i> to specify an interrupt level for card 0. If you do not use this switch, the Enabler tries to use a default level of 5.



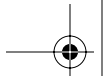


Table 2-2. Switch Options for the Keithley MetraByte Enabler (cont.)

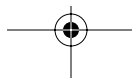
Switch Syntax	Description
<i>/I1:intlevel</i>	Uses the value you enter for <i>intlevel</i> to specify an interrupt level for card 1. If you do not use this switch, the Enabler tries to use a default level of 7.
<i>/MEM0:memaddress</i>	Uses the value you enter for <i>memaddress</i> to specify the address of a memory segment for card information on card 0. Make sure that &H precedes hexadecimal numbers and that the segment address is less than FFFFh.
<i>/MEM1:memaddress</i>	Uses the value you enter for <i>memaddress</i> to specify the address of a memory segment for card information on card 1. Make sure that &H precedes hexadecimal numbers and that the segment address is less than FFFFh.
<i>/NORETRY</i>	The Enabler detects an error ¹ if any base address, interrupt level, or memory segment address that you specify is in use by another card. If you do not use this option and specify a resource that is assigned to another card, the Enabler automatically selects an available resource.
<i>/U</i>	Unloads the Enabler from computer memory.

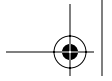
Notes

¹ An error detected by the Enabler is displayed when you run the diagnostics utility (see page 2-15). If the error is displayed in one of the following 4-digit formats, the error indicates an allocation problem with the named resource: 8xxx indicates base address; 4xxx indicates interrupt level; Cxxx indicates memory.

For example, if the default assignments for card 0 are appropriate but you want to change the assignments for card 1, enter a line similar to the following at the DOS prompt:

```
KMENABLE /BA1:&H310 /I1:11
```





As another example, if you want to change a base address and/or interrupt level without restarting your computer, you can unload the Keithley MetraByte Enabler by entering the following statement at the DOS prompt:

```
KMENABLE /U
```

Then, reload the Enabler using the command-line switch options to specify a new base address, and/or interrupt level.

9. Install your DASCard-232/422/485; refer to page 2-9.
10. To determine whether the Enabler recognizes your card and whether suitable resources were allocated, run the diagnostics utility; refer to page 2-13.

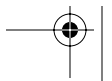
Note: If you use the PCMCIA software to reserve system resources and then use a switch option to specify a base address or interrupt level that was not reserved, the value you specify is ignored.

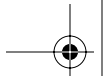
Installing the Card

Note: On most notebook computers, you can hot-swap PC Cards; you are not required to turn computer power off when installing or removing a card. A computer that does not conform to the ExCA (exchange card architecture) Specification cannot support hot swapping; you must turn on the socket with a software utility each time you insert a card. The socket turn-on utility should be described in your computer documentation.

To install your DASCard-232/422/485, perform the following steps:

1. Select a Type II or III, PCMCIA socket and remove the cover from the socket.
2. Insert the card into the selected socket; the card is labeled to show the direction of insertion and keyed to allow only one way of insertion. On some computers, one or more beeps indicates that the card is installed correctly.





3. Make sure the card is ready for proper operation by running the diagnostics utility (see page 2-13).

Note that while the Keithley MetraByte Enabler initially determines whether other Keithley MetraByte PC Cards are present, it does not recognize non-PCMCIA devices or other brands of PC Cards. If an unrecognized device is present, the Enabler could mistakenly assign the resources in use by that device, causing a conflict. The simplest way to resolve such a conflict is to remove the DASCard-232/422/485, reload the Keithley MetraByte Enabler for a different base address, and re-install the DASCard-232/422/485.

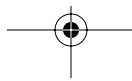
After installing your DASCard-232/422/485, you can connect a serial device to the card; refer to page 3-1 for information. Refer to the documentation provided with your computer for more information on installing cards.

Loading the Handshake Enable/Disable Utility (for the DASCard-422/485 Only)



Handshaking is a process by which one device checks the status of another and responds accordingly. When device A is ready to transmit data to device B, device A transmits an RTS signal to device B. If device B is idle and can receive data, device B notifies device A with a CTS signal. Device A does not transmit, however, unless it receives a CTS signal. You can write your application program to respond to the CTS signal from device B by disabling the device B data transmitter while device A is transmitting.

The Keithley MetraByte handshake utility (KMHSHAKE.EXE) is a TSR that allows you to enable/disable the handshake. When enabled and disabled, the block diagrams for the handshake channel appear as shown in Figure 2-1.



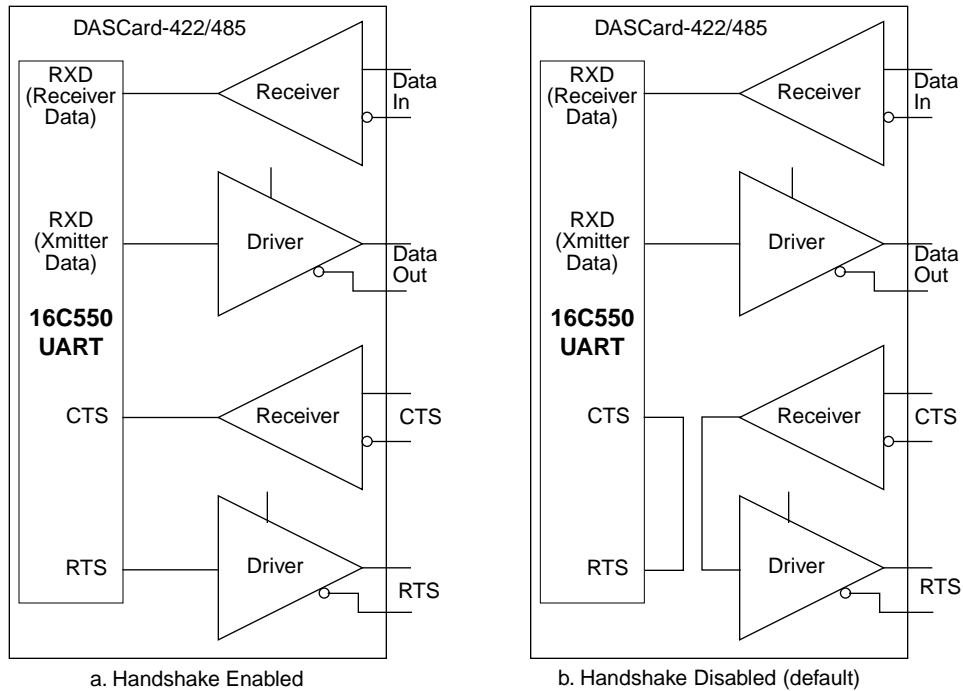
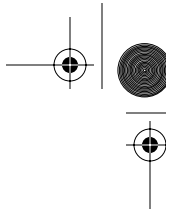


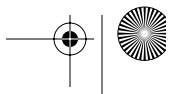
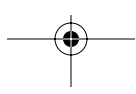
Figure 2-1. RTS-CTS Handshake Enabled/Disabled

Note: To use the Keithley MetraByte handshake utility, you must first load the Keithley MetraByte Enabler; the Keithley MetraByte handshake utility does not function with any other enabler.

At startup, the DASCARD-422/485 handshake is disabled. You load the handshake utility to enable the handshake by entering the following statement at the DOS prompt:

```
KMHSKAKE /ON
```

Note: To conserve lower memory, you can load the handshake utility into high memory (between 640K bytes and 1M bytes). Refer to your memory manager documentation for more information.



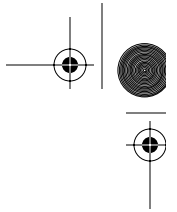


Table 2-2 lists the command-line switch options available for the handshake utility.

Table 2-3. Switch Options for the Handshake Utility

Switch Syntax	Description
/?	Displays usage information.
/ON	Enables handshaking.
/OFF	Disables handshaking.
/U	Unloads the handshake utility from computer memory.

Converting between RS-422 and RS-485 Modes

A DASCARD-422/485, as received from the factory, is configured for RS-422 mode, as shown in Figure 2-2a. Pin numbers in Figure 2-2 are for the 9-pin connector of the DASCARD-422/485 cable (see Figure 2-3).

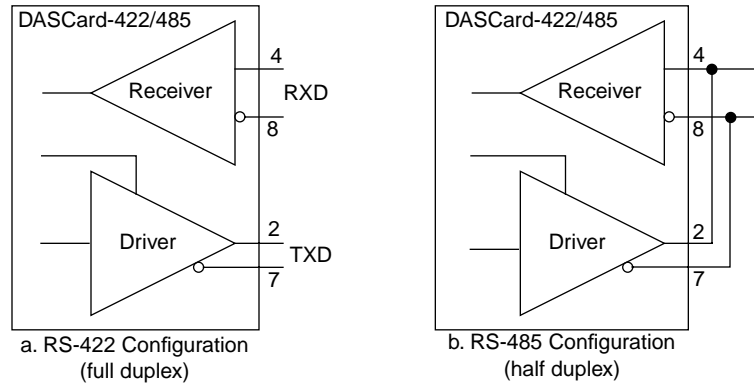
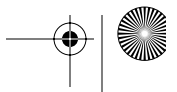
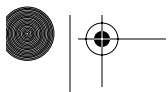
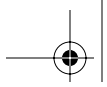


Figure 2-2. RS-422 and RS-485 Configurations

To convert a DASCARD-422/485 to RS-485 mode (half-duplex operation only), make external connections to tie like polarities of the receive





(RXD) and transmit (TXD) lines together, as shown in Figure 2-2b. You can make the connections in a cable that you construct to connect a serial device to the 9-pin female connector on the DASCARD-422/485 cable. You can also make the connections by constructing a connector box that attaches to the 9-pin connector of the DASCARD-422/485 cable, as shown in Figure 2-3.

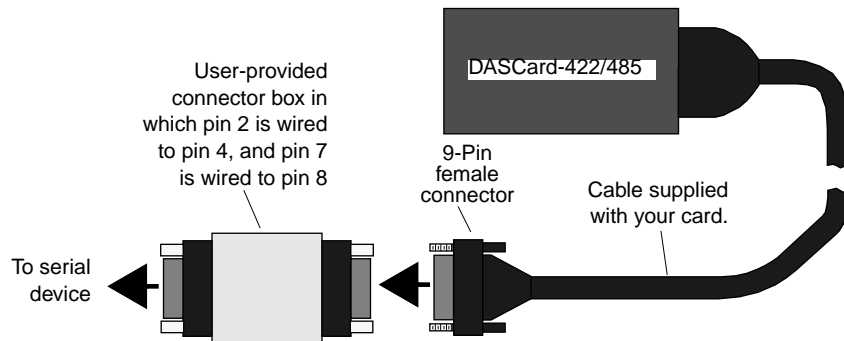
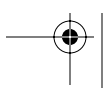
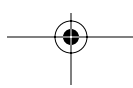


Figure 2-3. Feed-Through Connector Box for Converting DASCARD-422/485 to RS-485 Mode



Controlling Data Flow during Half-Duplex Operation (DASCARD-485 Only)

When you configure your DASCARD-422/485 for the RS-485 (half-duplex) mode, as described in the preceding section, you cannot transmit and receive simultaneously because transmission and reception use the same lines. To prevent the card from transmitting and receiving simultaneously, you must disable the card's drivers during reception. You can control the card's drivers by controlling the states of the RTS or DTR (data terminal ready) signals with your application program. If you use RTS, setting RTS active low enables the card's data and hardware-handshake drivers, while clearing RTS disables these drivers. If you use DTR, setting DTR active low enables the card's data and hardware-handshake drivers, while clearing DTR disables these drivers. The circuitry that allows these options is shown in the block diagram of Figure 2-4.



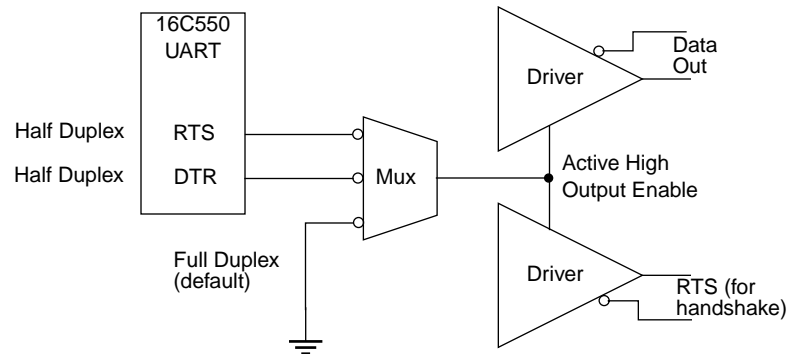
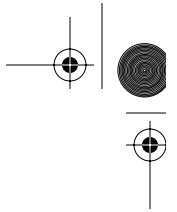
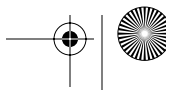
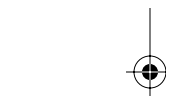
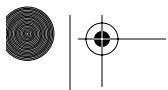
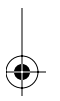


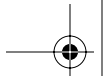
Figure 2-4. Block Diagram of RTS/DTR Signaling

Making COM Port Settings from Windows

When your DASCARD-232/422/485 is enabled as a COM port, you can set certain port parameters from Windows, as follows:

1. When you run the Keithley MetraByte diagnostics utility, after installing your card, note the base address and interrupt level on the diagnostics display.
2. Start Windows.
3. In the Program Manager panel, double click on the Main panel icon.
4. In the Main panel, double click on the Control panel icon.
5. In the Control panel, double click on the Ports icon.
6. In the Ports panel, select the port your card was assigned to by the Keithley MetraByte Enabler, then choose Settings.
7. The Settings panel allows you to set the desired baud rate and other parameters. Set Flow according to whether your card's handshake is enabled (Xon/Xoff) or disabled (None).
8. Choose Advanced Settings, and set the base address and interrupt level to match the ones shown in the diagnostics display (Step 1).
9. Choose OK for both Settings panels, then exit Windows.





Using the Diagnostics Utility

The Keithley MetraByte diagnostics utility (KMINFO.EXE for DOS, KMINFOW.EXE for Windows) allows you to check the status of your DASCARD-232/422/485 during installation and startup and during operation.

During installation and startup, use KMINFO.EXE to check your DASCARD-232/422/485 for correct installation. Enter the following at the DOS prompt:

```
KMINFO
```

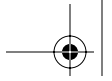
If your card is not operating properly while an application is running in Windows, use KMINFOW.EXE to check for proper installation. Choose Run from the Program Manager File menu, and use the Browse button to find KMINFOW.EXE.

The diagnostics utility displays the following information:

- The PCMCIA Card and Socket Services that are installed
- Whether the Keithley MetraByte Enabler is installed
- The following information for each socket:
 - The manufacturer of the installed card
 - The card type
 - Whether the card is enabled
 - If the card is enabled, the base address, interrupt level, memory window segment
 - If the card is not enabled, any errors that occurred while attempting to allocate system resources

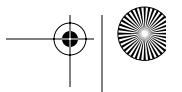
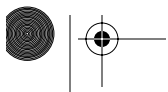
Note: The utility displays a base address as a number preceded by *0x*. The *0x* signifies a hexadecimal number. For example, *0x350* indicates *350h*.





If information for a field in the diagnostics utility is missing or if an error is displayed, the card is improperly configured. Refer to Chapter 4 for troubleshooting information.

An error displayed in one of the following 4-digit formats indicates an allocation problem with the named resource: 8xxx indicates base address; 4xxx indicates interrupt level; Cxxx indicates memory.



3

Cabling and Wiring

This chapter describes the cabling and wiring required for attaching peripheral devices to your DASCARD-232/422/485.

Connecting to a DASCARD-232

Connect a serial device to a DASCARD-232 using the DASCARD-232 cable supplied with your card, as shown in Figure 3-1.

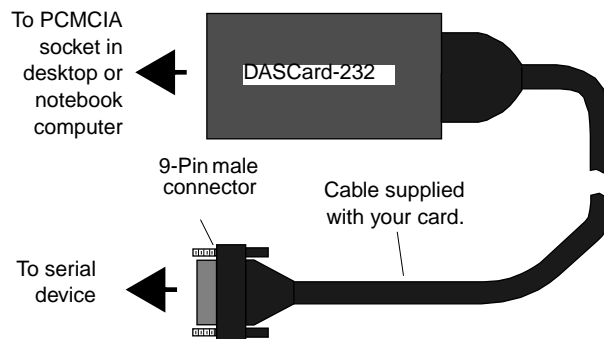


Figure 3-1. Connecting a Device to a DASCARD-232

Connecting One or More Devices to a DASCARD-422/485

Connect a serial device to an RS-422/485 port using the DASCARD-422/485 cable supplied with your card, as shown in Figure 3-2.

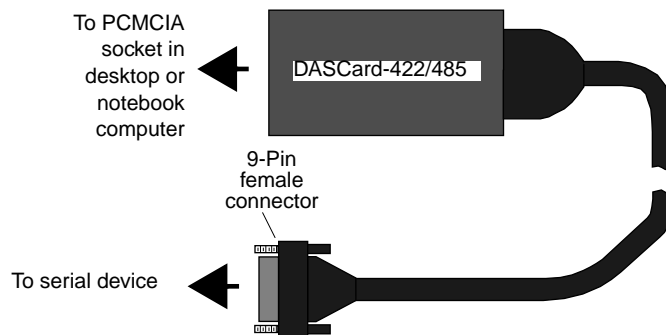


Figure 3-2. Connecting a Device to a DASCARD-422/485

Typical wiring for a DASCARD-422/485 operating in RS-422 mode and wired to a single device is shown in Figure 3-3. The wiring diagram also shows correct placement of termination resistors (termination resistors are not furnished with the DASCARD-422/485), which are recommended for only the extreme ends of long runs.

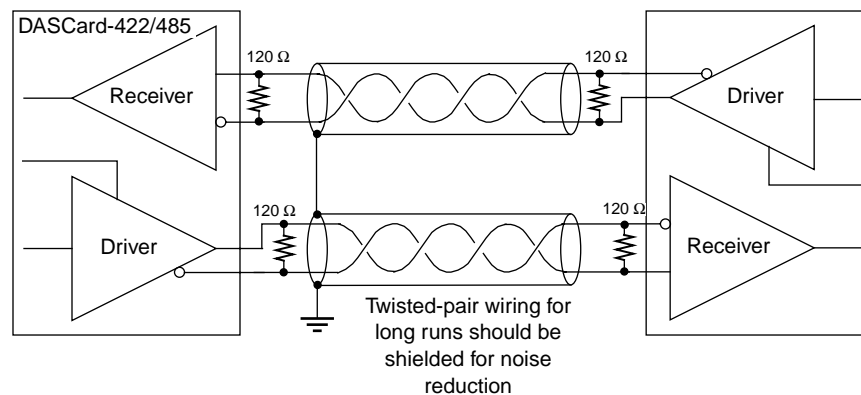


Figure 3-3. Wiring Diagram for a Typical RS-422 Single-Device Application, Showing Placement of Termination Resistors

Typical wiring for a DASCARD-422/485 operating in RS-422 mode and wired to multiple devices is shown in Figure 3-4. You can connect up to 32 driver/receiver pairs in this manner. The wiring diagram also shows correct placement of termination resistors (termination resistors are not furnished with the DASCARD-422/485), which are recommended for only the extreme ends of long runs.

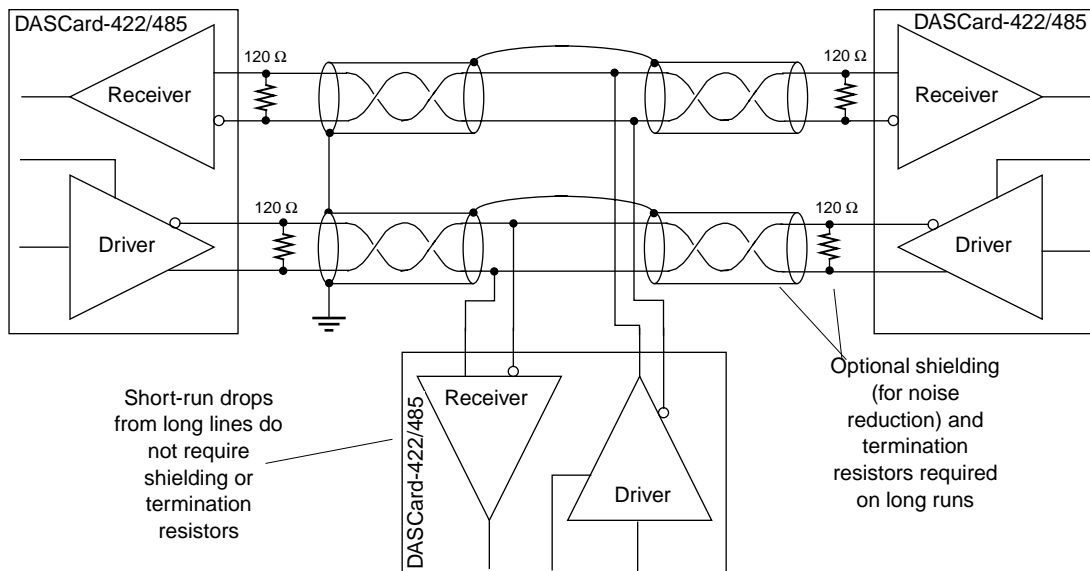


Figure 3-4. Wiring Diagram for a Typical RS-422 Multiple-Device Application, Showing Placement of Termination Resistors

Typical wiring for a DASCARD-422/485 operating in RS-485 mode and wired to a single device is shown in Figure 3-5. The wiring diagram also shows correct placement of termination resistors (termination resistors are not furnished with the DASCARD-422/485), which are recommended for only the extreme ends of long runs.

Note: When operating the card in RS-485 (half-duplex) mode, you must disable the transmitter in order to receive data.

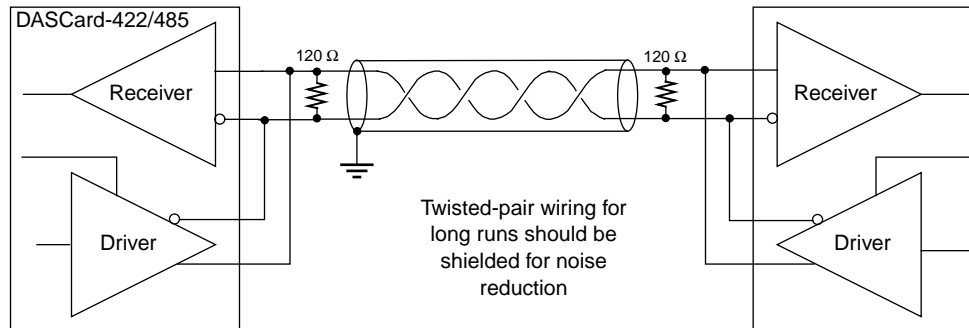


Figure 3-5. Wiring Diagram for a Typical RS-485 Single-Device Application, Showing Placement of Termination Resistors

Typical wiring for a DASCARD-422/485 operating in RS-485 mode and wired to multiple devices is shown in Figure 3-6. You can connect 50 to 60 transceivers in this manner. The wiring diagram also shows correct placement of termination resistors (termination resistors are not furnished with the DASCARD-422/485), which are recommended for only the extreme ends of long runs.

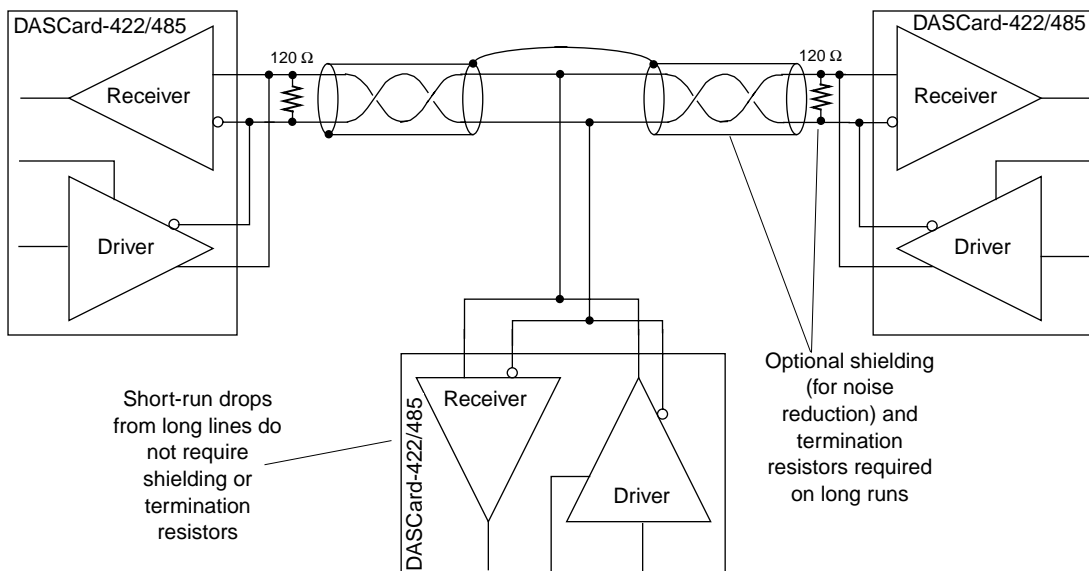


Figure 3-6. Wiring Diagram for a Typical RS-485 Multiple-Device Application, Showing Placement of Termination Resistors

Using a Null Modem Cable (DASCard-232 Only)

A DASCard-232 is a DTE device and can communicate directly with DCE devices, such as modems and printers. If you want to communicate with another DTE device, you must use a null modem cable. Null modem cables switch the signals on three pairs of lines between the two DTE devices, as shown in the wiring diagram of Figure 3-7. The purpose of switching these lines is to connect the transmit terminal of device A to the receive terminal of device B, the receive terminal of device A to the transmit terminal of device B, and so on. You can purchase a null modem cable at most electronic shops, or you can construct your own according to the wiring diagram.

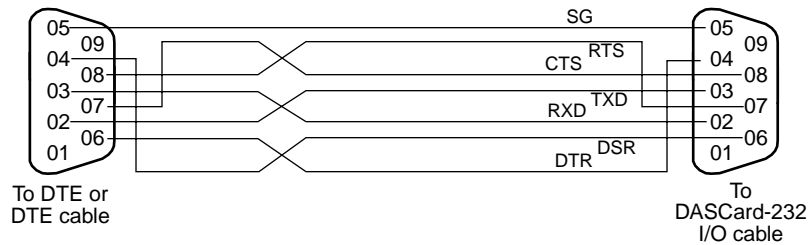
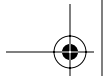


Figure 3-7. Wiring Diagram for a Null Modem Cable



4

Troubleshooting

If your DASCard-232/422/485 is not operating properly, use the information in this chapter to isolate the problem. If the problem appears serious enough to warrant technical support, refer to page 4-4 for information on how to contact an applications engineer.

Identifying Symptoms and Possible Causes

Table 4-1 lists general symptoms and possible solutions for problems with a DASCard-232/422/485.

Table 4-1. Troubleshooting Information

Symptom	Possible Cause	Possible Solution
Diagnostics utility indicates that the card is not installed correctly	The Enabler is not installed.	Reload the Enabler (You cannot load the Enabler from the DOS box in Windows.) Refer to page 2-4.
Card does not respond	The card is not inserted correctly in the PCMCIA socket.	Remove the card and insert again. If your computer does not support hot-swapping, you may have to power the socket using a PCMCIA Card Services utility.
Card is physically damaged		Contact the Keithley MetraByte Applications Engineering Department; refer to page 4-4.



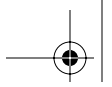
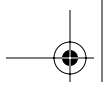


Table 4-1. Troubleshooting Information (cont.)

Symptom	Possible Cause	Possible Solution
Mouse does not work properly or interferes with other card operations	PCMCIA Card Services may have selected an interrupt level or base address that is being used by the mouse.	Use the diagnostics utility to determine the system resources selected by the PCMCIA Card Services; refer to page 2-13. If the interrupt level or base address is being used by the mouse, load the Enabler again using command-line options to select another interrupt level or base address; refer to page 2-4. Assign another interrupt level or base address to the mouse.
Intermittent operation	Vibrations or loose connections. Electrical noise. Improper cabling/termination in external wiring.	Cushion source of vibration and tighten connections. Provide better shielding or reroute wiring. Refer to wiring diagrams in Chapter 3.
Card does not work properly	You used Ctrl+Alt+Del to restart your computer. (On some computers, Ctrl+Alt+Del does not reset the socket controller.)	Restart your computer by using the reset button or by turning power OFF and then back ON. Refer to your computer documentation.
System lockup	A timing error occurred.	Press Ctrl+Alt+Del .
Handshaking is inoperable	Enabler could not allocate memory for handshaking window.	Use a memory manager to exclude a space for the handshaking memory window.

If you cannot identify the problem using the information in Table 4-1, refer to the next section to determine whether the problem is in the computer or in the DASCard-232/422/485.





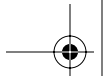
Testing the Card and the Computer

To determine whether the problem is in the computer or in the DASCARD-232/422/485, perform the following steps:

1. Remove power connections to the computer.
2. Unplug the DASCARD-232/422/485 cable from the card, keeping the connections intact on the device attached to the cable.
3. Remove the DASCARD-232/422/485 from the computer and visually check for damage. If a card is obviously damaged, refer to page 4-4 for information on returning the card.
4. With the DASCARD-232/422/485 out of the computer, check the computer for proper operation. Power up the computer and perform any necessary diagnostics.

If you have another DASCARD-232/422/485 that you know is functional, refer to the next section to determine whether the problem is in the PCMCIA socket or in the device attached to the cable. If you do not have another card, refer to page 4-4 for information on how to contact an applications engineer.





Testing the PCMCIA Socket and Attached Device

To determine whether the problem is in the PCMCIA socket or in the serial device, perform the following steps:

1. When you are sure that the computer is operating properly, install a DASCARD-232/422/485 you know is functional. Do not connect the device to the card cable.
2. Apply computer power and check operation with the functional DASCARD-232/422/485 in place. This test checks the PCMCIA socket. If you are using multiple cards, check the sockets you are using.
3. If the PCMCIA sockets are functional, connect the DASCARD-232/422/485 cable to the device, and check operation.
4. If operation is normal, the problem is in the original DASCARD-232/422/485.
5. If you cannot isolate the problem, refer to the next section for instructions on getting technical support.



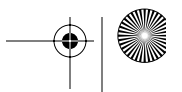
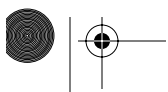
Technical Support

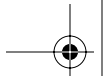


Before returning any equipment for repair, call the Keithley MetraByte Applications Engineering Department at:

(508) 880-3000

Monday - Friday, 8:00 A.M. - 6:00 P.M., Eastern Time





An applications engineer will help you diagnose and resolve your problem over the telephone. Please make sure that you have the following information available before you call:

DASCard-232/422/485 Model DASCard-232
DASCard-422/485

Serial # _____
Revision code _____

Computer Manufacturer _____

CPU type 286 386 486 Pentium

Clock speed (MHz) 20 25 33 66 100 _____

Math coprocessor Yes No

Amount of RAM _____

Video system EGA VGA SVGA

BIOS type _____

PCMCIA controller _____

Memory manager _____

Operating system DOS version _____

Windows version 3.0 3.1 _____

Windows mode Standard Enhanced

PCMCIA Card and Socket Services Type _____

Version _____

Compiler (if applicable) Language _____

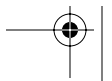
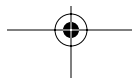
Manufacturer _____

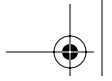
Version _____

Accessories Type/number _____

Type/number _____

Type/number _____





If a telephone resolution is not possible, the applications engineer will issue you a Return Material Authorization (RMA) number and ask you to return the equipment. Include the RMA number with any documentation regarding the equipment.

When returning equipment for repair, include the following information:

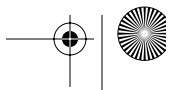
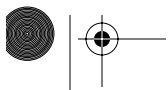
- Your name, address, and telephone number.
- The invoice or order number and date of equipment purchase.
- A description of the problem or its symptoms.
- The RMA number on the outside of the package.

Repackage the equipment, using the original anti-static wrapping, if possible, and handling it with ground protection. Ship the equipment to:

ATTN: RMA # _____
Repair Department
Keithley MetraByte
440 Myles Standish Boulevard
Taunton, Massachusetts 02780

Telephone (508) 880-3000
Telex 503989
FAX 508/880-0179

Note: If you are submitting your equipment for repair under warranty, you must include the invoice number and date of purchase.



A

Specifications

Table A-1 lists the specifications for the DASCARD-232/422/485.

Table A-1. DASCARD-232/422/485 Specifications

Attribute	DASCARD-232	DASCARD-422/485
UART	16C550 UART; provides a 16-byte FIFO to off-load the CPU	
Data transfer rate	Up to 115.2 kbaud	
+5 V power supply requirements	Static: 30 mA, maximum ¹ Operating: 36 mA, maximum Standby: 25 mA, maximum	Static: 30 mA, maximum ¹ Operating: 81 mA, maximum Standby: 25 mA, maximum
Operating temperature	0°C to 70°C	
Storage temperature	-40°C to 85°C	
Humidity	0 to 90%, noncondensing	
Dimensions	Standard PCMCIA Type II (5.00 mm thick)	
PCMCIA standard	PCMCIA PC Standard Specification 2.1	
Static discharge protection	10 kV ESD protection	4 kV ESD protection

Notes

¹ With I/O connector unplugged.

B

Connector Pin Assignments

The following tables list the pin assignments for the 9-pin connector of the DASCARD-232 and the DASCARD-422/485 cables.

Table B-1. Pin Assignments for the Connector of the DASCARD-232 Cable

Pin	Name	Function
1	CD	Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	SG	Signal Ground
6	DSR	Data Set Ready
7	RTS	Ready To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

**Table B-2. Pin Assignments for the Connector of the
DASCard-422/485 Cable**

Pin	Name	Function
1	RTS+	Ready To Send (positive)
2	TXD+	Transmit Data (positive)
3	SG	Signal Ground
4	RXD+	Receive Data (positive)
5	CTS+	Clear To Send (positive)
6	RTS-	Ready To Send (negative)
7	TXD-	Transmit Data (negative)
8	RXD-	Receive Data (negative)
9	CTS-	Clear To Send (negative)

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