Spectracom Model 8179T
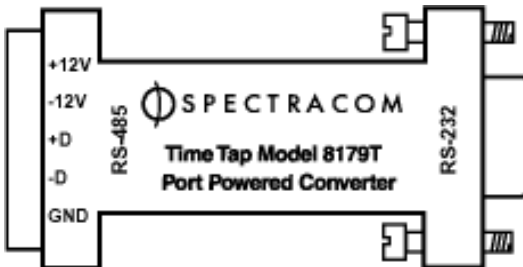# TimeTap®
Port Powered Converter

Instruction Manual

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Spectracom 5-Year Warranty

Spectracom warrants each new product manufactured and sold by it to be free from defects in material, workmanship, and construction, except for batteries, fuses, or other material normally consumed in operation that may be contained therein, for five years after shipment to the original purchaser (which period is referred to as the "warranty period"). This warranty shall not apply if the product is used contrary to the instructions in its manual or is otherwise subjected to misuse, abnormal operations, accident, lightning or transient surge, repairs or modifications not performed by Spectracom.

The GPS receiver is warranted for one year from date of shipment and subject to the exceptions listed above. The power adaptor, if supplied, is warranted for one year from date of shipment and subject to the exceptions listed above.

The Rubidium oscillator, if supplied, is warranted for two years from date of shipment and subject to the exceptions listed above.

All other items and pieces of equipment not specified above, including the antenna unit, antenna surge suppressor and antenna pre-amplifier are warranted for 5 years, subject to the exceptions listed above.

WARRANTY CLAIMS_____
Spectracom's obligation under this warranty is limited to in-factory service and repair, at Spectracom's option, of the product or the component thereof, which is found to be defective. If in Spectracom's judgment the defective condition in a Spectracom product is for a cause listed above for which Spectracom is not responsible, Spectracom will make the repairs or replacement of components and charge its then current price, which buyer agrees to pay.

Spectracom shall not have any warranty obligations if the procedure for warranty claims is not followed. Users must notify Spectracom of the claim with full information as to the claimed defect. Spectracom products shall not be returned unless a return authorization number is issued by Spectracom. Spectracom products must be returned with the description of the claimed defect and identification of the individual to be contacted if additional information is needed. Spectracom products must be returned properly packed with transportation charges prepaid.

EXCEPT FOR THE LIMITED WARRANTY STATED ABOVE, SPECTRACOM DISCLAIMS ALL WARRANTIES OF ANY KIND WITH REGARD TO SPECTRACOM PRODUCTS OR OTHER MATERIALS PROVIDED BY SPECTRACOM, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

TABLE OF CONTENTS

LIST OF TABLES AND ILLUSTRATIONS

GENERAL INFORMATION

1.0 INTRODUCTION

The Spectracom®Model 8179T TimeTap®,shown in Figure 1-1, is a Port Powered RS-485 to RS-232 Converter. The TimeTap connects to a Spectracom NetClock®Master Clock or TimeBridge RS-485 output port. This port sends a time of day data stream every second. The RS-485 time data may be distributed throughout a facility over a single twisted pair cable at distances of up to 4000 feet.

The TimeTap, when connected to the RS-485 data bus, provides an accurate and traceable RS-232 time source. The TimeTap output is used to synchronize dispatch consoles, CADs, networks, workstations, or any RS-232 device.
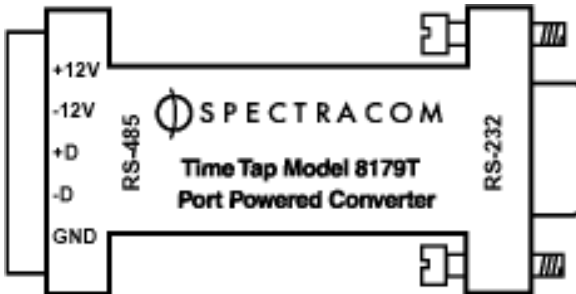

FIGURE 1-1   MODEL 8179T TIMETAP

Spectracom®, TimeTap®, NetClock®, TimeView™, TimeTalk™,TimeBurst™ and TimeBridge™ are trademarks of Spectracom Corporation. All other products are identified by trademarks of their respective companies or organizations.

1.1   FEATURES

The Spectracom TimeTap offers the following features:

* Efficient use of the NetClock: A NetClock RS-485 Remote Output can synchronize up to 32 devices using a single twisted pair cable. TimeTaps, TimeView Display Clocks or other RS-485 devices may be located up to 4000 feet from the NetClock receiver.

* Easy installation: Terminal block input connections make TimeTap installation quick and easy. Model 8179T TimeTaps connect directly to RS-232 devices having DB9 serial ports.

* Port Powered: The Model 8179T derives its operational power from the RS-232 flow control voltages. A power adapter is provided for use with RS-232 ports not having flow control.

* Transient protection: The RS-485 input circuit is equipped with protective devices to limit over-voltage conditions.

1.2   WARRANTY INFORMATION AND PRODUCT SUPPORT

Find warranty information on the inside cover of this manual. Should it become necessary to exercise the warranty, contact Spectracom Corporation to obtain a replacement or service.

Spectracom continuously strives to improve its products and greatly appreciates any customer feedback. Direct comments or questions regarding application, operation, or service to Spectracom's Customer Service Department. Customer service is available Monday through Friday from 8:00 AM to 4:30 PM Eastern time at 585-321-5800.

In addition, please contact Customer Service to obtain a Return Material Authorization Number (RMA#) before returning any device to Spectracom Corporation. Please provide the serial number and failure symptoms. Transportation to the factory is to be prepaid by the customer.

Product support is also available by e-mail. Questions on equipment operation and applications may be e-mailed to Spectracom at:

techsupport@spectracomcorp.com

Visit our web page for warranty registration, product information, and application notes as they become available at:

http://www.spectracomcorp.com

1.3   UNPACKING

Upon receipt, carefully examine the carton and its contents. If there is damage to the carton which results in damage to the unit, contact the carrier immediately. Retain the carton and packing materials in the event the carrier wishes to witness the shipping damage. Failing to report shipping damage immediately may forfeit any claim against the carrier. In addition, notify Spectracom Corporation of shipping damage or shortages to obtain replacement or repair services.

Each Model 8179T is shipped with an instruction manual and an ancillary kit. Table 1-1 lists the items included in the ancillary kit. Check that these items have been received.

Quantity	Part Number	Description
1	P13005	Terminal Block, 5-Position
1	R02121	Termination Resistor, 120 Ohms
1	T00026	Power Adapter

TABLE 1-1   ANCILLARY KIT

1.4   *SPECIFICATIONS*

This section lists the specifications for the Model 8179T TimeTap.

1.4.1   *RS-485 Input*

Connector:	5-position terminal block.
Input Signal:	RS-485 once-per-second time data stream from a NetClock or TimeBridge.
Max. Cable Length:	4000 feet (1.2 Km) using shielded twisted pair.
Max. RS-485 Loading:	32 devices.
Transient Protection:	Transient voltage suppressors protect RS-485 input from damaging surges.

1.4.2   *RS-232 Output*

Connector:	DB9 Female.
Output Signal:	RS-232 once-per-second time data stream. The data format and baud rate are determined by the NetClock or TimeBridge.
Configuration:	DCE; This allows the TimeTap to be directly connected to computers or controllers with DB9 serial communication ports.
Flow Control:	DTR, Data Terminal Ready, Pin 4. The TimeTap RS-232 output is enabled whenever DTR is high.

1.4.3   Power

Power Source:	RS-232 control lines; DTR or RTS.
Current:	5 milliamps.
External Power:	Power Adapter T00026 is provided for use with RS-232 ports not having DTR or RTS flow control.

1.4.4   Mechanical and Environmental

Size:	2.5L x 1.3W x 0.7H inches 63.5L x 33W x 18H mm).
Weight:	1.0 oz (27 g).
Temperature:	32° to 122°F (0° to 50° C).

INSTALLATION

2.0   INTRODUCTION

This section describes the TimeTap installation and interface to the NetClock Master Clock and TimeBridge RS-485 time data bus. Refer to Section 3.0 for information on the RS-232 interface and power requirements.
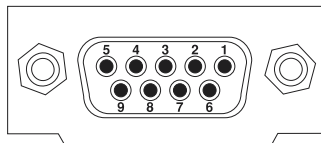
2.1   RS-485 INPUT CONNECTION

The TimeTap provides synchronized timing when connected to the following Spectracom products:

> Model 8182 NetClock/2, WWVB Master Clock
> Model 8183 NetClock/GPS, GPS Master Clock
> Model 8186 TimeBridge, Wireless Time Link
> Model 8189 NetClock/NTP, Network Time Provider
> Model 9183 NetClock/GPS, GPS Master Clock
> Model 9189 NetClock/NTP, Network Time Provider

The TimeTap connects to the RS-485 output port found on the NetClock Master Clocks and TimeBridge. These ports provide a continuous once-per-second time data stream, which is converted to RS-232 by the TimeTap.
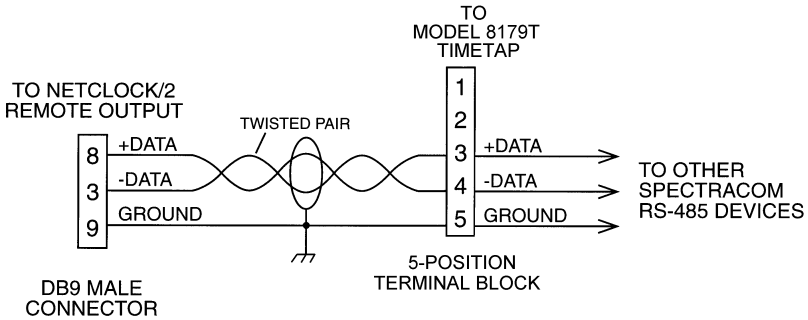
2.1.1   Connection to NetClock/2

The Model 8182 NetClock/2 provides the RS-485 time data stream on the Remote Output connector. The Remote Output is a DB9 female connector. Refer to Figure 2-1 for connector pin numbering.

FIGURE 2-1 NETCLOCK/2 REMOTE OUTPUT CONNECTOR

Connect the TimeTap to the NetClock/2 RS-485 data bus as shown in Figure 2-2. The mating 5-position terminal block is furnished in the TimeTap ancillary kit.
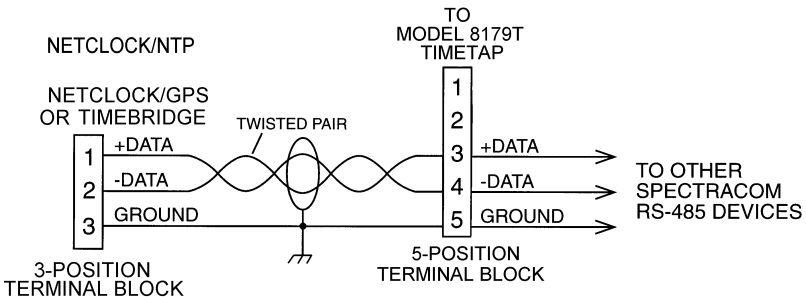

FIGURE 2-2   CONNECTION TO NETCLOCK/2

To simplify installation, Spectracom offers a NetClock/2 RS-485 interface cable. This cable has the mating RS-485 DB9 male connector on one end and prepped leads on the other end. Specify part number CA14xxx, where xxx equals the length in feet.

## 2.1.2   *Connection to NetClock/GPS, NetClock/NTP, or TimeBridge*

Spectracom NetClock/GPS, NetClock/NTP, and TimeBridge provide the RS-485 synchronizing data stream on a 3-position terminal block. Connect the TimeViews to the NetClocks or the TimeBridge as shown in Figure 2-3.

FIGURE 2-3   NETCLOCK/GPS, NETCLOCK/NTP, OR TIMEBRIDGE CONNECTION

2.1.3   Strain Relief

TimeTap input connections are made on a removeable terminal strip. Wires are secured by a jaw which compresses the wires when tightened. When using small diameter wire, 22-26 gauge, a strain relief can be fashioned by wrapping the stripped wire over the insulating jacket as shown in Figure 2-4. Wrapping the wires in this manner prevents smaller gauge wires from breaking off when exposed to handling or movement.

STRIP
WIRE

WRAP WIRE OVER
INSULATING JACKET

INSERT AND
TIGHTEN
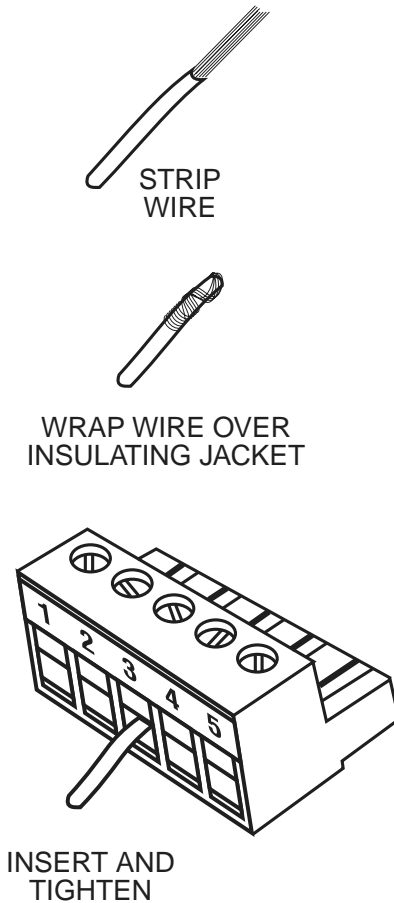
FIGURE 2-4 WIRE STRAIN RELIEF

2.2   INTERCONNECTION INFORMATION

2.2.1   RS-485 Guidelines

Background: RS-485 is a balanced differential transmission that offers exceptional noise immunity and cable lengths up to 4000 feet using twisted pair cable.

Cable Selection: Low capacitance, shielded twisted pair cable is recommended when the RS-485 cable length is expected to exceed 1500 feet. Table 2-1 suggests some manufacturers and part numbers for extended distance cables. These cables are specifically designed for RS-422 or RS-485 applications; they have a braided copper shield, nominal impedance of 120 ohms, and a capacitance of 12 to 16 picofarads per foot.

RS-485 cable may be purchased from Spectracom. Specify part number CW04xxx, where xxx equals the length in feet.

Manufacturer	Part Number
Belden Wire and Cable Company 1-800-BELDEN-1	9841
Carol Cable Company 606-572-8000	C0841
National Wire and Cable Corp. 232-225-5611	D-210-1

TABLE 2-1   CABLE SOURCES FOR RS-485
LINES OVER 1500 FEET

For cable runs less than 1500 feet, a lower-cost twisted pair cable may be used. Refer to Table 2-2 for possible sources. In addition, Catagory 5 cable may also be used.

Manufacturer	Part Number
Alpha Wire Corp 1-800-52ALPHA	5471
Belden Wire and Cable Company 1-800-BELDEN-1	9501
Carol Cable Company 606-572-8000	C0600

TABLE 2-2   CABLE SOURCES FOR RS-485 LINES UNDER 1500 FEET

Termination: Terminate the end devices on the RS-485 time data bus. For a one-way bus installation (as shown in Figure 2-6), terminate the last device on the bus. In a split bus installation (Figure 2-7) terminate the devices installed on each end of the bus.

To terminate the Model 8179T TimeTap, place a 120 ohm resistor across Pins 3 and 4 of the input terminal strip. This resistor is supplied in the ancillary kit and installs as shown in Figure 2-5.
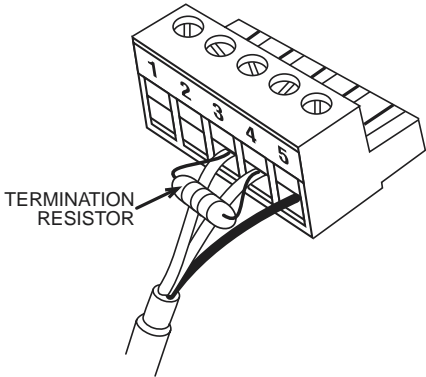
FIGURE 2-5 TERMINATION RESISTOR

Connection Method: The RS-485 transmission line must be connected in a daisy-chain configuration as shown in Figures 2-6 and 2-7. A branched or star configuration is not recommended. Taps into the main transmission line (stubs) should be kept as short as possible. Long stub lengths affect the bus impedance and capacitive loading that could result in reflections and signal distortion.

Loading: Each NetClock or TimeBridge can drive up to 32 RS-485 devices, including the Spectracom products described below:

The Model 9175, TimeView 230, is a display clock with 2.3 inch high green LED digits. The TimeView 230 terminal block input connects directly to the RS-485 data bus.

Spectracom also offers Model 8177, TimeView 400 Display Clock, which features large 4.0 inch high LED digits. The TimeView 400 terminal block input connects directly to the RS-485 data bus.

Spectracom Model 8185 TimeBurst provides a digital time-of-day data burst to a radio transmitter. TimeBurst, when used with the Spectracom Model 8186 TimeBridge, provides community-wide time synchronization to a single NetClock Master Clock. The Model 8185 terminal block input connects directly to the RS-485 data bus.

Spectracom Model 8188 is an Ethernet Time Server which supports NTP, SNTP and UDP/Time protocols. The Model 8188 accepts Formats 0 or 2, and connects to the RS-485 data bus through a terminal block.
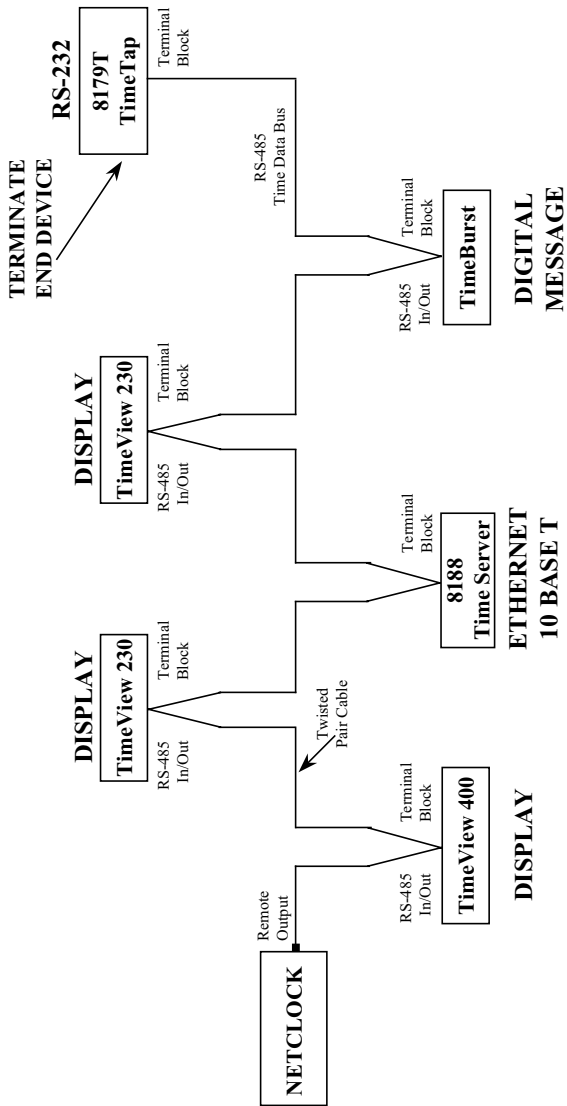
FIGURE 2-6   ONE-WAY BUS INSTALLATION
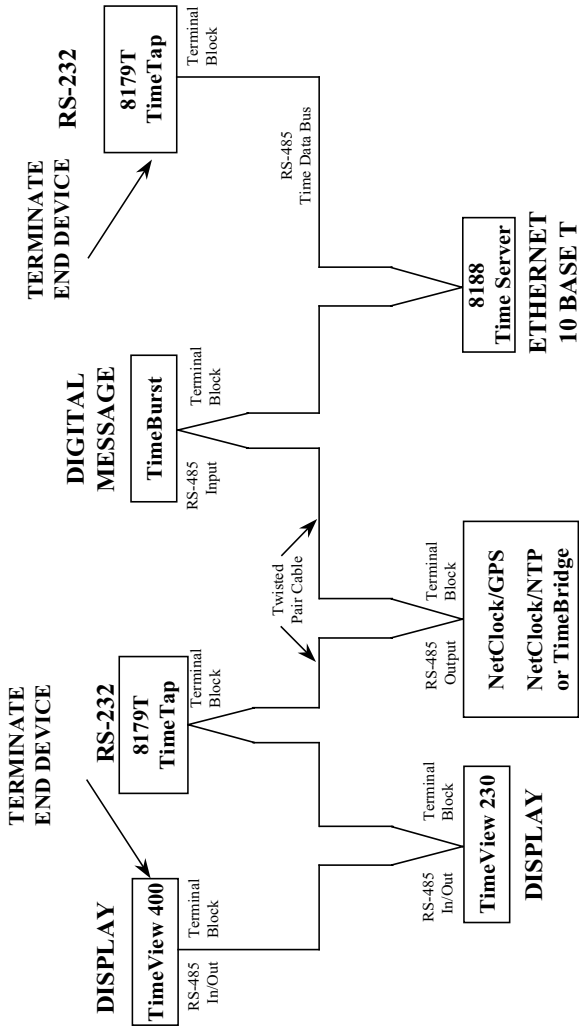
**FIGURE 2-7   SPLIT BUS CONFIGURATION**

OPERATION

3.0   INTRODUCTION

This section describes the TimeTap™ input connections, output connections and operation.

3.1   RS-485 INPUT CONNECTOR

The RS-485 input connector, shown in Figure 3-1, is a removable 5-position terminal strip. The RS-485 data stream from a NetClock or TimeBridge connects to pins 3, 4 and 5 of the terminal strip. An external power source, when required, connects to pins 1 and 2. Refer to Section 3.2 for additional information.
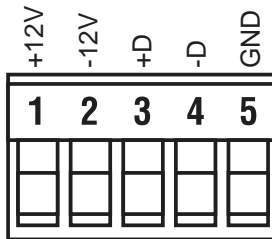
FIGURE 3-1   MODEL 8179T INPUT CONNECTOR

Table 3-1 lists the RS-485 interface connections for the Model 8179T TimeTap to the NetClock/2, NetClock/GPS, NetClock/NTP, and TimeBridge.

TimeTap RS-485 Input	Singnal Description	NetClock/2 Remote Output	NetClock/GPS NetClock/NTP TimeBridge RS-485 Output
3	+ Data	8	1
4	- Data	3	2
5	Ground	9	3

TABLE 3-1   RS-485 INTERFACE

3.1.1 RS-485 Line Termination

A termination resistor is required on devices located at the ends of the RS-485 transmission line. Terminating the cable end preserves data integrity by preventing signal reflections. A 120 ohm 1/2 watt resistor is supplied in the TimeTap ancillary kit. Secure this resistor between pins 3 and 4 of the input terminal strip whenever termination is required. Refer to Section 2.0, INSTALLATION, for additional information on termination and other RS-485 guidelines.

3.2 POWER

The Model 8179T TimeTap can derive its operational power from the RS-232 flow control lines DTR or RTS. Power is applied to the TimeTap whenever one or both of these lines are asserted high. Power consum-ption is less than 5 milliamps.

In some applications the TimeTap may be connected to RS-232 ports not having the DTR or RTS control lines. When connecting to this type of port, the TimeTap must be externally powered.

A serial port can be tested for the presence of flow control using a voltmeter. Connect the negative voltmeter lead to the serial port ground, Pin 5. With the positive voltmeter lead, measure the voltage potential at Pin 4, DTR, and Pin 7, RTS. If either or both pins measure +3.3 to +12 VDC, the TimeTap can be port powered.

3.2.1 External Power

When external power is required, use the supplied AC adapter, Part number T00026. Connect the positive (+) lead to Pin 1 and the negative (-) lead to Pin 2 of the five-position terminal strip. The power adapter can be used in all applications, even where flow control exists.

3.3   RS-232 OUTPUT CONNECTOR

The TimeTap provides the RS-232 time data on the DB9 female connector. The connector pin numbers are shown in Figure 3-2. Table 3-2 lists the RS-232 connector pin assignments.
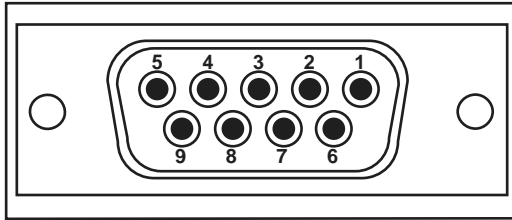
FIGURE 3-2   TIMETAP RS-232 OUTPUT CONNECTOR

PIN	SIGNAL	DESCRIPTION	DIRECTION
2	RXD	RECEIVE DATA	FROM TIMETAP
4	DTR	DATA TERMINAL READY	TO TIMETAP
5	GND	SIGNAL GROUND	COMMON
6	DSR	DATA SET READY	FROM TIMETAP
7	RTS	REQUEST TO SEND	TO TIMETAP
8	CTS	CLEAR TO SEND	FROM TIMETAP

TABLE 3-2   RS-232 OUTPUT INTERFACE

The TimeTap outputs the ASCII time data format and baud rate as configured by the NetClock or TimeBridge. Refer to the equipment manuals for a description of the data formats and RS-485 port config-uration.

The TimeTap RS-232 connector is configured as Data Communication Equipment, or DCE. This allows the TimeTap to be directly connected to a computer or other devices classified as Data Terminal Equipment (DTE). If the TimeTap is connected to a DCE device (i.e. modem), a null modem connection is required.

3.3.1   Flow Control

The TimeTap RS-232 output is enabled whenever Pin 4, Data Terminal Ready (DTR), is held high. The RS-232 output is disabled whenever the DTR is held low. Request To Send (RTS) and Clear to Send (CTS) pins are connected together inside the TimeTap. RTS does not need to be asserted to enable an output. TimeTap power is derived from either the RTS or DTR control lines. The TimeTap pin 6 Data Set Ready (DSR) is tied high whenever power is applied.

> **NOTE**: *To insure that a complete RS-232 data stream is received, hold the DTR line high for a minimum of two seconds. This delay is required because the synchronizing RS-485 data stream is sent only at the beginning of each second. The received data may then be processed to recover a complete time data stream.*

Operation on a serial port not having flow control pins DTR or RTS requires an external power source. Refer to Section 3.2 for additional information. In addition, to enable an RS-232 output connect DTR, pin 4, to DSR, pin 6.

3.3.2   Applications using TIMETAP.EXE program

Spectracom offers the NTM5, DTM5 and DTM3 software packages to synchronize Novell networks,Windows 95/98/NT/ME/2000 workstations and PC-DOS computers. Included with each software package is a program that is compatible the TimeTap. This program requires all flow control connections, RTS, CTS, DSR, and DTR to operate. Contact Spectracom Sales Department for additional information.