APPENDIX B

PATTON ELECTRONICS MODEL 593 SERIES
EIA-530 PIN CONFIGURATIONS

DIRECTION	"DCE" SETTING	DIRECTION
	7- Signal Ground	
To Model 593 Series Receive Data-B (RD)-16	3-(RD) Receive Data-A	From Model 593 Series
From Model 593 Series Transmit Data-B (RD)-14	2-(TD) Transmit Data-A	To Model 593 Series

USER
MANUAL

MODELS 593/25, 593/45 and 593/TB
RS-422/RS-485
Optical Isolators

ISO 9001 CERTIFIED

An ISO-9001 Certified Company

Part# 07M593
Doc# 055041U Rev. A
Revised 07/05/00

SALES OFFICE
(301) 975-1000
TECHNICAL SUPPORT
(301) 975-1007
http://www.patton.com

PATTON Electronics Co.

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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 593/25, 593/45, and 593/TB components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

1.1 RADIO AND TV INTERFERENCE

The Model 593/25, 593/45, and 593/TB generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The Model 593/25, 593/45, and 593/TB has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the Model 593/25, 593/45, and 593/TB does cause interference to radio or television reception, which can be determined by disconnecting the RS-485 interface, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

1.2 CE NOTICE

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

1.3 SERVICE

All warranty and nonwarranty repairs must be returned freight pre-paid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Support at:

telephone: **(301) 975-1007**
email: **support@patton.com**
web address: **http://www.patton.com**

NOTE: Packages received without an RMA number will not be accepted.

Patton Electronics' technical staff is also available to answer any questions that might arise concerning the installation or use of your Patton Model 593/25, 593/45, and 593/TB. Technical Support hours: **8AM to 5PM EST, Monday through Friday.**

2.0 GENERAL INFORMATION

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions or problems arise during installation or use of this product, please do not hesitate to contact Patton Electronics Technical Services at (301) 975-1007.

2.1 FEATURES

- Asynchronous Operation
- Half or Full Duplex over 2 or 4 wire lines
- Maximum cable length 4000 ft.
- Supports Data rates to 115.2 kbps
- 2500 Vrms isolation

2.2 DESCRIPTION

The Patton Models 593/25F, 593/45 and 593/TB are asynchronous RS-422/RS-485 optical isolators, which guard your asynchronous data equipment from the hazards of ground looping. All Models have selectable Dip switch settings for RS-422/RS-485 applications. The Model 593 series provides 2500Vrms of isolation and supports data rates up to 115.2 kbps. Models 593/25F/45/TB are powered by an external +5V regulated power supply.

The Models 593/25F, 593/45, and 593/TB isolates transmit data (XMT+ and XMT-) and receive data (RCV+ and RCV-). The model 593/45 has a RJ-45 on both sides, the model 593/TB has a terminal block on both sides and the model 593/25F has DB-25 female connectors on both sides.

Warning: This product will not provide complete protection should your equipment or building be subject to a direct lightening hit.

3.0 CONFIGURATION

The Models 593/25F, 593/45, and 593/TB feature configuration via hardware switches and headers. This section describes all possible hardware configurations, including the factory default settings. Table 1 below summarizes configuration of switches and headers for the Model l 593/25F, 593/45, and 593/TB.

Switch			Typical Application Settings		
		Mode	422 4W	485 2W	485 4W
Position	Function	ON/OFF	Full Duplex	Half Duplex	Half Duplex
S2-1	TX Mode	HD/FD	OFF	ON	ON
S2-2	Operation	422/485	ON	OFF	OFF
S3-1	TX Mode	HD/FD	OFF	ON	ON
S3-2	Operation	422/485	ON	OFF	OFF
S1-1,2	Interface	2W/4W	OFF	ON	OFF
S1-3	RX IMP.	120 Ω/HI	ON	ON	ON
S1-4	Not Used	( )	X	X	X
S4-1, 2	Interface	2W/4W	OFF	ON	OFF
S4-3	RX IMP.	120Ω /HI	ON	ON	ON
S4-4	Not Used	( )	X	X	X

Table 1. Configuration summary of swithes and headers

3.1 DIP SWITCH S2 & S3

The Models 593/25F, 593/45, and 593/TB feature two eight-position Dip switches (S2 and S3). These switches are accessed by opening the plastic case by inserting a small flat blade screwdriver in the slot on either side of the case and twisting gently. Figure 1A, below shows Models 593/TB & 593/45 bottom view of the printed circuit board and the location of the dip switches. Figure 1B shows Model 593/45 bottom view of the printed circuit board and the location of the DIP switches

The Models 593/25F, 593/45, and 593/TB switches (S2-1 thru S2-8 & S3-1 thru S3-8) can be configured as either "On" or "Off". Figure 2 shows the orientation of the DIP switches with respect to ON/OFF positions.
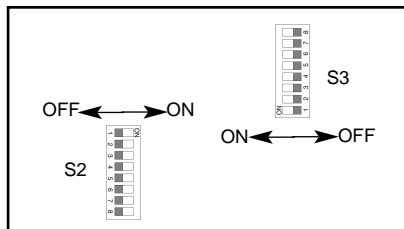
Figure 1A. Models 593/TB & 593/45, location of S2 & S3 on Printed Circuit Board
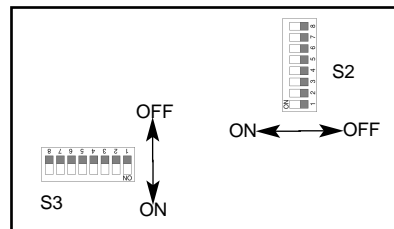
Figure 1B. Model 593/25, location of S2 & S3 on Printed Circuit Board
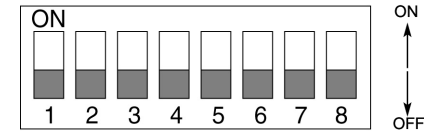
Figure 2. Close up of DIP switches showing ON/OFF positions. The switch is shown in the Off position.

3.1.1 Configuration DIP Switches Sets S2 and S3

The two eight-position Dip switches are used to configure the units for common asynchronous data rates, full or half duplex over 2-wire/4-wire twisted pair. The following sections describe all the possible configurations.

> **NOTE:** **When selecting any hardware configurations below, Switch S2 and Switch S3 must be set the same.**

3.1.2 Full/Half Duplex S2-1 and S3-1

Switches S2-1 and S3-1 determine full duplex or half duplex transmission mode.

	Half Duplex	Full Duplex
S2-1	ON	OFF
S3-1	ON	OFF

3.1.3 422/485 Operation S2-2 and S3-2

Switches S2-2 and S3-2 determine RS-422 or RS-485 interface operation.

	RS-422	RS-485
S2-2	ON	OFF
S3-2	ON	OFF

3.2 DIP Switch S1 & S4

The Models 593/25F, 593/45, and 593/TB features 2 four-position DIP switches S1 and S4. Figure 3A (below) shows Models 593/TB & 593/45 top view of the printed circuit board and where S1 and S4 are located. Figure 3B shows Model 593/25 top view of the printed circuit board and the position of S1 and S4. Following figure 3A/3B is a detailed description on the different switch settings and their functions.
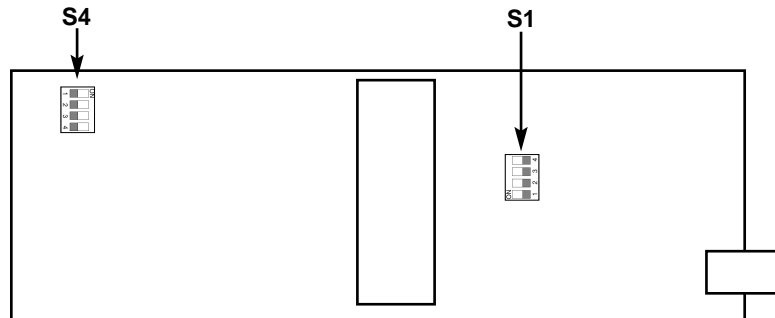

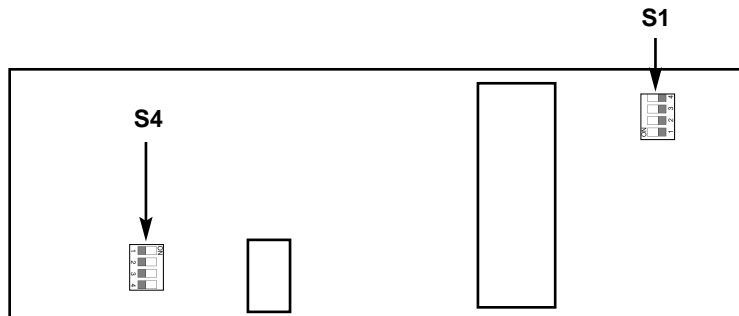**Figure 3A.** Models 593/TB & 593/45 Location of JP7 Pins 1-4 & JP8 Pins 1-4

Figure 3B. Model 593/25, Location of JP7 Pins 1-4 & JP8 Pins 1-4

3.2.1 2W/4W Interface S1-1, 2 and S4-1, 2
Switches S1-1, 2 and S4-1, 2 set up the interface for 2 wire or 4 wire operation.

	2 Wire	**4 Wire**
S1-1, 2	ON	OFF
S4-1, 2	ON	OFF

3.2.2 Receive Impedance S1-3 and S4-3
Switches S1-3 and S4-3 set the receive impedance for 120 Ohms or high impedance.

	120 Ohm	**High Impedance**
S1-3	ON	OFF
S4-3	ON	OFF

3.3 Data Rates DIP Switch Setting S2 and S3

The table below shows the data rates DIP switch settings for S2 and S3. *Switches S2 and S3 must be set identically to operate properly.*

Model 593 Series Data Rate Table				
Switch Positions		**Data Rates**		
S2 Position	**S3 Position**	**4800 bps**	**9600 kbps**	**19.2 kbps**
S2-3	S3-3	OFF	OFF	OFF
S2-4	S3-4	OFF	OFF	OFF
S2-5	S3-5	OFF	OFF	OFF
S2-6	S3-6	OFF	OFF	ON
S2-7	S3-7	OFF	ON	OFF`
S2-8	S3-8	ON	ON	OFF

Model 593 Series Data Rate Table (continued)				
Switch Positions		**Data Rates**		
S2 Position	**S3 Position**	**38.4 kbps**	**57.6 kbps**	**115.2 kbps**
S2-3	S3-3	OFF	OFF	ON
S2-4	S3-4	OFF	ON	ON
S2-5	S3-5	ON	OFF	OFF
S2-6	S3-6	OFF	OFF	OFF
S2-7	S3-7	OFF	OFF	OFF`
S2-8	S3-8	OFF	OFF	OFF

4.0 INSTALLATION

Once you have properly set the configuration switches and jumpers, you are ready to connect Models 593/25F, 593/45, or 593/TB to your system. This section tells you how to connect the interfaces and how to operate your Model 593/25F, 593/45, or 593/TB.

4.1 CONNECTING TO THE RS-422 OR RS-485 INTERFACE

To function properly, the Models 593/25F, 593/45, and 593/TB must have one or two pair of twisted pairs of metallic wire. These pairs must be "dry" (unconditioned) metallic wire between 19 and 26 AWG.

The 593 Series has three physical interfaces as listed below. Following the list is figure 4, which shows the location of the physical interfaces.

1. Model 593/45:   RJ-45 jacks on both sides
2. Model 593/TB: Terminal blocks with strain relief on both sides
3. Model 593/25F: DB-25 female connectors on both sides.

4.1.1 4-Wire Connection Using RJ-45

The RJ-45 connectors on the Model 593/45 are pre-wired for a standard TELCO wiring enviroment. The signal/pin relationships are shown below.

RJ-45	SIGNAL
1	N/C
2	GND*
3	RCV-
4	XMT+
5	XMT-
6	RCV+
7	GND*
8	N/C

*Connection to ground is optional
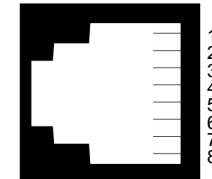
In most modular RS-422/RS-485 applications it is necessary to use a "cross over" cable. The diagram below shows how a cross over cable should be constructed for an environment where the Model 593/45 and the RS-422/RS-485 device uses a 8-wire RJ-45 connector. Similar logic should be followed when using RJ-45 connectors or a combintion of the two.

| MODEL 593/45		RS-422/485 DEVICE	
SIGNAL	PIN#	PIN#	RS-422/485 SIGNAL
NC	1 ------------------N/C		
GND	2 ------------------N/C		
RCV-	3 ------------------5		XMT-
XMT+	4 ------------------6		RCV+
XMT-	5 ------------------3		RCV-
RCV+	6 ------------------4		XMT+
GND[†]	7 ------------------N/C		
N/C	8 ------------------N/C		

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4.1.2 2-Wire Connection Using RJ-45

Most RS-485 devices employ a two-wire, half duplex configuration. When using this configuration, be sure to first set the Model 593/45 to half duplex mode by switching DIP switches and jumpers (refer to section 3.0 for this configuration)—then use *only the transmit (XMT) pair* as shown below

593/45 SIGNAL   **RS-485 SIGNAL**

XMT+ ....+
XMT- ....-

4.1.3 4-Wire Connection Using Terminal Blocks

If you purchased the Model 593/TB, you will need to open the case to access the terminal blocks. The following instructions will tell you how to open the case, connect the bare wires to the terminal blocks, and fasten the strain relief collar in place so that the wires won't pull loose.

1. If the case is not already open, open it now by twisting it open with a small plastic screwdriver.

2. Strip the outer insulation from the twisted pairs about one inch from the end.
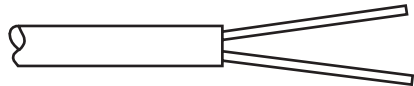
3. Strip back the insulation on each of the 2 twisted pair wires about .25 inch.
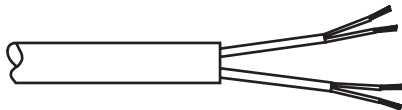
4. Place the cable through the end plate, and make a small loop in the cable and feed the cable under the tie wrap which is currently installed in the board. When you have completed this assembly it should resemble figure figure 5. Connect *one pair* of wires to XMT+ and XMT- (transmit positive and negative) on the terminal block, making careful note of which color is positive, and which color is negative.
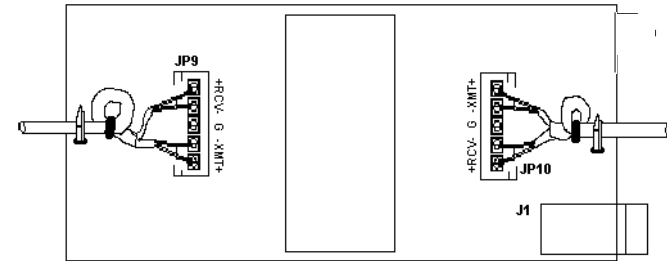

Figure 5. Model 593/TB, showing Terminal Block & Cable Routing

5. If you are using 4-wire mode, connect the other pair of wires to RCV+ and RCV- (receive positive and negative) on both of the terminal blocks, again making careful note of which color is positive, and which is negative.

Ultimately, you will want to construct a four pair cross over cable that makes a connection with the RS-422/485 device, as shown below.

Model 593/TB		**RS-422/-485 Device**
SIGNAL	**TERMINAL BLOCK**	**SIGNAL**
TXB+	TB (5)	RXB+
TXA-	TB (4)	RXA-
RXB+	TB (1)	TXB+
RXA-	TB (2)	TXA-

4.1.4 2-Wire Connection Using Terminal Blocks

Most RS-485 devices employ a two-wire, half duplex configuration. When using this configuration, be sure to first set the Model 593/TB to half duplex mode by switching DIP switches and jumpers (refer to section 3.0 for this configuration)—then use *only the transmit (XMT) pair* as shown below

Model 593/TB   **RS-485 Device**

XMT+ .... +
XMT- .... -

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4.1.5 4-Wire Connection Using DB-25

Most DB-25 connectors on the Model 593/25F conform to EIA-530 interface standards. When connecting to the RS-422/485 devices which also conform to EIA-530 standards, your cable should have crossed over wiring, as shown below.

Model 593/TB		RS-485	
SIGNAL	DB-25 PIN	DB-25 PIN	SIGNAL
TXA+	2	3	RXA+
TXB-	14	16	RXB-
RXA+	3	2	TXA+
RXB-	16	14	TXB-

4.1.6 2-Wire Connection Using DB-25

Most DB-25 connectors on the Model 593/25F conform to EIA-530 interfaces standards. The RS-422/485 devices also conform to EIA-530 requirements and when connecting these devices, follow the wiring shown below.

Model 593/25F		RS-485
SIGNAL	DB-25 PIN	SIGNAL
TXA	2	+
TXB	14	-

4.2 OPERATING THE MODELS 593 SERIES

Once the Models 593/25F, 593/45, and 593/TB are properly configured and installed, it should operate transparently—as if it were a standard cable connection. Plug in the external power supply and the units will be powered up.

PATTON ELECTRONICS MODEL 593/25, 593/45, and 593/TB SPECIFICATIONS

Transmission Format:	Asynchronous, full or half duplex
Interface Standard:	RS-422/RS-485
Connectors:	Model 593/25F; DB-25 female on both sides
	Model 593/45; RJ-45 on both sides
	Model 593/TB; Terminal block on both sides
Data Rates:	Up to 115.2 kbps
Power Supply:	External wall-mount transformer, Regulated +5 VDC @ 120mA
Isolation:	2500 Vrms/optical Isolation
Dimensions:	Model 593/45 & 593/TB 3.8"L x 2.1"W x 0.79"H
	Model 593/25 4.1"L x 2.1"W x 0.79H
Temperature Range:	0-60°C (32-140°F)
Altitude:	0-10,100 feet
Humidity:	5 to 95% noncondensing

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