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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Nov 00
1.0	First Release	Feb 01
1.1	Added info for Dual Fiber versions	Mar 01
1.2	Added info for LTC versions	Feb 02
1.2.1	Corrected LTC pinouts in Table 1 Updated infor about Mode jumper	Jun 02
1.3	Added 8 new CWDM wavelengths	Dec 02
1.4	Corrected Table 1	Aug 03
1.5	Added Application Configuration table	Aug 03
1.6	Fixed formatting	Nov 08

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1. OVERVIEW

The 7705DT series Fiber Data Transceivers provide an economical method of transmitting up to eight RS-232 or four RS-422 data signals over a fiber optic link. Another 7705DT Data Transceiver facilitates conversion back to RS-232 or RS-422 data signals at the destination. A pair of 7705DT Data Transceivers permits bi-directional data transmission over distances up to 50 Km, with minimum possible latency. The 7705DT-LTC versions transmit Linear Time Code (LTC) and up to seven RS-232 or four RS-422 data signals over a fiber optic link. Another 7705DT-LTC facilitates conversion back to RS-232 or RS-422 data signals and LTC at the destination.

Different versions of the 7705DT and 7705DT-LTC allow the user to choose the optimal function/ price / performance ratio to suit a particular application. The FC versions and versions with no suffix are the lowest cost, but have higher insertion losses as they receive and transmit on the same wavelength over a single fiber. The FW versions are designed to receive and transmit on different frequencies over a single fiber and have a lower insertion loss (The 7705DT-LTC is not available in an FW version). The F2 versions have the lowest insertion loss and are designed to receive and transmit on the same wavelength over separate fibers.

Each version of the 7705DT is available with different laser output configurations to meet a variety of applications. (See specifications for complete information) Two versions are suitable for single fiber or dual fiber wave-division multiplexing (WDM) applications:

7705DT13 1310 nm FP Laser
7705DT15 1550 nm DFB Laser

There are sixteen versions with built in isolators specifically suited to coarse wave-division multiplexing (CWDM) applications.

7705DT27 1270 nm DFB
7705DT29 1290 nm DFB
7705DT31 1310 nm DFB
7705DT33 1330 nm DFB
7705DT35 1350 nm DFB
7705DT37 1370 nm DFB
7705DT43 1430 nm DFB
7705DT45 1450 nm DFB
7705DT47 1470 nm DFB
7705DT49 1490 nm DFB
7705DT51 1510 nm DFB
7705DT53 1530 nm DFB
7705DT55 1550 nm DFB
7705DT57 1570 nm DFB
7705DT59 1590 nm DFB
7705DT61 1610 nm DFB

The chart below shows some typical applications and power budget calculations.

Fiber Type	Fiber Links	Optical/Link Budget	Transmit Side		Receive Side		Description
			Ordering Product Info	TX Power	Ordering Product Info	RX Sensitivity	
Multi-Mode	2	< 3km	7707DT13-F2	-7dBm	7707DT 13-F2	-31dBm	1310nm on Tx & Rx fibers
Single-Mode	2	24dB/60km	7707DT 13-F2	-7dBm	7707DT 13-F2	-31dBm	1310nm on Tx & Rx fibers
Single-Mode	1	17dB/40km*	7707 DT 13	-10dBm	7707DT13	-27dBm	1310nm, bi-directional, one fiber
Single-Mode	1(WDM)	28dB/70km	7707DT13M-W	-1dBm	7707DT15-W	-29dBm	1310nm/1550nm, WDM, bi-directional on one fiber
Single-Mode	1(CWDM)	27dB/90km**	7707DTxx-F2	0dBm	7707DTyy-F2	-31dBm	Different CWDM wavelengths on Tx & Rx, with 8 channel CWDM Mux/Demux**

*With >20dB return loss on fiber Interface
**Assume 8 Ch Mux/Demux loss of 3.5dB
Tx Power/Rx Sensitivity are nominal values ± 1
Fiber Loss = 0.4/0.3dB per km @ 1310nm/15

Table 1-1: Typical Application Configurations

Features:

- Eight RS-232 or four RS-422 bi-directional data channels – jumper selectable
- LTC versions support LTC with seven RS-232 or four RS-422 bi-directional data channels
- Protocol independent - handles any baud rate or word length up to 1 Mb/s
- Fully hot-swappable from front of frame with no fiber or data channel disconnect required
- SC/PC, ST/PC or FC/PC connector options
- Card edge LEDS indicate module health, optical failure, fiber link OK
- Tally output on Frame Status bus upon loss of input signal

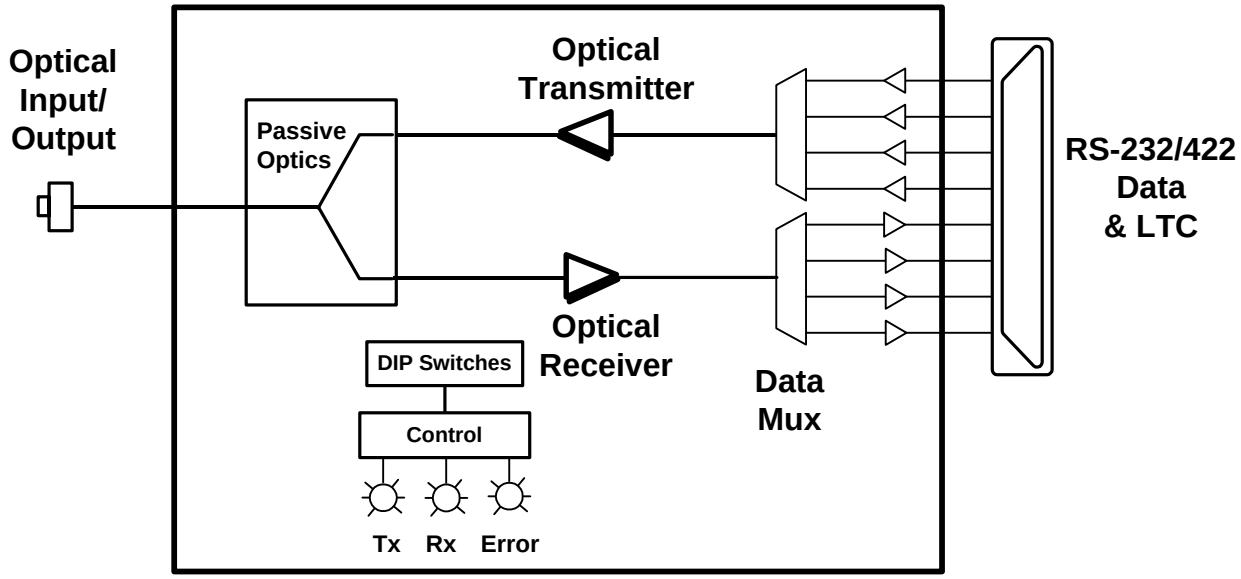

Figure 1-1: 7705DT Block Diagram – Single Fiber Versions

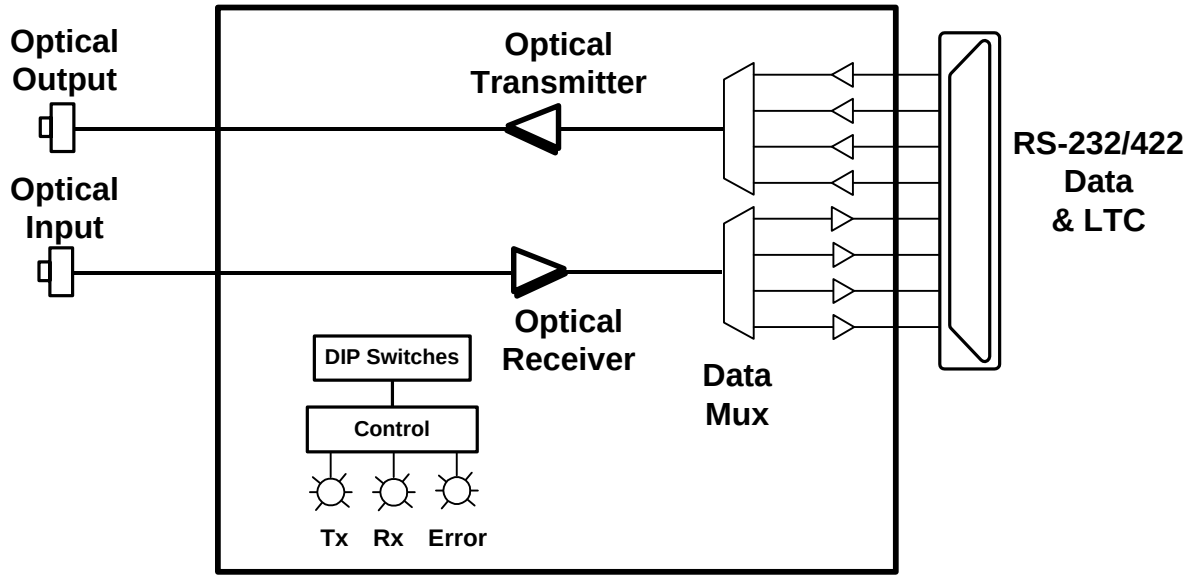

Figure 1-2: 7705DT Block Diagram – Dual Fiber Versions

2. INSTALLATION

The 7705DT-FC, 7705DT-FW and 7705DT-LTC versions come with a companion rear plate that has a 25 pin female D connector and one SC/PC (shown), ST/PC or FC/PC optical connector. The 7705DT-F2 and 7705-LTC-F2 versions come with a companion rear plate that has a 25 pin female D connector and two SC/PC (shown), ST/PC or FC/PC optical connectors. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

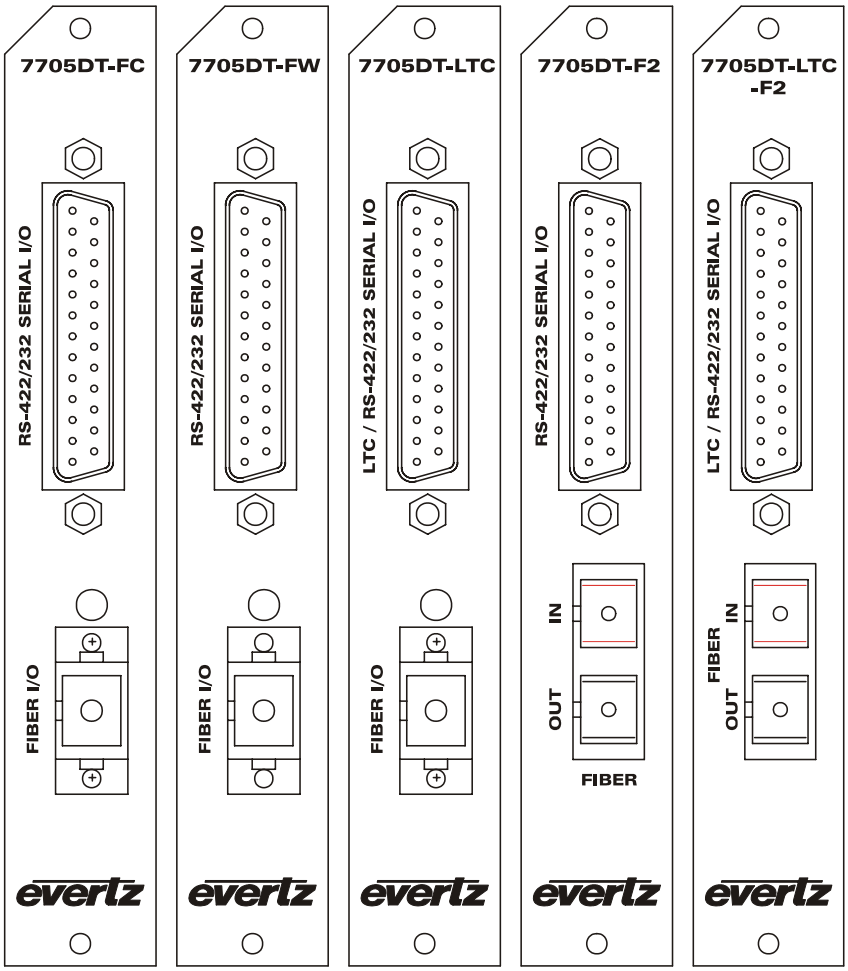

Figure 2-1: 7705DT and 7705DT-LTC Rear Panels

2.1. RS-232/422 SERIAL PORT AND LTC CONNECTIONS

RS-232/422 SERIAL I/O: On the 7705DT versions, this 25 pin female D connector provides connections for up to eight RS-232 or four RS-422 serial data streams. The connector has 4 sections of serial data I/O each consisting of 2 input pins, 2 output pins and 2 ground pins as shown in Table 2-1.

LTC/RS-232/422 SERIAL I/O: On the 7705DT-LTC versions, this 25 pin female D connector provides connections for up to LTC and either seven RS-232 or four RS-422 serial data streams. The connector has a pair of LTC input pins, a pair of LTC output pins, and 4 sections of serial data I/O each consisting of 2 input pins, 2 output pins and 2 ground pins as shown in Table 2-1.

On all versions, the SEL 1, 2, 3, and 4 jumpers located at the rear of the module determine whether each section will be operated as a balanced RS-422 Receive and Transmit channel, or two RS-232 Receive and Transmit channels (See section 5.3 for location of the SEL jumpers). If flow control is required for an RS-232 data channel then one Rx/Tx pair of the section can be used for data and the other pair can be used for flow control. If no flow control is required then both Rx/Tx pairs may be used for data. The pins labeled Rx are inputs to the 7705DT, and the pins labeled Tx are outputs from the 7705DT. On the 7705DT-LTC versions, the pins labeled LTC In are LTC inputs to the 7705DT-LTC, and the pins labeled LTC Out are outputs from the 7705DT-LTC.

When the inputs are configured as RS-422 inputs, four jumpers J27, J19, J20 and J21 allow you to determine the default state of the input when there is no signal connected. See section 5.4 for information about setting the jumpers.

	Model			
	7705DT		**7705DT-LTC**	
	SEL4 Setting		**SEL4 Setting**	
Pin #	**RS232**	**RS422**	**RS232**	**RS422**
1	Ground	Ground	Ground	Ground
2	Tx4B Out	Tx4 + Out	Tx4B Out	Tx4 + Out
3	Tx4A Out	Tx4 – Out	Tx4A Out	Tx4 – Out
4	Ground	Ground	LTC + Out	LTC + Out
5	Tx3B Out	Tx3 + Out	Tx3B Out	Tx3 + Out
6	Tx3A Out	Tx3 – Out	Tx3A Out	Tx3 – Out
7	Ground	Ground	Ground	Ground
8	Tx2B Out	Tx2 + Out	Tx2B Out	Tx2 + Out
9	Tx2A Out	Tx2 – Out	Tx2A Out	Tx2 – Out
10	Ground	Ground	LTC + In	LTC + In
11	Tx1B Out	Tx1 + Out	Tx1B Out	Tx1 + Out
12	Tx1A Out	Tx1 – Out	---	Tx1 – Out
13	Ground	Ground	Ground	Ground
14	Rx4B In	Rx4 + In	Rx4B In	Rx4 + In
15	Rx4A In	Rx4 – In	Rx4A In	Rx4 – In
16	Ground	Ground	LTC - Out	LTC - Out
17	Rx3B In	Rx3 + In	Rx3B In	Rx3 + In
18	Rx3A In	Rx3 – In	Rx3A In	Rx3 – In
19	Ground	Ground	Ground	Ground
20	Rx2B In	Rx2 + In	Rx2B In	Rx2 + In
21	Rx2A In	Rx2 – In	Rx2A In	Rx2 – In
22	Ground	Ground	LTC - In	LTC - In
23	Rx1B In	Rx1 + In	Rx1B In	Rx1 + In
24	Rx1A In	Rx1 – In	---	Rx1 – In
25	Ground	Ground	Ground	Ground

Table 2-1: DB25 Pin Connections

2.2. OPTICAL CONNECTIONS

In order to establish a valid link between a pair of 7705DT modules, one module must be configured as 'Mode A', and the other as 'Mode B'. Selection of the correct mode is achieved by setting jumper J22, at the rear of the board. See section 5.2.

The 7705DT modules are designed to work only with single mode optical fiber.

2.2.1. Single Fiber Versions

FIBER I/O: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical input/output from the 7705DT as shown in section 3.1. This connector should be connected to the matching connector of another 7705DT module at the destination end with a suitable fiber optic cable.

The 7705DT-FC, 7705DT-FW and 7705DT-LTC versions have an optical isolator built in so that one fiber optic cable can handle a bi-directional data signal. The 7705DT-FC and 7705DT-LTC versions receive and transmit on the wavelength marked on the rear panel. The 7705DT13-FW version transmits on 1310 nm and receives on wavelengths in the 1530 to 1570 nm range. The 7705DT15-FW and 7705DTxx-FW versions transmit on the wavelength marked on the rear panel and received on 1310 nm.

2.2.2. Dual Fiber Versions

FIBER IN: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical input to the 7705DT-F2 and 7705DT-LTC-F2 as shown in section 3.1. This connector should be connected to the FIBRE OUT connector of another 7705DT-F2 or 7705DT-LTC-F2 module at the destination end with a suitable fiber optic cable. The 7705DT-F2 and 7705DT-LTC-F2 versions receive on wavelengths in the 1310 to 1570 nm range.

FIBER OUT: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical output from the 7705DT-F2 and 7705DT-LTC-F2 as shown in section 3.1. This connector should be connected to the FIBRE IN connector of another 7705DT-F2 or 7705DT-LTC-F2 module at the destination end with a suitable fiber optic cable. The 7705DT-F2 and 7705DT-LTC-F2 versions transmit on the wavelength marked on the rear panel.

2.3. CARE AND HANDLING OF OPTICAL FIBER

2.3.1. Safety

Never look directly into an optical fiber. Non-reversible damage to the eye can occur in a matter of milliseconds.

The laser modules used in the 7705DT modules are Class I, with a maximum output power of 2mW.

2.3.2. Handling And Connecting Fibers

Never touch the end face of an optical fiber.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. We recommend that you maintain a minimum bending radius of 3 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module. For further information about care and handling of fiber optic cable see section 3 of the Fiber Optics System Design chapter of this manual.

3. SPECIFICATIONS

3.1. OPTICAL INPUT/OUTPUT

Number:	1 (Standard, FC and FW versions) 2 (F2 versions)
Connector:	Female SC/PC, ST/PC or FC/PC
Input Wavelengths:	1310nm to 1610nm
Maximum Input Power:	0 dBm
Input Optical Sensitivity:	
Standard version:	-25dBm
FC version:	-25dBm
FW version:	-27dBm
F2 version:	-29dBm
Output wavelengths:	
Standard:	1310nm, 1550nm nominal
CWDM:	1270nm to 1610nm (see ordering information)
Output power:	
1310nm FP:	-7dBm ±1dBm (Standard, FC and FW versions) -4dBm ±1dBm (F2 version)
1550nm , CWDM DFB:	-3dBm ±1dBm (Standard, FC and FW versions) 0dBm ±1dBm (F2 version)
Fiber Size:	9 μm core / 125 μm overall

3.2. DATA INPUT/OUTPUT

Number of Ports:	
Standard Version:	8 RS 232 or 4 RS 422 – Jumper Selectable (ports are individually configurable)
LTC Version:	7 RS 232 or 4 RS 422 – Jumper Selectable (ports are individually configurable)
Connector:	Female DB-25
Baud Rate:	Determined by incoming data, up to 3 MBaud
Latency:	Maximum single direction latency with 1m of fiber is 500ns for RS422, 10m for RS232. Additional latency due to fiber is 5μs/km.

3.3. LTC INPUT/OUTPUT

Standard:	SMPTE 12M
Number:	1 input and 1 output.
Connector:	Female DB-25.
Input Level:	0.2 to 4V p-p, balanced or unbalanced
Output Level:	1V p-p nominal, balanced
Impedance:	110 ohm balanced

3.4. ELECTRICAL

Voltage:	+ 12VDC
Power:	6 Watts.
EMI/RFI:	Complies with FCC regulations for class A devices. Complies with EU EMC directive.

3.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS LEDS

LOCAL FAULT (LD2): This Red LED will be On when there is insufficient optical input power, an optical transmitter failure or when there is a fault in the module power supply. When the FRAME STATUS jumper is set to the ON position the FRAME STATUS bus will also be asserted. (See section 5.1)

MODULE OK (LD5): This Green LED will be On when the module is operating properly.

NO LINK (LD3): This Yellow LED will be On when there is a no valid link established with another 7705DT at the destination end.

OPTICAL FAULT (LD4): This Red LED will be On when there is failure in the optical receiver or transmitter.

5. JUMPERS AND USER ADJUSTMENTS

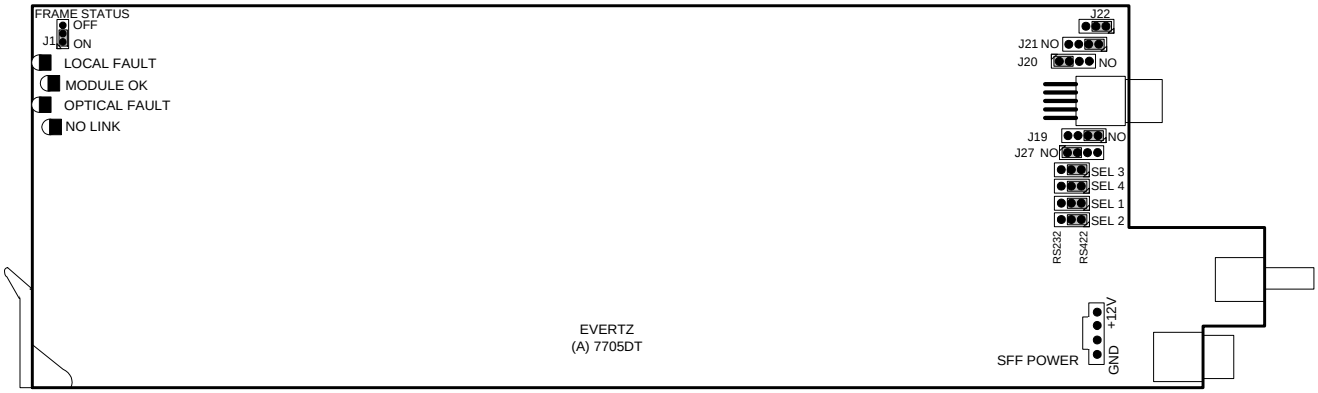

Figure 5-1: Jumper Locations for Rev A Modules

5.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J1, located at the front of the module, determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

FRAME STATUS: To monitor faults on this module with the frame status indicators (on the PS FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (default)

When this jumper is installed in the Off position local faults on this module will not be monitored.

5.2. SELECTING THE LINK MODE

The Link Mode setting allows each 7705DT module to distinguish it's own signal, and that of a sister card at the other end of a fiber link. In the case of an incomplete or damaged fiber link each 7705DT module will see reflections or its own signal. In order to establish a valid link between a pair of 7705DT modules, one module must be configured as 'Mode A', and the other as 'Mode B'. Selection of the correct mode is achieved by setting jumper J22, at the rear of the board. It does not matter which card is selected as Mode A and which as Mode B, as long as they are different. Jumper J22 should be set to the 'IN' position on one end of the link, and to the 'OUT' position on the other.

5.3. SELECTING THE DATA COMMUNICATIONS STANDARD (RS-232 OR RS-422)

There are 4 jumpers located at the rear of the module that are used to configure whether the data channels will operate in the RS-232 or RS-422 standard. The 25 pin D connector used to connect the data channels is divided into four sections, each consisting of a pair of inputs, a pair of outputs and a pair of grounds. Each jumper controls one section of the connector. For simplicity, only section 1 is described below, however the other sections operate in the same way.

SEL 1: To set section 1 inputs and outputs to operate in the RS-232 standard, install the jumper in the RS-232 position. In this mode, section 1 of the connector will be configured as two Rx/Tx ports (Port 1A and Port 1B) as shown in Table 2-1.

To set section 1 inputs and outputs to operate in the RS-422 standard install the jumper in the RS-422 position. In this mode, section 1 of the connector will be configured as one Rx/Tx port (Port 1) as shown in Table 2-1.

5.4. SELECTING THE DEFAULT BEHAVIOUR OF THE INPUTS WHEN THERE IS NO SIGNAL CONNECTED

Four jumpers J19, J20, J21 and J27, located at the rear of the board, control the behaviour of the RS-422 inputs for Rx2, Rx3, Rx4 and Rx1 respectively when there is no signal connected. This is not critical for most applications, and the setting will not typically affect performance. Figure 5-2 shows a simple schematic of the receiver input. The RS-422 receiver device has a pulldown to ground on the Rx+ input and a pullup to +5v on the Rx- input.

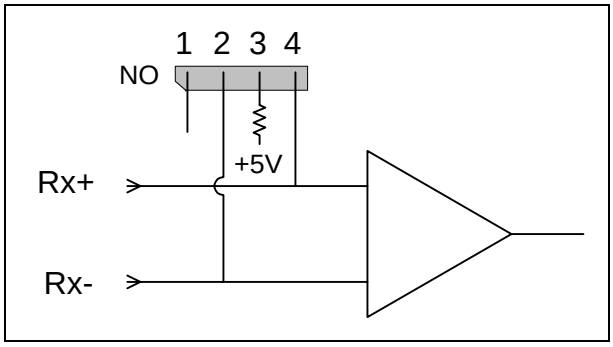

Figure 5-2: Receiver Input Pullup Configuration

If you want to override the default pullups set the appropriate jumper as shown in the chart below.

Jumper on pins	Function
1 & 2	Default pullups (Rx+ low, Rx- high)
2 & 3	Rx- pulled up to +5 volts, Rx+ default (low)
3 & 4	Rx+ pulled up to + 5 volts, Rx- default (high)

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