RSF User's Guide

August 2004

Board Version 1.1

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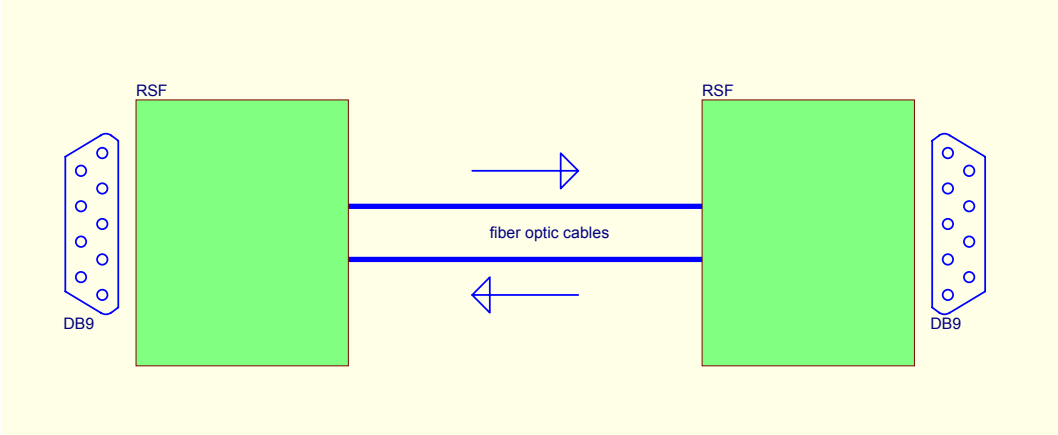
1 OVERVIEW

The RSF is a low-cost fiber optic to RS-232 converter board. The RSF was designed to be used by schools, hobbyist, and in light industrial applications to facilitate communications over longer distances than possible with RS232. It uses two low-cost plastic fiber optic cables to convey the RS-232 transmit (TxD) and receive (RxD) signals up to 100 meters (300 feet). The plastic fiber optic cable (IF-C-E1000) may be cut with sharp knife at a 90-degree angle, without the need for special tools. The RSF uses visible light transmitters to facilitate visual inspection of the signals. The RSF supports communications from DC up to 1 million bits per second. The RSF has a standard DB9 RS-232 connector, as well as a three-pin header to connect to the serial port. The DB9 connector may be directly inserted to the serial port. The RSF is jumper configurable to act as a DTE or a DCE. The RSF requires a well-regulated 5Volt supply.

The RSF uses the transmit and receive signals of the RS-232 protocol. Typically, two RSF units are connected through fiber optic cables. Each RSF is powered from a different supply. The two ends of the link act as a transparent RS-232 serial connection. Fiber optic links are useful to communicate between equipment with different ground voltages. Being insensitive to electromagnetic static, fiber optic links are also useful in noisy environments such as heavy industrial applications or in lightning-prone environments.



2 BOARD CONNECTIONS

2.1 Power

The RSF is powered by an external well-regulated 5 Volt power supply. Two terminals J1 and J2 are provided for the power input. J1 is a 3.5 mm terminal block plug. J2 is a two-pin header. Either J1 or J2 may be used. Due to its small size, for applications where space is limited, perhaps J2 is more convenient. Alternatively, wires may directly be soldered to J2 terminals. J1 supports polarized plug-style terminal blocks. This facilitates quick connections in the field.

Powering the RSF

Once connected to a well-regulated 5 Volt supply, verify that the LED (D2) is on. Then, view the output of the fiber optic transmitter. This is the blue connection. The transmitter uses visible light to simplify visual verification. Connect the fiber optic cable to the transmitter and view the far end of the cable to verify that the transmitter output is present.

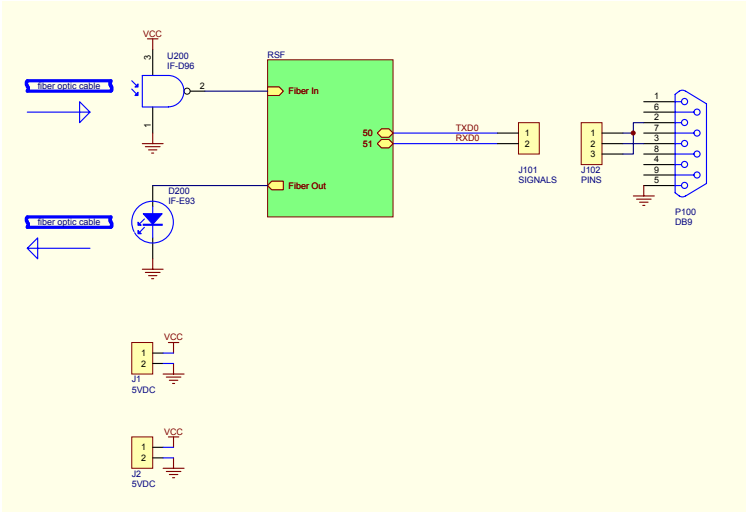
2.2 Fiber Optics

Two fiber optic cables connect the RSF to another RSF unit. One of the fiber optic cables caries the received signals, and the other, the transmitted signals. The transmit cable is connected to the blue connector. The receive cable is connected to the black connector. Cut the fiber optic cable with a sharp blade. The cut should be clean and perpendicular to the cable. A good cut ensures a good transfer of light between the cable and the connector.

Two fiber optics cables are used between each pair of RSFs. The fiber optic cables should connect the transmit (blue) connector of one RSF to the receive (black) connector of the other RSF.

2.3 Serial RS-232 Signals

The serial input (RxD) and serial output (TxD) signals are not directly connected to the DB9 connector. Instead, the signals are brought to a two-position terminal, J101. These signals are to be connected to pins 2 and 3 of the DB9 connector. However, whether RxD is to be connected to pin 2 of the DB9, or pin 3 of the DB9 depends on the type of serial port the RSF is to be connected. The RSF unit may be bought already configured. Otherwise, the user must configure the RSF by soldering two wires to connect J101 and J102 terminals.



RSF Simplified Block Diagram

3 CONFIGURING THE RSF

The RSF serial port may be configured as a Data Terminal Equipment (DTE) or a Data Communication Equipment (DCE). The IBM compatible PC ports are configured as DTE. The default DB9 DTE and DCE connections are shown below.

DTE pin		DCE pin
TD 3	---------->	2 RD
RD 2	<----------	3 TD
SG 5	<---------->	5 SG

Note that other signals are not given in the list above, since they are not used by the RSF.

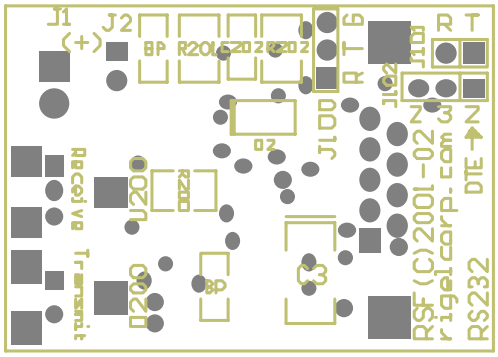
Two wires must be soldered between the terminals of J101 and J102. J101 terminals are connected to pins 2 and 3 of the DB9 connector. Pin 2 is repeated (appears twice) in J102 for convenience. The RSF circuitry receive and transmit signals are denoted by the letters “R” and “T” on J101. Note that “R” and “T” refer to transmit and receive from the viewpoint of the RSF.

3.1 Configure RSF to as a DCE to be connected to a DTE

Connect terminal 2 of J102 to terminal “T” of J101 to configure the RSF as a Data Communications Equipment (DCE). Similarly, connect terminal 3 of J102 to terminal “R” of J101. Note that, the “R” and “T” terminals of J102 are connected to the closest terminals on J101. This is the configuration if the RSF is to be connected to a PC (DTE). A straight arrow with the label “DTE” is placed on the board to indicate this configuration.

3.2 Configure RSF to as a DTE to be connected to a DCE

Connect terminal 3 of J102 to terminal “T” of J101 to configure the RSF as a Data Terminal Equipment (DTE). Similarly, connect terminal 2 of J102 to terminal R of J101



Hints

Note that two DTEs, for instance, two PCs, may be connected to each other through a fiber optic link. In this case, simply configure both RSFs as DCEs. Similarly, two DCEs may be connected together through the fiber optic link. In this case, configure both RSFs as DTEs.

If you use a serial cable to connect the RSF to the serial port, use a straight-through modem cable. There are serial cables, called cross cable, where transmit and receive lines are interchanged at the ends. This type of cable is useful in connecting two similar ports (DTE to DTE or DCE to DCE). If you want to use a cross cable, you may do so, provided that you configure the RSF accordingly.

3.3 Determine the Type of an Unknown Device (DTE or DCE)

If you are not sure what type of serial port (DTE or DCE) a device has, use the following procedure. Connect an unconfigured RSF to the serial port. That is, remove the connections between J101 and J102. The unknown device may be a DTE or a DCE, a PC, a printer, a modem, etc. You may need a gender changer on the DB9 port to fit two dissimilar DB9 connectors. Power the equipment and the RSF. Measure the voltage on J102 terminals. Of J102 terminals 2 and, one should read a negative voltage (-9V or so) and the other a positive voltage. Connect the J102 terminal with the negative voltage to terminal “R” of J101. Similarly, connect the other terminal of J102 to terminal “T” of J101.

4 RSF Bill of Materials

Quantity	Part	Designator
2	BP, 1206	C1, C2
4	150pF, 1206	C202, 203, 204, 205
4	luF cap	C101, 102, 103, 104
1	33uF, 2216	C3
1	270 Ohm, 1210	R201
4	470 Ohm, 1210	R202, 203, 204, 205
1	560 Ohm, 1210	R200
1	680 Ohm, 1210	R1
1	1N4001	D1
1	Led SM	D2
1	3.5 Terminal Block Socket	J1
2	1x3 Header	J100, J102
2	1x2 Header	J2, J101
1	DB9 Connector	P100
1	IF-E97	U200
1	IF-D95T	D200
1	SN74ACT08D	U201
1	MAX232D	U100