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Professional Solutions to Professional Problems

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Information and Instruction Manual for the
RS232ToTTL
RS232 to TTL-Serial Conversion Board

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Disclaimer and Revision History

All of our products are constantly undergoing upgrades and enhancements. Therefore, while this manual is accurate to the best of our knowledge as of its date of publication, it cannot be construed as a commitment that future releases will operate identically to this description. Errors may appear in the documentation; we will correct any mistakes as soon as they are discovered, and we will post the corrections on the web site in a timely manner. Please refer to the specific manual for the version of the hardware and firmware that you have for the most accurate information for your product.

This manual describes the RS232ToTTL RS232 to TTL-Serial conversion board, artwork version 2.

Product Warnings

Note that the product is not protected against static electricity. Its components can be damaged simply by touching the board when you have a “static charge” built up on your body. Such damage is not covered under either the satisfaction guarantee or the product warranty. Please be certain to safely “discharge” yourself before handling any of the boards or components.

LIFE SUPPORT POLICY

Due to the components used in the products (such as those from National Semiconductor Corporation and others), Peter Norberg Consulting, Inc.'s products are not authorized for use in life support devices or systems or in devices that can cause any form of personal injury if a failure occurs.

Note that National Semiconductor states "Life support devices or systems are devices which (a) are intended for surgical implant within the body, or (b) support or sustain life, and in whose failure to perform when properly used in accordance with instructions or use provided in the labeling, can be reasonably expected to result in a significant injury to the user". For a more detailed set of such policies, please contact National Semiconductor Corporation.

Introduction and Product Summary

The Peter Norberg Consulting, Inc. RS232ToTTL serial communications adapter board is a tiny (1" x 1.725") board that allows TTL-Serial devices (such as our BC4D15 stepper motor controller board) to communicate via a standard RS232 port on a computer.

The RS232ToTTL adapter is powered by your power supply.

The board supports communication rates of up to 1 megabaud; however, when used with our stepper motor controllers, you normally operate at 9600 baud (due to the design specifications of those products). If the board is connected to some other TTL-Serial compatible device, its full communication rate may be available, depending on the limitations of the device to which it is being connected.

From a connections point of view, there are exactly 2 connectors on the board. One is an RS232 DB9 female connector, to be used to connect to your RS232 system. The other is a 5-wire connector (either a screw-terminal or an MTA-100 SIP header), which is to be connected to your target board. The 3 signals transferred are Serial Input (to the RS232ToTTL board), Serial Output (from the RS232ToTTL board), and ground (so that the systems are correctly referenced to each other). In addition, this connector provides power for the board. You either provide regulated 5 volts to the "+5" and GND pins, or 6.5 to 9 volts to the "Vc" and GND pin.

No other standard serial signals are provided (such as CTS, RTS, DSR, etc.); this reduces the cost and complexity of the connections. You should refer to the following manual section ("Connecting the RS232ToTTL") for more information about the connections.

Connecting the RS232ToTTL

The RS232ToTTL board appears as shown here.



The image shows the board with the MTA-100 connector option.

The board as shown (not including the overhang from the DB9 connector) is 1 inch wide by 1.725 inches tall. The mounting holes are 0.125" in diameter, positioned in 0.125" from each corner. This size hole can accept up to a number 5 screw; this means that the standard #4 mounting posts work quite well. The screw hole positions are therefore:

0.125, 0.125 0.875, 0.125
0.125, 1.600 0.875, 1.600

The signals on the remaining connector are to be attached to your motor controller board (or your Parallax Basic or Javalin Stamp, etc.) and your power supply. The signals are defined as:

Signal	Description
Vc	+6.5 to +9 volt regulated power input to the board. Use this to provide power if your power supply produces voltage in this range.
+5	+5 volt regulated power input to the board. Use this to provide power if you are providing voltage from a 5 volt regulated source.
GD	Ground reference. This must be connected to the ground on your controller board; otherwise, the TTL signals may not have a correct reference for operation.
SO	Serial Output FROM the RS232ToTTL board TO your controller (usually, this is attached to the SI line for our boards)
SI	Serial Input TO the RS232ToTTL board FROM your controller (usually, this is attached to the SO line for our boards)

The power requirements for the board are less than 20 milliamps, and either a 5 volt or a 6.5 to 9 volt regulated supply must be used to provide the power. If you use 5 volts, connect it to the "+5" and "GD" connectors on the board. If you use +6.5 to +9 volts, connect it to the "Vc" and "GD" connectors on the board. **Do not connect power supplies to both the Vc and the +5 power input pins!** You will blow out the board, and you may damage your power supplies!

As noted in the above table, you need to have a good ground reference for the system to work correctly. The "GD" signal on the RS232ToTTL board is internally connected to the ground wire of the RS232 cable and also *must* be attached to the ground reference for the board to which it is attached (such as one of our motor controller boards). Failure to connect this line can result in inability to communicate and also can cause failure of the RS232ToTTL board. Note that this means that you will probably be running two wires to the GD pin: the ground for your power supply, and a reference line to the GND for the motor controller board. If the motor controller board is supplying the power (i.e., the +5 voltage input is used), then just the one ground wire to the motor controller board will be needed.

The SO line is the serial output from the RS232ToTTL board to the motor controller (or other board). It is “logically connected” to the serial output line from the computer; thus, it needs to be connected to the Serial Input (“SI”) line of the motor controller in order for the controller to see the serial data.

Similarly, the SI line is the serial input to the RS232ToTTL board from the motor controller. It is “logically connected” to the serial input line to the computer; therefore, it needs to be connected to the Serial Output (“SO”) line of the motor controller in order for the computer to see the data from said controller.

The signal levels to and from the RS232ToTTL board are standard TTL logic levels. This means that the board’s worst-case response is:

High signal: Minimum 3.2 volts, maximum 4.9 volts

Low signal: Minimum 0.3 volts, maximum 0.6 volts

Input switching threshold: 1.3 to 1.9 volts, with about 50 mV of hysteresis

This is fully compatible with all of our board level products and should be compatible with most TTL-serial devices.

When connecting the RS232ToTTL board to any of our products which have a “**JS**” jumper (which is most of them), the **JS** jumper **MUST** be removed in order for the RS232ToTTL board to be able to “talk” to the motor controller board. For our older boards which have a socketed MAX232 serial chip (such as the BiStepA04 or the SimStepA04), the serial chip must be removed (same effect as removing the JS jumper on the later boards). Otherwise, your connection to the motor controller is:

RS232ToTTL Signal	Motor Controller Signal	Description
GD	GND	Common Ground
SO	SI	Serial Data from RS232ToTTL to Motor Controller
SI	SO	Serial Data from Motor Controller to RS232ToTTL

Observe that the “SO” signal from each board is connected to the “SI” of the other board. This is because the signal names are always relative to the given board; therefore, “Serial Input” to one board must be connected to the “Serial Output” of the other board.

Quick test by use of HyperTerminal

The easiest way to test the connection to one of our boards is through use of HyperTerminal. Load HyperTerminal, and define a new connection using the appropriate RS232 COM port. Follow the description in our “First Use” manual to make certain that the communication parameters are set up correctly.

Testing without being connected to any other board

You can easily test the RS232ToTTL board by simply jumpering its SO line back to its SI line, and then sending serial data to it. Everything that you send will be echoed back.

Under HyperTerminal, if you set “Local Echo” on (as suggested in our “First Use” manual), this method will make all of the characters that you type appear twice on the screen: for example, typing “hello” would cause the screen in Hyperterminal to show “hheelloo”, assuming that the RS232ToTTL board is operating.

Testing when connected to any of our motor controllers

Having set up the communications parameters, turn on power to our motor controller board (which has already been connected to the RS232ToTTL board as described previously under Connecting the RS232ToTTL). Our copyright message should appear on the HyperTerminal screen if everything is connected correctly.

All of our motor controllers will also respond to the command “-12?” by displaying another copy of the copyright message.