

Modem to Serial Port Interfacing for RLC Series Controllers



The RLC controllers support a full duplex serial port for interfacing to a computer or serial terminal. This connection can be made with just a cable, a telephone modem, a packet TNC, or any other method that will send the serial characters back and forth (some have even used Telnet over the Internet).

Using a Telephone Modem

There are two ways to control the RLC controllers over the phone line. If the RLC-controller has an autopatch, you can control it using the reverse autopatch and entering commands with the telephone's DTMF pad. This works well for small changes, but if you want to do a lot of programming remotely, it is nice to do it with a computer. You can do this by putting an external modem on the controller and calling it from a modem attached to your computer (either internal or external). The modem should be connected to the controller's serial port - it has nothing to do with the autopatch. You can either run separate phone lines to the autopatch and the modem, or you can split the phone line and use it for both (one at a time, of course).

Sharing 1 phone line with your autopatch

You can either have your computer call the modem and have it answer or you can have the controller call your computer. If you want to call the controller and have the modem answer and you plan to use the reverse autopatch, you will have to have a way of determining which one answers the phone. The most common way is to set the modem to answer on three rings, then to change the reverse patch setup to make it answer on either 1 or 5 rings (you can do that with a couple of macros). Whichever one answers first will make the connection. It is also possible to use a call routing interface (similar to a fax switch) to detect whether you are calling with a modem or not or to make you press DTMF digits to get to the modem.

Controller calls your computer

The other option is to make the controller call your computer (if this function is supported on your controller). This is usually done by sending a DTMF command to the controller to tell it to call you, which means you can't connect with the modem if there is a problem with your receiver. The DTMF command usually calls a macro that sends "ATDT <phone number>" to the modem. The advantage of having the controller call you is that it doesn't conflict with the reverse patch and since the phone number is hard coded in the macro, you can be sure that no one else will call the controller with their modem and get control (since the modem can be set not to answer). If you plan to use this method, you may have to turn off line feed sending, since most modems will abort the dialing process if they receive any more serial characters after "ATDT<phone number><carriage return character \$0D hex or 014 decimal>" and the controller usually sends both a carriage return and line feed at the end of each line.

Before connecting the external modem to the controller, you should connect it to your computer or serial terminal and enter some setup commands. Even if you already have a modem in your computer, you need to hook up the modem that will go on the controller to set it up. You can use a standard modem cable for this, or build one according to the chart below. Note that this cable is different than the one that you will use between the controller and the modem, even if the connectors are the same (pins 2 and 3 are swapped).

Computer to Modem Cable

Computer DB-9	Computer DB-25	Description	Modem DB-9	Modem DB-25
3	2	Data Out of Computer	3	2
2	3	Data Into Computer	2	3
.....	.....	Hand Shaking Line	.....	4 to 5
.....	.....	Hand Shaking Line	.....	6 to 8
.....	.....	Hand Shaking Line	.....	8 to 20
5	7	Ground	5	7

You will not need to connect the modem to the phone line to enter these setup commands. Load your communications program and set the communications port to talk to the external modem (it will probably be set for the internal modem when you start). Enter "ATZ" (without the quotes) and press enter. You will see an "OK" response if everything is hooked up right. Then enter (without the quotes, pressing enter after each command):

- "AT&F" to set everything to factory defaults.
- "ATS0=3" to make the modem answer after 3 rings or "ATS0" to keep the modem from answering at all.
- "AT&K0" to disable local flow control (the controller doesn't support it).
- "ATE0" to disable local echo.
- "ATQ1" to keep the modem from sending result codes.
- "AT&W" to store the settings to the modem's non-volatile memory.
- "AT&W1" to store the settings to the modem's non-volatile memory.

RS-232 Signals and Interfacing

The RLC-controllers input and output is the RS-232 standard, $\pm 12V$. The pin-out is standard for a 9-pin serial connector (Except for the RLC-2/2a controller). To connect to a terminal or computer's 9-pin serial connector, use a straight-through cable (not a null modem) with at least pins 2, 3, and 5 connected. To connect to a computer with a 25-pin serial connector, you can use a standard 9 to 25-pin converter or wire your own cable. To wire your own, connect the RLC-controllers pins 2, 3, and 5 to the computer's 3, 2, and 7 respectively.

If you are connecting the controller to a modem, you will need to swap pins 2 and 3 relative to how you would connect it to a computer or run your cable through a null-modem adaptor. This is because master and slave devices (DTE and DCE devices) are wired differently. When hooking the controller and a modem (both slave devices) together, you have to adjust accordingly. The following chart summarizes the four different types of cables you may need.

RLC-2 Controller to Computer or Modem Cable

Controller DB-9	Description	Computer DB-9	Computer DB-25	Modem DB-9	Modem DB-25
9	Data Out of Controller	2	3	3	2
4	Data Into Controller	3	2	2	3
5	Ground	5	7	5	7

Other Controllers to Computer or Modem Cable

Controller DB-9	Description	Computer DB-9	Computer DB-25	Modem DB-9	Modem DB-25
2	Data Out of Controller	2	3	3	2
3	Data Into Controller	3	2	2	3
5	Ground	5	7	5	7

Communications Parameters

After connecting your terminal, computer, or modem (either packet or telephone) to the RLC-controllers, you need to make sure that the communications parameters match on both ends. The default settings for the RLC-controllers are 9600 N-8-1:

Baud Rate	9600
Parity	None (N)
Word Length	8
Stop bits	1

If you are using a modem, you may be able to set the baud rate that the modem uses to communicate with the controller to be different than the speed at which it connects to the other modem. In other words, a 2400 baud modem may be able to connect to the controller at 9600 baud and to the other modem at 2400 baud.

Troubleshooting

- If you can't get the connection between your computer or serial terminal and the controller to work, there are several things you can check. Make sure that the serial cable is properly connected between a serial port on your computer and the serial port on the controller and that the controller is powered up. Load your communications software (Procomm, Telix, the Windows terminal program, etc) and make sure it is set for the right communications port and baud rate. Whenever you reset the controller (or cycle the power) it will output a serial message you should see on the screen. Pressing enter should get you a "DTMF>" prompt that indicates that it is ready to accept the same commands you might enter from a radio's DTMF pad. If neither the reset message or pressing enter gets any response, double check that you have the communications port set right on your computer. Then disconnect the serial cable from the controller and short pins 2 and 3 on that end of that cable together (those are the data in and out pins). Then type on the keyboard and see if what you type shows up on the screen - it should (even with echo turned off). If you quit shorting those pins, the

data should not show up on the screen. If you cannot get the data to show up on the screen by shorting those two pins, the problem is either in the computer or the cable (the controller isn't even hooked up). The most common problem is having the communications port set wrong - try all the settings. Then check your cable again. If you still can't get it to echo, unhook the cable from the computer and try shorting pins 2 and 3 together on the serial port right at the computer, eliminating the cable as a possible problem. Again, you should see whatever you type appear on the screen. If you don't, the problem is in the computer or how you have the communications program set up. Once you get it to echo with the jumper wire at the computer, hook up the cable to the computer and try the jumper wire at the other end of the cable. If that doesn't work, the problem is in the cable. Finally hook the cable back up to the controller and try again. If the characters echo but don't work, you may be in 7 bit mode rather than 8 bit mode. If all else fails, feel free to contact Link Communications, Inc. for help on our Technical Support Number: 1-406-482-7515.

