

RTC Communications Procedure

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Chapter 1

Direct Serial Connect to AP22 Time Switch

1. Setup Hyperterminal to 2400 bits per second using the COM port on your computer. See [Appendix A](#).
2. If you have an AP22 time switch with version CP22 software in it, you must set the baud rate to 2400 in the time switch. This is done with command 33. At the main menu in the AP22 press **3, 3**, and then select **1** for 2400 baud.
3. Connect the RTC serial cable from your PC to the AP22 time switch. The RTC cable number is #504567. Although it looks like a typical serial cable, it is not. The DB9 female port on the top of the time switch has RS232 signals routed in pins different than typical RS232 pinouts. This was designed to achieve 100% compatibility with our older time switches that used pagers and different radios requiring power and TTL level signals.
4. The next step tests whether or not the AP22 can receive characters, by sending a universal command to the time switch that causes it to reply. This command is three characters typed in a row-- @, P, and #. An easy way to type these three characters is to hold down the Shift button and press **2, p**, and **3**.

The time switch will respond with the string shown in Fig. 1, or something similar.

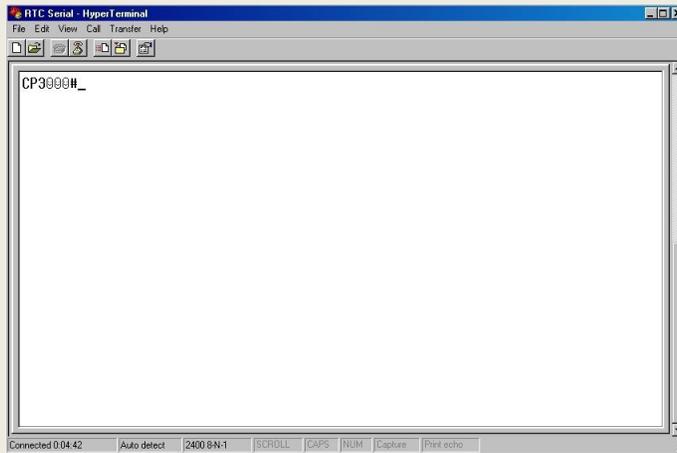


Fig. 1

Depending on the version of firmware in your time switch, you will see a string that looks like CP...#. Your string may be AP...#. The string that returns depends on the version of the code in the time switch, its address, and current running status.

5. At this point you have verified that the PC COM port, cable, and time switch are all connected properly and working correctly.
6. Turn off Hyperterminal as you no longer need it.
7. Once this diagnostic test has been performed, you can run any of the RTC software requiring a serial port. This simple test assures a technician that the base components are working correctly.

Chapter 2

Direct Serial Connect to CPR2102 Revision M

The CPR2102 board comes in versions A through M. This section is for connecting to M boards. For A through L, please see [Chapter 3](#). To identify if you have an M board, see [Appendix B](#).

Set up Hyperterminal to 2400 bits per second using the COM port on your computer. See Appendix A.

1. Connect the RTC serial cable from your PC to the CPR2102 time switch. RTC cable number is #504567. Although it looks like a typical serial cable, it is not. The DB9 female port on the top of the time switch has RS232 signals routed in pins different than typical RS232 pinouts. This was designed to achieve 100% compatibility with our older clocks that used pagers and different radios requiring power and TTL level signals.
2. Open the top of the time switch and check that the selector for RS232 and TTL is set to RS232. Notice in the picture below (Fig. 2) it is set up this way. The jumper is the white jumper seen to the right of the rotary switch in the upper left oval.

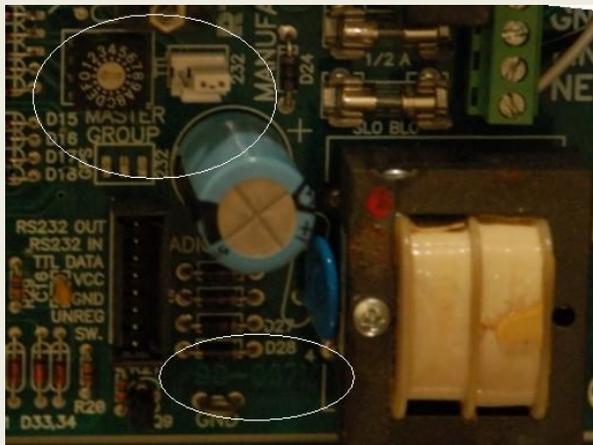


Fig. 2

3. The next step tests whether or not the CPR2102 can receive characters, by sending a universal command to the time switch causing it to reply. The command is three characters typed in a row-- @, P, and #. An easy way to do this is to hold down the Shift button and press **2**, **p**, and **3**.

The time switch will respond with the string shown in Fig. 3, or something similar.

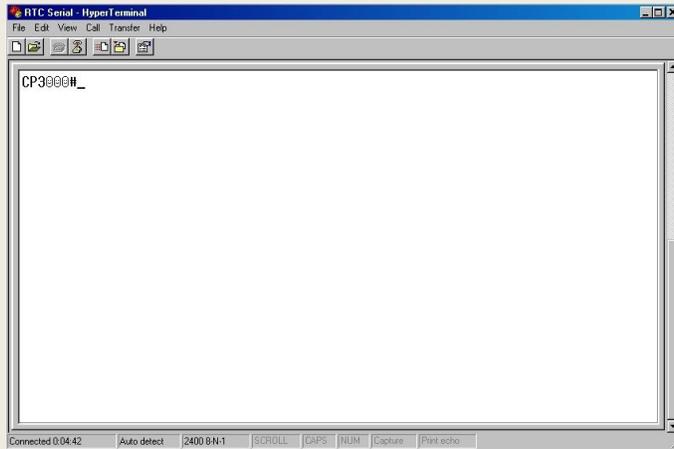


Fig. 3

Depending on the version of firmware in your time switch, you will see a string that looks like CP...#. Your string may be AP...#. The string that returns depends on the version of the code in the time switch, its address, and current running status.

4. At this point you have verified that the PC COM port, cable, and time switch are all connected properly and working correctly.
5. Turn off Hyperterminal.
6. Once this diagnostic test has been performed, you may run any of the RTC software requiring a serial port. This simple test assures a technician that the base components are working correctly.

Chapter 3

Serial Port Connect through RTC #TSC-B1

RTC has a device that can connect to an AP22 and CPR 2102 time switch of any vintage. It has two slide switches on the top to allow easy connection and configuration.

1. Move the lower selector switch to the *right*. It is the slide labeled Computer/PalmPilot.

2. If you have an AP22 time switch then slide the upper switch to the *left*.
 - For a CPR2102 version L or earlier time switch, slide the upper switch to the *right*.
 - For a CPR2102 version M board, the selector switch has to match the jumper setting inside. If the jumper is set to RS232, slide the switch to the *left*. If the jumper is set to TTL, slide the switch to the *right*.
3. The next step tests if the time switch can receive characters, by sending a universal command to the time switch causing it to reply. The command is three characters typed in a row: @, P, and #. An easy way to type these is to hold down the Shift button and press **2**, **p**, and **3**.

The time switch will respond with the string shown in Fig. 4, or something similar.

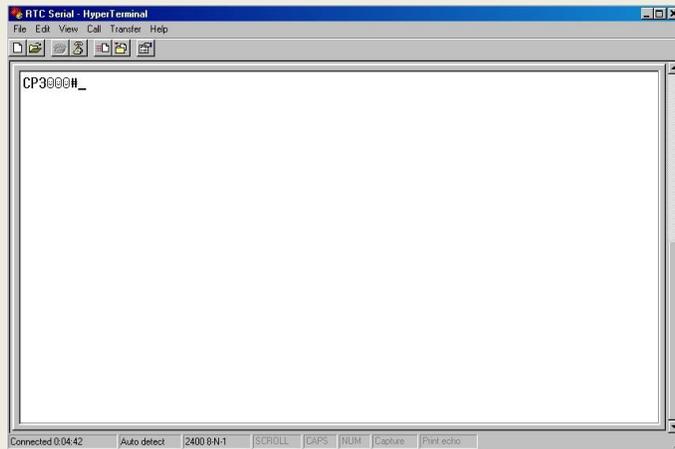


Fig. 4

Depending on the version of firmware in your time switch you will see a string that looks like CP...#. Your string may be AP...#. The string that returns depends on the version of the code in the time switch, its address, and current running status.

4. At this point you have verified that the PC COM port, cable, and time switch are all connected properly and working correctly.
5. Turn off Hyperterminal.
6. Once this diagnostic test has been performed, you may run any of the RTC software requiring a serial port. This simple test assures a technician that the base components are working correctly.

Chapter 4

Use Hyperterminal to connect to an IP based AP22 or CPR2102 time switch

RTC makes IP devices that allow time switches to connect through IP networks. This takes place over standard TCP/IP protocols and is easily tested outside of RTC software. The ability to diagnose connections outside of the RTC software helps to solve problems early.

In order for a device to talk on an IP network it must have an IP address. You must know this address in order to talk to it. There are written procedures for each IP device sold by RTC that allow you to program it to any IP address. In this example, the IP address being used is 10.0.0.200.

1. The first step is to ping the IP device. The ping command is performed from the command line. To enter this mode, go to Start\programs\accessories\command prompt. You will see this screen (Fig. 5), or perhaps something very similar depending on your installation of Windows.



Fig. 5

2. Type the command **ping 10.0.0.200** (Fig. 6). Of course, you will use the IP address to which you are trying attempting to connect.



Fig. 6

If it connects properly, the box will look like Fig. 7.

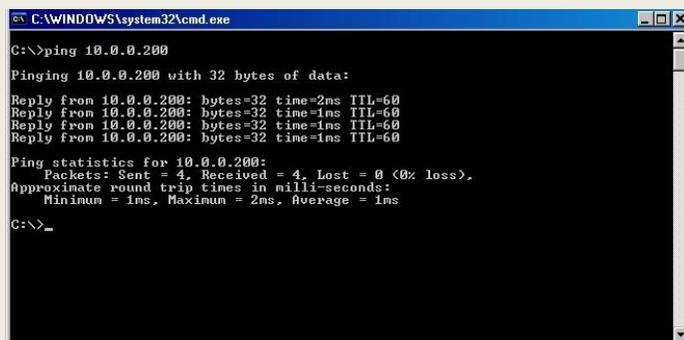


Fig.7

The screen dump above shows that of the four times connection was attempted, all were successful and the underlying network to the time switch was established.

APPENDIX A

Setting up Hyperterminal for serial connections

1. Find the program Hyperterminal on your PC. It is typically in the \start\programs\accessories\communications folder.
2. When you run the program you will be asked to make a new connection. Make the connection and call it RTC Serial as shown in Fig. 8.

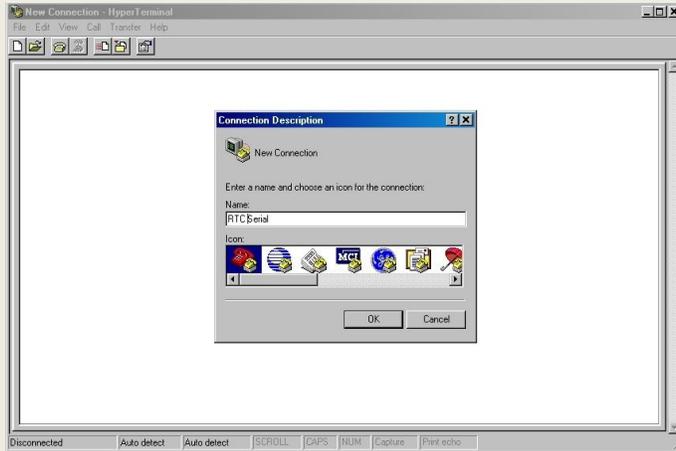


Fig. 8

3. Hit the OK button and you will see the screen below (Fig. 9). Select the COM port you will be using. If you have a typical notebook with a serial port, it will be COM1. If you are using a USB to serial converter, see [Appendix D](#) to find the COM port.

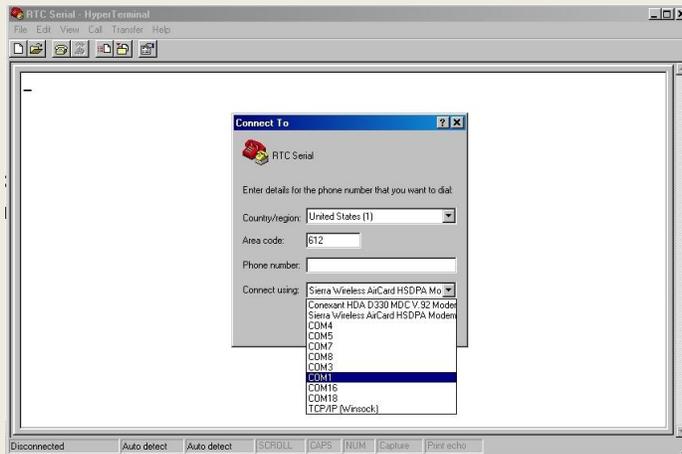


Fig. 9

4. Setup the port settings as shown in Fig. 10. Make sure Bits per second is 2400, Data bits is 8, Parity is None, Stop bits is 1, and Flow control is None. Click Apply, then OK.

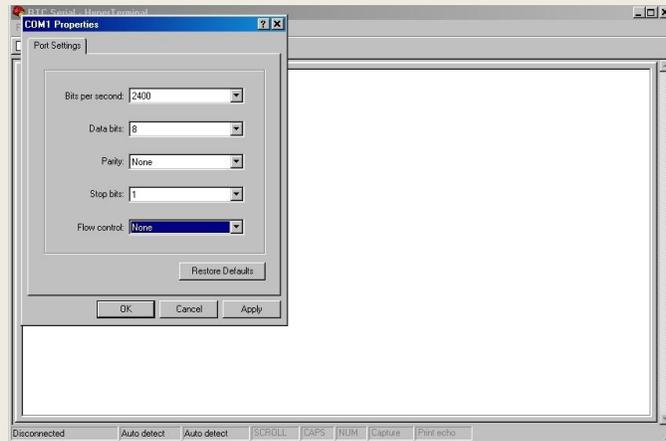


Fig. 10

5. The program will connect automatically. When it does, the screen below (Fig. 11) will appear. The status, Connected, should be displayed in the lower left corner of the screen. If it is, you are finished. If not, proceed to Step 6.

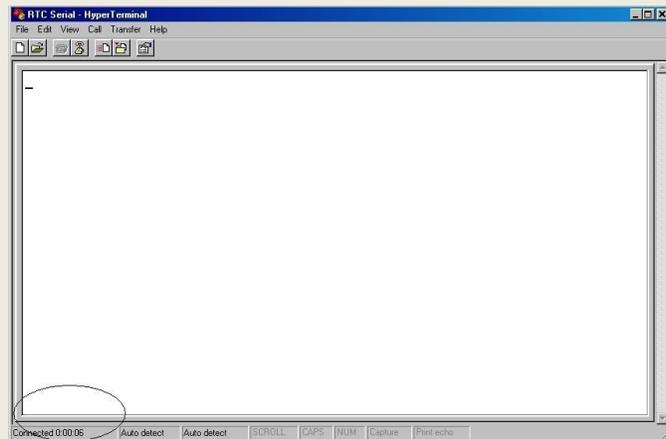


Fig. 11

6. If the COM port is already used by some device you will see an error message (Fig. 12). This could be an RTC program using it, or any other program in the computer.

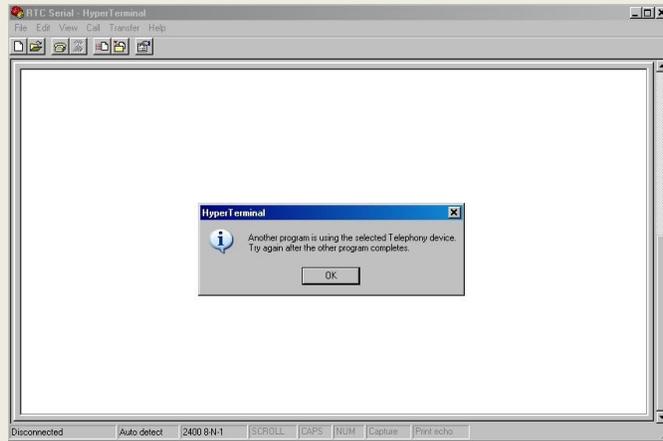


Fig. 12

APPENDIX B

Identifying a CPR2102 board revision

There are two principal versions of the CPR2102 board for the purposes of communications. All the boards are backward compatible. That is to say, any board being produced today can replace a board of an earlier version.

The two board types are the M board (any version of board that is revision M), and the L board (any version of board that is revision L, or earlier). If it is not an M, it is by default an L.

All M boards have three identifying features:

1. The board revision label has the letter M in it. You will see it on the bottom of the circuit board. The revision information is plated in the circuit board to the left of the transformer. Notice in the picture (Fig. 13), the letters 90-0071M are visible. The numbers may be different on your board, as this is the lot number. The key identification is the letter M at the end.
2. There is a rotary switch that selects the master group number. There are some earlier versions of CPR2102 boards that have rotary switches, so this alone does not positively identify a board as an M board. However, *all* M boards have this rotary switch. You can see the switch in the upper left oval of Fig. 13.
3. There is a jumper to the right of the rotary switch on all M boards, which also can be seen in the picture. No other version of board has this switch.

This switch determines whether the time switch uses RS232 level signals or TTL signals. TTL signals are often used in older radio installations. The RS232 signals are often used in direct connection cables.

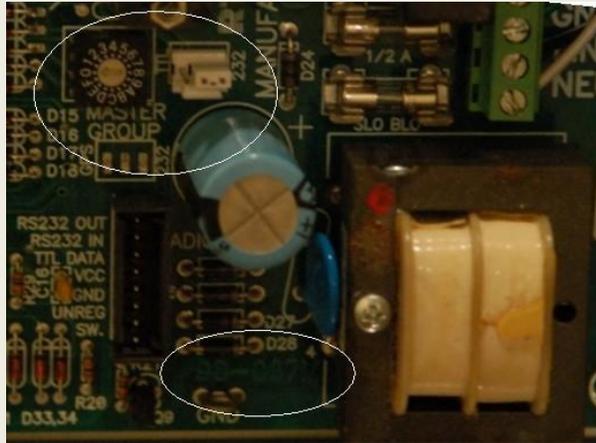


Fig. 13

APPENDIX C

CPR2102 version M and AP22 Serial cable pinouts

You can find in the chart below the pinouts for building a cable that will connect your typical PC 9 pin serial port to a CPR2102 version M board or an AP22 board.

| PC Pin (9 pin female) | AP22 Pin (9 pin male) | |
|-------------------------|-------------------------|---------------|
| 5 | 3 | PC ground |
| 3 | 9 | PC TX AP22 RX |
| 2 | 2 | PC RX AP22 TX |

On PC side, tie pins 4, 6, and 8 together to jump out hardware handshaking.

Appendix D

Steps to identify COM port number Windows assigns

For this procedure to work the USB device must have been installed correctly. Here's how to check it:

1. Open the Control Panel from your computer's Start menu.
2. Then, find and click on the System icon or link. (Fig. 1)

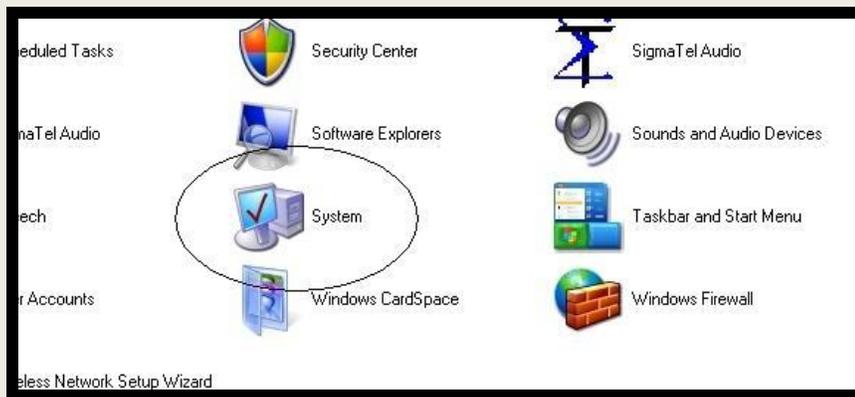


Fig. 1

3. A box resembling Fig. 2 will appear.



Fig. 2

4. Click the Hardware tab. (Fig. 3)



Fig. 3

Open the following box (Fig. 4) by clicking the Device Manager button in the System Properties box. This window may look slightly different from computer to computer.

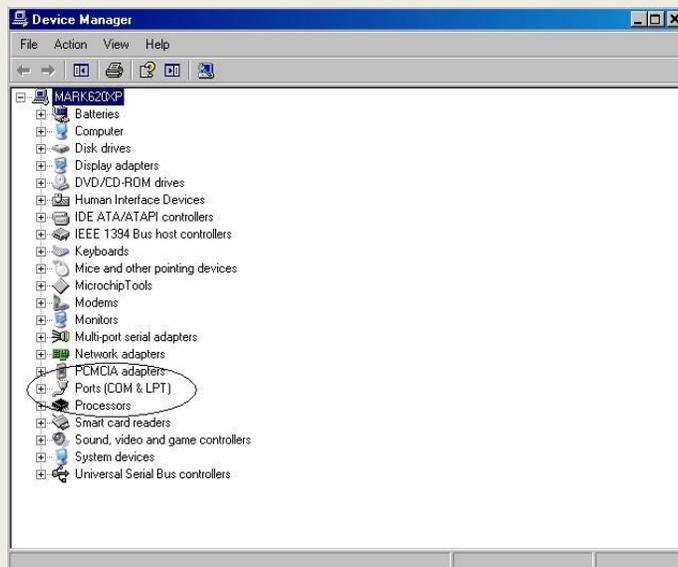


Fig. 4

Notice the icon labeled Ports (COM & LPT). This is where you identify which port is which. Click on the + to the left to expand the Ports section. If your system does not have a Ports section then you have no ports installed. This is OK.

Fig. 5 shows the ports that are currently installed in the system.

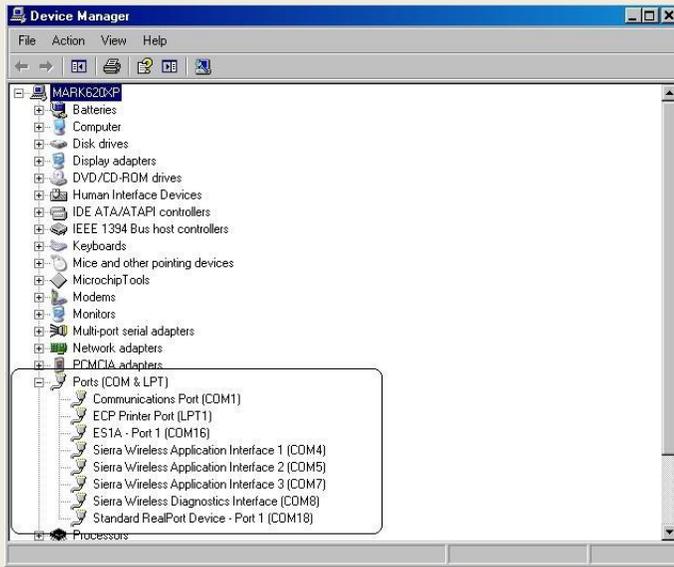


Fig. 5

Notice in this system, the COM ports 1, 16, 4, 5, 7, 8, and 18 are used.

Jot down which ports, if any, are currently in your system. If none are listed, you will have to install a USB converter mentioned at the beginning of this article.

Once the USB device is installed into a USB port, you will see a new port listed. (Fig. 6) In the system below, Windows has assigned COM36 to the USB to serial converter.

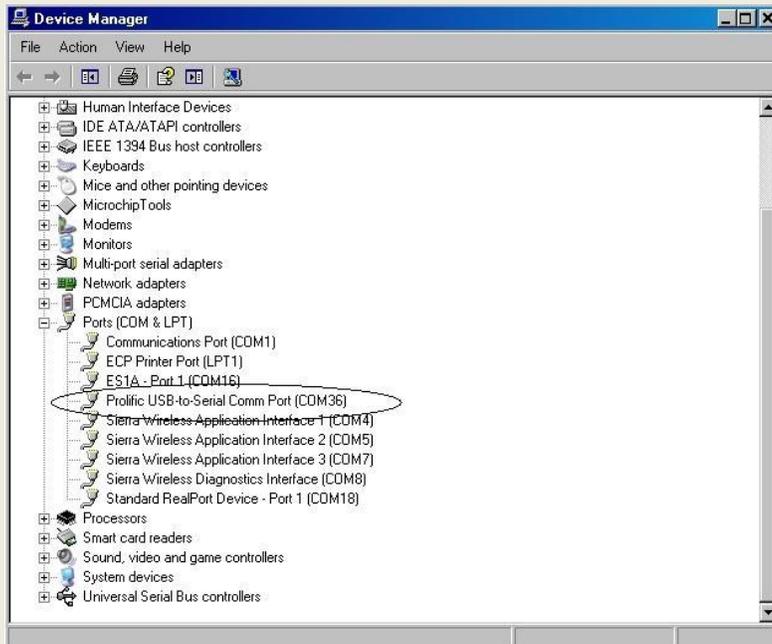


Fig. 6

In this case, COM36 would be entered in the RTC software to communicate to the switches.

All RTC software uses a COM selection box similar to the one below. (Fig. 7)

Note that COM 36 is not available. There are over 250 possible COM ports, so not all of them are displayed. To get COM 36 to work, type the number 36 in the text area of the dropdown box, as shown in Fig. 8.

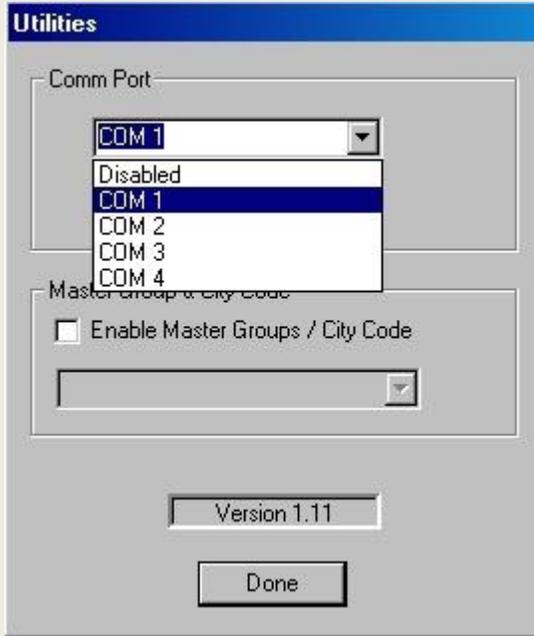


Fig. 7

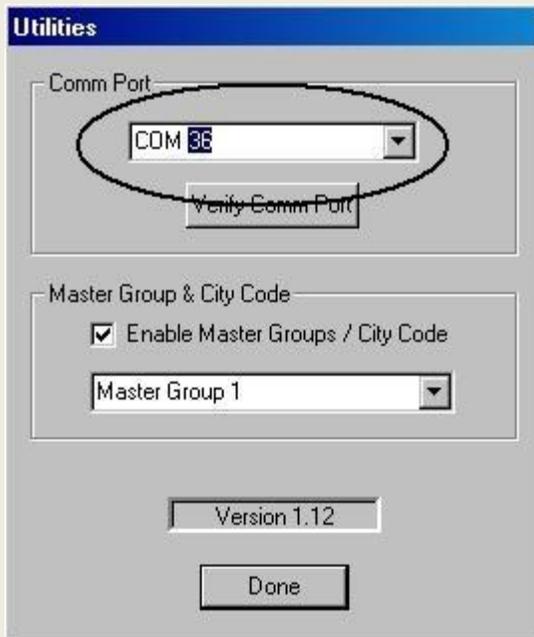


Fig. 8

5. Click Setup after you have entered COM 36, or the COM port number your system has given you.

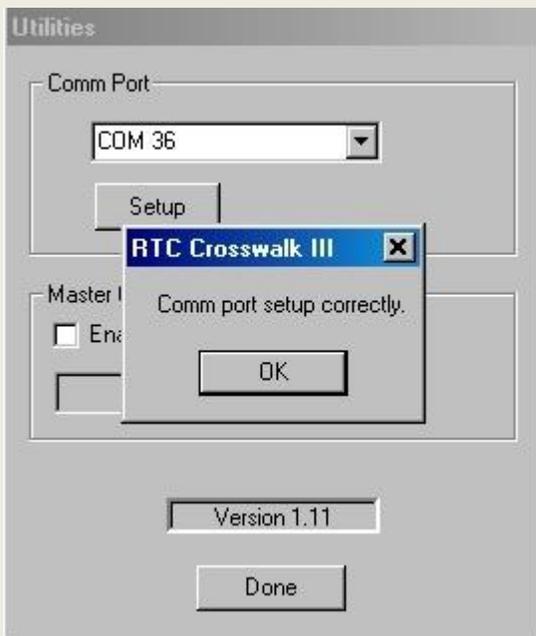


Fig. 9

Fig. 9 shows that the port in our example has setup correctly. If you get an error message, check the numbers and retry the setup.

The device will likely work if the success message appears. There are some cases, however, where the success message is given and the device still will not work.

The above steps can be repeated as often as needed to find the correct port number. Typically, if you always connect the USB device to the same port you will likely get the same COM port number. This is not always the case, as Windows ultimately decides which port number to assign.