

Communicating with the CD17 via USB Port

Introduction:

The CD17 carrier demodulator is designed to be powered by the USB interface to your PC and to send pressure data over the USB port to your software. Communication to the CD17 is accomplished by a virtual COM port that is installed into your PC when you load the CD17 driver. Your PC assigns a COM port number to the CD17 and thereafter you send serial character strings down to the CD17 and it replies with serial data strings. If you have existing software designed to work with serial devices you should be able to configure it to work with the CD17 as the commands are very simple.

This document will describe how to identify the virtual COM port assigned to the CD17 by Windows, how to obtain and install a simple terminal program and how to communicate with the CD17.

Driver Installation and Virtual Com Port

When you plug the CD17 into your PC USB port you will be asked to supply a driver. This is available from our support website: www.validynesupport.com – in the software download area. Once the driver is loaded your PC will assign a virtual COM port for the CD17.

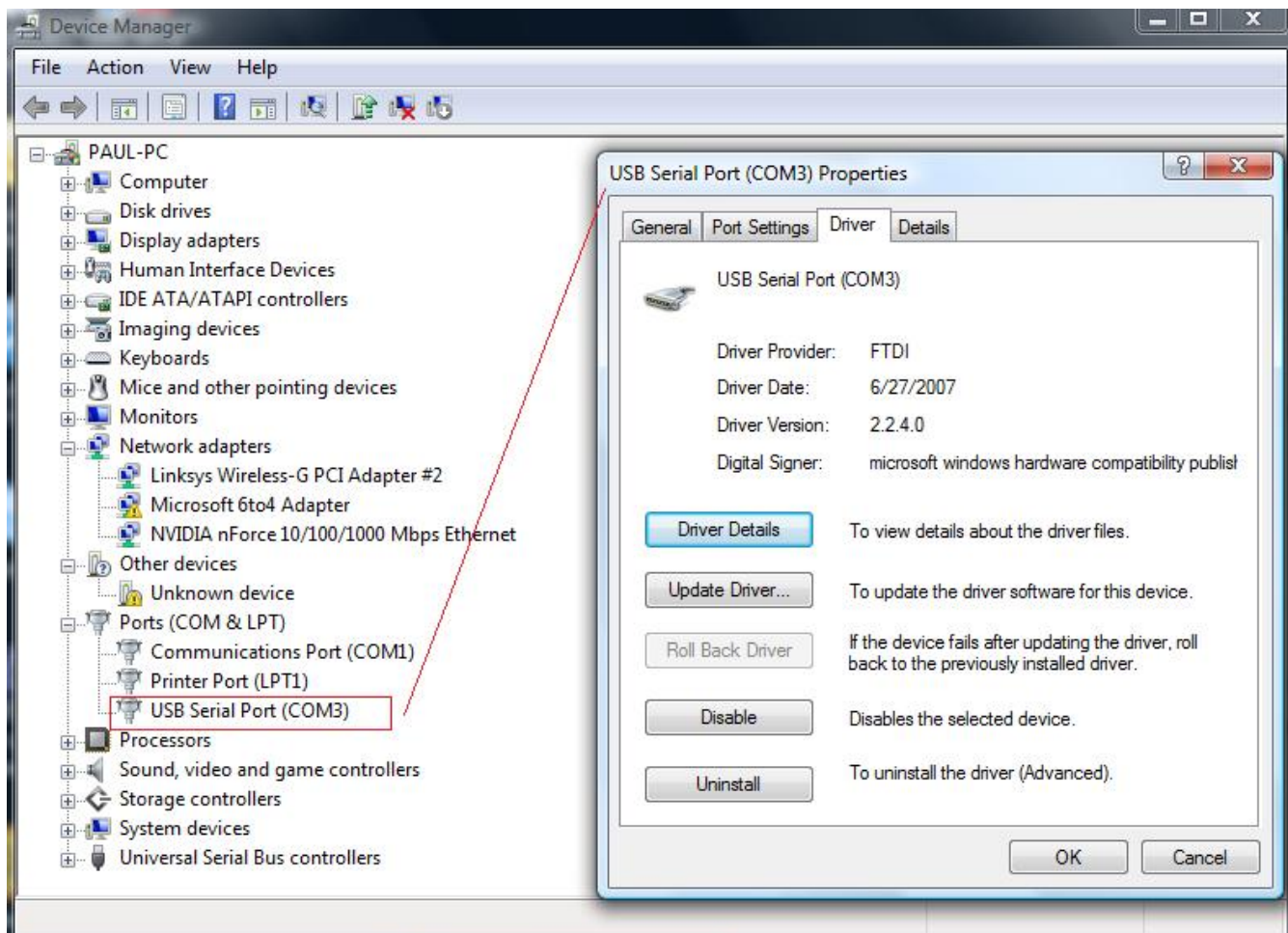
Note: You need to identify the virtual COM port number in order to communicate with the CD17.

Here is how you find the COM port number given to the CD17:

1. - Open the Windows Device Manager.

How you do this may vary with the version of Windows you are using, but typically you would go to *Start, Control Panel, System, Device Manager*.

You should then see a listing of all the devices on your PC, like that shown below.



You scroll down the list until you see Ports (COM and LPT). You should see a 'USB Serial Port (COM3)' under the Ports listing. Clicking on this will bring up the Properties Box, and in the example above the virtual COM port has been designated as COM3. **Good idea to write this COM port number down.**

2. - Set the Virtual COM Port Settings

Click on the *Port Settings* tab of the *USB Serial Port Properties* window. You should see a window like that below.

Set the parameters as follows:

Bits per Second - 9600

Data Bits - 8

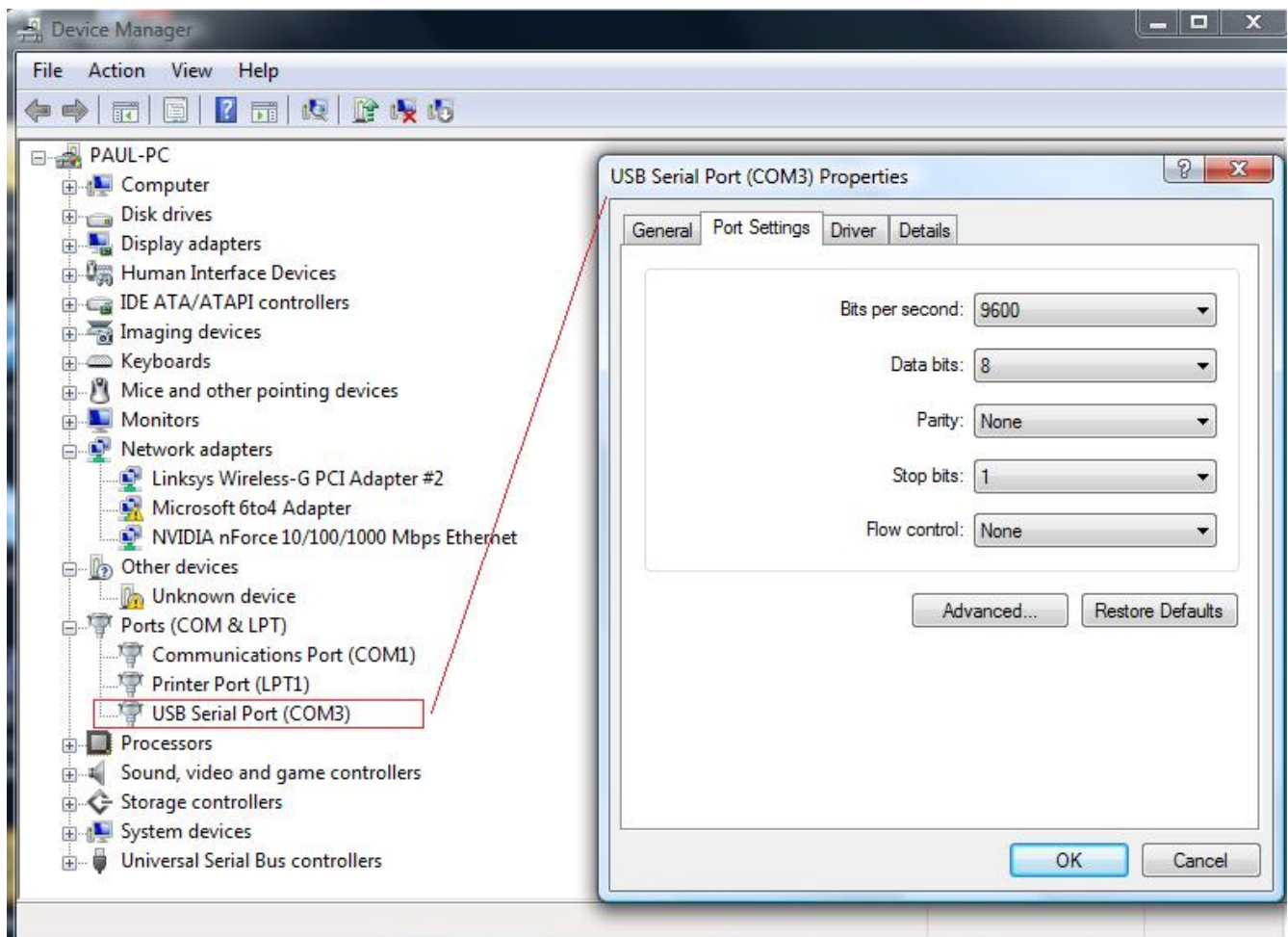
Parity – None

Stop Bits – 1

Flow Control – None

Click on OK and close out the *Properties* box and *Device Manager*.

The hard part is over!

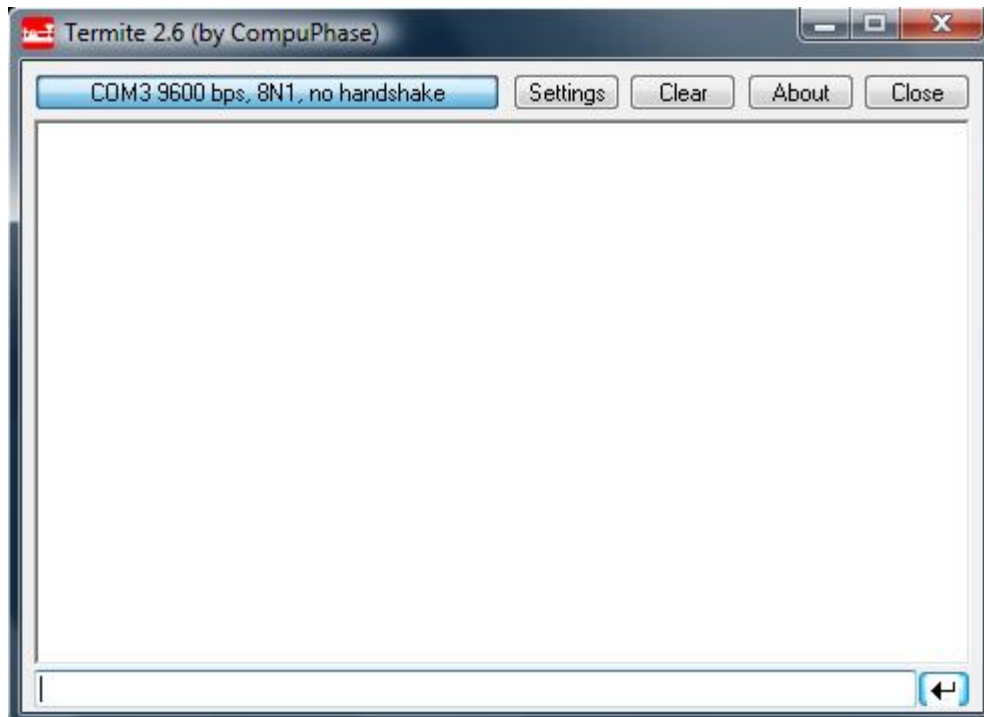


Communicating with the CD17 via the Virtual COM Port

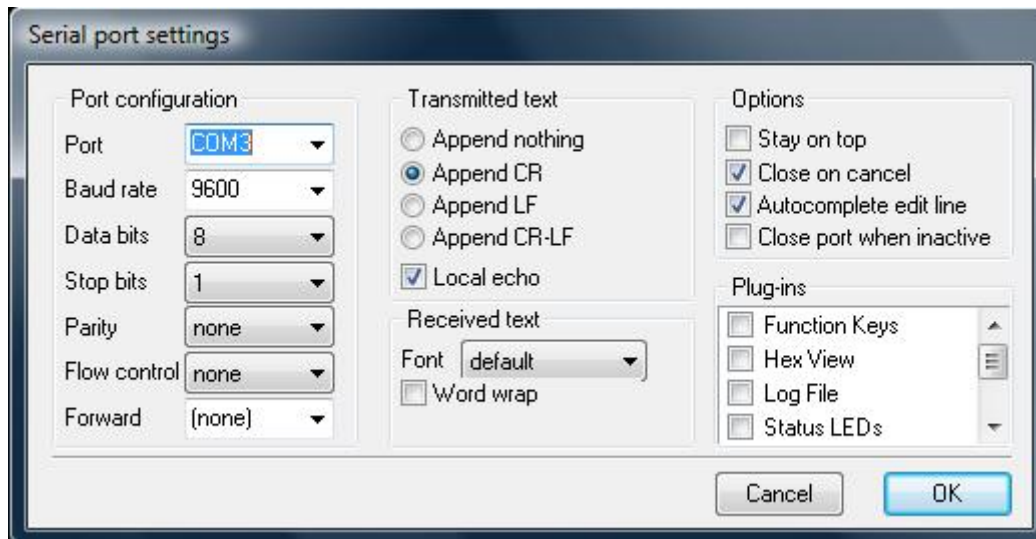
To communicate with the CD17 we simply need a terminal program that will send and receive strings of characters over the virtual serial port. You could use HyperTerminal – a Windows accessory for this – but HyperTerminal is notoriously hard to configure and use.

A better choice is Termite, a freeware terminal program that is much more straightforward to use. You can download Termite from <http://www.windows7download.com/win7-termite/ekejdiwv.html> or Google it.

Once Termite is downloaded and installed, simply run it. You will see a screen like this:



You will need to configure Termite so that the serial port settings match the virtual COM port settings. Press the Settings button on the top of the Termite window and configure as shown below:



In this example we use COM3 because this is the COM port assigned to the CD17. Your PC may assign a different COM port number – so be sure you know what the port number is for your PC.

You can see that the parameters match that assigned to the COM port settings in the Windows Device Manager. Note also the *Append CR*, *Local Echo* settings – be sure these match the screen above.

Using Termite to Communicate to the CD17

Once Termite has been configured you must exit and re-start it so that it comes up with the correct COM port settings enabled. Now we can talk to the CD17, but first there is some housekeeping.

Setting the CD17 Bus Address

The CD17 must be assigned a bus address before you can send commands or receive data. To do this we simply send out a string using Termite that looks like the following:

>9912345610

The > sign indicates that we are sending an outbound command to the CD17.

The **99** tells every CD17 on COM3 to listen for a bus address assignment.

123456 is the serial number of the CD17 transducer – yours will be different be sure you have that handy! It is a six-digit number stenciled in white on the base plate of the CD17 housing.

10 is the bus address we are assigning to this CD17. You can use any number from 01 to 98 but they must be two digits.

When we press the enter key, the CD17 responds by acknowledging its bus address with a string that looks like this:

<10123456

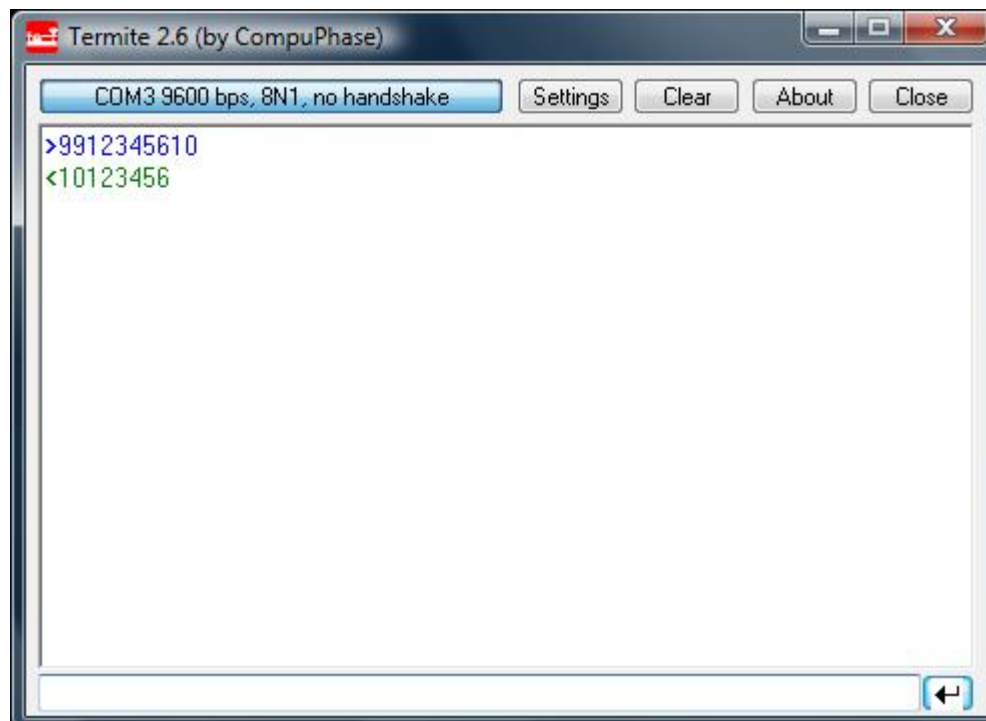
< indicates an incoming data string from the CD17

123456 is the serial number of the CD17 (yours will be different)

Note that the bus address assignment need be made only once prior to using the CD17 to collect pressure readings. If the CD17 is powered down, the bus address must be reassigned.

You can set the bus address using the Validyne USB utility program or with Termite as described above. You can also configure the CD17 using your own software by simply following the above steps.

Here is what the bus address assignment sequence looks like in Termite:



Getting Temperature and Pressure Data from the CD17

Now that the CD17 is reachable over the virtual COM port, we can get actual data.

Getting CD17 Temperature Data

The CD17 has a temperature sensor and the reading in deg F can be obtained by a simple serial command, as follows:

>10T

Where:

> is the outbound command characters

10 is the CD17 bus address (previously assigned)

T is the command to request the P61 temperature reading.

The CD17 will respond with a string containing the temperature reading, as follows:

<10T*76.7°F

Where:

< is the inbound string indication

10 is the bus address of the CD17 responding

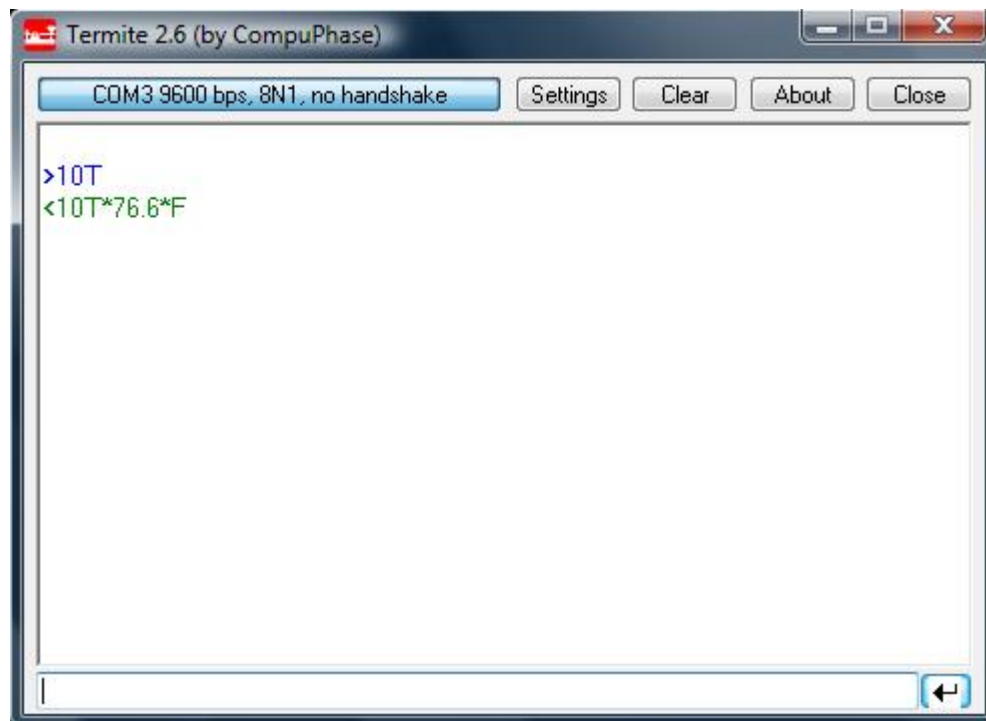
T is the command being responded to

***** is the data delimiter characters

76.7 is the temperature in degrees F

F is the units of temperature

Here is how this sequence appears in Termite. You type in **>10T** and *Enter*, then the P61 responds.



Pressure Readings

Pressure is obtained in a similar fashion:

You type **>10P**

And the CD17 responds

<10P*16.3*m

The **<10** string is the address ID of the responding CD17, the **16.3** is the sensor output reading and the **m** indicates mV/V.

Converting the Readings to Units of Pressure

The CD17 is a carrier demodulator and can read any Validyne variable reluctance pressure sensor. The output of the Validyne pressure sensor is in mV/V – that is, millivolts of signal per volt of excitation. It really does not matter – mV/V is simply a number that represents the electrical output of the pressure sensor.

At zero applied pressure a Validyne transducer will have a reading between -5 mV/V and +5 mV/V. It could be any number between those two values.

To convert the readings in ,V/V from the CD17 to units of pressure proceed as follows:

Apply zero differential pressure – this is easy, the transducer can be sitting on the bench un-connected to any pressure source.

Write down the CD17 reading at zero pressure. Let's say this reading is -1.7 mV/V

Apply full scale pressure to the + port of the pressure sensor. Validyne transducers are available in a wide range of full scale pressures. You can use the range code of the transducer to determine it's full scale pressure. The range code is a two-digit number that corresponds to a full scale pressure. A range code of -26 is 0.5 psi full scale. A range code of -50 is 125 psi full scale, etc. A range code chart appears at the end of this document. For this example let's assume a DP15 with a -42 diaphragm. From the chart the full scale of the -42 range is 20 psi. When we apply 20 psid, the CD17 reading is, say, 25.3 mV/V.

Calculate the scale and offset factors needed to convert the mV/V readings to psi, as follows

The scale factor is equal to the change in pressure divided by the change in mV/V reading:

$$\text{Scale Factor} = (20 - 0)/(25.3 - -1.7) = 0.741$$

$$\text{Offset Factor} = -1 * (\text{Scale Factor} * \text{Zero mV/V Reading}) = -1 * (0.741 * -1.7) = 1.26$$

Check by calculating the full scale reading:

$$\text{Psi} = (0.741 * 25.3) + 1.26 = 20.00$$

This same calculation will work for any units of pressure.

Going Further

Of course you will want to do more than just communicate with the CD17 using Termite. But you can see how the serial communication proceeds with command strings from the host followed by response strings from the CD17. You can easily program in Visual Basic to send and receive these strings, as well as parse out the returning strings for data – simply look at each character in the string and when you have identified the asterisks, the characters in between are the data you want.

:LabView, PC Wedge and many other software programs are available for data acquisition that have menus for setting up the command prompts and rules for parsing the incoming strings.

The CD17 should be capable of responding to data requests up to about once per second.