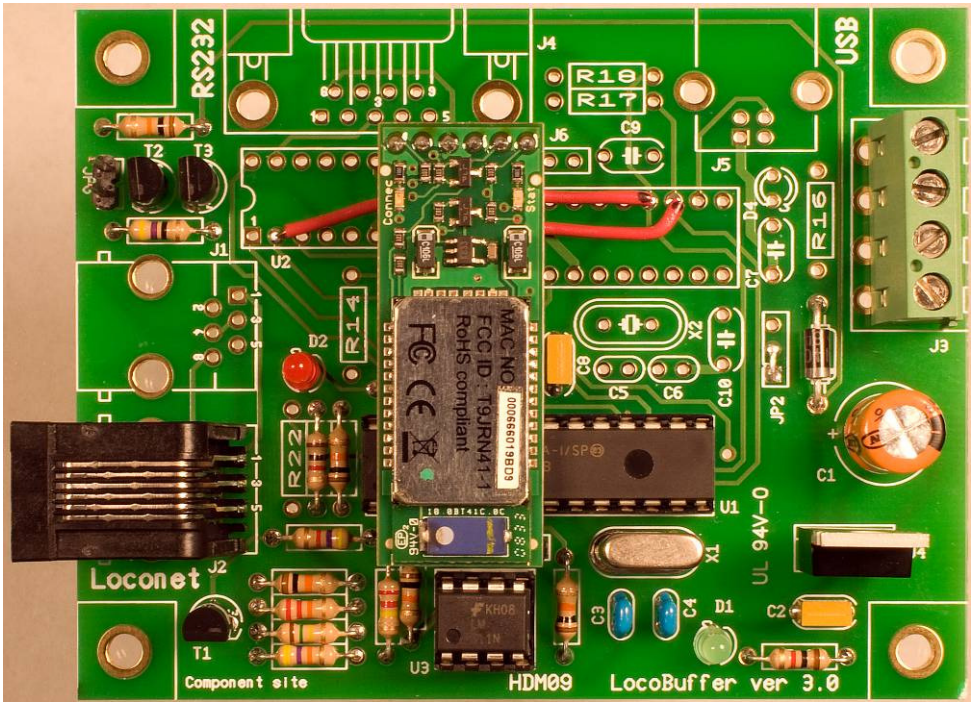
LocoBuffer-Blue Manual



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Liability Disclamer:

Use all items and instructions described in this document at your own risk. They have been developed for personal use only. All items and procedures have been tested and used on my own model railroad systems without causing any damage. However, they have not been tested in all possible environments or system configurations. For that reason the instructions and devices described within should be considered experimental in nature. I can not take responsibility for your circumstances of use. Always use your own judgment, common sense, and error on the side of safety.

Locobuffer-Blue 1.0

Locobuffer-Blue is a device that provides a BlueTooth wireless interface to Loconet using the Bluetooth Serial Port Profile (SPP). This document is a supplement to the Locobuffer 3.0 Manual developed by Hans Deloof. The original Locobuffer provided a USB or RS232 interface to Loconet. This manual describes how to assemble the LocoBuffer 3.0 with a Bluetooth wireless interface. The full Locobuffer 3.0 instructions may be found at http://users.telenet.be/deloof/page5.html . In addition, there are links there to purchase the PC board that is used for this device.

Bluetooth Module

The LococBuffer-Blue uses the BlueSMiRF Gold Bluetooth module available from SparkFun Electronics, http://www.sparkfun.com . This is a Bluetooth class 1 device with a theoretical operating range of 100m (300ft). The module is available in two flavors: with an onboard chip antenna (part# WRL-10268) or with a reverse polarity SMA connector for an external antenna (part# WRL-00158). The WRL-00852 is pictured in Figure1. Both use the same hardware interface that provides a radio transceiver, Bluetooth stack, and TTL level serial interface with RTS/CTS hardware handshaking. Once properly configured, the BlueSMiRF will appear as a COM Port in the Windows operating system.

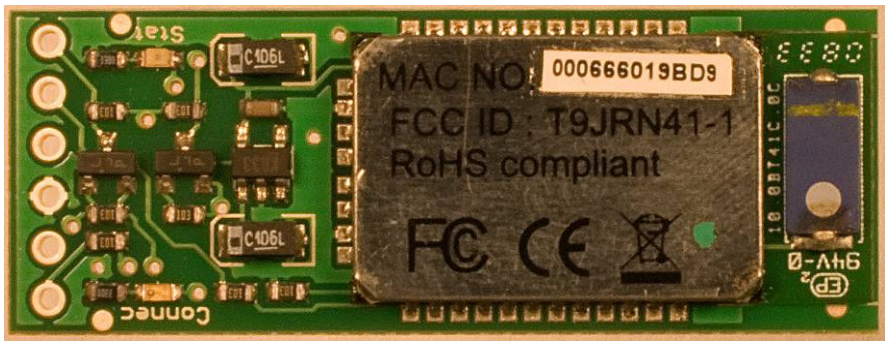

Figure 1: Sparkfun BlueSMiRF Gold Module

SparkFun now offers a cheaper BlueSMiRF Sliver Bluetooth module (part# WRL-10269) that is pin out and command set identical to the Gold module. In addition to being about $25 cheaper, it is a class 2 Bluetooth device with a shorter range of 18m (50 ft)

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Bill of Materials

Device	Label	Value	Notes
Resistor	R1, R8	1kΩ - 1/4w	Brown-Black-Red
Resistor	R2	220kΩ – 1/4w	Red-Red-Yellow
Resistor	R3	22KΩ – 1/4w	Red-Red-Orange
Resistor	R4,R11,R12, R13,R15,R19	10KΩ – 1/4w	Brown-Black-Orange
Resistor	R5	47KΩ – 1/4w	Yellow-Violet-Orange
Resistor	R6	150kΩ – 1/4w	Brown-Green-Yellow
Resistor	R7	4.7kΩ -1/4w	Yellow-Violet-Red
Capacitor	C1	100uF – 25v Electrolytic	Polarized Device
Capacitor	C2,C8	0.1uF	
Capacitor	C3,C4	15pF	
Diode	D3	1N4001	Polarized Device
LED	D1	3mm Green	Polarized Device
LED	D2	3mm Red	Polarized Device
IC	U1	PIC16F883-I/SP or PIC16F873A-I/SP	Must Be Programmed
IC	U3	LM311N – Op Amp	
IC	U4	7805 – 5V Regulator	
Crystal	X1	20Mhz	Metal Case can short PC board
Transistor	T1	BC337	Verify pinout against spec sheet
Jumper	JP1, JP3	2 pin.100 in jumper	
Jumper	JP2	Hard Wire Jumper	Permanente Jumper pins 1 & 2
Loconet Jack	J1, J2	RJ-12 Modular Phone Jack	
Terminal Strip	J3	4 Position Screw Terminal	
Socket	U1	28 Pin IC Socket	
Socket	U3	8 Pin IC Socket	
Socket	J6	6 pin .100in pin Header Socket	
Plug	J6	6 pin .100in header plug	
Bluetooth	N/A	BlueSMiRF Module	part# WRL-00582
PC Board	N/A		
Current Source Option			
Resistor	R9	47 Ω– 1/4w	Yellow-Violet-Black
Resistor	R10	10k Ω – 1/4w	Brown-Black-Orange
Transistor	T2, T3	BC547	
Jumper	JP6	2 Pin Jumper	
No Echo Option			
Jumper	N/A	2 Pin Jumper - U5 Pins 7&8	

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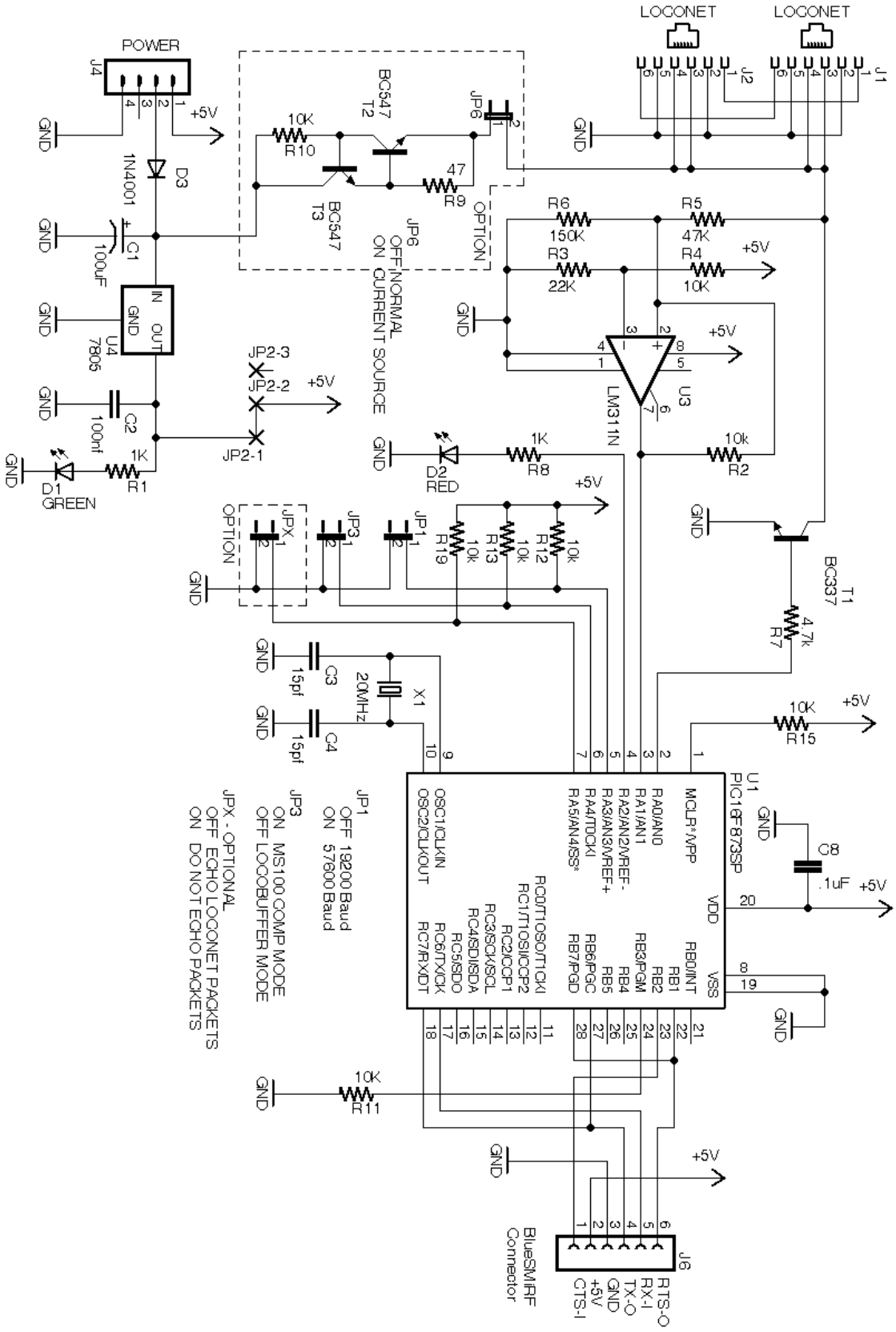

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Assembly Instructions

1) Installed Named Components onto the board.
2) 3 Pin Jumper JP2 is unnecessary in this configuration. Simply hard jumper the holes labeled 1 and 2 with a small wire. A discarded resistor lead works nicely for this.
3) Installs the 6 pin Socket for the BlueSMiRF module in the position marked J6, pins 1 through 6. See Figure 2 and Figure 3. User caution and try to get the socket square to the board both vertically and horizontally.
4) 6 Jumper wires must be placed to provide power and serial signals to the BlueSMiRF module socket. See Figure 2 and Fiqure 3. Use insulated wires for these jumpers as they will need to cross PCB traces and each other. The jumper end points are contained on the board where IC's U2 and U5 were located. The jumpers connect the pins in the following table

Start	End
U5-28	U2-2
U5-27	U2-7
U5-26	U2-9
U5-25	U5-17
U5-24	U5-18
U5-23	U5-5

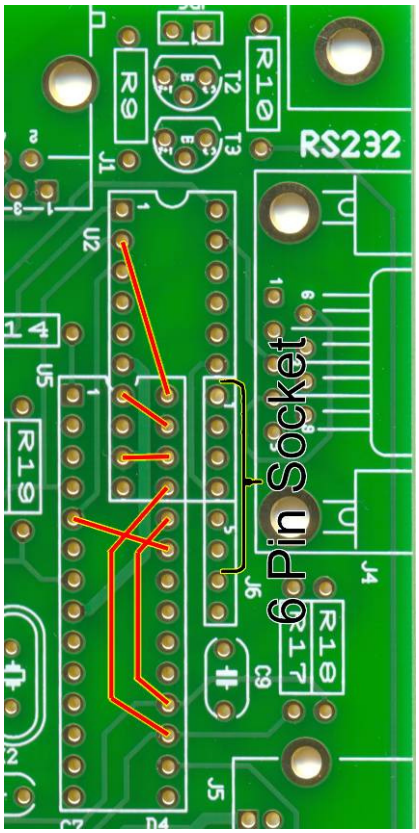

Figure 2: Socket and Jumper Placement

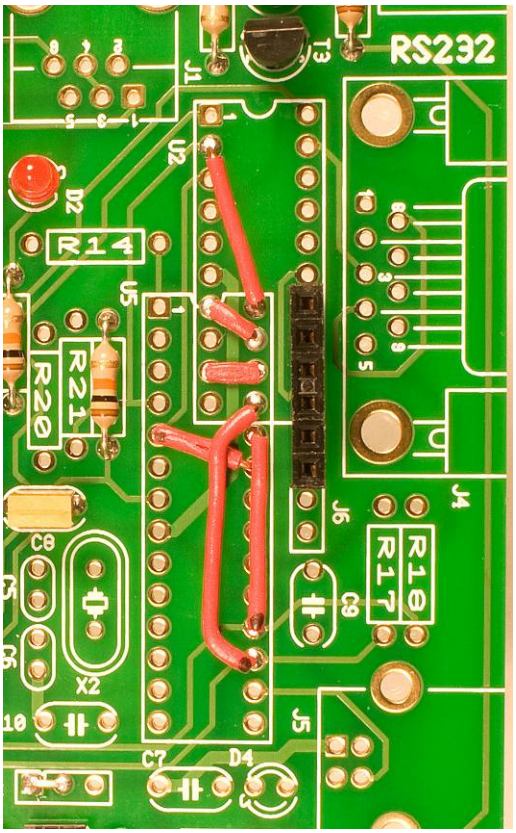

Figure 3: Board after Jumper Installation

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5) Install the 6 pin header plug on the non component side of the BlueSMiRF module. See Figure 4. Once again take care that the plug is perpendicular to the board.

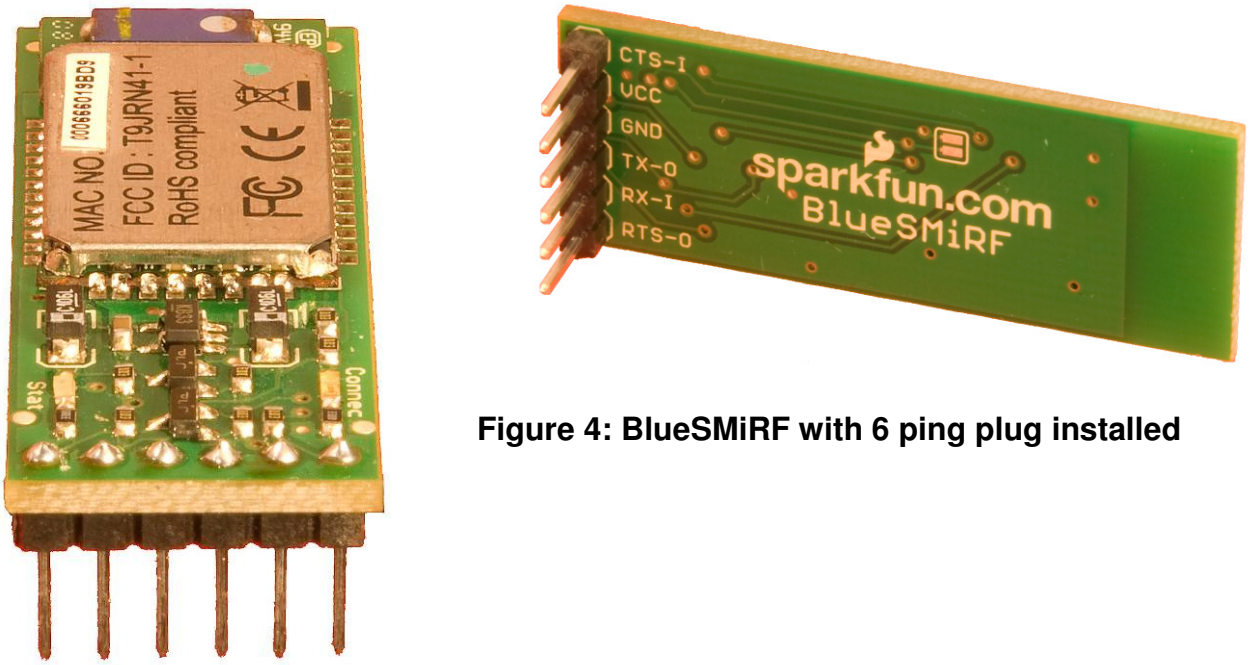

Figure 4: BlueSMiRF with 6 ping plug installed

6) Plug the BlueSMiRF Module in so that in sits over the PIC - U1. It will just clear a jumper on J1 or J3. See Figure 5.

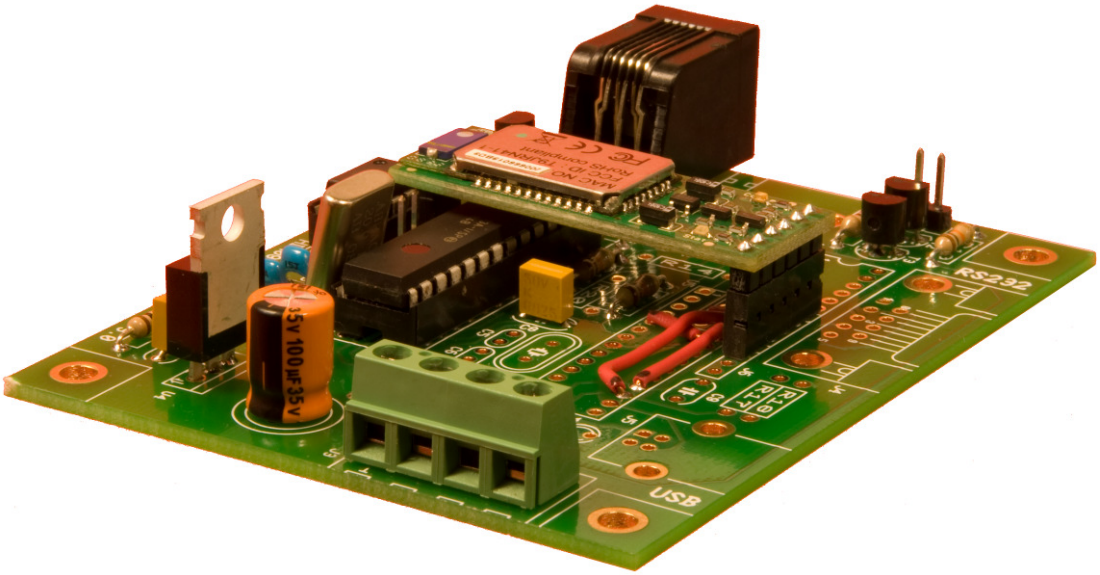

Figure 5: Locobuffer with BlueSMiRF installed

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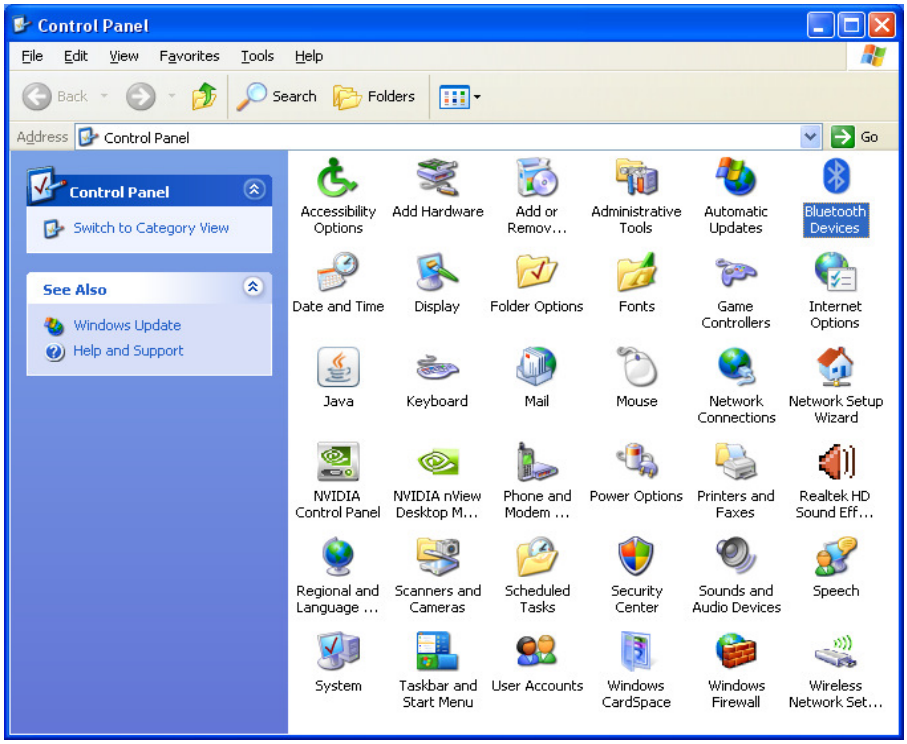
Configuration

The BlueSMiRF module's serial port must be configured to the same baud rate as the baud rate select jumper JP1. This can be done by establishing a Bluetooth connection to the device and using a terminal emulator to send commands to the module. The following instructions assume a jumper is on JP1 for a baud rate of 57,600.

Adding as a Bluetooth Device – Windows XP

The LocoBuffer-Blue can be configured as a COM port on the host Windows computer. Windows XP SP2 and later includes a Bluetooth stack. The instructions that follow show how to set up the COM port using the Microsoft Bluetooth stack under XP. Your computers Bluetooth dongle may have come with a different vendors stack. The screens will be different, but the steps should be similar.



1) Go to the Windows Control Panel and open **Bluetooth Devices.**

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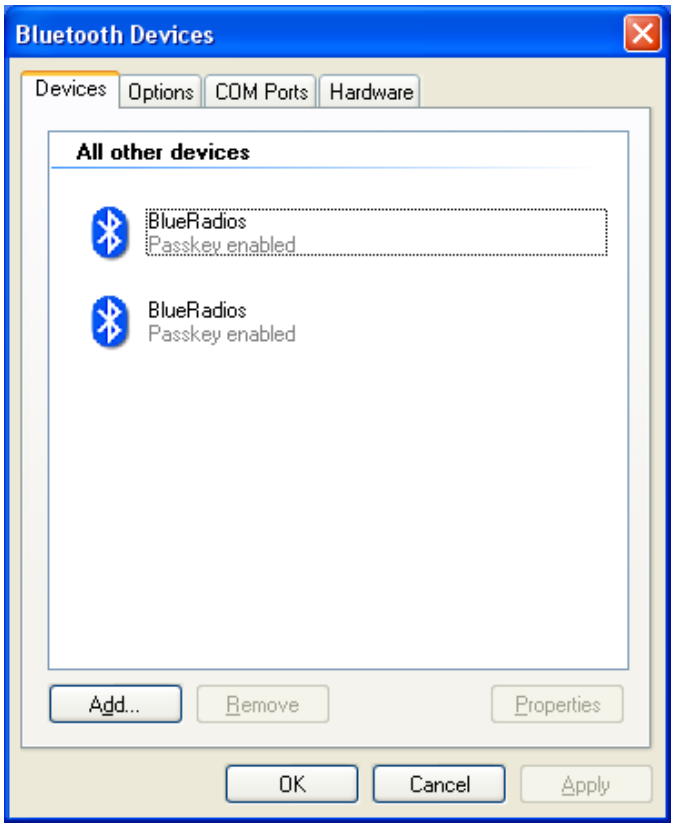

2) Select the **Devices** tab and press the **Add..** button.

3) The Add Bluetooth Device Wizard should appear. Power up the LocoBuffer-USB, the Red led on the BlueSMiRF should be flashing. Check “My device is ready” and press **Next >**.

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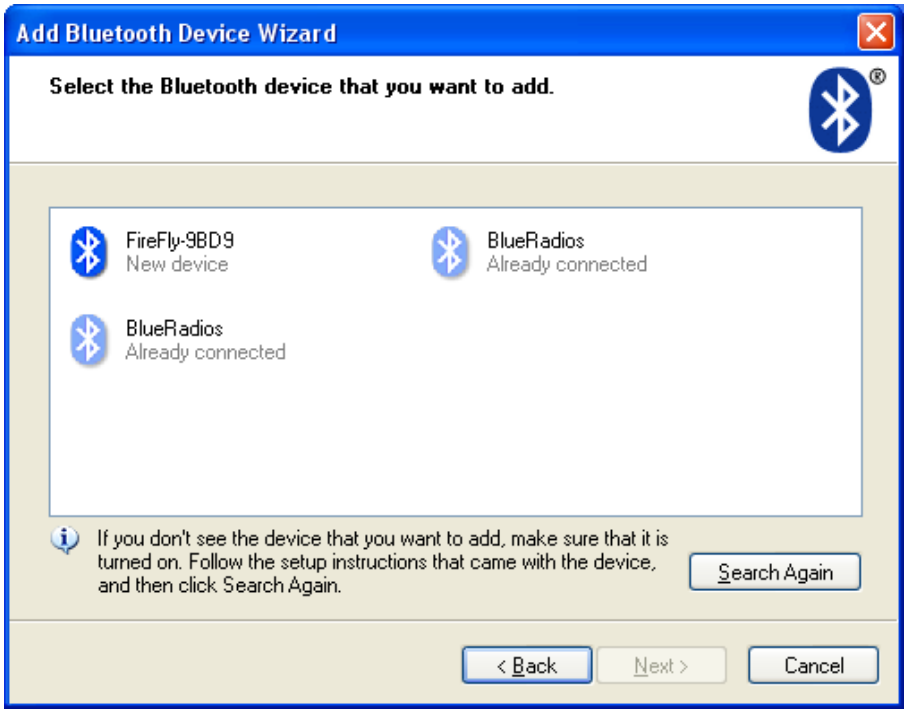
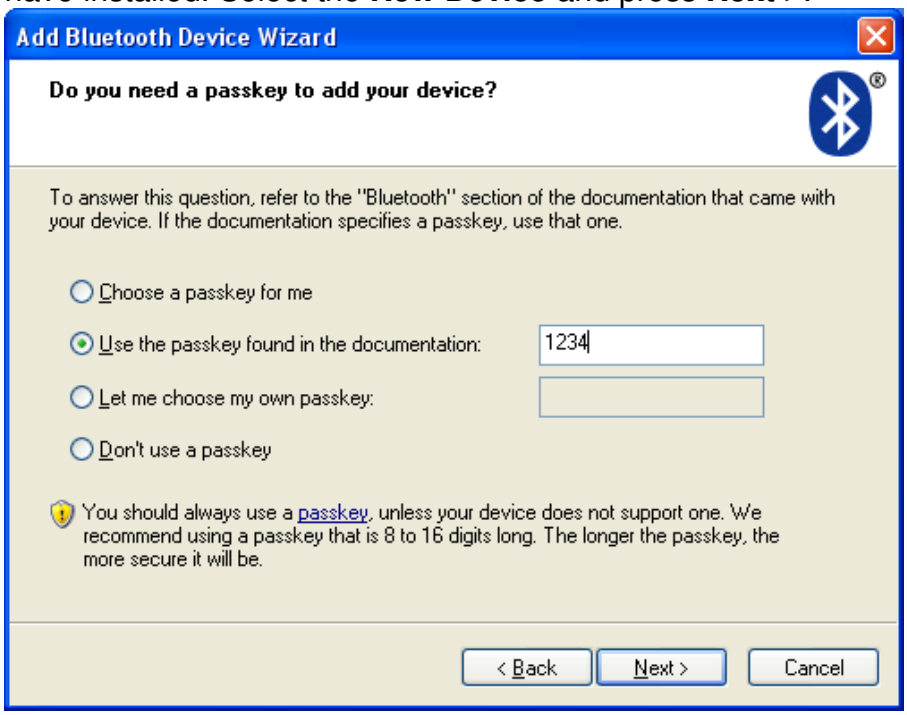


4) The dialog will search for a while and then show any new Bluetooth device that it finds. The Name of your LocoBuffer-Blue will depend on the Model of BlueSMiRF you have installed. Select the **New Device** and press **Next >**.



5) You should now be prompted to enter a passkey for the device. The default passkey for BlueSMiRF Gold is **1234**. Select “Use the pass key found in the documentation” and enter the passkey.

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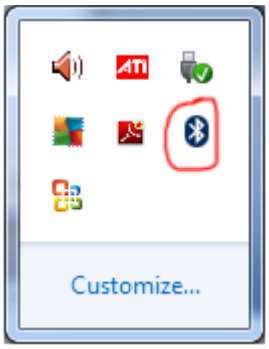
6) You will now be told that the Bluetooth device had been connected. Take note of the **Outgoing COM Port**. You will use it to communicate with the LocoBuffer-Blue.

Adding as a Bluetooth Device – Windows 7



1) Got to the system tray. Select the show hidden icons button. Right click on the Blueyooth Icon. Select the “Add a device” item from the pop up menu. (Alternatively, go to the Start Button -> Control Panel -> Hardware and Sound -> Add a Bluetooth device)

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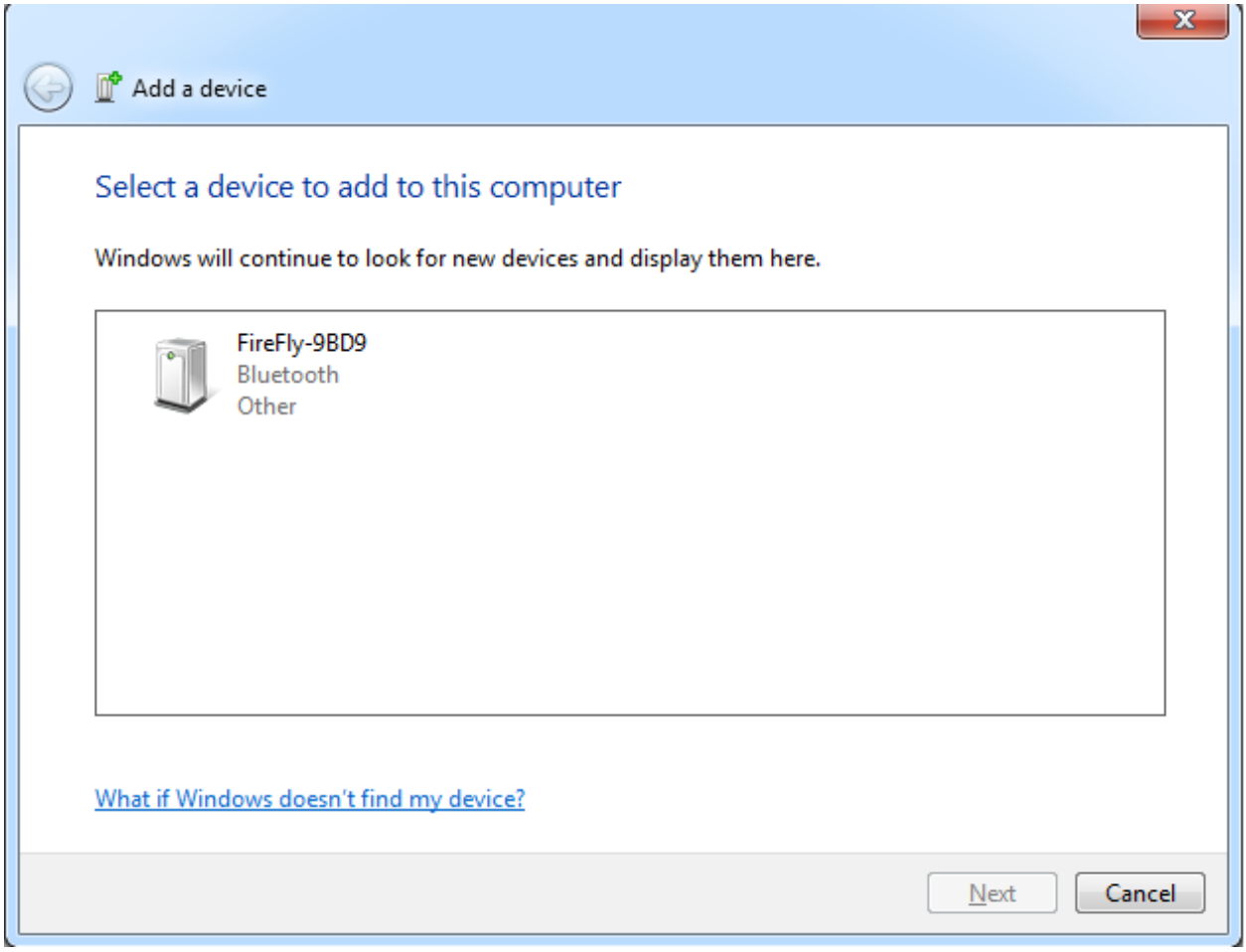
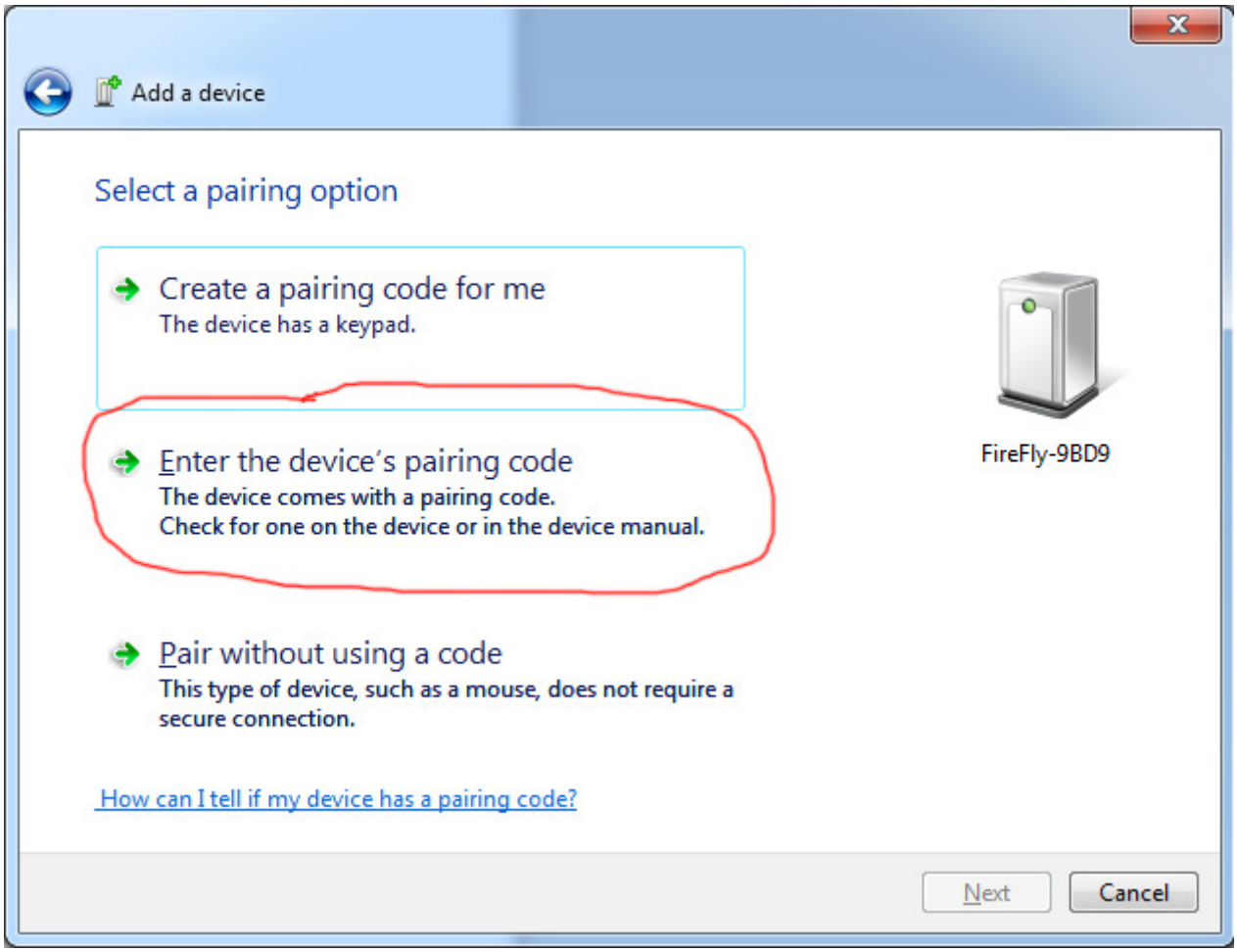


2) Windows will now search for active Buletooth Devices. You should now Power up the LocoBuffer-Blue. It should find the LocoBuffer-Blue as a FireFly device as show above. The last few digits in the name are part of the Bluetooth address and will be different for each module. Select the FireFly icon and press the “Next” button.



3) You will now be prompted to select a paring option. Select “Enter the device’s pairing code”.

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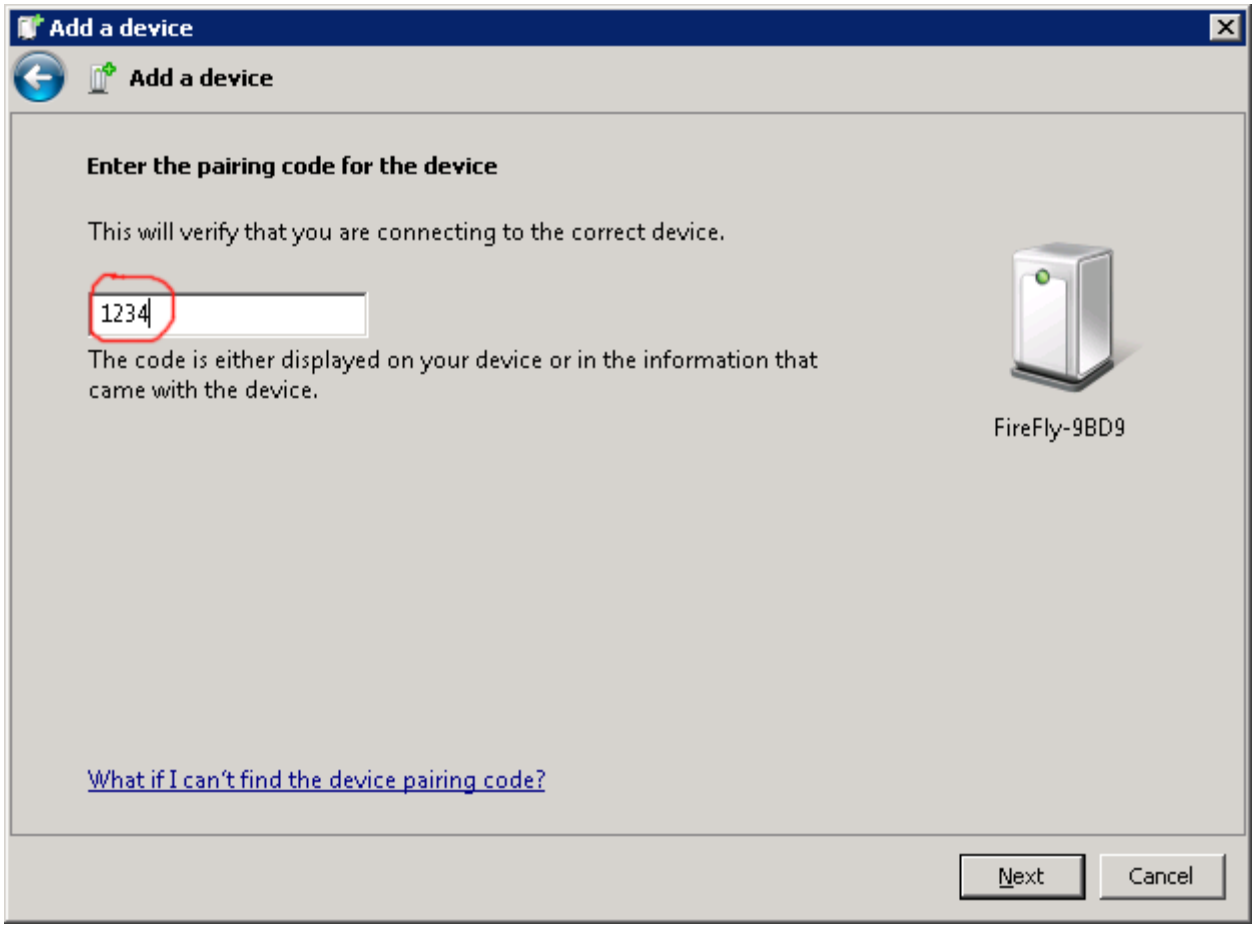

4) You will now be prompted to enter the paring code for the BlueSMiRF. The default code is **1234**. Enter the code and press the "Next" button.

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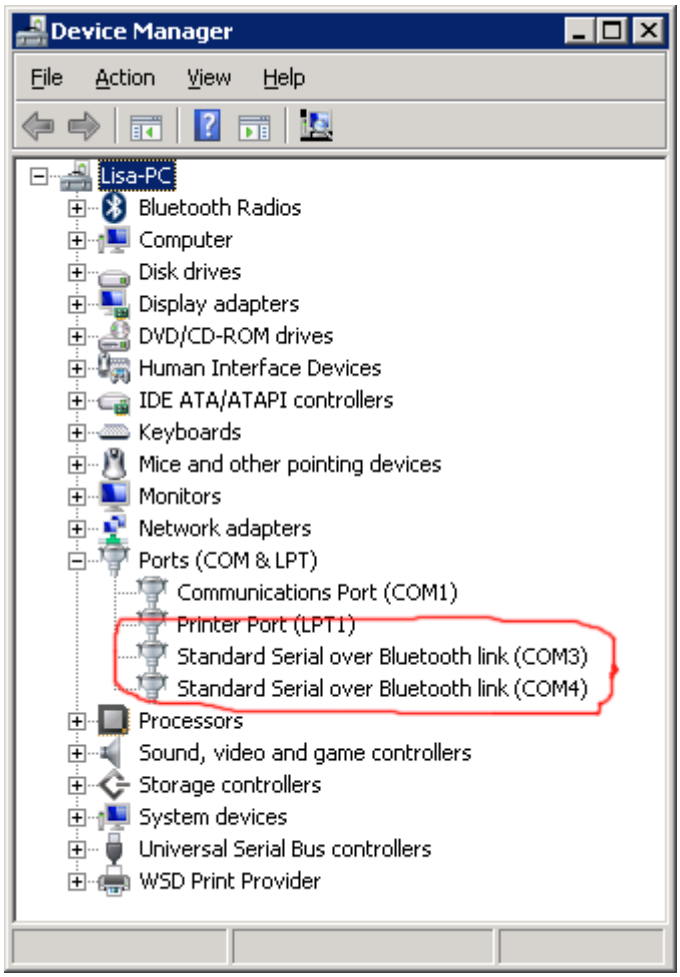
5) You should now see the device successfully added dialog. However, Windows 7 does not tell you want Com Ports were assigned to the BlueSMiRF. We will have to go else where for that.



6) Go to the Start Button -> Control Panel -> Hardware and Sound -> Device Manager. The device manager window should now appear. Expand the Ports (COM & LPT) list. There should now be two “Standard Serial over Bluetooth link (COM*)” devices. The lower numbered port (COM3 in the image above) will be the outbound connection port. You will use it to communicate with the LocoBuffer-Blue.

Configuring the BlueSMiRF Gold Serial Port

Using a terminal emulator you will need to connect to the LocoBuffer-Blue using the Outgoing COM port installed above. Windows XP comes with HyperTerminal which can be found under Start->All Programs->Accessories->Communications. However, Issues have been reported when using Hyperterminal and the Bluetooth serial device. HyperTerminal is not included with Window 7. The follow examples use a freeware emulator, Tera Term. It is available from http://ttssh2.sourceforge.jp/. The BlueSMiRF will not echo the commands you send to it so you may want to set “Local Echo” on the terminal emulator.

The BlueSMiRF modules can only be configured from the Bluetooth connection if configuration mode is entered with in 60 seconds of power up.

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Start your Terminal Emulator, and power up the LocoBuffer-Blue. The Red LED on the BlueSMiRF will begin to flash. Select the Outgoing Com Port configured above (COM8 in the example). The Red LED will go out and the Green LED will go on once the Bluetooth connection is established.

Type **$$$** in the emulator, the BlueSMiRF should respond with **CMD** and the Red LED on the BlueSMIRF will begin flashing rapidly. The BlueSMiRF is now in configuration mode and will accept configuration commands from the terminal emulator.

Type **D** and hit enter. Basic configuration settings will be dumped including the moduels Bluetooth address and current serial port settings.

Type **SU,57.6** and hit enter. The module should respond **AOK** indicating it accepted the command. This will set the serial port to 57,600 baud. However, it will not take affect until power is cycled on the module.

Type **- - -** (three dashes) and enter. The module will respond **END** and the Red LED will quit flashing. The module will now be out of configuration mode. Cycle power on the Locobuffer-Blue so that the configuration changes you made will take effect. If desired, you can connect to the module again, place it in configuration mode, and use the **D** command to verify the serial port settings.

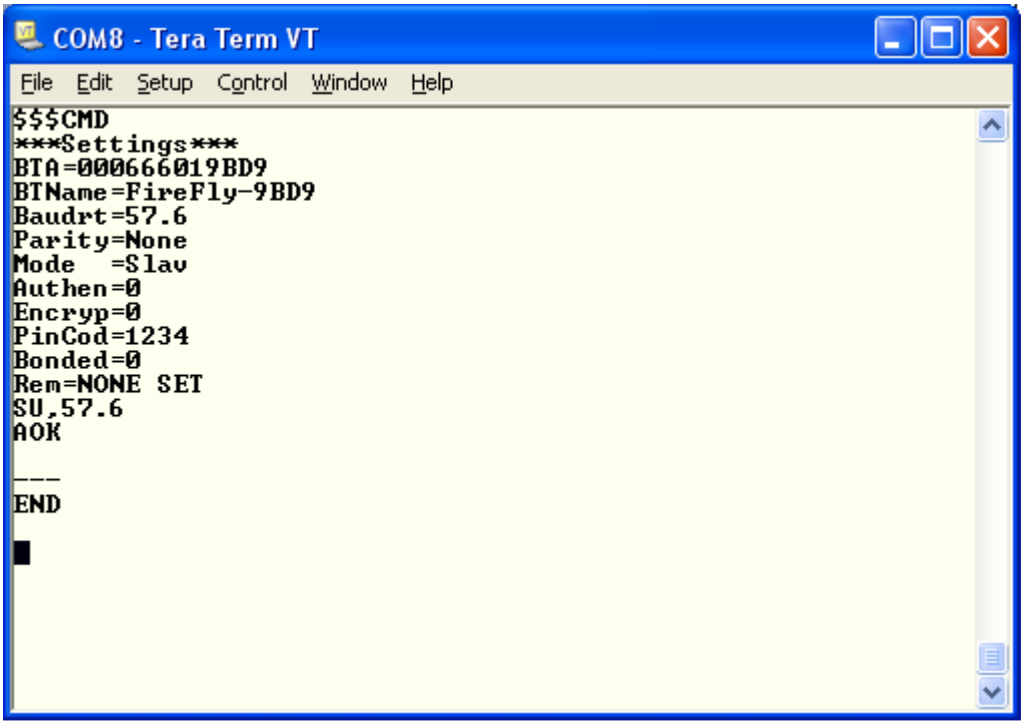

Figure 6: BlueSMiRF Gold Configuration Session

Using the LocoBuffer-Blue

The LocoBuffer-Blue can be used in place of any of the versions of the Locobuffer by specifying the outgoing virtual com port created in the configuration steps. The baud rate does not matter as it is irrelevant to the Bluetooth connection and is ignored.

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Note that most software using the Locobuffer does not expect the Com port they are using to potentially disappear so they do not handle a drop in the Bluetooth connection well. If you are using a Bluetooth stack other than the Microsoft XP stack it may handle the disconnection and reconnect for you. However, the Microsoft XP Bluetooth stack does not. The virtual Com port must be close and reopened. Products such as JMRI will have to be restarted to reconnect to the Locobuffer-Blue.

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