

Learning to Code Programming Series

2022

Wireless Bluetooth Model Trains



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2/1/2022

Introduction

This report walks you through the process of adding Bluetooth capability in order to control your Lionel TMCC (Train Master Control) trains! The original CAB-1 remote base and the newer CAB-2 Legacy base, use a traditional RS-232 or serial (DB-9) connector instead of USB. You can use this adapter on either model. Therefore, we need to purchase a Bluetooth to Serial adapter like the one described below. We are basically going to pair our PC and the Cab-remote base via Bluetooth. After we configure the adapter, it will look like any other Bluetooth device you are used to working with.

In the folder that you can download, there is a setup program for this adapter. Use these instructions to get it all working.

Configuring Our Bluetooth to Serial Adapter

My adapter is the [Gozen Bluetooth V4.2 RS232 Dipole Antenna Model](#). Any similar device should work. Make sure it comes with configuration switches labeled DTE/DCE so these instructions will work for you.

Step 1:

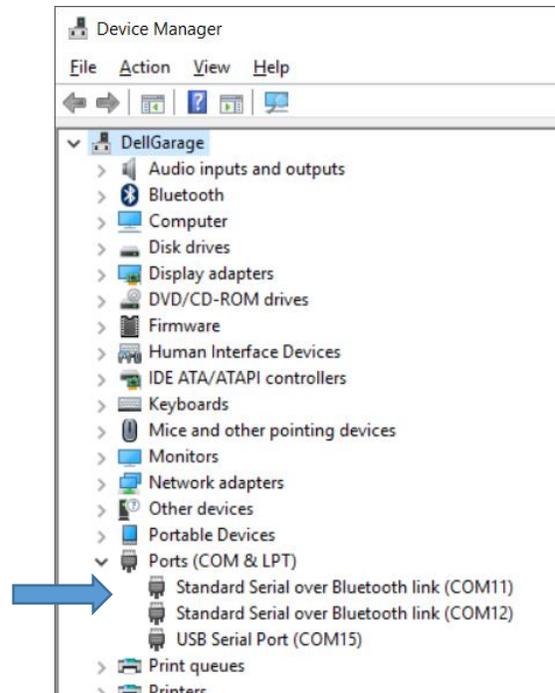
- Connect Serial Adapter (SA) to PC via USB to Serial Cable. Use the DB-9 connector on the SA.
- Connect the USB cable that came with the adapter to another USB port on the PC for power. This USB cable will ONLY supply power. It will not show up as an active COM port in device manager. Or you can use a 9 Volt battery using the supplied tiny connector.



Step 2:

- Set the DTE/DCE switch to DCE for this setup part. **Use DTE when running the trains!**
- **Make sure the slide switches are set for “Slave” and “NG” (no group).**

Step 3: Open Device Manager (Press down the Window Key + X) and choose Device Manager. Write down the COM port your Serial/USB cable is plugged into on the PC. In my case it is COM15.



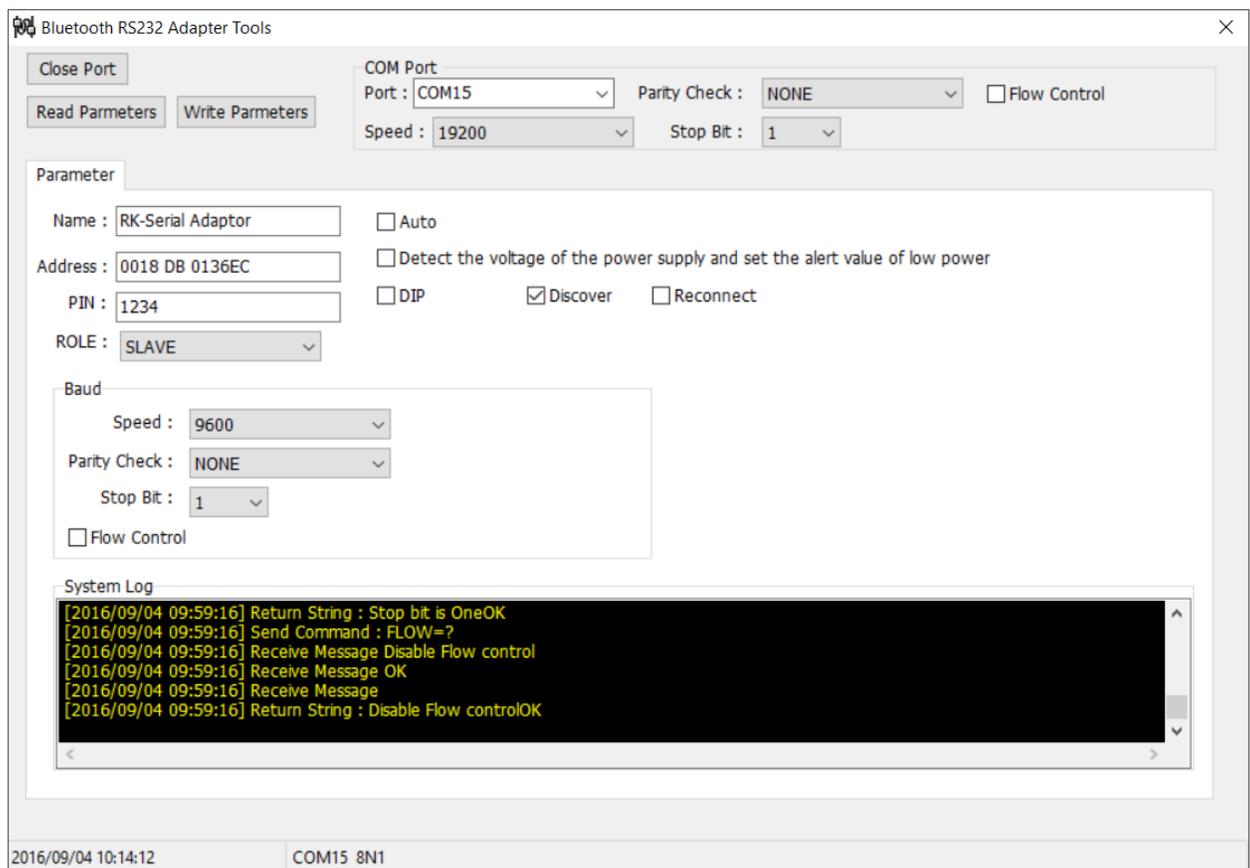
Step 4:

Launch the uBTRS232UI software.

1. Now choose the port in the dialog box of the setup software (Figure 1 below).
2. The default baud rate for the adapter is 19200 so select that. Leave other settings alone.
3. Click Open Port button. It should show success in the log screen.
4. Click Read Parameters button.
5. After the fields are filled in, change the Baud speed to 9600 in the group box at the bottom of the page to match the TMCC command base unit. Rename the device if you wish. (Makes it easier when pairing with Bluetooth program later.
6. Click Write Parameters button to save settings to the adapter. The software will tell you that you cannot communicate with the adapter because we changed the baud rate.

7. Close the setup program.

Figure 1: Configuration of the Serial BT Adapter



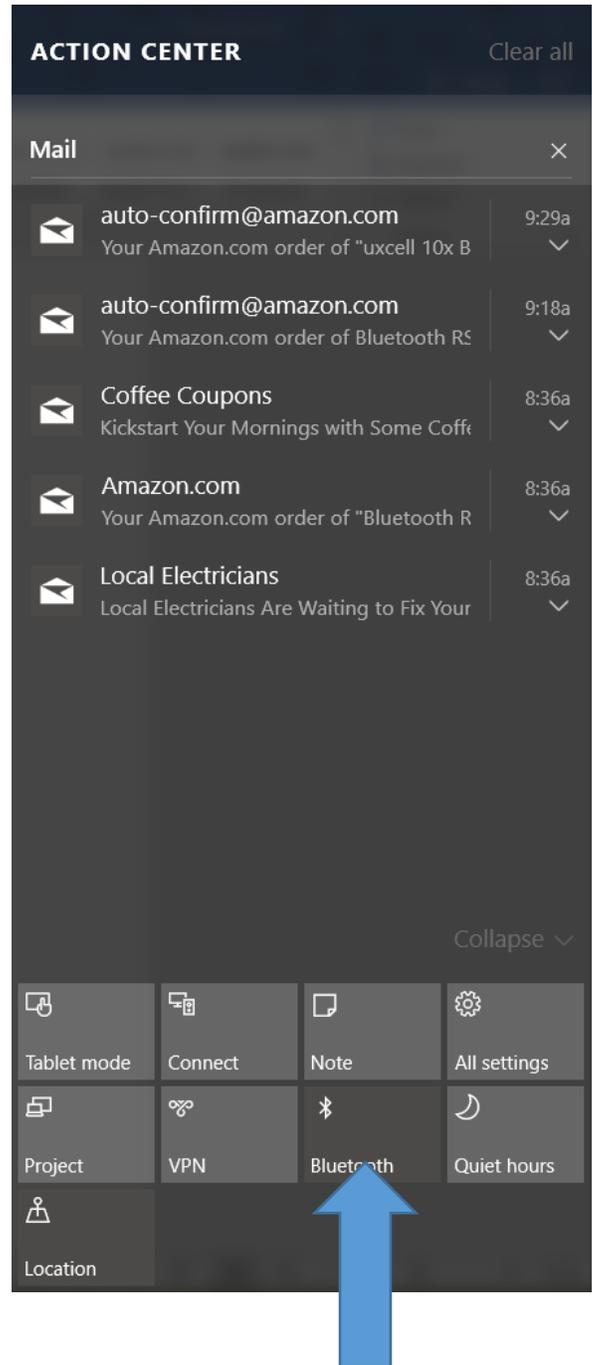
8. If you want to configure the adapter again, you must choose 9600 when you open the port at the top of the screen since we saved that speed to the adapter.
9. **Unplug your adapter and set the DTE/DCE switch to DTE(Data Terminal Equipment).** This will allow the adapter to communicate with the Command Base. DCE (Data Communication Equipment) is used to connect the adapter to a smart device like the PC. Our command base unit has different capabilities. If you cannot control the trains wirelessly, be sure to check this switch setting.
10. Next, we will add the adapter to your Bluetooth devices on the PC you want to use as a Train Controller.

Configuring Your Adapter to Communicate with Your PC

In this section, we will add our adapter to the Bluetooth devices collection on the Windows PC. Take your time and be patient. Sometimes, you must go through this process a couple times.

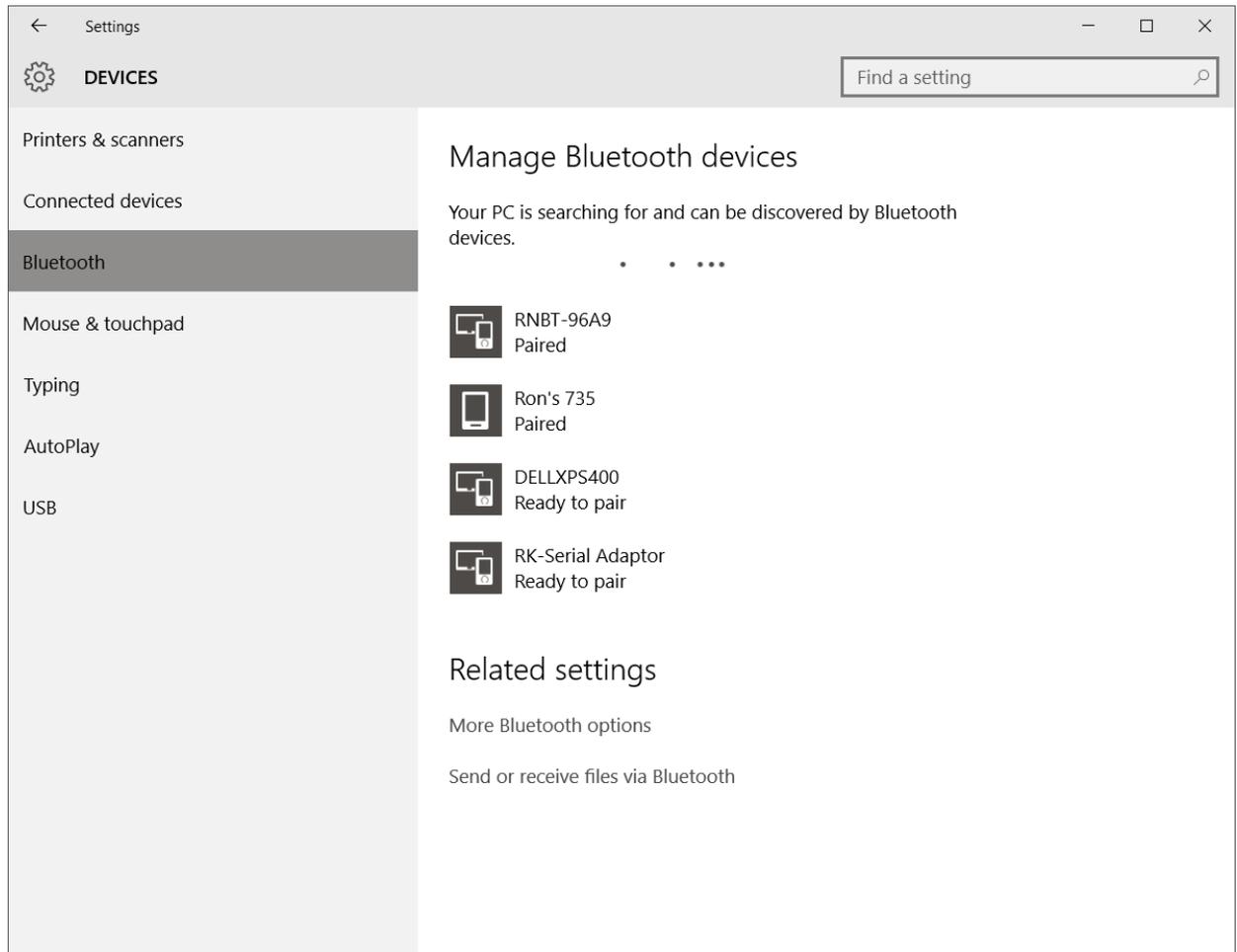
Step 1:

- Open the Windows 10 Action Center by click on the “Hamburger” icon next to the Time/Date on the right side of the Task Bar.
- Click on the Bluetooth button. This will bring up a dialog box where we can add the adapter and pair it with your computer



Step 2:

- Wait a few moments for your adapter to be recognized. You can see why I renamed mine. It is easy to spot when you have a bunch of BT devices.
- When it says “Ready to pair” click on the button. It will ask for a code. Type in 1234 and click Next.

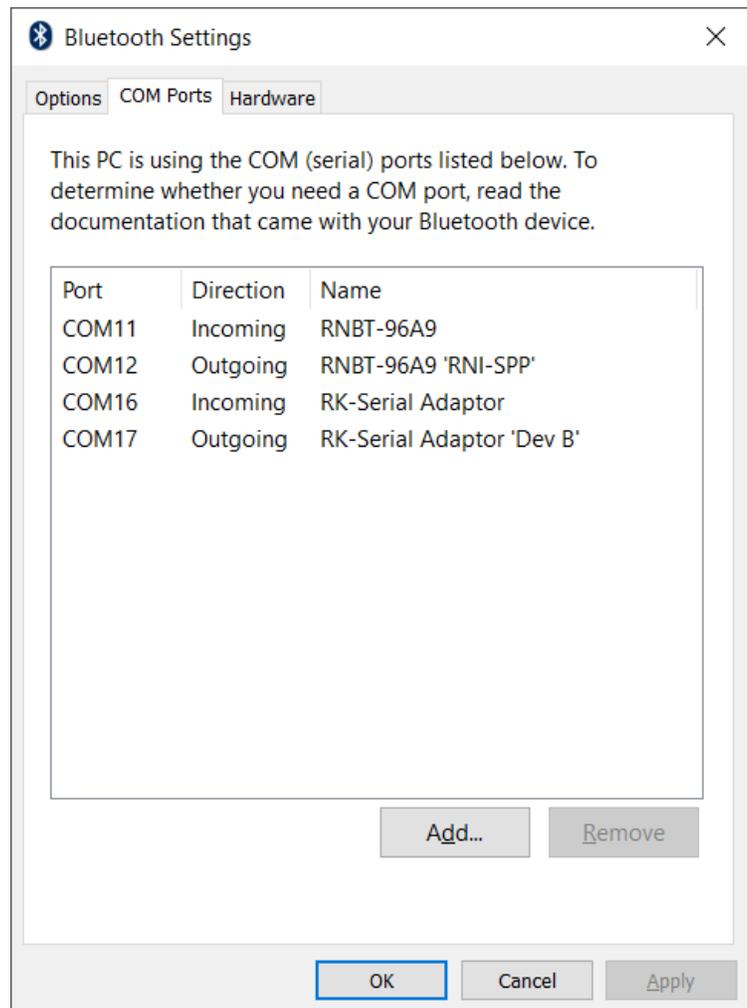


Step 3:

- We need to find out which COM port our adapter is using. So, click on the link that says “More Bluetooth Settings”. This brings up the Bluetooth Settings Dialog box shown below.

Step 4:

- Open the COM ports tab.
- Write down the Outgoing port number for your device. You can see that mine is COM17.
- You will only use this port in the TMCC software application. We do not use the Incoming port unless you want to read data FROM the Command Base. Be sure to choose the correct device.
- Click OK to close the dialog.



Step 5:

- Connect your adapter to the Command Base.
- Plug in the USB cable that came with the adapter to a USB power source (PC or phone charger) to give it power.
- Or use the small power plug that came in the kit and connect a 9V battery like I did. Just connect a battery adapter to the leads (I soldered mine). This will give you maximum flexibility.
- Use a male-male “gender changer” to plug in the adapter to the base. The adapter and Command Base are female connectors.



- See the connectors I ordered at Amazon:
https://www.amazon.com/gp/product/B00LFB0JCC/ref=oh_aui_detailpage_o08_s0?ie=UTF8&pisc=1
- Now run your app and connect to the trains wirelessly and have a great time!

Programming Note:

If you write your own app, the outgoing COM port for the adapter is the one you will use when you create an RS-232 port in your code. I use a dropdown box that displays all the current COM ports on the PC, and it lets the user select it easily. Refer to my code snippets at the end of this document to see how I created my app using Visual Studio 2022 and C#.

You can have several PC's, laptops, Surface Tablets paired with this adapter at the same time. That way you can use different devices such as the Surface to control the trains with a touch screen. However, you can only connect one PC to the Command Base at a time.

I often use the Surface tablet to control some trains and let my grandkids you the Cab-1 remote to control their trains. So, you can still have several engineers running the layout. You can only have one of them using the wireless adapter at a time.

Be sure to close the connection on the PC you are using before switching to another PC. Adapter.

Programming Snippets

Get all available COM ports from the PC and display in a dropdown box.

```
using System;
using System.Windows.Forms;
using System.IO.Ports;
using System.IO;

namespace RK_TMCC_DesktopApp
{
    public partial class Form1 : Form
    {
        private void Form1_Load(object sender, EventArgs e)
        {
            //---show all available Com ports
            foreach (string sp in SerialPort.GetPortNames())    //do not instantiate SerialPort. It is a type.
            {
                cboPorts.Items.Add(sp);
            }

            cboPorts.SelectedIndex = -1;
        }
    }
}
```