

Quick Start



How to get going with your new WifiTrax System

Practical notes by Steve Shrimpton

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To use this leaflet, you need to have purchased one or more WifiTrax Wi-Fi Locomotive Controller products and have downloaded and installed the Loco Operator App either on Android or on Windows 10.

This document is a brief guide to getting going with driving your locomotive quickly with basic information. If you need more help and guidance you can find a great deal of information at <http://www.wifitrax.com/appNotes/howToArticles.html>.

Installing Your WifiTrax Locomotive Controller

Before you can use the Loco Operator App, you must equip one of your locomotives with a WifiTrax controller. You can use either the WMR-10 board replacement module or the WMH-20 harnessed decoder. The WMH-20 is the easiest as it simply plugs into a DCC ready 8-pin socket using a short harness.

You may have already worked through the Getting Started leaflets provided with your WifiTrax modules. If so, you might want to skip to the section "Going Forward with the Loco Operator App".

WMH-20 Wi-Fi Locomotive Controller

WMH-20 Installation

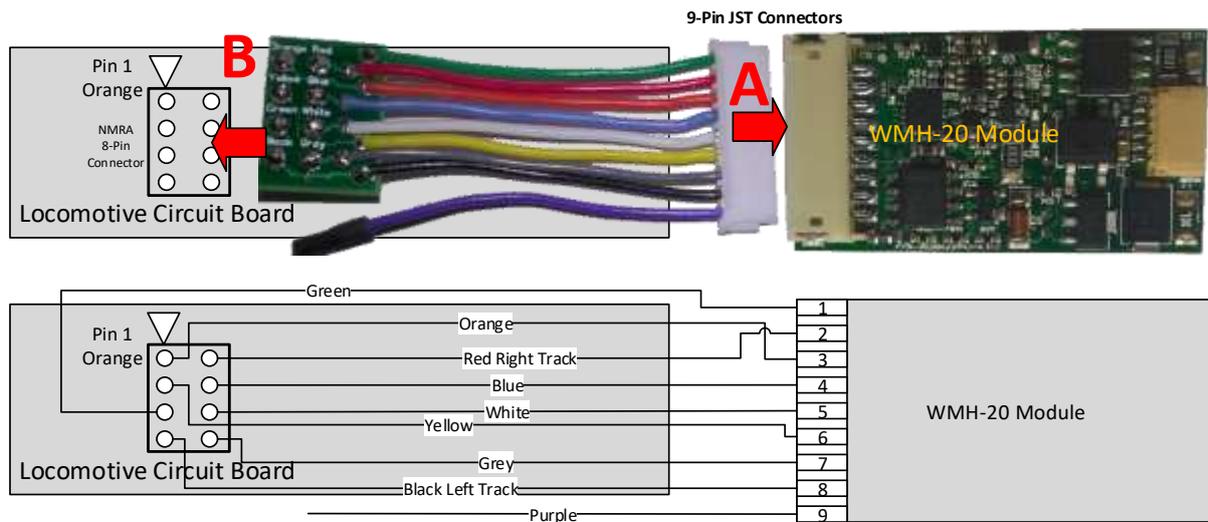


Figure 1. Connection Diagram

Summary Instructions

- (1) Remove the plastic shell from your model locomotive.
- (2) **Make sure that the motor is isolated from the track power!** This is most important – if one side of the motor is connected to the track through the frame, you will have to re-wire the locomotive before you start. You will not have a problem with DCC-Ready Locos.
- (3) Find the 8-Pin DCC Ready socket on the circuit board inside. Remove the jumpers. If your loco does not have an 8-pin socket you may be able to use our “flying-lead” harness.
- (4) Check the intended location of the WMH-20 unit in the loco. Insulate any exposed metal that will be underneath it with electrical tape. **This is very important.**
- (5) Make sure you have bought a harness of the correct length. Any standard DCC harness that fits will be OK.
- (6) Connect your chosen harness to the 9-pin JST socket. See A on Figure 1. Make sure it is the right way around. **Do not force it in the wrong way around or you will break the socket.**
- (7) Connect the other end of the harness to the DCC ready 8-pin connector on the locomotive circuit board. See B on Figure 1.
- (8) Make sure the pin marked Orange matches the Pin 1 or Orange label on the Locomotive Circuit Board. If you want the module the other side of the DCC-Ready connector, you can use one of our “Reversed” harnesses and flip the WMH-20 module over as in the second installation in Figure 2.
- (9) Check everything carefully.
- (10) Place your locomotive on the track and apply power. 12 to 18V DC is OK but we recommend 12 -14 volts as the unit will run cooler.
- (11) Verify that the front and rear lights flash briefly when the track power is turned on.

Be sure to insulate all metal parts of the module from the locomotive frame or any electrical connections. You can use a strip of electrical tape to do this.

WMH-20 Wi-Fi Locomotive Controller

Notes

1. The 12V Common is provided by the WMR-10 module. DO NOT CONNECT THIS TO THE TRACK POWER. This is used to supply power to the LED front and rear lights.
2. The track voltage must not exceed 18 volts. We recommend 12-14 volts. The polarity of the track voltage does not matter.
3. If you run at 18 volts at full speed, you may overheat some locomotive motors and/or the unit may shut down due to its overload protection.
4. The polarity of the motor connection does not matter as you can change the direction in the configuration variables during tuning.



Figure 2 Typical WMH-20 Installations. Always put a piece of electrical tape underneath!

If you need more help please visit our website. There are very detailed application notes for a selection of locomotives.

www.wifitrax.com/appNotes/howToArticles.html

WMR-10 Wi-Fi Locomotive Controller

WMR-10 Installation

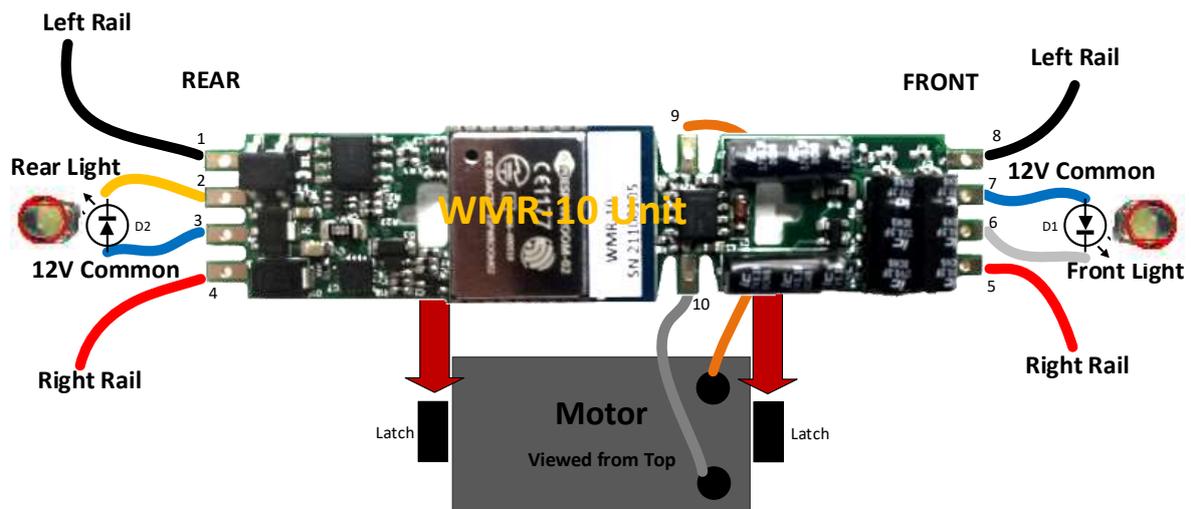


Figure 3 Connection Diagram

Pin Number	Lead Color on Diagram	Function
1	Black	Left Rail
2	Yellow	Rear Light
3	Blue	12V Common
4	Red	Right Rail
5	Red	Right Rail
6	White	Front Light
7	Blue	12V Common
8	Black	Left Rail
9	Orange	Motor +
10	Gray	Motor -

Summary Instructions

For more information please see our website www.wifitrax.com

- (1) Remove the plastic locomotive shell.
- (2) **Make sure that the motor is isolated from the track power!** This is most important – if one side of the motor is connected directly to the track, possibly through the frame, you will have to re-wire the locomotive before you start.
- (3) Make a note of the wire connections on the original circuit board. Remove all the wires connected to the locomotive circuit board. Keep any plastic clips as you can use these to reconnect the wires to the WMR-10. Alternatively, you can solder them.
- (4) Remove the locomotive circuit board.
- (5) Clip the WMR-10 module over the plastic latches replacing the circuit board you removed.
- (6) Connect the wires to the motor as shown in Figure 3. Note that in the original circuit board, the motor connections are usually on the same side. On the WMR-10, they are on opposite sides. The polarity of the motor connections is not critical since you can reverse it as part of the configuration variables.
- (7) Connect the wires from the trucks that make contact with the left and right rails as in Figure 3.
- (8) Connect the leads to the front and rear lamp LEDs as in Figure 3. If these are too dim when operating, you may find there is a resistor in series that can be removed. Alternatively, you

WMR-10 Wi-Fi Locomotive Controller

can replace your locomotive's lights with the LEDs supplied. Be sure to get them the right way around, so the flats are in the position shown in the diagram above.

- (9) Check all of the connections.
- (10) Place the loco on the track and apply power, the LED lights should flash briefly. If they do not, check to make sure they are the correct way around. They should be the same polarity as when originally connected.

Notes and Cautions

1. The 12V Common is provided by the WMR-10 module. **DO NOT CONNECT THIS TO THE TRACK POWER.** This is used to supply power to the LEDs front and rear lights.
2. The track voltage must not exceed 18 volts. We recommend 12-14 volts as the unit will run cooler. The polarity of the track voltage does not matter.
3. If you run at 18 volts at full speed, you may overheat some locomotive motors and/or the unit may shut down due to its overload protection.
4. If you use your locomotive's original LEDs and they are too dim, there may be a resistor in series. Our unit includes a 1K Ohm series resistor, so you could remove any additional series resistor or use the LEDs supplied with your WMR-10 unit.

If you need more help please visit our website. There are very detailed application notes for a selection of locomotives.

www.wifitrax.com/appNotes/howToArticles.html



Figure 4. WMR-10 Installed in a locomotive. Here the wires and the LEDs have been soldered to the tabs on the module.



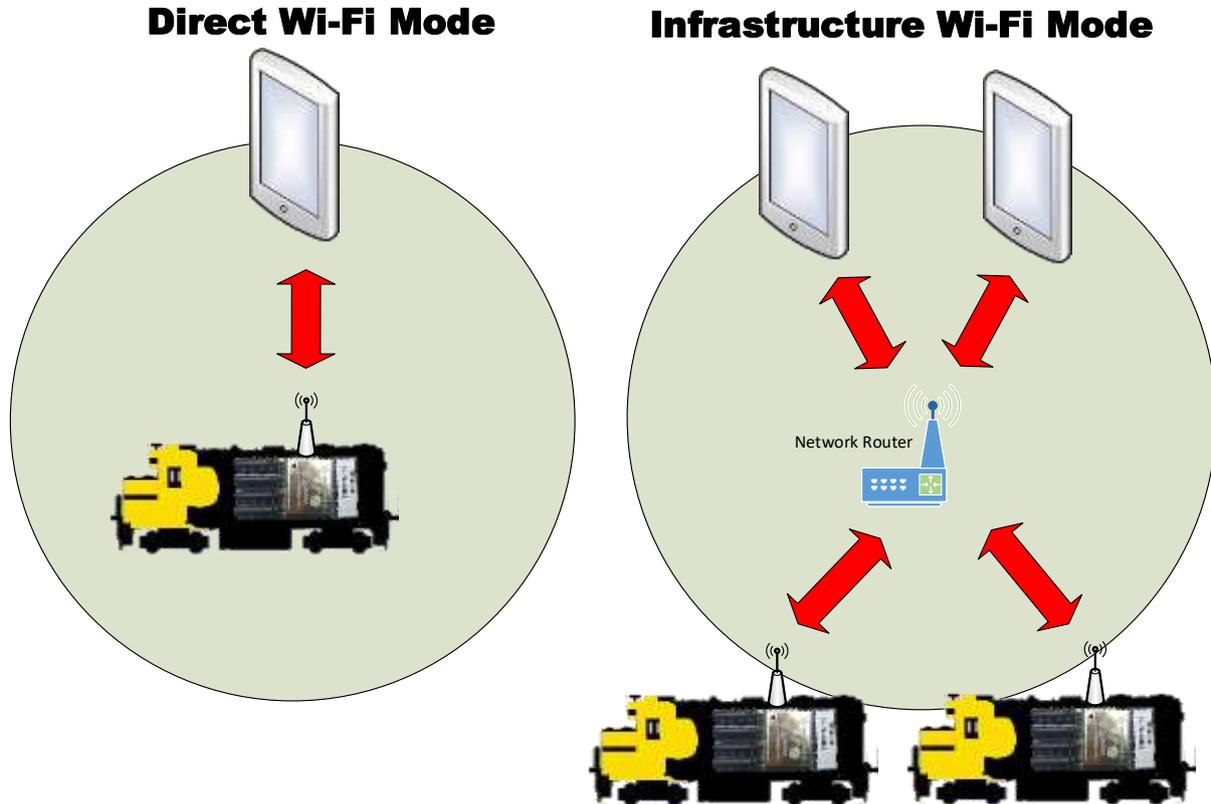
Figure 5. WMR-10 Installed in a locomotive. Here the wires have been attached using the original plastic clips.

Loco Operator App

Getting Started with the Loco Operator App

The Loco Operator App allows you to drive one or two locomotives fitted with a WifiTrax Loco Controller such as WMH-20 or WMR-10. You can download and install it from the Microsoft Store for Windows 10 or the Google Play Store for Android.

Wi-Fi - Direct and Infrastructure Modes



The first thing to understand is that there are two ways of controlling your loco over Wi-Fi: Direct Mode and Infrastructure Mode.

In direct mode, your computer, tablet or phone must be connected to the Wi-Fi access point within the loco. You can only drive one locomotive with each tablet.

In Infrastructure Mode, the locomotive and your computer, tablet or phone connect to the access point of your network router as Wi-Fi Stations. You can then build a full model railroad network with many locos and many computers, tablets or phones. You can drive two locos with each installation of Loco Operator.

Quick Start – Driving in Direct Wi-Fi Mode

The easiest way to get your new loco running and give it a test drive is in direct mode.

- (1) Power up your WifiTrax locomotive on the track.
- (2) Start the Loco Operator App on your computer, tablet or phone,

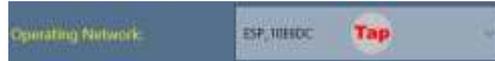
(3) On the App, select the Settings Tab , then the Networks Page ,

(4) Click or Tap the Scan Nets button, 

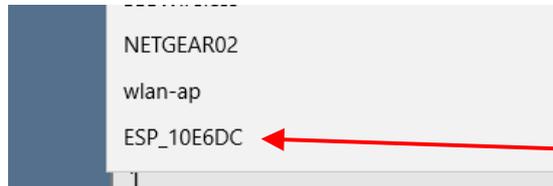
Loco Operator App

(5) Go to the General Page  of the Settings tab,

(6) Click or tap the Operating Network drop-down.



(7) Select by tapping, the network that has the last six digits equal to the last six digits of the STA MAC on the label of your WifiTrax module. This label is on the ESD Protection Bag in which your module arrived.



WifiTrax Model Science
WMR-10 Wi-Fi Loco Controller
Ser. No. 21100138
STA MAC 2C-3A-E8-10-E6-DC
AP MAC 2E-3A-E8-10-E6-DC
www.wifitrax.com

(8) Connect your computer, tablet or smart phone to the same network, just as though you were connecting to a Wi-Fi access point in a restaurant. This is outside the Loco Operator App, often under the Settings,

(9) Select the Locomotives Tab.  Check the network is shown as accessible, then click the

Scan button. 

(10) Check that your locomotive appears and show as Available. Its name will be SN followed by the serial number on the label.

(11) Go to the Drive Tab.  Select a loco and drive it.

(12) You can first check the lights work OK by toggling the front and rear light between Off, On and Auto. Leave them both on Auto.

(13) Next you can make the Loco move forward by touching the throttle slider and gently moving it upwards. Your loco should move forward. The front light should come on.

(14) Stop your loco and change direction by tapping the Direction button. Now you should be able to move the throttle up and the Loco should move backwards. The rear light should come on. You can get ultra-fine control by tapping the region of the throttle control above or below the slider. This will tap the speed up or down.

(15) If your loco moves in the wrong direction, you can go to the Tuning tab  Page 2 and correct it – check the Loco Operator manual for full details. You must tap the “Send to Loco”

button  and then the Save button  to fix the changes in the Loco’s flash memory.

Going Forward with the Loco Operator App

Unless you are happy to just run one train, you will want to learn how to work with the WifiTrax system in Infrastructure Wi-Fi Mode. This will allow you to work with as many locomotives as you wish, controlling one or two from each free installation of Loco Operator. It will also allow you to set up multiple unit consists and use our other products such as control of switch machines, power districts etc.

This document continues by explaining in a step by step procedure how to configure your Infrastructure WifiTrax Model Railroad Network.

Loco Operator App

- (4) Figure 6 shows the settings for the network SSSWireless which is provided by the Access Point of a network router. We will use this network as the *home network* which means the network that locomotives will connect to as Wi-Fi Stations. Yours will have a different name of course.
- (5) Make sure the Wireless Router SSID is the correct SSID for the wireless access point of your router.

Wireless Router SSID:

- (6) Enter your Wi-Fi password in the text box of that name. This password will be saved on the computer, tablet or phone on which you have installed Loco Operator. It will then be sent to each Locomotive that you connect to this network.

Wifi Password:

- (7) Choose a suitable range of IP Addresses that the locomotives will have. You can leave the default settings of 1 to 254, but if you don't have many computers on your network it will save time if you set the range say 1 to 50 or even less. This is because scanning for locos requires Loco Operator to scan this whole range.

First Address in Subnet:
Last Address in Subnet:

- (8) Go to the General page of the Settings tab.
- (9) Tap on the Home Network drop-down selector and choose the network you have just configured as your home network. Remember the home network is the network that locomotives will be told to connect to as stations. Only infrastructure networks can be home networks.

Settings
Tap and Select
Home Network:

- (10) Click or tap on the Save button to save the settings.

- (11) Now you have completed setting up your home network. The next thing to do is to tell your locomotive to connect to it.

Note for Advanced Users

When you scan for locomotives on the network, it will take quite a long time with the default settings of 1 – 255. You can reduce this in two ways:

Reduce the range of IP addresses that the DHCP server of your router can allocate. This is OK if you only ever have a few devices on your network. You then enter this range at step (7) above.

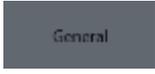
Set up IP Address reservations for your locomotives in your router. You can define a small range of IP addresses say just 5 or 10, then use that range in step (7). This will also avoid problems if one of your locos gets assigned a different IP address by DHCP.

Loco Operator App

Configuring your Locomotive as a Station

Your locomotive must be configured with the SSID and Password for the home network router access point. This is how you do it:

- (1) To provide this information you need to connect to the Controller Network of the locomotive. This is the same as when you were driving the locomotive in Direct Wi-Fi mode.
- (2) Power up your WifiTrax locomotive on the track.

- (3) On the App, select the Settings Tab , then the General Page .
- (4) Click or tap the Operating Network drop-down and select the Controller Network for the locomotive, for example, for a locomotive with STA MAC 2C-3A-E8-09-0E-36



- (5) Connect your computer, tablet or smart phone to the same network, just as though you were connecting to a Wi-Fi access point in a restaurant. This is outside the Loco Operator App, under the Settings, Wi-Fi page for Android or using the Networks system tray icon for Windows 10

- (6) Go to the Locomotives tab  and see if the locomotive is available. If it is not visible click the Scan button . The locomotive should be shown as in Figure 7 for this example.

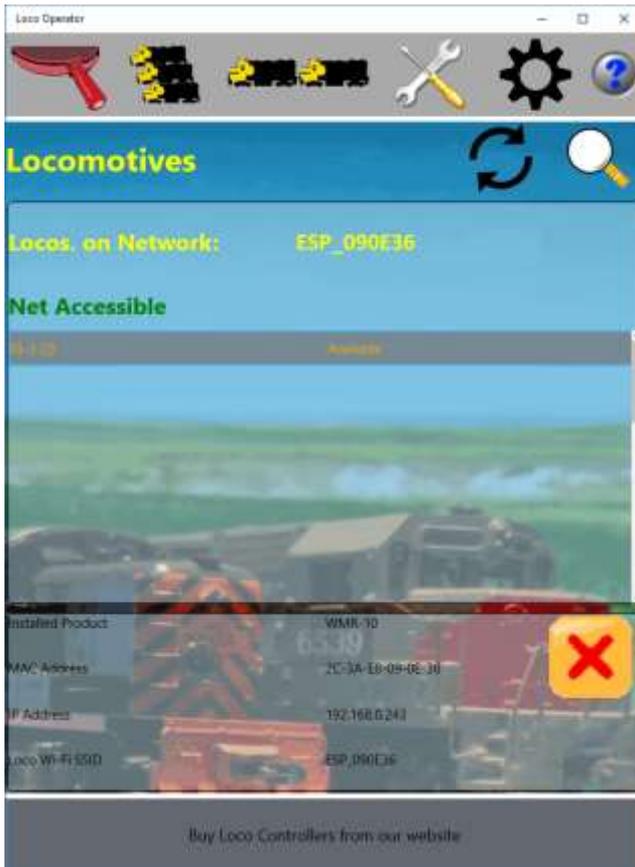


Figure 7 The Locomotives Tab showing a Locomotive Visible on its own Controller Net

- (7) Go to the Drive tab  and select the locomotive in the Drive: drop-down selector:



Loco Operator App

- (8) Go to the Tuning Tab  and click or tap Page 2. The screen appears as in Figure 8.



Figure 8 The Tunings Tab Page 2. Here you can download the Home Network Access Point SSID and Password

- (9) For a locomotive that has not been configured to act as a Station the existing Station SSID and Station Password will be blank. You cannot enter the Station SSID and Station Password at this point. They will be populated from the network details of the Home Network as shown in Figure 8.
- (10) At this point you click or tap the Send to Loco button which will cause the locomotive to save this information and restart in StationAP mode. This means that it now acts as both an Access Point for its own Controller Network and a Station on the Home Network. The locomotive should restart, then return the new tuning data showing this information as in Figure 9. If you do not see it, click the Refresh button .

Loco Operator App



Figure 9. Page 2 of the Settings Tab after the Home Network Access Point SSID and Password have been Sent to the Locomotive

- (11) Now you can disconnect your computer from the locomotive's Controller Network and reconnect to the infrastructure network you have chosen as Home Network. Use the Settings, Wi-Fi for your device or the Networks icon from the System Tray, as before.
- (12) Next go to Settings tab General page on the Loco Operator App and select your home network as the operating network.



- (13) Finally, go to the Locomotives tab, make sure it shows as Accessible, and do a Scan. Now you should see your locomotive available on this network as in Figure 10. You are operating on your home network. You can now go to the Drive tab and drive the locomotive. You can repeat this procedure for all the locomotives that you have.

Loco Operator App



Figure 10. The locomotive now Appears on the Home Network when that Network is Chosen as the Operating Network

Review of Concepts

Networks

In Loco Operator, a Network is a collection of devices accessible to the computer, tablet or phone on which Loco Operator is installed via either a wired LAN or a Wi-Fi access point. The computer, tablet or phone must connect to the network to access the devices on it.

Controller Network

The Wi-Fi network exposed by a WifiTrax Locomotive Controller. It will always have the locomotive accessible on it at IP Address 192.168.4.1. Your computer, tablet or phone can connect to it if it has a Wi-Fi adapter.

Infrastructure Network

A network controlled by a network router that exposes a Wi-Fi access point that many locomotives can connect to as well as many computers, tablets or phones running instances of Loco Operator. There may be other devices on the network such as printers etc. It may also have internet access. If it does have internet access, you will be able to view the on-line help pages for Loco Operator.

Wired LAN Network

A network that is accessible using a wired ethernet connection from the computer on which Loco Operator is installed. To be useful, this network must also contain a Wi-Fi access point to which WifiTrax locomotives can connect to as their home network.

Home Network

The Home Network is the network accessible via Wi-Fi Access point that the locomotives can connect to as Wi-Fi Stations. The home network must be a Wi-Fi Infrastructure network with a Wi-Fi Access point that locomotives can connect to.

Loco Operator App

Operating Network

The Operating Network is the network that the installed instance of Loco Operator uses to contact locomotives, configure and drive them. It can be a Wi-Fi Infrastructure Network, a Wired LAN Network or a Controller Network. If it is a Controller Network, only the locomotive exposing that network can be contacted by Loco Operator.

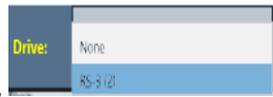
Displayed Network

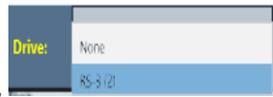
This is simply the network chosen for display and edit on the Networks page of the Settings tab.

Dual Locomotive Driving

This section takes you through the steps of Driving two locomotives at the same time from the installation of Loco Operator. It assumes that you already have added at least two locomotives to your Wi-Fi Infrastructure Network. You can drive from Loco Operator either on a Windows 10 or Android computer, tablet or a phone.

- (1) Go to the Locomotives tab  and make sure the locomotives you want to drive are shown on the operating network and are available. If necessary do a Scan  to find new locomotives or a refresh  to update the status of known locomotives.
- (2) Go to the Drive tab  and tap the Single/Dual button  so that two sets of controls are displayed.



- (3) On the left-hand Drive: Selector, , select the locomotive that you want to drive with the left-hand controls.
- (4) On the right-hand Drive: Selector, select the locomotive you want to drive with the right-hand controls.
- (5) Now you can drive both at the same time, either by sliding either of the speed controls or tapping up or down. The speeds of both locomotives will be displayed.
- (6) You can switch Auto-Drive on  and tap the regions above and below the speed control thumb pads to initiate automatic acceleration and deceleration.

Define and Operate a Multi-Unit Consist

- (1) Go to the Locomotives tab  and make sure the locomotives you want to use in the consist are shown on the operating network and are available. If necessary do a Scan  to find new locomotives or a refresh  to update the status of known locomotives.
- (2) Go to the Consists tab .
- (3) Click the button  to create a new consist.
- (4) Select the Name text box , type a suitable name and click the Save button .
- (5) Look at the Available Locomotives section.

Loco Operator App



- (6) Select one and click the Add Locomotive button .
- (7) Repeat for a second locomotive.
- (8) Look at the Consist Details section as in Figure 11.

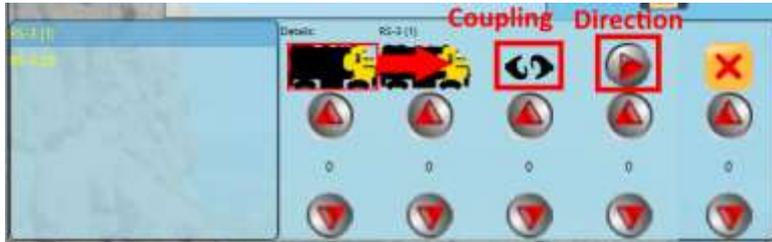


Figure 11 Consist Details Section

- (9) Select each locomotive and check that the direction is correct  according to the direction the locomotive is facing in the consist.
- (10) Select each locomotive and click the Coupling button so that each shows the coupled state .
- (11) Select the Drive tab, select the consist by name in the Drive: Drop-down selector and begin driving the consist.
- (12) If necessary use the speed tap-up/down for the five speed ranges to match the locomotive speeds by driving them physically uncouple a short distance apart.