.: Model Railroad Signal Systems

Free-mo Turnout Module - Installation Instructions

The **FTM-2** Module has been designed to route signal bus information through a turnout that uses a set of signals to protect the turnout.

Please read these instructions before you begin to ensure the installation is done correctly. Failure to properly connect the board may result in damage to the circuitry. Ensure all power is turned off before you begin the installation.

Handling of the circuit board

Use care when handling the circuit board. Most electronic circuits are sensitive to static electricity and can easily be damage. Be sure work in an area where static is not an issue.

STEP 1 – Jumper Settings

There are four jumpers on the FTM-2, Free-mo Turnout Module. The chart in Table 1 list the different signal types and the settings for the jumpers. If the jumpers are not set correctly, your signals will not operate properly. If you make changes to the jumper settings, you should reset the power to the FTM-2 board so your signals operate properly.

1	2	3	4		Jumper Number
	On	CA	CA		- 3 LED Signal Head, Common lead is positive (+)
	On	CC	CC		- 3 LED Signal Head, Common lead is negative (-)
	Off	CA	CA		- 2 LED Signal Head, Common lead is positive (+)
	Off	CC	CC		- 2 LED Signal Head, Common lead is negative (-)
On					Advance Approach is flashing
Off					Advance Approach is steady

Table 1

STEP 2 – Mounting the FTM-2 board

Choose an area under your Free-mo module that is suitable for mounting the FTM-2 board. Keep in mind the length of your signal leads. Under or near the protected turnout is most likely the best place.

STEP 3– Turnout Contacts

The FTM-2 board relies on a set of contacts at the turnout. The contacts can be a part of the turnout motor, or any other circuit that provides a set of closed contacts when the turnout is in the diverted route position. This allows the FTM-2 to divert the occupancy bus information from the approach side of the turnout to the diverted route providing your signals with realistic operation. Figure 1 shows how the board should be connected to a set of contacts.

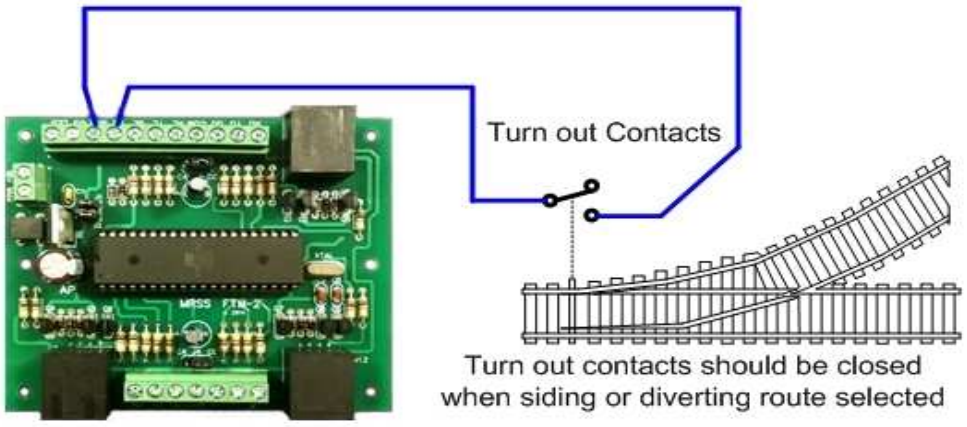


Figure 1

STEP 4 – Signal Connections

There are several types of signals that can be connected to the Free-mo Turnout Module. Refer to the information sheet that comes with your signals to determine which kind you have. Figure 2 below shows how to connect several different types. If yours in not shown, please send me an email with your details.

The back to back configuration shown at the end on the right will work to display a red or green aspect only. The signal would go dark if the module is trying to display a yellow aspect. This is why this type of signal is currently not supported. A red or green aspect can be made to display in place of yellow if external diodes are used when connecting the signal.

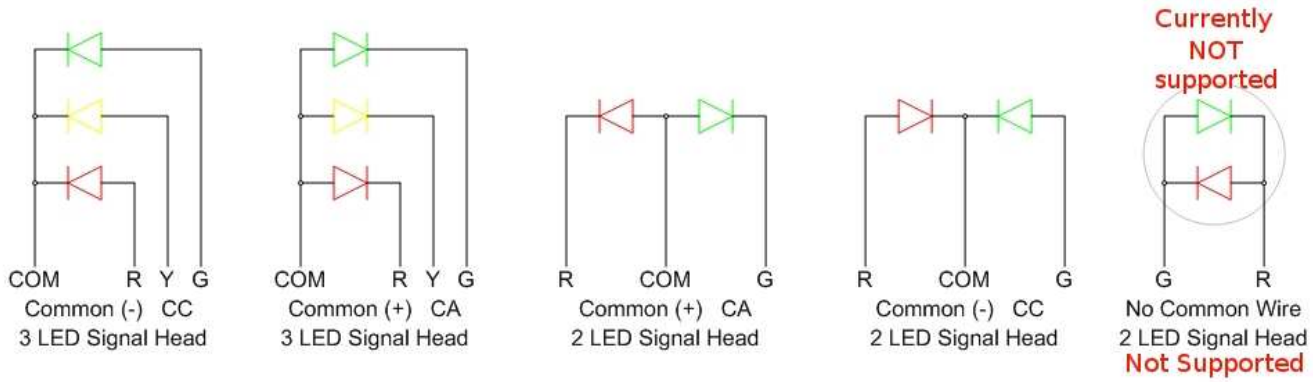


Figure 2

Figure 3 indicates the position of the four signals. Refer to this diagram when connecting your signals to the FTM-2 board.

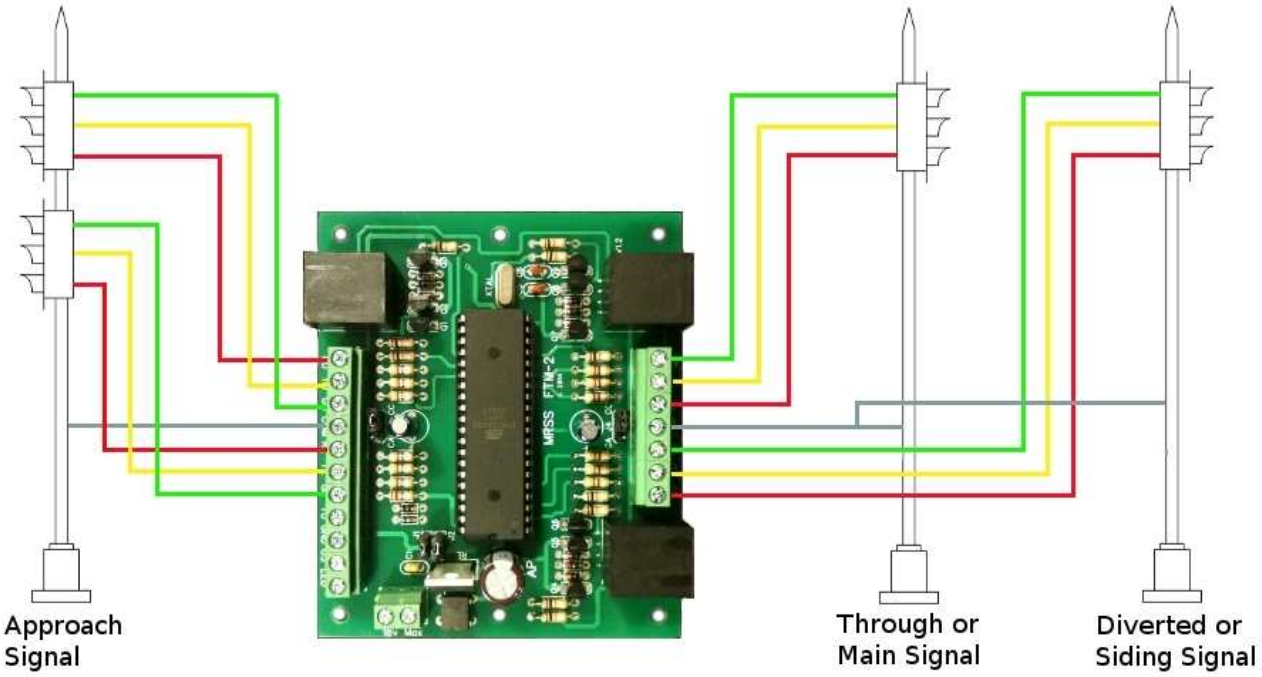


Figure 3

Terminal connections for the signals are as follows:

RD – Red led, diverted signal.

YD – Yellow led, diverted signal.

GD – Green led, diverted signal.

RT – Red led, through signal.

YT – Yellow led, through signal.

GT – Green led, through signal.

RU – Red led, upper approach signal.

YU – Yellow led, upper approach signal.

GU – Green led, upper approach signal.

RL – Red led, lower approach signal.

YL – Yellow led, lower approach signal.

GL – Green led, lower approach signal.

COM – Common signal wire for all signals.

STEP 5 – Power Connections

The Free-mo Turnout Module has been designed to accept several different power supplies.

– A separate AC adapter that can supply between 8 and 18 volts AC or DC.
– Connecting the board to the accessory bus.
– Connecting the board to the DCC bus.
– A 12 volt battery.

Refer to figure 4 when making power connections.

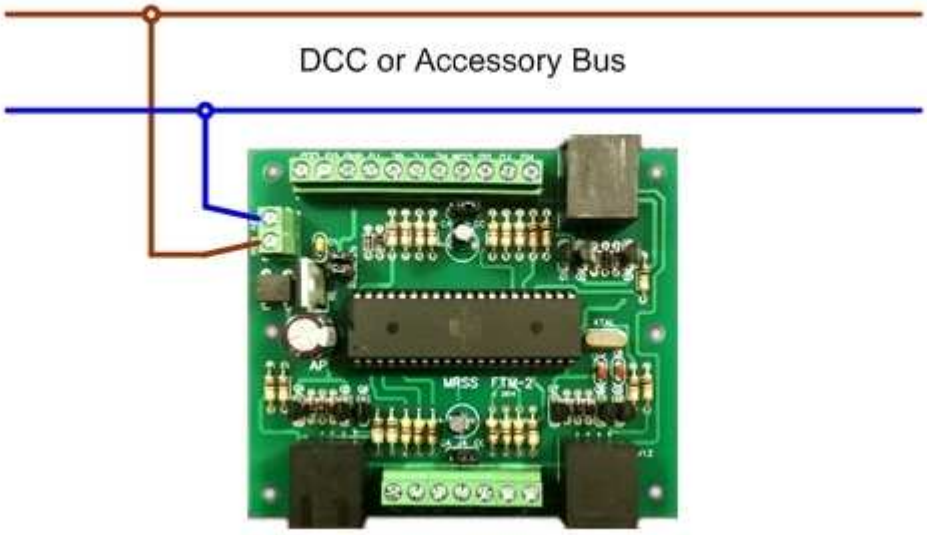


Figure 4

STEP 6 – Optical Sensor

The optical sensor is meant to be installed under the track at the approach end of the turnout just past the points. Be sure not to cover the sensor with ballast or other objects otherwise the sensor will not work. Figure 5 is a cut away diagram displaying how the sensor should be mounted.

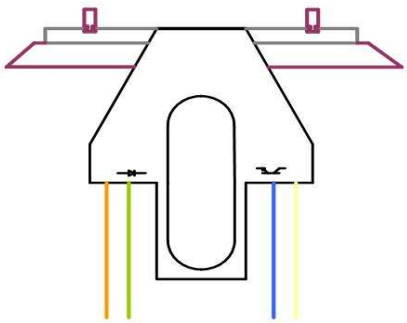


Figure 5

Connecting the provided optical sensor is simple and should be made as follows:

LED Anode lead – Orange.	To LED terminal.
LED Cathode lead – Green.	To GND terminal.
TRANSISTOR Emitter lead – Blue.	To GND terminal.
TRANSISTOR Collector lead – White.	To OS terminal.

There is no need to put a current limiting resistor in line with the LED as this is already on the circuit board. Figure 6 is a diagram of how to connect the optical sensor.

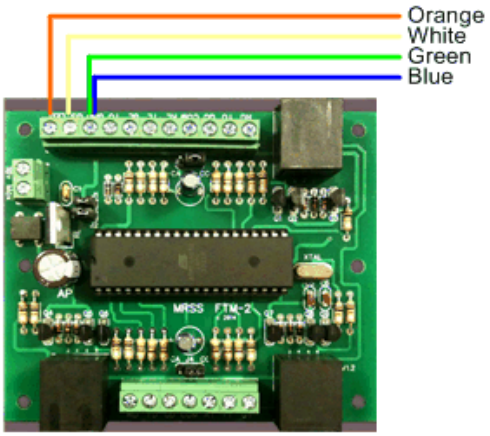
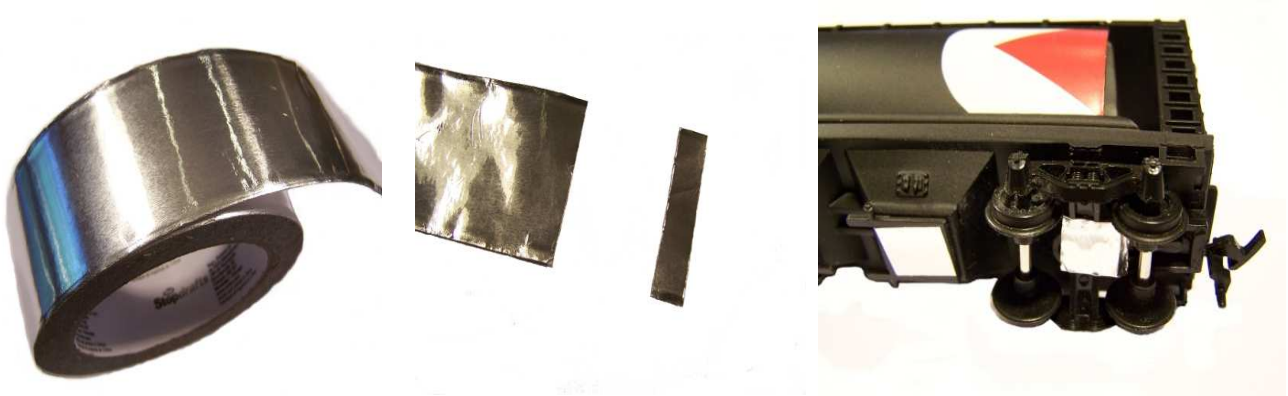


Figure 6

Most rolling stock have a dark non reflective surface which greatly reduces the optical sensor's ability to reflect back the infrared light it produces. This can lead to a non detected train even though the train is sitting directly over the optical sensor. There is a simple way to correct this problem. Hardware stores sell a roll of silver tape that is normally used to seal cracks in HVAC ducts. Do not mistaken this tape for duct tape which is gray and is not for use on ducts in HVAC systems. Cutting small strips off the roll and sticking them to the under side of your rolling stock provides an excellent reflective surface for the optical sensor. This is shown in the three photos in Figure 7.



Roll of silver tape | Cut strips from roll | Cut into cubes and stick to underside of rolling stock.

Figure 7

STEP 7 – Occupancy Bus

The RJ45 jacks are used to connect your Free-mo Turnout Module to other boards such as block detectors or cascade modules. This is called the Occupancy Bus. The cable type to be used between modules must be a Cat 5 cross over Ethernet cable. The use of just a strait through cable will not allow your signals to function properly.
If the module next to yours does not have a signal bus, you can extend your cable with a strait through cable as long as there is an odd number of cross over cables between circuit modules.

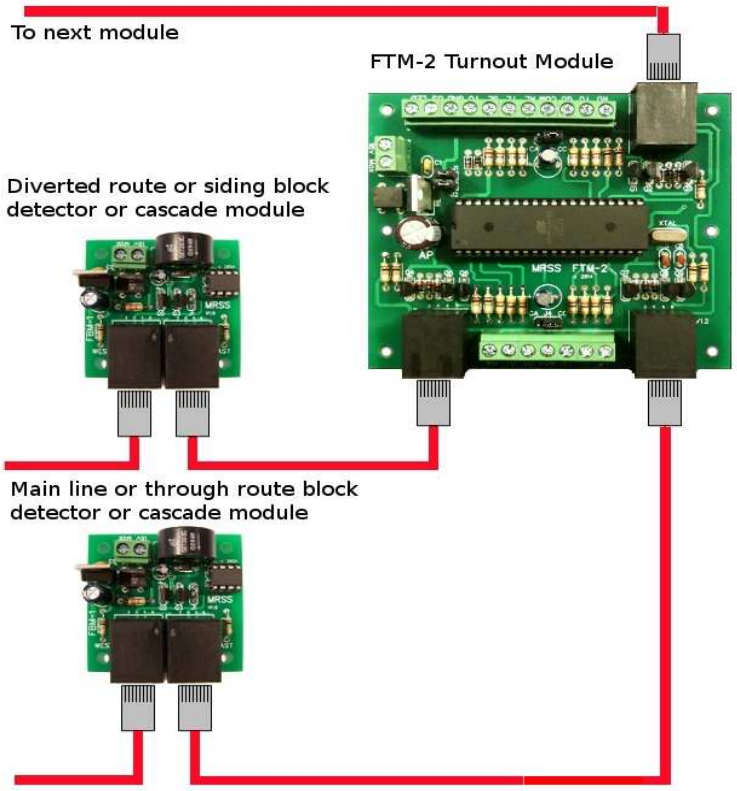


Figure 8

STEP 8 – Applying Power

The last step is to turn on the power and test your module. Double check all your connections prior to applying power. A second look can save you a lot of frustration if connections are made incorrectly.

Disclaimer

All the circuits designed and posted on the Model Railroad Signal Systems website have been designed and created as a hobby. Many hours of research and development have gone into the design of each circuit so that they will operate as described without any problems.

The circuits will work as designed and will not be dangerous to persons or property when used in their intended manner. However, if you choose not to follow the installation instructions as stated above and use the circuits in any other fashion, you may pose a risk to yourself and property.

I am not responsible for any injuries or damages whatsoever that may arise from the use or misuse of these circuits as I have no control over the actions of the user or installer.

Warranty

All the circuits here are inspected and tested before they are shipped. If there is a defect due to manufacturing or programming, I will gladly replace your board for a new one within 90 days of purchase.

Misuse, abuse, or the use of cheap power supply to power these circuits which will cause damage to the board, is not covered by warranty. If you have any doubts about the use of any type of power supply, please contact me before applying power to your board.

Questions or Comments

If you have any questions or comments please send them to me by using the email address on the Model Railroad Signal Systems Website.