

.: Model Railroad Signal Systems

Free-mo Cascade Module - Installation Instructions

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 Free-mo Cascade 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 must reset power to the FCM-1 board in order for the changes to take effect.

1	2	3	4	Jumper Number
On	On		CA	- 3 LED Signal Head, Common lead is positive (+)
On	Off		CC	- 3 LED Signal Head, Common lead is negative (-)
Off	On		CA	- 2 LED Signal Head, Common lead is positive (+)
Off	Off		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 FCM-1 board

Choose an area under your Free-mo module that is suitable for mounting the FCM-1 board. Keep in mind the length of your signal leads and that the track feeders will also need to reach the board.

STEP 3 – Optical Sensor

The optical sensor is meant to be installed under the track between the two isolated track sections. Be sure not to cover the sensor with ballast or other objects otherwise the sensor will not work. Figure 1 is a cut away diagram displaying how the sensor should be mounted.

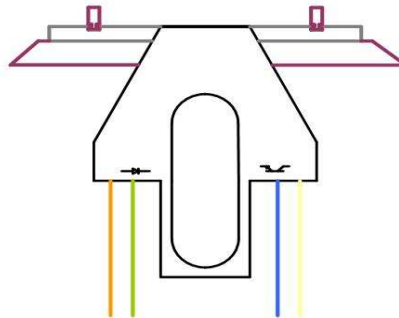


Figure 1

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 2 is a diagram of how to connect the optical sensor.

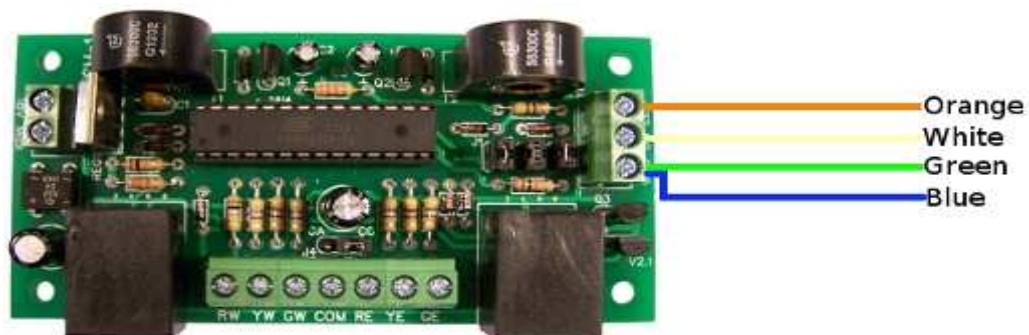


Figure 2

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 3.



Roll of silver tape



Cut strips from roll



Cut into cubes and stick to underside of rolling stock.

Figure 3

STEP 4 – Track Feeders

In order to detect current through the tracks, your track feeders need to pass through the air core transformers on the FCM-1 board as shown in Figure 4. There will be one track feeder for the east block and one for the west block. Loop the track feeders through the hole twice or three times if more sensitivity is required for detecting your trains. Use care when feeding the wire through the transformer. Pulling on the wire while looped through the transformer will tear the transformer from the circuit board. This will not be covered under warranty. Recommended wire size is between 16 and 18 gauge.

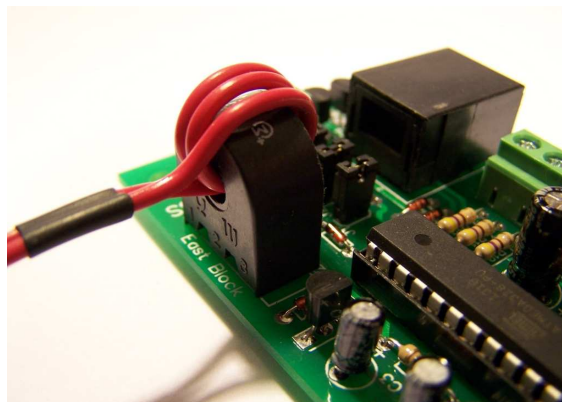


Figure 4

STEP 5 – Signal Connections

There are several types of signals that can be connected to the Free-mo Cascade Module. Refer to the information sheet that comes with your signals to determine which kind you have. Figure 5 below shows how to connect several different types. If yours is not shown, please send me an email with your details.

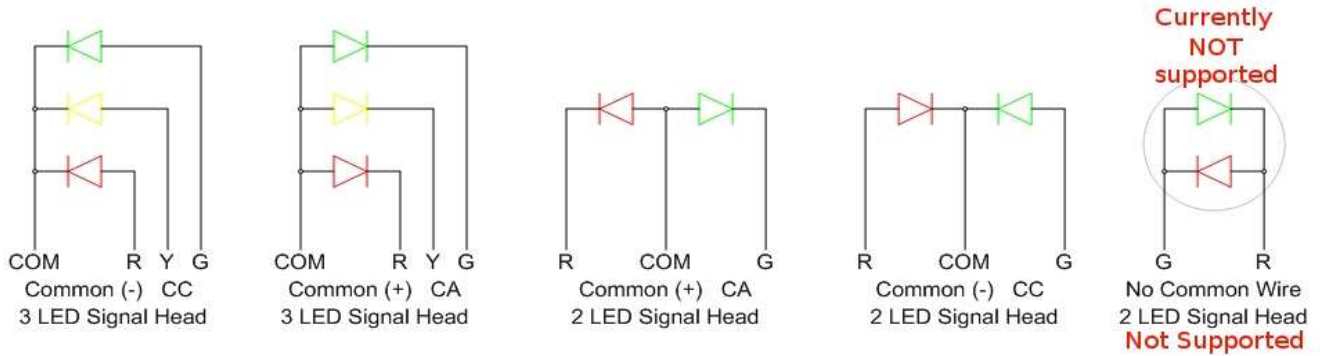


Figure 5

Terminal connections for the signals are as follows:

RW – Red led, west signal.

RE – Red led, east signal.

YW – Yellow led, west signal.

YE – Yellow led, east signal.

GW – Green led, west signal.

GE – Green led, east signal.

COM – Common signal wire for both west and east signals.

STEP 6 – Power Connections

The Free-mo Cascade 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.

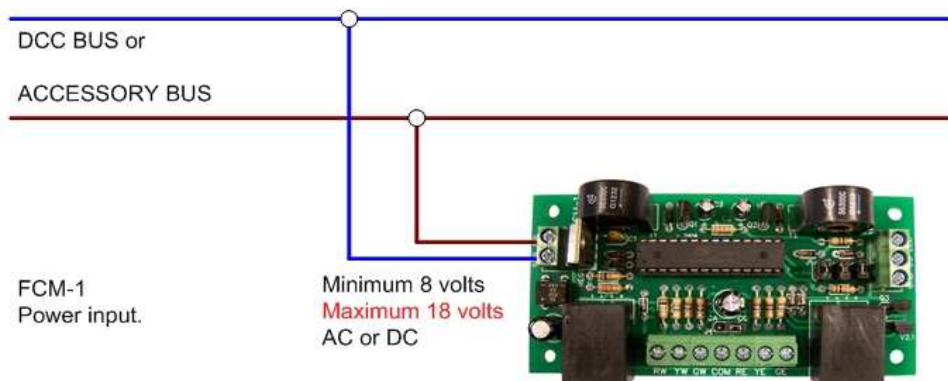


Figure 6

STEP 7 – Occupancy Bus

The RJ45 jacks are used to connect your Free-mo Cascade Module to other modules. This is called the Occupancy Bus. The cable type to be used between modules must be a cross over category 5 Ethernet cable. The use of a straight through cable will not allow your signals to function properly. See figure 7 for more details.

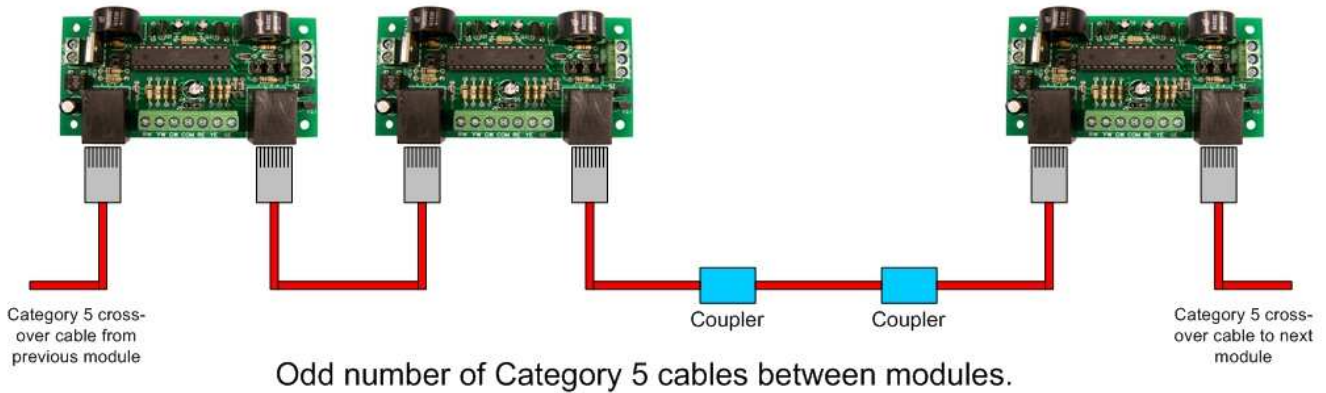


Figure 7

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.

Additional Notes

Unless you have several FCM-1 modules within a functioning occupancy bus, you may only be able to get a RED or Stop signal. Manual switches can be connected to the occupancy bus as shown in Figure 8 in order to display other signal aspects if only one FCM-1 board is being used.

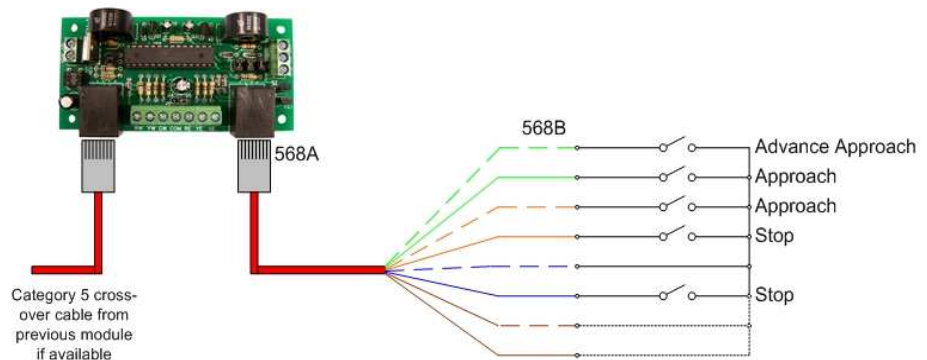


Figure 8

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.