

DM TMCC Buffer

Product Description

A common problem with TMCC/Legacy layouts is inadequate command signals that cause poor locomotive operation. Many efforts to enhance the transmission of the command signal through earth-ground enhancement wires and other techniques are available, but problem areas remain on some large layouts. The late Dale Manquen set about designing a buffer to resolve some of these issues; this unit is the result of his labors. Sadly, Dale passed away before he could complete his work, so this is a continuation of his efforts. The DM in the name is to recognize Dale for the original concept and design of the TMCC Buffer.

The DM TMCC Buffer is designed to provide stronger command signals everywhere on the layout through two improvements. First, the signal source impedance has been made much lower, resulting in less signal attenuation due to the very heavy loads placed upon the base by layouts with extensive track mileage. As an example, the output of a Legacy base will drop about 45% with major waveform distortion when driving a 50 ohm load. In comparison, the Buffer/Booster drops less than 5% with no distortion.

The second improvement is a three times increase in the signal level thanks to a power amplifier in the Buffer/Booster. The normal (unloaded) Legacy base signal of five volts peak-to-peak is amplified to 15 volts peak-to-peak. This triples the signal throughout the layout, even with the heavy loading of a large layout. The net effect can be more than triple the original loaded-down track signal actually fed to the track when we combine these improvements.

What's In The Kit?

The DM TMCC Buffer is supplied with three separate components.

1. The DM TMCC Buffer Power Amplifier box that provides the signal processing.
2. The 24VDC power supply to provide buffer power.
3. The "earth ground tether" that taps the earth ground connection from the TMCC/Legacy command base.

For the curious, the complete schematic diagram is available on request.
Email: TMCCBuffer@will-enterprises.com.



Figure 2 TMCC Buffer Power Amp



Figure 1 24VDC Power Supply & "earth ground tether"

Connecting the Components

1. The “earth ground” tether is connected to the command base power jack, and the command base power supply cable is connected to the other end of the “earth ground” tether. The single wire from the “earth ground” tether is connected to the DM TMCC Buffer *Earth GND* connection (black wire in graphic).
2. The command base track signal is connected to the DM TMCC Buffer *Base INP* connection (yellow wire in graphic).
3. The DM TMCC Buffer *Boost Out* connection is the new track signal to be connected to the outside rail of the layout, this replaces the original command base track signal connection (white wire in graphic).
4. The 24V power supply is connected to the power jack on the rear of the DM TMCC Buffer.

NOTE: Do not confuse the power connection from the 24V power supply for the DM TMCC Buffer with the power connection for the TMCC/Legacy command base. Although they use similar connectors, they are NOT compatible! The Lionel command bases use an AC supply from 8.5 VAC to 12 VAC, depending on the specific model of command base. The DM TMCC Buffer uses a 24V DC power supply.

Pay careful attention to the proper power connections!



Figure 3 DM TMCC Buffer Connection Diagram

Using the DM TMCC Buffer

There are two LED indicators on the top of the DM TMCC Buffer. A blue LED is lit any time the DM TMCC Buffer is receiving power from the 24V power supply.

The bi-color LED is an approximate quality indication of the input track signal from the command base. It's not designed to be a definitive test; however it does give you the signal status at a glance.

- If the indicator is red, you have a very low or unconnected track signal. You will likely experience operational problems if you're seeing this indication with any command base.
- If the indicator is off, that indicates you have a marginal but probably usable track signal. The older TMCC BASE1 will frequently give this indication as its output voltage isn't typically as high as the Legacy base.
- If the indicator is green, this indicates you have a good track signal. A Lionel Legacy base in good operating condition should give you a green signal indication. If you get no indicator or a red indicator with a Legacy base, your base most likely has a signal output problem.

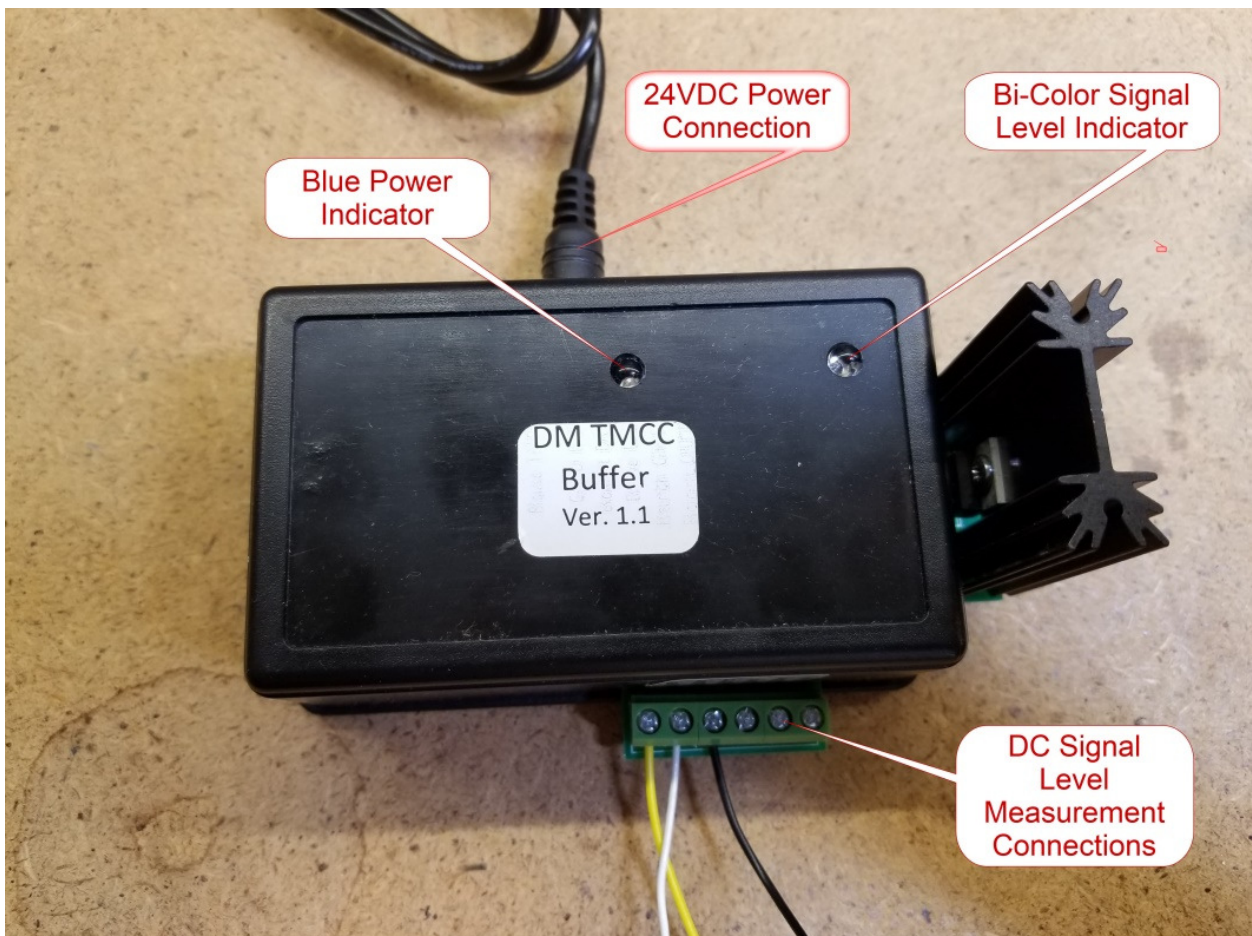


Figure 4 DM TMCC Buffer Connections & Indicators

Measurement of Relative Signal Strength

In addition to the LED indicators there are two measurements of relative signal strength that can be measured with a multimeter (set to DC volts). Any multimeter can be used, but it's best to always stick to one specific brand and model for any comparative measurements. The reasoning here is the measurement output circuits are fairly high impedance so as not to impact the actual buffer operation, and different models of multimeter may have different input impedance and would thus skew your comparative results. All my testing was done using the Fluke 117 True RMS multimeter.

Measurement of the TMCC/Legacy command base signal from the base as it enters the DM TMCC Buffer. For this measurement, connect the multimeter black lead to **Gnd DC**, and the Red lead to **Base DC**. A typical reading might be 1.88 volts DC which would indicate that the peak to peak signal is 5.4 volts from the command base.

Measurement of the output signal from the DM TMCC Buffer to the track. For this measurement, connect the multimeter black lead to **Gnd DC**, and the Red lead to **Boost DC**. A typical reading might be 6.44 volts DC which would indicate that the peak to peak signal is 16 volts.



Figure 5 DM TMCC Buffer Connection Block

These are relative measurements and will vary from layout to layout. They are intended to track long-term trends of an individual layout. It is suggested that you record these two readings when you get the DM TMCC Buffer working. Then periodically check and record these readings to look for changes over time. These are measurement outputs only and do not have any effect on the actual functionality of the DM TMCC Buffer operation or track output signal.