SOUNDTRAXX®

**New Dimensions in Digital Sound Technology**

Technical Note #10
Using 1.5 volt lightbulbs with SoundTraxx Tsunami® Decoders

The Tsunami Digital Sound Decoder (DSD) function outputs typically work at track voltage levels. Thus to use 1.5 volt bulbs, it is necessary to drop the voltage level using resistors or some other means. The Tsunami Owner's Manual recommends a nominal starting value of 560 ohms. A 560 ohm resistor assumes the bulb draws a 15mA current and the track current is nominally 14 volts. It is important to note that the bulb current and track voltage vary from manufacturer to manufacturer and scale to scale. Changing any one of these variables, even slightly, will affect bulb performance – it could suddenly grow dim, burn out, or never turn on. The proper resistor value can be calculated by first measuring the decoder's output voltage. Connect a voltmeter to the DSD's blue wire and the function wire you wish to use, turn the decoder's function ON, measure the voltage, and use the following formula:

$$\text{Resistor Value (Ohms)} = \frac{(\text{Measured Voltage} - 1.5 \text{ Volts})}{\text{Bulb Current}}$$

It is important to also remember that you will need one resistor for each bulb. Connecting two bulbs in parallel, for example, will double the bulb current and require a resistor that is about half the calculated value. The problem with this scheme is that when one bulb burns out, the other immediately becomes bright and burns out shortly after.

WRONG!

RIGHT!
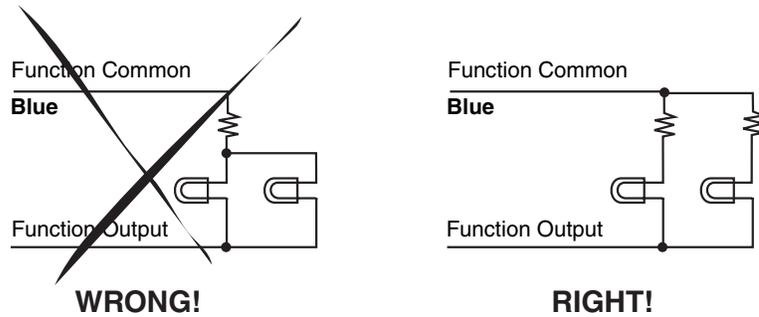
Another circuit can be built that uses diodes rather than resistors to regulate bulb voltage and has the advantage that more than one bulb can be connected to the same circuit (you will still need a separate circuit for each function output). In addition, the bulb brightness stays constant even when track voltage does not. It requires a few more parts, but is trouble-free and well worth the effort.