USING ELECRONIC METERS FOR YOUR TRACK CAR

By Jay Boggs
Pittsburgh & Lake Erie, M-19, No. 299

I recently read an article about installing an alternator in an M-19, that was very interesting and helpful. My ex Pittburgh & Lake Erie R.R. M-19 #299 received this addition also last fall, in time for my rail car trip to "Almost Heaven", West Virginia.

After all my mechanical work (hammering, bending and painting) was completed on the #299, I wanted to check the output of my junk yard alternator, to see if it was still working. If you want to do the same thing, a good meter will be required. This tool can be used for many jobs around the home as well as in the motor car shed. If you have little or no experience using meters, now is the time to start.

The first step is selecting the right type of meter for the job. A low cost meter is not much better than a test light, having limited range and poor accuracy. Remember, you get what you pay for. There are two types of meters, analog and digital. The analog has a needle to indicate the reading and the digital has a series of three or four numbers that appear in the window. The analog has been the old reliable workhorse, since Thomas Edison first invented utility bills. Most early models were used for only one type of measurement, and had only one range, typically 0-15 volts. To measure current flow (amperage) a different meter would be used. To cut costs and make meters easier to handle, several ranges were combined into one, and became known as the multi-meter.

Advantages of the multi-meter are lower cost, and the ability to check ignition timing. Meters today have many ranges, so that volts, amps, and ohms can be read by setting the switch to the correct position. An analog meter will usually have three or four DC volt ranges, 0-1.5 volts, 0-15 volts and 0-150 volts. The same number of AC volt ranges, current (amperage) ranges, and resistance (amperage) ranges are also provided.

The reason for so many ranges is that the most accurate reading is available when the needle is between 1/4 and 3/4 of the range being used. If you want to check out your battery in the track car, select the 0-15 volt DC range. This would be much more accurate than using the 0-150 volt range.

New technology has given us the digital style meter. Some of the advantages of the digital include accuracy, readability, and ruggedness. The model that you choose should be easy to read and have a durable case. The test leads should fit tight in the meter jacks, and the probes should have a rib near the tip to prevent fingers from slipping off the end of the probe handles and onto the metal tip. This safety feature is found on all good probes. A set of insulated alligator clips that fit on the probes is also very handy. If you already have a good set of jumpers, they will help too. If not, you will need at least one piece of #14 gauge stranded wire, with an alligator clip on each end.

Some of you might wonder precisely what makes voltage different than amperage. Voltage is a unit of electrical *pressure*; the more voltage, the greater the pressure to "push" current (amperage). Direct current (DC) voltage is produced by batteries and generators. Alternating current (AC) voltage is generated by most power plants, to be used in homes and industry; it is also produced by automotive alternators.

Amperage is a unit or "amount" of electricity that flows in a wire, bulb, coil, or motor. For example, the small bulbs in a track car marker light use about 1 ampere (usually called *amp*). Resistance (ohms) is what limits the current in a circuit. For example, many ignition circuits have a resistor in them to reduce the current (amps) going through the points. This, along with the capacitor (in the past called a condenser) gives the points longer life.

Here's a safety tip, when using the meter...most voltages on track cars are 12 volts or less, except for the spark voltage, which can be quite high. Even the 12 volts though can be dangerous, due to te high amperage of storage batteries. Get in the habit of connecting the meter *before* turning on the power, read the meter, shut the power off, then disconnect the meter.

Here's a little excercise that you can try, if you either have, or intend on buying a meter. To find out if your track car battery is properly charged, (1.) select the proper scale, 0-15 volts DC for most analog meters, or 0-20 volts DC for most digital models. (2.) Find the positive and negative battery posts and connect the meter leads, using the alligator clips or jumpers. Since the battery is always "on", use caution, and connect only one lead at a time. (3.) Read the meter; a 6-volt battery should read 6.6 volts when fully charged. A 12-volt battery should read 13.2 volts when fully charged, and the maintenance-free batteries should read slightly higher...about 13.4 volts.

If your readings are lower than this, check your connections to be sure that you are connected to a clean

spot on the battery. If you find corroded terminals, they should be taken apart, cleaned, then reassembled. A bad connection between the battery and the cables will prevent the battery from getting a full charge. This will cause hard starting, and possible damage to the alternator. After correcting any problems, check the voltage again. If it is still low, (11-12 volt range for a 12-volt battery) it will need additional charging. If your engine has a charging system, start the engine and watch the meter (*be sure the leads are not near any moving parts and the meter is secured!*). When the engine speed is increased, the voltage should increase to 14-16 volts, depending on your charging system. If there is no increase in voltage, the charging system isn't working. In some cases, there will be a slight increase, but it won't be enough to fully charge the battery. This could mean that you have a bad regulator or open diodes in an alternator, or a dirty commutator or bad brushes in a generator. Alternators also have brushes or slip rings that can wear out.

This is just one example of what a meter can show you. Perhaps some of you readers can provide THE SETOFF with some other examples of how you use your meter for the track car hobby.

TIPS FOR OWNERS OF 6-VOLT ELECTRICAL SYSTEMS

By Dick Ray
Western Maryland M-9, No. 67

As a railcar restoration and preservation enthusiast, I am always a little distressed to read how someone has installed a modern 70-amp alternator on a Fairmont M-9 or an M-19. These earlier cars never had these modern devices as original equipment, but instead usually had 6-volt generators and associated 6-volt hardware.

The Autolite 6-volt generator installation bulletin first appeared in 1944, although some larger cars such as the Fairmont A-3 had generators earlier. The alternator installation bulletin is dated 1969 and it is known that even into the 1960's these Fairmont cars still had 6-volt systems. If you desire to restore your car to the *original* type electrical system, then these dates can be used as a guideline.

The most common reason that many people switch to a 12-volt system is that 6-volt lights and accessories are sometimes hard to find. For headlamps, 5 1/2" diameter headlight bulbs that fit Fairmont headlamp shells are often found also on older off-the-road motorcycles with 6-volt systems. These bulbs can likely be found at a motorcycle parts shop. They can withstand vibration and have a wide enough beam spread to "see" out to the side as well as ahead. They are available in 35- or 40-watt versions. They usually have a low beam and high beam capability; the low beam is especially helpful going through switches and grade crossings and when following another track car. The 6-volt lamps from Fairmont are also available and are available with either a flood or spot beam pattern. The motorcycle lamps are a good compromise between the two.

For larger cars, the big 7-inch diameter dual-beam headlight bulb, like the ones that Volkswagen used to use, will fit into old street motorcycle shells. I used a shell from a Honda 450 on one end of our ex Lehigh & Hudson River R.R. Fairmont A-3 and a shell of unknown origin on the other end. Joel Williams fabricated an authentic looking bracket for each and a forward-reverse switch provides power to one or the other.

Small 4 1/2" diameter lights for backing up can be found at tractor dealers or NAPA auto parts stores. They usually have the correct looking round metal shells available also. In this small size though, only the flood types seem to be available, but this is generally ok for low-speed backup moves. For tail lights, the small red "beehive" lights are authentic looking. These come with #1073 or #1157 12-volt bulbs, but you can replace them with a #1129 six-volt bulb from an auto parts store. If you wish to use a dual-filament stop and tail light assembly, then use the #1154 6-volt bulb.

Small, flat clearance lights, sometimes used as tail lights typically come with one or two wedge-base bulbs. These bulbs can be replaced with a #159, #259 or #555 bulb. These are three different brightness levels, and are usually available through electronics supply stores.

Other accessories are available in 6 volt also. Horns are available from Fairmont, and J.C. Whitney (an auto parts supplier that has 6-volt items for many pre-1955 cars). Some of you like the rotating beacons for your cars. They really weren't in vogue during the era of the earlier built cars, although they are sometimes helpful at crossings. A 6-volt version is available from McMaster-Carr, a nationwide industrial supply company. Radios are almost always 12 volt, but these should probably be operated from a separate battery anyway. I'll cover 6-volt generator and battery maintenance in a later article.