Dealing with Cheap Battery Terminals

By Paul Rupp

At New Concept Auto Service (NCAS) when performing a visual inspection our policy is to recommend replacing temporary type battery terminals whenever we see them. I developed this policy due to the number of times we solved an intermittent no crank or slow crank problem by finding a poor connection where the cable is clamped down to the terminal with the two-bolt strap.

Ohm's basic law of electricity applies here: V = IR, volts equals amps times resistance. If the resistance goes up and the amperage remains relatively constant, the voltage must go down. I like to think of electrical resistance as energy being used up in the form of heat.

The vehicle in question is a '73 Ford F250 belonging to a local landscaping company we have begun to do fleet work for. The customer brought the truck in for a rough idle problem initially. We noted the engine had a slow crank when we took it on the initial test drive. The customer told us the starter was replaced a year or so ago at another facility and the battery had tested good then. I told him the battery was connected to what I call inferior quality (cheap) terminals and suggested we replace the terminals with the good quality pinch and solder type we use and retest the battery. Figure 1 shows the terminal in question with my voltmeter lead clamped to the post.

The test procedure is quite simple. The circuit has a large cable directly from the battery pos to the big lug on the starter solenoid. I am interested in the voltage drop and amperage draw on this leg of the circuit. The voltage drop should be less than a few tenths of a volt or say 0.1 volt per connection depending on amperage. If the voltage drop is within spec, excessive amperage will tell me if the starter has a problem. The engine may also have a mechanical problem drawing down the starter. I disabled the ignition at the distributor so the engine would crank and not start.

Figure 2 shows the test setup with the meter on the left reading amps and the meter on the right reading volts. Notice I connected the voltmeter pos lead directly to the battery post to catch any resistance from the post to the terminal as well as from the terminal to the cable. The neg meter lead is connected to the starter big lug.

I cranked the engine over for five seconds and took the readings. The test showed 0.45 volt drop from the pos post to the starter big lug. Next I moved the pos lead to the terminal itself and found the same 0.45 volt drop. I next moved my lead from the terminal to the exposed copper wiring in the big cable. The voltage drop was near zero. This info tells me the exact location of the resistance and voltage drop is where the terminal connects to the cable. The right meter showed the starter drawing 152 amps constant crank, which is pretty normal.

Remember, everything looked shiny and new and the post hold down strap was tight. The cable wiggled a little, but the reading did not change. I unbolted the strap and pulled the cable out to find half the copper strands were cut to make the cable small enough to fit, I suppose. The entire cable seemed a little short as well, meaning the other facility most likely cut off the corroded last few inches of the cable. If you are wondering, I did check the ground side earlier and found no problem there.

It was a beautiful fall day outside with a cool temp of around 70 degrees F and I decided to verify the problem another way. Figure 3 shows the infrared temp gun reading of the problem resistance point at 95 degrees F. Five seconds earlier, before cranking,

Figure 1

Figure 2

it was all 70 degrees F. Therefore, when I suspect a significant voltage drop problem on a starting circuit, to save time, I quickly measure the temp of the circuit just after cranking. Sure enough V = IR holds true every time and I will find a "hot spot" sometimes even under the insulation in a nice looking starter cable. Most commonly the connection points are the problem or acid from a previously leaking battery has seeped into the cable insulation and slowly corroded over time.

Replacing the terminal in this case restored the voltage to within spec and the starter had a nice sounding crank speed. The battery tested good and the starter amperage was fine. The customer was pleased.

These types of terminals are sold everywhere and I'm sure serve a useful purpose. I have even used them myself in the past when in a pinch. I refer to them as an inferior quality (or cheap) terminal, but I also call them a "temporary" terminal. I try hard to use the correct wording when talking to my customers. I do not want to insult anyone, especially if the customer installed them himself on a weekend. I do wonder why the initial starter was replaced and when this poor quality terminal job was performed. All in all, keep an eye out for these suspect terminals—though they may appear shiny and new, resistance may be lurking within.

For fun, Figure 4 got the "OE battery terminals of the month" award at NCAS. I could not pass up the photo-op. This vehicle cranked just fine with the acid seeping battery and the original terminals. I mentioned this condition to the customer who truthfully responded with, "Well, the engine starts just fine."

I smiled and said, "Yes it does, and please call us if you need anything, thank you."

Paul Rupp is owner of New Concept Auto Service, Overland Park, Kan.

Figure 3


Figure 4