GRAND NATIONAL – TURBO REGAL ENGINE WIRING

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The stock ECM in your turbo Regal processes and controls multiple closed loop functions of the engine. In its efforts to maintain a good running and clean burning engine, it relies on several sensors to receive information about what is happening during engine run time. Because of the balance between the ECM and the sensors, perfect electrical connections are absolutely necessary.

Considering the age of our Buicks, problems associated with the factory wiring have surfaced. Add the extra heat of the turbo and you can understand why the wiring gets more than its share of aging. Connectors become brittle and break, wire that gets soaked with oil and other fluid becomes hardened and brittle, and wire/connector seals dry out and become ineffective.

There are approximately 50 connectors, 35 different wire colors in three different wire gages (over 730 feet total length), and 219 terminals in the turbo Regal wiring harness. The stock engine harness weighs over 10 pounds. There are also 12 internal splices within the harness.

It is important to understand how each electrical connection is made using a terminal attached to the wire through a special crimp. Each terminal is pre-loaded with a sort of "spring" tension designed into it. The terminal then gets inserted into a connector that holds it into alignment with the mating connector. When the two mating connectors lock together, the spring tension of the terminal causes enough pressure to maintain a good electrical connection. If the spring tension drops below a certain point, the electrical connection weakens, picks up additional resistance, and provides less than adequate current flow. This is why it is essential that the connections be tight and clean.

Tin plating is applied to each terminal to prevent oxidation (which increases "resistance" to the connection) and maintain a good electrical connection. If the terminal should become overloaded or the tin plating wear off, the underlying brass terminal will have a tendency to oxidize, causing increased resistance and less than adequate current flow. Also, contaminants such as moisture and salt have a damaging effect to the plating and ultimately cause a problem in the connection.

Most of the connections are sealed and weather-tight. Seals made of silicone are added to the wire as it enters the connector, and seals are placed between the connectors to maintain the weathertight connection. Weatherpack, Micropack and Metripack connectors are used throughout the engine. There are, however, several connectors that are not sealed. These are:

- Low Speed Fan relay
- High Speed Fan relay
- Fuel Pump relay
- AC Compressor relay
- Fan Delay relay
- Hi-Lo Boost switch (in digital dash equipped cars only)
- Heater Fan feed connector
- C-100 Bulkhead connector
- Hot Engine switch
- Fuel Pump Primer connector
- Tachometer Tap connector

With these connectors, it is essential to use an externally applied sealant to prevent moisture and other contaminants from causing damage. The factory applied sealant, a tar-based material that can be easily

seen on the Coolant Fan connectors, has probably hardened and cracked by now. Because of this, the unsealed connectors become a concern as they are vulnerable to failure due to moisture damage. It is very important that you spend the time to maintain the sealant in these connectors. By unplugging the device, you can clean the connectors and terminals with a mild solvent such as mineral spirits, and re-apply the sealant (which is available through a GM dealer) or use white lithium grease. This creates a barrier that keeps the weather from the electrical connection.

How do you identify an electrical problem with your existing wiring? This is no simple task, as there are many connections, each with its own unique function. You can, however, eliminate electrical "gremlins" by locating and identifying the weak areas in the wiring harness. The biggest problems occur in the power feed and ground locations.

All electrical grounds break out of the wiring harness in the rear of the engine, passenger side, right above the rear of the passenger side cylinder head. There are four ring terminals with a total of seven wires attached. Most ground wires are black with a white stripe. The ring terminals are then attached to the cylinder head and a bell housing bolt. Because of the cramped location, the grounds are prone to failure by fatigue and loosening. A loose ground can cause backfeed which is very difficult to diagnose. And fatigue can cause the wire to break internally. It is therefore imperative that these grounds be checked and maintained. A ground stretcher kit is available which is designed to re-locate the grounds and place them in an isolated and easily accessed location.

The positive feeds that provide battery power to the entire car are located on the starter stud, and are attached to fuse links to protect against short circuits. There are five 12 gage red wires attached to three fuse links at that location. A common problem associated with fuse links is overheating. Breakdown of the insulation occurs and the wire becomes exposed to contamination. This is where the failure of the link begins to show up. Additionally, excessive load to the starter stud causes loosening of the connection, which adds to the resistance of the connection, causes more heat, and speeds up failure. Fuse links should be checked regularly and replaced whenever signs of breakdown are visible. A link replacement kit is available specifically for the turbo Regal harness.

The wire harness is jacketed with round and oval conduit, in addition to a hard plastic channel that wraps around the rear of the engine. It is essential that the jacketing be maintained and kept clean, free of debris and oil. Also, don't use ordinary black PVC electrical tape to close the ends of the conduit; the standard PVC tape is not heat resistant. It becomes gummy and shrinks during normal engine operation. Use only special harness tape to re-tape the conduit. This tape is available along with all other components to re-wrap the factory harness. We recommend going through the harness every season to maintain integrity of the connections and conduit.

Another critical connection is the one on the oxygen sensor. This sensor works in the millivolt (1/1000 of a volt) range between 100 and 900 millivolts and a good connection is mandatory. The Oxygen Sensor provides feedback in a closed loop system and the voltage sensed by the feedback essentially tells the ECM how much oxygen is in the exhaust gas. The higher the voltage, the less oxygen is sensed, thus, a rich condition. A bad (high resistance) connection can cause the computer to read a low voltage (lean condition) and then try to compensate by opening the injectors for a longer period of time (pulse width) which results in poor gas mileage and a rich condition during normal driving.

When tapping into an existing wire in the engine harness, DO NOT use unsealed connectors such as spade or butt connectors. These types of connections lead to failure due to weather and moisture and will eventually fail and cause electrical problems. Use only factory type connectors when adding electrical extensions to existing points under the hood. And as a note, there's a fuel pump primer wire located behind the alternator, gray wire with a black connector. If you touch this wire to the positive stud of the alternator, the fuel pump will run. There's also a green connector with two white wires in the same location. This is a tachometer feed. DON'T connect these together. If you do, the bar-graph tachometer won't work. If for some reason the tachometer doesn't work or malfunctions, check this connector; the two wires must be connected together well, and if corrosion had set in, it could cause the crimp to fail, causing malfunction at the tachometer.