



## **No-Start or Hard-Start Troubleshooting**

If you've installed your Electromotive system and have a hard time getting the engine to fire, or it won't fire at all, here are some steps you can use to determine where the problem may lie.

A useful tool in troubleshooting a starting issue is [the Electromotive Crank Trigger Simulator](#) . This tool can help troubleshoot and rule out wiring and installation related issues as it will run the system without the need of running the engine. Also, make sure that the basics have been gone over, like ensuring that the car has fuel, fuel pressure and that the ECU is powering up.

1. All Electromotive systems feature a crank trigger status light (see system manual). This light will oscillate between green and red when the engine is cranking, providing the system is recognizing the crank input. This is the first thing that should be checked.
  - a. If the light flashes green/red during cranking, then the signal is making it to the ECU. This means the coil and injector outputs should be active. On systems with PC interface, you can see the RPM gauge move and injector PW should be present. Things that may prevent starting in this condition could be
    - i. Power is not present at injectors and/or coils. Use a VOM to test including while cranking. Too low of voltage during cranking may also cause injectors or coils to not function. Voltage should not drop below 10v, preferably not below 11.
    - ii. No ground signal from ECU to injectors or coils. Check output with an LED test light or noid light. If output is not present,
      1. Wire harness has a break or non-contact condition. Check pins at ECU connector and any other connection points.
      2. ECU may be damaged and need repair.
    - iii. Clear-flood is active. This occurs when the TPS voltage meets or exceeds the wide-open throttle voltage value in the software. This function turns off the injectors. Check TPS voltage and settings in software.
2. If the LED does NOT flash, then there could be a number of issues that could be to blame. We will start with the most common first.
  - a. Wiring and connector errors.
    - i. Most issues tend to be wiring related. Make sure to thoroughly check all connections, including the terminals at the main Electromotive ECU connector. Continuity tests should be done carefully as to not damage/overspread terminals in the connectors.
    - ii. Never wire system power to the starter/starter solenoid. Always get system power from the battery directly. This will reduce noise and voltage loss attributed to wiring to the starter circuit.
  - b. Low battery voltage
    - i. Many of the problems listed in this document can be caused by or exasperated by poor battery voltage. Most issues are caused by insufficient battery for the application, insufficient wiring between the battery and starter/ground, or an old battery. To ensure that the battery is performing properly, monitor voltage at the battery during cranking and ensure it does not drop below 10.5v.

- c. Mag sensors
  - i. Electromotive's standard Magnetic Sensor can fail over time and use. The easiest test to determine the sensors status is a resistance test between the signal (white or red) and ground (black) wires. Resistance should read between 600-700 ohms. This test can be performed on non-Electromotive VR sensors as well, but you'll need to check with the manufacturer for resistance specs.
- d. Hall-sensors
  - i. Make sure the unit has been configured for use with a hall sensor. All units default to magnetic sensor input mode and must be reconfigured when using a hall sensor. See your manual for directions.
  - ii. Electromotive's Hall-effect can be tested with a digital volt meter. When powered up. It should produce a voltage/ground trigger when metal is passed before the sensor tip. Voltage should be equal to input voltage.
  - iii. Non-Electromotive Hall sensors should have a pull-up resistor installed between the signal and voltage supply wires. If this is not in place the sensor will not work.
- e. Crank trigger wheel installation
  - i. Crank trigger wheel could be installed in such a way as to not allow for proper signal pick up. Make certain that out-of-round and sensor gap settings are set to the specifications outlined in our manual.
  - ii. Check crank trigger wheel for magnetization. In rare occasions we have found trigger wheels that have become magnetized. This will make them unusable, and the wheel will need to be degaused or replaced.
- f. Starter noise
  - i. Electromotive systems can be sensitive to starter noise interference. This is most common on older car models and US Domestic V8 applications that utilize aftermarket starters built without noise suppression in mind. The simplest cure for these applications is to use a hall effect sensor. If this is not possible due to the age of the unit and/or installation considerations, here are some possible remedies.
    1. Make sure power for the ECU is isolated from the starter by the battery, allowing it to act as a filter for the noise.
    2. Make sure crank sensor wiring is not routed close to the starter or battery cables.
- g. Other electrical noise.
  - i. Other equipment in the vehicle can also contribute to starting issues in the same way that the starter does. If using electric water pumps, cooling fans, etc.. Make sure they are manufactured using a suppressed motor, and try not to mount the sensor and wiring in too close a proximity. Use of a hall-effect sensor can also resolve most of these issues.
- h. Cranking RPM/Consistency of rotation.
  - i. Electromotive systems require a minimum of 80 RPM of cranking speed to synchronize to the trigger wheel. Factors that may increase the minimum requirements would include rotating mass and compression ratio. Large displacement and high compression ration engines often need to spin at higher RPMs to overcome the significant changes in RPM they go through as they are cranking. This fault can often be verified by removing the plugs from the engine and retesting for signal. Things that can be done to overcome cranking speed/consistency limitations include
    1. Increased battery voltage. 16 volt batteries can be used to improve the cranking of most race engines, and have the added benefit of improving ignition system performance.
    2. Custom starters and gearing ratios. Starter companies can provide specialized starters and gearing ratios to increase the speed of engine rotation if needed.

- i. System failure
  - i. While very uncommon, it is possible for the system's crank sensor input circuit to fail. If this is suspected or verified, please follow the instructions on the [Diagnostic and Repair](#) page of our website to begin the repair process.