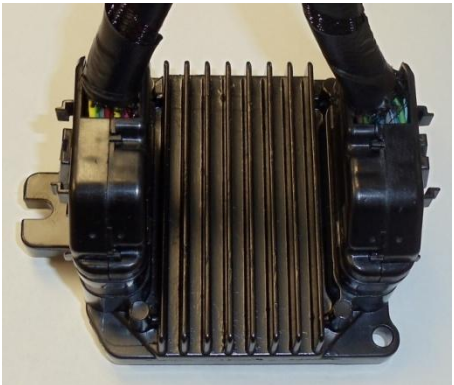


Geared Drives LS1 Engine Wiring Owner's Manual Version 1.0

Introduction:

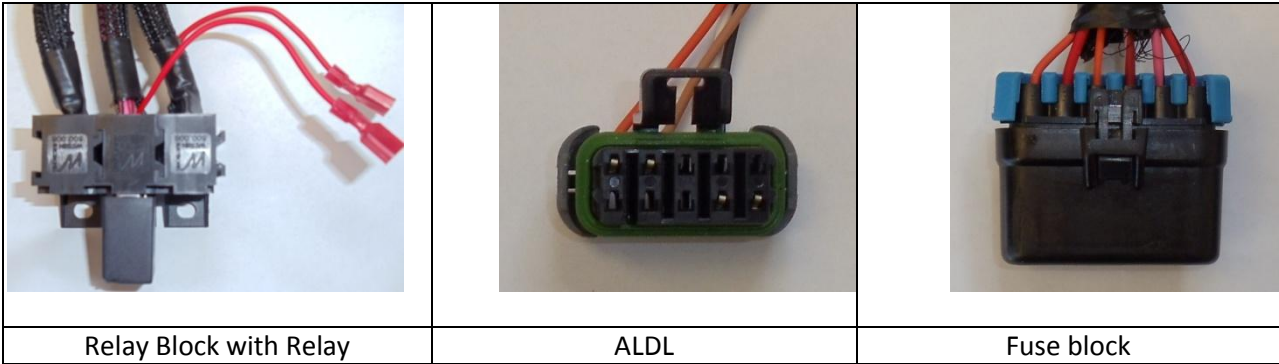
The wiring harness and ECU included with your engine package is for use on stock LS1 engines using a mechanical throttle body and includes all wiring needed by the computer to control the fuel injection system.

The computer is weather resistant and may be mounted on the firewall of your airplane. All wiring engine side of the firewall is GM color coded and is rated at 275°F.



Your harness consists of three major wiring groups:

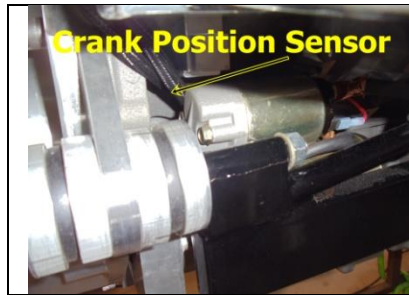
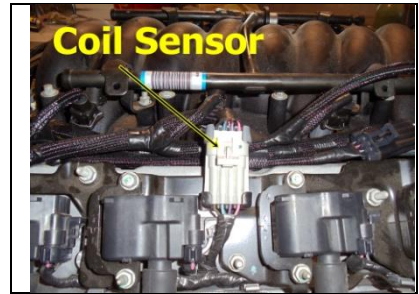
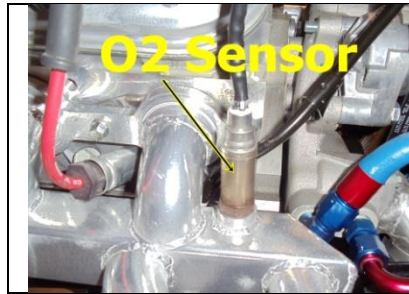
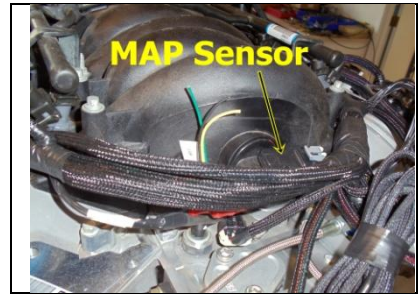
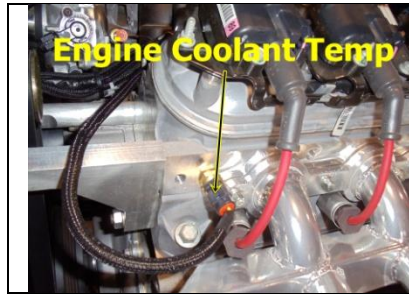
- Engine Group Includes wiring for the fuel injectors, coil plugs, sensors, fuel pump and coil power wire
- Panel Group Ignition feed and tach wires, ALDL, and check engine light
- Fuse Block and Relay Includes wiring for the fuse block, fuel pump relay, A/C relay, ignition relay, cooling fan relay ground and alternative ground wire



This system eliminates the Mass Air Flow (MAF) sensor but keeps the Manifold Absolute Pressure sensor (MAP). It uses only one (1) Oxygen sensor and is designed to work with the cable throttle system.

Sensor part numbers are as follows:			
Engine coolant temp	GM #12551708	Intake Air Temp Sensor	Delco #213-243
Throttle Position Sensor	Delco #213-912	Oxygen Sensor	Delco #AFS 105
MAP Sensor	Delco #213-331	IAC	GM #17113391
Knock Sensor	Delco #213-362	Coils	Delco #D580
CMP Sensor	Delco #213-335	CKP Sensor	Delco #213-354
Micro Relays	Delco #D1703-A		

Geared Drives LS1 Engine
Wiring Owner's Manual Version 1.0



Geared Drives LS1 Engine

Wiring Owner's Manual Version 1.0

General Instructions

CAUTION: DO NOT DISCONNECT THE BATTERY OR COMPUTER CONNECTOR(S) WHILE IGNITION IS ON.

DO NOT SHORT ANY WIRE IN THIS HARNESS TO GROUND (with exception of labeled ground wires) **OR DAMAGE TO THE COMPUTER WILL RESULT.**

USE ONLY A 12V BATTERY CHARGER TO CHARGE THE BATTERY IF NEEDED. "JUMP STARTING" MAY DAMAGE THE COMPUTER. Do not use a test light when testing computer sensors or computer circuits as damage to the computer will result.

Note: Your wiring system should include a constant duty solenoid for each battery. Each solenoid should activate by applying ground to the coil connection on the solenoid.

Each connector in this system is different from the others and will not fit in the wrong location. **DO NOT FORCE ANY CONNECTOR**

When connecting the plugs to the computer take extreme care to be sure that none of the pins in the computer are or have become bent.

Fuel pump and regulator **MUST** maintain a constant pressure of 58 pounds per square inch (PSI). Use only the recommended fuel pump and regulator designed for stock LS1 engines. If you are using a higher pressure pump you **MUST** add an inline regulator to bring the pressure down to the 58-60 PSI range since the fuel rail does not have a built in regulator as many earlier LS engines had. Avoid this situation by using only the proper fuel pump and regulator for a 1997-2004 LS1 engine. You may use a GM part number or cross it to aftermarket regulator/filter. We use WIX P/N 33737 as an alternative to the GM part.

Do not neglect proper grounding. The only appropriate place for grounding on your aircraft is on the engine.

Panel Group Installation:

The wires in this group consist of the assembly line diagnostic link (ALDL) connector, the check engine light, ignition and tach wires, which are pre mounted into a bracket with four other wires.

CAUTION: DO NOT MAKE ANY CONNECTIONS WHEN THE HARNESS IS PLUGGED INTO THE COMPUTER.

A. Choose the location on your panel to mount the check engine light. It should be in a place where you will see it easily in the event that it ever needs to catch your attention.

B. Mount the ALDL connector. This can be underneath the panel, where it is out of the way but you are able to reach it easily.

Geared Drives LS1 Engine Wiring Owner's Manual Version 1.0

C. Locate the pink wire and attach it to the fuse block or the coil power wire. This is the ignition power wire for the ECU. POWER IS REQUIRED WHEN THE KEY IS IN THE RUN AND START POSITION.

Sensor and Relay Group Installation:

Note: The single RED wire with the female terminal that comes out of the fuel pump and ignition relay base is a **test lead only** and is not to be connected to anything.

There are three relays:

Fuel Pump Relay In a vehicle this supplies 12V ignition power to fuel pump when the key is on and in start-however-we do not use it in this application. We just wanted you to know what it is.

A/C Signal Relay Supplies a ground for the computer to increase the engine RPM when the A/C compressor has been turned on in the event that you are using an A/C in your airplane.

Ignition Relay Supplies 12V ignition hot power to the O2 Sensor, check engine light and computer when the key has been turned to on or start position. This will be the only relay block with a relay in place.

Trouble Shooting:

Note: The ECU will only communicate with scanners that have marine type cartridges and marine cable plugs.

If you are having trouble with your engine running badly or not at all, first perform basic trouble shooting by checking for faulty connections, spark, fuel pressure, etc, then see if the computer has stored any trouble codes in its memory.

Check Engine Light: Normally the check engine light will come on when the ignition is initially turned on and then go off after a few moments of the engine running. If the computer has detected a problem and a trouble code has been set in the computer the light will come back on.

- A. The computer identifies a particular trouble codes by flashing the check engine light in a particular way. The codes are read by counting the flashes.
- B. The first digit (the "tens" digit) of the code is flashed quickly, followed by a brief pause, then the second digit (or "ones") is flashed, followed by a longer pause. For example, three (3) quick flashes followed by a brief pause followed by two (2) flashes indicate code 32.
- C. The code will repeat itself two (2) times. The next code if any will be displayed in the same manner.

Note: When you access the codes from the computer a code 12 (one flash followed by two flashes) will first be displayed. THIS DOES NOT INDICATE A PROBLEM. Code 12 will be flashed 2 times, followed by the particular trouble codes, if any. IF the computer merely

Geared Drives LS1 Engine Wiring Owner's Manual Version 1.0

flashes code 12 there are not trouble codes stored, Code 12 means the engine is not running.

Retrieving Trouble Codes from the Computer:

- A. In order to retrieve the trouble codes stored in the computer, locate the ALDL plug already installed. Turn the ignition in, BUT DO NOT START THE VEHICLE. Connect a jumper wire from the ALDL terminal "A" to terminal "B" and observe the check engine light.
- B. After you read the codes (remember the normal code 12) write them down for reference. Remove the jumper wire from the ALDL.
- C. Take the codes one at a time and match them to the codes in the table below. This will tell you in which circuit the computer has detected a problem.

Note: A code indicates a problem is a specific circuit, NOT THAT A PARTICULAR PART IS BAD.

- D. Before taking more extensive corrective measures for any trouble codes, make sure that all connections on the indicated circuit, INCLUDING THE COMPUTER, are clean and tight. Inspect the wiring in the circuit for any broken, shorted, or exposed wires. Finally, insure that all ground wires are clean and secure.
- E. If you are getting a code from your computer and need to clear the code, other than 12, after you have replaced a part, readjusted a part, etc, do it this way:
 1. Install a jumper wire from Terminal A to Terminal B
 2. Ignition ON engine OFF
 3. Move throttle from 0% (idle) to 100% (wide open throttle) and then back to 0%
 4. Remove the jumper wire
 5. Turn ignition OFF for at least 20 seconds
 6. Ignition On engine OFF
 7. Recheck the codes

Code	Circuit Affected	Code	Circuit Affected
13	Oxygen Sensor Inactive	34	MAP Sensor (high voltage)
14	Coolant Sensor High Voltage (COLD)	41	EST Fault
15	Coolant Sensor Low Voltage (HOT)	42	EST/Bypass Fault
21	Throttle Position Sensor (high voltage)	44	Knock Sensor Inactive
22	Throttle Position Sensor (low voltage)	51	Calibration Checksum
23	Manifold Air Temp (low temp)	54	Oxygen Sensor (lean reading)
25	Manifold Air Temp (high temp)	55	Oxygen Sensor (rich reading)
33	MAP Sensor Circuit (high voltage)	81	Throttle Position Sensor (out of range)

Geared Drives LS1 Engine Wiring Owner's Manual Version 1.0

Wiring which will penetrate your firewall:

There is a bundle of labeled wires which you will use through the firewall to your instrumentation:

- Start** RED wire routed from the starter solenoid. Connect to battery power through a momentary switch. This is how you will crank the engine.
- Alt** This wire arms the alternator. You can take it to battery through a switch or just connect it. This turns on the alternator.
- GBT** This wire goes to the front of the gear box and connects to the Gear Box temp sensor in the bottom of the gear box. This goes to what ever you intend to use to monitor temps and pressures. The sensor is from Grand Rapids and is used with their EIS System.
- GBP** Gear Box Pressure - It goes to the VDO pressure sensor near the Oil Filter on the gear box and should go to whatever you are using to monitor pressure. 0-150 PSI Normal about 50 PSI in flight.
- H2O Temp** This is the water temp sensor. It is the same type of sensor as the GBT sensor.
- Fuel Flow** This wire connects to one of the injectors to measure fuel flow if you have a EIS that uses Injector Pulse Width to calculate fuel flow. The Grand Rapids does.
- Fuse Block Ignition - VERY IMPORTANT Wire.**
This wire provides power to the computer. Connect to a fused 15A circuit on your essential buss.
- Kill** Run this PINK wire through a high quality switch as it is the switch that will kill the engine. If it does not have power the engine WILL NOT start or remain running (also on the essential buss)
- Tach** This wire comes from the computer and will run a tach input for your EIS or EFIS.
- Extra wires** There are two extra wires supplied for any of your additional power needs
- Ground** You will need a ground wire from the battery(s) all the way to the engine. Use one of the holes in the block. They are M10 x 1.5 x 20 holes. The engine needs an excellent ground. We use #4 welding lead with crimped on lugs.

In addition, you will need to be a battery cable connected to the starter or alternator to provide power to the engine and to allow the alternator to recharge the battery(s). On your FWF engine package there is already a #4 cable running from the alternator to the starter.