



Glossary Key...

(A) - Purpose
 (B) - Operation
 (C) - "Also known as"

(M) - Maintenance Item
(service per manufacturers' recommendations)

1974-1977 Standard Beetle & 1974-1979 Super Beetle 1600cc Engine Electronic Control Unit (ECU)

Diagram "A" FUEL FILTER (M)

A) To maintain the high degree of fuel cleanliness critical to proper fuel injection operation and component longevity.

B) Fuel must pass through a paper element, a fibrous "fluff trap", and finally through a mesh strainer - when replaced at proper intervals as specified by the vehicle manufacturer, the fuel filter will allow no particles larger than 10 microns to pass through it.

Diagram "B" ELECTRIC FUEL PUMP

A) Creates continual pressurized fuel supply of specific volume to central fuel metering area.

B) The electric fuel pump is usually a roller cell design driven by a permanent magnet electric motor. Fuel is scavenged from the vehicle fuel tank and pressurized within cavities formed between the individual pump rollers. The pressurized fuel exists, the outlet check valve as a direct result of the centrifugal sealing action created in the roller chamber during rotation.

C) High Pressure Pump, Supply Pump

Diagram "C" AUXILIARY AIR VALVE

A) The auxiliary air valve opens a cross-sectional air bypass around the closed throttle blades to maintain an acceptable idle during cold engine operation.

B) A precisely calibrated bi-metallic strip governs the cross sectional area of an internal gate which meters the amount of extra air admitted to the engine during the warm-up period. The bi-metallic strip has its regulating time governed by the use of a ceramic heating element

C) Auxiliary Air Device, Auxiliary Air Regulator

Diagram "D" AIR FLOW SENSOR / METER

A) The air flow sensor provides the ECU with a continuous voltage signal as a measure of inducted air volume (engine load). This signal is a major contributor to the injector duration signal from the ECU.

B) Incoming air volume, as controlled by engine load, deflects a spring loaded flap, which at one end of its pivot shaft has a potentiometer contact. An inversely proportionate voltage signal (along with an air temperature signal in some cases) are sent to the ECU to help govern duration of injection.

C) Air Flow Meter, Vane Meter, VAF (Vane Air Flow)





Diagram "E" THERMO-TIME SWITCH

- A)** The thermo time switch completes the electrical circuit for, and limits the duration of operation for the cold start valve.
- B)** An internal bi-metallic strip, heated both electrically and via engine heat, determines cold start valve on time by providing a short duration electrical ground.

Diagram "F" VACUUM LIMITER

- A)** This device provides additional air to the engine during transitional/closed throttle positions to maintain combustion.
- B)** When a specific difference in pressure before and after the throttle valve is achieved (as in deceleration) this valve opens to supply additional air to the engine.

Diagram "G" DOUBLE RELAY

- A)** The relay provides electrical power to the engine management system and provides a safety circuit to prevent fuel flow when the engine is not running.
- B)** A primary ignition signal is most often used as an input to the relay which, when energized, provides power to the fuel pump, ECU, and the heated oxygen sensor if so equipped.

Diagram "H" ELECTRONIC CONTROL UNIT

- A)** Operating in a central processing capacity, the electronic control unit calculates the engine management control parameters based on data received from various sensors.
- B)** Responding to measured variables and sensor input, the control unit adjusts fuel delivery through its controlling output stage.
- C)** ECA (Electronic Control Assembly), ECU, ECM, Logic Module, Trigger Box.

Diagram "I" THROTTLE VALVE SWITCH

- A)** Communicates idle and full load position to the electronic control unit to allow for adjustment in engine 'management control.
- B)** Actuated by the throttle shaft, one set of contacts closes at idle with another signaling full-load electronically; all dependent on throttle position. Normally, the idle contact assists overrun fuel cutoff and idle speed actuator controlling functions, while the full-load contact acts to signal need for additional fuel under wide open throttle.
- C)** Throttle switch, load switch

Diagram "J" RESISTOR UNIT

- A)** The resistor unit reduces the voltage supplied to the port fuel injectors.
- B)** Battery voltage, supplied to the port injectors continuously when the vehicle is running, is reduced by the resistor unit prior to reaching the injection valves. Only certain L-Jetronic port injectors are designed to operate on this reduced voltage.
- C)** Dropping Resistors, Ballast Pack, Resistor Pack.

Diagram "K" INJECTOR/PRESSURE REGULATOR SEAL (M)

- A)** These flexible rings prevent unmetered air from entering the engine, position the injection valve, and prevent fuel leakage.
- B)** Depending upon system design, the injector seal is positioned on the injection valve so as to provide a leak proof seal between the injector and the intake manifold. In many electronic fuel injection systems, an additional seal is fitted between the injector and fuel rail. The pressure regulator seal is utilized at the junction of the pressure regulator and fuel rail to prevent fuel leakage.

Diagram "L" ENGINE TEMPERATURE SENSOR

- A)** This device measures engine temperature and reports this information to the electronic control units.
- B)** The internal resistor of the temperature sensor decreases in electrical resistance as the engine warms. Engine temperature via this resistance value is reported to the ECU and used as a correction to the output state (injector delivery, etc.).
- C)** CTS (Coolant Temperature Sensor), Temperature Sensor II

Diagram "M" FUEL INJECTION VALVES (Solenoid Types)

- A)** The solenoid type fuel injection valve precisely meter fuel into the individual engine intake ports.
- B)** Driven by the electronic control unit, the valve needle will lift within the solenoid body to deliver the predetermined fuel quantity. Replaceable O-ring seals are provided to limit vibration and leakage problems, and to ensure that characteristic good hot start condition.

Diagram "N" COLD START VALVE

- A)** Used to provide additional fuel needed to overcome fuel condensation and additional friction present during cold engine start-up.
- B)** Dependent on, and operating in series with the thermo-time switch, this solenoid operated valve creates an atomized "swirl" mixture, which is injected directly into the intake manifold plenum.
- C)** The "5th" injector, Cold Start Injector, Cold Start Device.

Diagram "O" FUEL PRESSURE REGULATOR

- A)** The (EFI-multi port type) fuel pressure regulator maintains required system specific fuel pressure in a differential relationship between fuel pressure and manifold vacuum. This device directs excess fuel back to the fuel tank.
- B)** A spring loaded diaphragm (assisted by a vacuum chamber opposite the fuel side) exerts a preset pressure on the incoming fuel flow, and by deflecting slightly to allow through flow, assures precise fuel rail pressure. The vacuum chamber receives and responds quickly to the signal from the intake manifold.





Fuel Injected
1600cc Engine Electronic
Control Unit (ECU). Item #317-921

Keep All of your **Volkswagen's Electronic System** functions running smoothly with this technical tip.

Before replacing the electronic control unit, the following procedures should be observed. The engine compression should be measured and found within specifications. The ignition system should be thoroughly checked, with

special emphasis given to breaker point condition and correct dwell. All fuel injection system components and wiring should be tested.

When troubleshooting the fuel injection system, you need to test a component that connects to the control unit. Never attempt to make tests at the terminals of the control unit itself. Always disconnect the battery ground strap before you remove the plug from the electronic control unit.

If for any reason you must install a replacement control unit, make sure that the new control unit has the same part number as the original control unit. A number of changes were made since the first fuel injection models were introduced in 1975.

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