

When You Replace...

Handling Tips

The ECM package is treated to insulate the computer from electrostatic discharge. Always keep the replacement computer in the box until you are ready to install it. Place the used computer in the box for core return.

The remanufactured computers are sealed in a shrink wrap material to protect from moisture and dirt. Keep the unit sealed until you are ready to install the unit.

Make sure your work area and you are grounded to prevent electrostatic discharge when handling electronic components.



GM PROM Replacement



Many GM computers use a removable PROM, CALPAC or MEM-CAL. You must remove this chip from the old unit and install it into the remanufactured computer.

Use care when removing and installing these chips. They can be damaged by electrostatic discharge, mishandling and dropping.

A detailed instruction for replacing memory chips is included with the replacement ECM.

Installation Tips

1. Turn the ignition switch to the off position and disconnect the negative battery cable.
2. Disconnect the computer harness connectors by releasing the locking tabs or unscrewing the retaining bolt. Do not pull on the wires. Pull off by holding onto the plastic connector.
3. Remove all retaining hardware brackets from the old unit and reinstall them onto the remanufactured computer.
4. Reinstall the computer and secure the harness onto the computer. All of the harness connectors are keyed, so they will only fit in

one direction. If it doesn't slide on, check the key position for proper fit. Do not force the connector into the remanufactured ECM.

5. Reinstall the negative battery cable and start the engine. In order for the remanufactured computer to operate properly it may be necessary to drive the vehicle for ten to twenty minutes in order to establish proper idle speed.
6. Pack the old computer in the original shipping carton for protection and return the used part to your supplier for core credit.

How Do I Order?

Using the Industry's most complete resource, you can look up a part by application and/or OE number. Most popular items are stocked by your local Distributor. If an item has an asterisk (*) next to it, it is a Critical Core Item (see below). We supply or rebuild ANY ECM.

Critical Cores

SLOW-MOVING COMPUTERS STOCKED AT THE FACTORY

Over 1,500 items, not stocked by distributors. Order by 12:00 noon Eastern time, and a rebuilt computer is shipped from the factory the same day; the core comes back through normal channels.

To order you need:

- O.E. part number (from the old computer).
- Part number (from the application guide).
- Vehicle make, model, year, engine size, and VIN code.
- Shipping address, contact person, and shipping method.
- Billing information (distributor address and contact person).
- You'll get instructions for tagging and returning the core to the distributor.

Replacement PROMs

To get a new or updated PROM, phone or fax our factory. We'll ship the same day (if ordered by 12:00 noon Eastern time).

To order you need:

- Original PROM ID number, which consists of 2 to 4 letters and 4 numbers.
- Original GM part number, or scan tool ID number (1985 or later vehicles).
- Vehicle make, model, year, engine size, and VIN code.
- Vehicle details (transmission type, air conditioning, Federal/California, etc.).
- If there is an updated PROM for the application, you'll be notified.
- Shipping address, name of contact person, and shipping method.
- Billing information (distributor address and name of contact person).

Same Day Service

PROMs and Critical Cores shipped same day if ordered by 12:00 noon EST.

R&R Rebuild and Return

FOR COMPUTERS NOT EVEN IN THE CATALOG

We can rebuild any computer ever made. Your computer is tested, rebuilt and returned in two working days. If testing shows your computer doesn't need rebuilding, you're only charged 50% of the rebuilding charge.

To order you need:

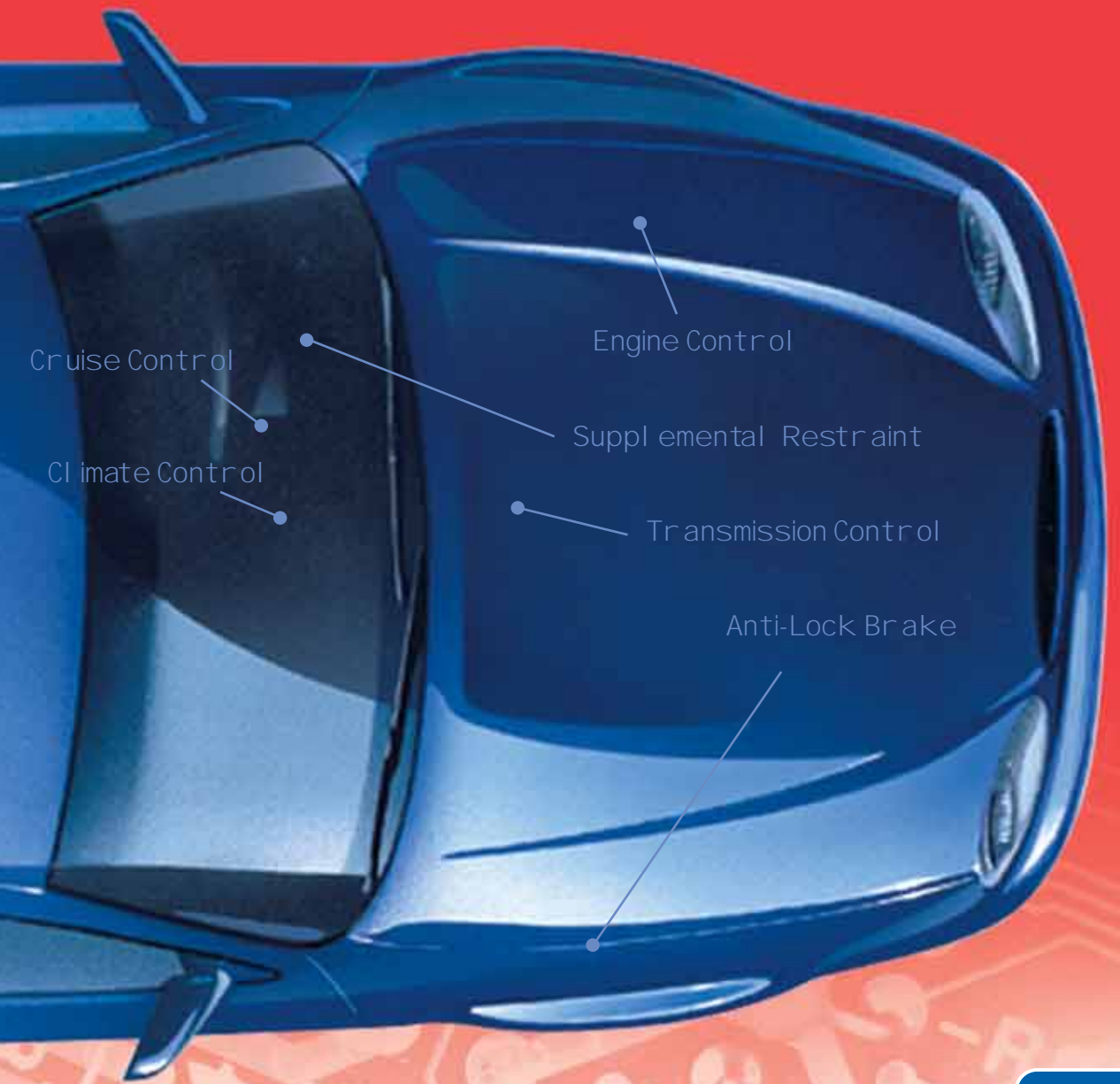
- R&R Return Form (from Remanufactured Electronics Application Guide).
- O.E. part number (from the old computer).
- Vehicle make, model, year, engine size, and VIN code.
- Make sure there's no regular stock number of Critical Core number for that application (these would be available quicker).
- A description of the problem and error codes.
- Installer name and phone number (if unit tests good, we will call).
- Shipping address, name of contact person, and shipping method.
- Billing information (a direct distributor's address and contact person)

Free Technical Advice

1-561-989-3755: Computer experts will lead you through the diagnostic steps – what and how to probe, and what the readings mean. You'll find out whether the symptoms point to the computer or something else.

**Call Toll-Free Order Line: 1-888-826-2719
or FAX Order to 1-561-989-9031**

REMANUFACTURED ELECTRONICS A Counterperson's Guide



More detailed counter person training is available on our website at: www.smp-training.com



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Why Computers?

The Engine Control Module (ECM) can maintain engine efficiency under all driving conditions by controlling ignition timing and modifying the air fuel ratio. The ECM can help achieve the highest fuel economy and the lowest vehicle emission levels regulated by federal and state governments.

What Goes Wrong?

What Causes Damage

- External damage, moisture contamination or physical damage from vehicle accidents
- Improper handling allowing static discharges to enter the ECM circuits
- High voltage or high current passing through the circuits
- Low voltage caused by low batteries or failed alternators
- Poor ground connections can impede the operation of the ECM

Testing

Before replacing the ECM perform the following tests.

- Available voltage and ground circuit resistance
- Reference voltage signal (usually 5 volts)
- Sensor-ground circuits for open or shorts
- Diagnostic trouble codes (repair as necessary)
- Output device operation and current draw
- You will need a reference manual, scan tool or a DVOM to monitor the test results.

How Do They Work?

The ECM is programmed with a complex set of instruction. The program is placed electronically into a memory chip called the Programmable Read Only Memory (PROM). The ECM receives input information from various sensors and switches through voltage and frequency signals. The input information is then stored in the Random Access Memory chip (RAM). The ECM converts the data into a binary code for processing.

After processing the information, the ECM sends output commands to modify ignition timing and air/fuel (A/F) ratios. The ECM also controls other devices like the engine cooling fan, AC compressor, torque converter clutch, EGR valve and canister purge solenoid. The automotive computer control system delivers better performance, fuel economy, and lower emissions levels.

Input Devices feed ECM information

AC System Pressure Sensor
Represents the amount of load being placed on the engine by the AC system. ECM adjusts idle speed and control of the cooling fans.

AC Request Switch
Indicates the state of the AC input circuit from the HVAC control. ECM determines AC system status.

Engine Coolant Temperature (ECT)
Represents the engine operating temperature. ECM modifies A/F ratios, ignition timing and cooling fan controls.

Brake Lamp Switch
Indicates brake pedal application. ECM disengages the torque converter clutch and may turn the AC compressor off.

Knock Sensor (KS)
Indicates engine detonation. ECM retards ignition timing to eliminate detonation.

Fuel Tank Pressure
Indicates pressure of vacuum in the fuel tank. ECM controls EVAP system and monitors for vapor leaks.

Park/Neutral Position
Indicates transmission gear selection. ECM Adjusts idle speed controller.

Mass Air Flow Sensor (MAF)
Indicates air entering the engine in grams per mile. ECM adjusts A/F ratios and ignition timing.

Throttle Position (TP)
Indicates the throttle angle. ECM modifies ignition timing, A/F ratios, and idle speed.

Crankshaft Position Sensor (CKP)
Indicates engine rpm. ECM controls ignition timing.

Power Steering Pressure (PSP)
Indicates hydraulic pressure in the power steering system. ECM adjusts idle speed and may reduce transmission pressures to reduce the engine load.

Barometric Pressure (BARO)
Indicates the vehicle operating altitude. ECM compensates A/F ratios for elevations.

Camshaft Position Sensor (CMP)
Indicates #1 piston position. ECM synchronizes fuel injector operation.

Heated Oxygen Sensor (HO2S)
Indicates oxygen content in the exhaust stream and efficiency of the catalytic converter. ECM controls injector pulse width (A/F ratios) and determines the converter operation. Some vehicles can have four O2 sensors.

Manifold Absolute Pressure Sensor (MAP)
Indicates the intake manifold pressure from the engine load conditions. ECM adjusts ignition timing and A/F ratios.

Vehicle Speed (VSS)
Indicates vehicle velocity. ECM adjusts ignition timing, A/F ratios, transmission shifting, and the torque converter clutch.



Processes information

ECM Processing & Operating Modes

- Open Loop Mode (OL):** Designed to control the engine warm up and initial operation. Enables the ECM to start monitoring the input sensors and to process the data for optimum engine operation.
- Closed Loop Mode (CL):** ECM maintains correct idle rpm under various load conditions and engine component conditions.
- Adaptive Fuel Trim:** ECM maintains correct A/F ratios by compensating for normal variations in the system components and operating conditions.
- Diagnostic Test Mode (DTM):** Enables the ECM to run the On Board Diagnostic (OBD) program.
 - OBD Monitors sensor parameters, activates warning lights and interfaces with diagnostic equipment.
 - PCM may substitute bad input data for pre-programmed information (logical comparisons).

EGR Solenoid
ECM regulates EGR solenoid opening based on engine conditions.

Ignition Control
ECM determines required ignition timing and controls module triggering.

Fuel Pump Control
ECM activates the fuel pump relay on initial key on.

Cooling Fan Control
ECM activates the fan relays to control engine operating temperatures.

AC Request
ECM activates the AC clutch relay that turns the clutch coil on.

Torque Converter Solenoid
ECM activates the torque converter solenoid to engage or disengage the transmission converter.

EGR Control
ECM regulates valve opening as per engine conditions. ECM receives feedback as to the valves position.

Diagnostic Data Link
ECM sends serial data to the connector in order to interface with a scan tool.

Canister Purge
ECM activates the canister purge solenoid that allows fuel vapors to be pulled into the intake system.

Transmission Gear Select
ECM controls the shift points of the transmission via solenoid activation.

Fuel Injectors
ECM modulates the injector pulse width to control the Air/Fuel Ratios.

Diverter Valve
ECM activates the air bypass solenoid to direct and divert the air flow.

Idle Air Control Valve
ECM modulates the air valve stepper motor to control engine idle rpm.

ECM sends commands to Output Devices

Remanufactured Electronics Line Content



ABS Computers are programmed to compensate for tire lock up by modulating the braking action.



Air Bag Computers are designed to control the inflation of a safety bag in the event of a major collision.



Body Control Computers are programmed to manage and control several devices such as theft deterrent, lighting, climate control, intermittent wipers and vehicle mileage.



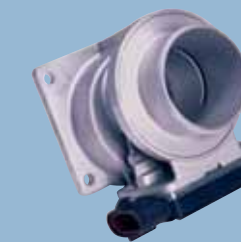
Climate Control Computers are designed to manage the heating ventilation and air conditioning of the vehicle. They are also used as an interface with the Body Computer.



Cruise Control Modules & Servos are designed to maintain a constant vehicle speed under all driving conditions.



Engine Control Computers also known as Powertrain Control (ECM) and Vehicle Control Computers (VCM) maintain proper engine operation to provide better fuel economy, lower emission levels and better engine performance.



Mass Airflow Sensors monitor the volume and temperature of the air entering the engine. They input this information to the ECM via a frequency-generated signal.



Ride Control Computers are programmed to modify the suspension characteristics of the vehicle to compensate for road and driving conditions.



Electronic Dashboards can be both digital and analog. They function in a similar manner to mechanical dashboards but operate electronically.