

## Computers and Control Systems: Symptom Related Diagnostic Procedures

### Testing Notes

- Verify that a pass code 11/111 was received in Key On Engine Off (KOEO), Engine Running (KOER), and Continuous self tests before continuing with this test.
- If a symptom is present and the EEC system is suspect, continue to symptom charts. See: Symptom Cross Reference Chart
- If the EEC system is not suspected or if symptom or application is not contained in the diagnosis by symptom charts, go to Diagnosis By Symptom (Diagnostic Routines). See: Diagnostic Routines

SYMPTOM	RESULT	ACTION TO TAKE
<ul style="list-style-type: none"> <li>• Engine stalls.</li> <li>• Stalls in Self-Test.</li> <li>• Runs rough.</li> <li>• Misses.</li> </ul>	Always rich/lean. ▶	<ul style="list-style-type: none"> <li>• GO to Pinpoint Test Step <b>S1</b>.</li> <li>• Map test GO to Pinpoint Test Step <b>DF-20</b>.</li> <li>• Poor power/ground connections.</li> <li>• Ignition system distributor cap, rotor, wires, coil, plugs.</li> <li>• Base engine valves cam timing, compression etc.</li> </ul>
<ul style="list-style-type: none"> <li>• Detonation/spark knock.</li> </ul>		GO to Pinpoint Test Step <b>DG1</b> .
<ul style="list-style-type: none"> <li>• Lack of fast idle assist with A/C On.</li> </ul>		GO to Pinpoint Test Step <b>FA1</b> .
<ul style="list-style-type: none"> <li>• A/C does not cut-off under WOT conditions.</li> </ul>		GO to Pinpoint Test Step <b>KM1</b> .
<ul style="list-style-type: none"> <li>• Stumble after hot re-start (HEGO).</li> </ul>		GO to Pinpoint Test Step <b>HG21</b> .
<ul style="list-style-type: none"> <li>• Stalls during parking maneuvers.</li> </ul>		GO to Pinpoint Test Step <b>FF3</b> .

### Diagnostic By Symptom

201	CRANKS NORMALLY BUT WON'T START	
System	Component	Reference
Ignition	Electrical Connections Secondary Ignition Wires Ignition Coil Ignition Module Rotor Alignment Distributor Cap, Adapter, Rotor & Stator Spark Plugs Fouled Ignition Switch	IGNITION SYSTEMS
External Carburetor/Fuel Charging Assy./Throttle Body	Electrical and Vacuum Connections Choke Plate and Linkage Cold Enrichment Rod and Linkage (7200) Venturi Valve (7200) Throttle Linkages	FUEL SYSTEMS
EGR	Valve	EMISSION CONTROLS
Internal Carburetor	Float/Inlet Needle and Seat Idle Air Bleeds and Fuel Passages	FUEL SYSTEMS
Fuel Delivery	Filter Pump Water/Dirt/Rust Contamination in Fuel Lines Tank (Fuel Supply) Dual Tanks (Selector Switch) Sender Filter Inertia Switch	FUEL SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Basic Engine	Camshaft Timing Compression	ENGINE MECHANICAL

**NOTE:** Extended cranking, because of a "No Start" condition, can load the exhaust system with raw fuel, which can ruin the catalytic converter after the engine start. To prevent this, disconnect the thermactor air supply (and, if EFI/CFI, the injectors), and run engine until surplus fuel is used up before reconnecting.

### Cranks Normally But Won't Start

202	STARTS NORMALLY BUT WON'T RUN (STALLS)	
System	Component	Reference
External Carburetor/Fuel Charging Assy./Throttle Body	Electrical and Vacuum Connections Fast Idle Speed Choke Plate and Linkage Cold Enrichment Rod and Linkage (7200) Choke Pulldown Adjustment & Diaphragm Venturi Valve (7200) Choke Cap Indexing Feedback Solenoid (YFA)	FUEL SYSTEMS
Ignition	Electrical Connections Secondary Ignition Wires Ignition Coil Ignition Module Rotor Alignment Distributor Cap, Adapter, Rotor & Stator Ignition Switch Ballast Resistor	IGNITION SYSTEMS
EGR	Valve	EMISSION CONTROLS
Fuel Delivery	Filter Pump Water/Dirt/Rust Contamination in Fuel Lines Tank (Fuel Supply) Sender Filter Inertia Switch	FUEL SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Internal Carburetor	Float/Inlet Needle and Seat Idle Air Bleeds and Fuel Passages	FUEL SYSTEMS
Exhaust	Component (Restricted)	EMISSION CONTROLS
Basic Engine	Camshaft and Valve Train	ENGINE MECHANICAL

### Starts Normally But Won't Run (Stalls)

<b>203</b>		
<b>CRANKS NORMALLY BUT SLOW TO START</b>		
System	Component	Reference
<b>NOTE:</b> It is a good practice to confirm that the correct starting procedure was being used by the customer before proceeding with diagnosis.		
External Carburetor/Fuel Charging Assy/Throttle Body	Electrical and Vacuum Connections Choke Plate and Linkage Cold Enrichment Rod and Linkage (7200) Choke Cap Indexing Accelerator Pump Venturi Valve (7200) Bowl Vents	FUEL SYSTEMS
Fuel Delivery	Filter Pump Water/Dir/Rust Contamination in Fuel Lines Sender Filter	FUEL SYSTEMS
Internal Carburetor	Hot Idle Compensator (may be external) Float/Inlet Needle and Seat Stepper Motor (7200) Cold Enrichment Adjustments (7200)	FUEL SYSTEMS
Ignition	Scope Engine for: Spark Plugs, Coil, Secondary Ignition Wires, Distributor Cap, Adapter & Rotor Spark Plugs Fouled	IGNITION SYSTEMS
Induction and Vacuum Distribution	Vacuum Leaks Air Cleaner Element Restricted	FUEL SYSTEMS
Cooling	Electric Fan (Hot Start Only)	ENGINE MECHANICAL
EGR	Valve	EMISSION CONTROLS
PCV	Valve	EMISSION CONTROLS
EVAP	Components	EMISSION CONTROLS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST

### Cranks Normally But Slow To Start

<b>205</b>		
<b>MISSES UNDER LOAD</b>		
System	Component	Reference
Ignition	Scope Engine For: Spark Plug, Coil, Secondary Wires, Distributor Cap, Adapter and Rotor	IGNITION SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Fuel Delivery	Filter Pump Lines Sender Filter	FUEL SYSTEMS
External Carburetor/Fuel Charging Assy/Throttle Body	Electrical and Vacuum Connections Choke and Linkage Cold Enrichment Rod and Linkage (7200) Venturi Valves (7200)	FUEL SYSTEMS
Internal Carburetor	Basic: Idle, Main, and Accelerator Pump Float/Inlet Needle and Seat Main Metering Fuel Enrichment	FUEL SYSTEMS
Ignition Timing	Base plus Advance and Retard Functions	IGNITION SYSTEMS

### Misses Under Load

207	HESITATES OR STALLS ON ACCELERATION	
System	Component	Reference
External Carburetor/Fuel Charging Assy/Throttle Body	Choke Plate and Linkage Electrical & Vacuum Connections Cold Enrichment Rod and Linkage (7200) Accelerator Pump Venturi Valve (7200)	FUEL SYSTEMS
Induction and Vacuum Distribution	Vacuum Leaks	VISUAL AND AUDIBLE INSPECTION
Induction	Air Cleaner Duct and Valve	FUEL SYSTEMS
Ignition	Scope Engine For: Spark Plug, Coil, Secondary Wires, Distributor Cap, Adapter and Rotor	IGNITION SYSTEMS
External Carburetor/Fuel Charging Assy/Throttle Body	Choke or Fast Idle Speeds	FUEL SYSTEMS
EGR	Valve	EMISSION CONTROLS
Fuel Delivery	Filter Pump Water/Dirt/Rust Contamination in Fuel Lines Sender Filter	FUEL SYSTEMS
Internal Carburetor	VV Diaphragm (7200) Power Valve Stepper Motor (7200) Main System (Restriction)	FUEL SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Turbocharger		FUEL SYSTEMS
Ignition Timing	Base plus Advance and Retard Functions	IGNITION SYSTEMS
Exhaust (Restriction)	With Backpressure EGR System	EMISSION CONTROLS

### Hesitates Or Stalls On Acceleration

208	BACKFIRE (INDUCTION OR EXHAUST)	
System	Component	Reference
Vacuum Distribution	Vacuum Leak(s)	VISUAL AND AUDIBLE INSPECTION
Ignition	Scope Engine For: Spark Plug, Coil, Secondary Wires, Distributor Cap and Rotor, Crossed Wires	IGNITION SYSTEMS
External Carburetor	Choke Plate and Linkage	FUEL SYSTEMS
Basic Engine	Intake Manifold Gaskets Compression Check Camshaft Valves	ENGINE MECHANICAL
Thermactor		EMISSION CONTROLS
Pulse Air		EMISSION CONTROLS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Ignition Timing	Base plus Advance and Retard Functions	IGNITION SYSTEMS
Exhaust	Components (Restricted)	EMISSION CONTROLS
Fuel Delivery	Filter Pump Water, Dirt, Rust, Contamination in Fuel Lines Sender Filter	FUEL SYSTEMS

### Backfire (Intake Or Exhaust)

209	LACK OF POWER	
System	Component	Reference
External Carburetor/Fuel Charging Assy/Throttle Body	Electrical and Vacuum Connections Choke Plate and Linkage Accelerator Pump Venturi Valves (7200)	FUEL SYSTEMS
Induction	Air Cleaner Duct and Valve and Element	FUEL SYSTEMS
Fuel Delivery	Filter Pump Lines Sender Filter	FUEL SYSTEMS
EGR	Valve	EMISSION CONTROLS
Internal Carburetor	Float/Inlet Needle and Seat Accelerator Pump Main Metering System Fuel Enrichment Altitude Compensator Stepper Motor (7200) Pullover Rod (Sticking 1949/6149)	FUEL SYSTEMS
Basic Engine	Compression Check Camshaft Valves	ENGINE MECHANICAL
Drive Train	Clutch, Automatic Transmission, Brakes	TRANSMISSION OR BRAKES
EEC	Component Diagnostics	ENGINE MECHANICAL
MCU	Component Diagnostics	ENGINE MECHANICAL
Turbocharger		FUEL SYSTEMS
Exhaust	Components (Restricted)	EMISSION CONTROLS
Ignition Timing	Base plus Advance Retard Functions	IGNITION SYSTEMS

### Lack Of Power

210	SURGE AT STEADY SPEED	
System	Component	Reference
External Carburetor/Fuel Charging Assy (Throttle Body)	Choke Plate and Linkage Electrical & Vacuum Connections Venturi Valves (7200) Feedback Solenoid (YFA)	FUEL SYSTEMS
Vacuum Distribution	Vacuum Leaks	VISUAL AND AUDIBLE INSPECTION
Fuel Delivery	Filter Pump Lines Sender Filter	FUEL SYSTEMS
Internal Carburetor	Idle, Main Systems Float/Inlet Needle and Seat Fuel Enrichment Systems Altitude Compensator	FUEL SYSTEMS
EGR	Valve	EMISSION CONTROLS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Turbocharger		FUEL SYSTEMS
EVAP	Components	EMISSION CONTROLS
Basic Engine	Valve Train and Camshaft Inake Manifold Gaskets	ENGINE MECHANICAL
Thermactor		EMISSION CONTROLS
Ignition Timing	Base plus Advance and Retard Functions	IGNITION SYSTEMS

### Surge At Steady Speed

211	ENGINE DIESELS (OR IDLES TOO FAST)	
System	Component	Reference
External Carburetor/Fuel Charging Assy/Throttle Body	Curb or Fast Idle Speeds Electrical and Vacuum Connections Throttle Positioner or Dashpot Choke Plate and Linkage Fast Idle Linkage Venturi Valves (7200) Speed Control Chain	FUEL SYSTEMS
Vacuum Distribution	Vacuum Leaks	VISUAL AND AUDIBLE INSPECTION
Cooling	Overheating	ENGINE OVERHEATING DIAGNOSTIC ROUTINE
Idle Speed Control	Components	QUICK TEST
Induction	Vacuum Leaks	FUEL SYSTEMS

If engine idles smoothly after being shut off, trouble is likely to be in the ignition switch, ignition harness, starter solenoid "IGN" tap, or EEC relay.

### Engine Diesels (Idles Too Fast)

212	ENGINE NOISE	
Symptom	Component	Reference
Squeal, Click, or Chirp	Oil Level (low) Valve Train Drive Belts (loose) Belt Driven Components EEC Solenoids	VISUAL AND AUDIBLE INSPECTION
Rumble, Grind	Belt Driven Components	
Rattle	Component (loose)	
Hiss	Thermafactor System (leak) Vacuum Distribution System (leak) Induction System (leak) Spark Plug (loose)	VISUAL AND AUDIBLE INSPECTION
	Cooling System (leak)	
	EVAP System (leak)	ENGINE MECHANICAL
Snap	Secondary Ignition	VISUAL AND AUDIBLE INSPECTION
Rap, Roar	Exhaust System (leak) Pulse Air System (air cleaner)	ENGINE MECHANICAL
Whine	Turbocharger (some whine is normal)	AUDIBLE INSPECTION
Knock	Connection Rod Bearing (worn) Main Bearing (worn) Piston Pin (loose) Piston to Bore Clearance (cold engine)	ENGINE MECHANICAL
	Fuel Pump	FUEL SYSTEMS
	Detonation	SPARK KNOCK/PING DIAGNOSTIC ROUTING

### Engine Noise

213	POOR FUEL ECONOMY	
System	Component	Reference
While fuel consumption is drastically increased for short-run operation, stop and go driving, trailer towing, extended winter warm-up periods, etc., as opposed to "trip" mileage, an attempt should be made to determine these factors when confronted with "poor mileage" conditions. However, since the operator is not always at fault, the following is appended:		
External Carburetor/Fuel Charging Assy/Throttle Body	Choke Plate and Linkage Cold Enrichment Rod and Linkage (7200) Electrical & Vacuum Connections Feedback Solenoid (YFA)	FUEL SYSTEMS
Induction	Air Cleaner Duct and Valve Air Cleaner Element (Restricted)	FUEL SYSTEMS
Ignition	Scope Engine For: Spark Plug, Coil, Secondary Wires, Distributor Cap, Adapter and Rotor	IGNITION SYSTEMS
Internal Carburetor	Idle, Main Systems Enrichment Systems Float/Inlet Needle and Seat	FUEL SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Fuel Delivery	Fuel Return Line Blocked	FUEL SYSTEMS
Cooling	Thermostat	ENGINE MECHANICAL
Factors External to the Engine	Tire Pressure & Type Clutch Operation Automatic Transmission Shift Pattern and Fluid Level Brake Drag Exhaust System Speedometer/Odometer Gear Ratio Axle Ratio Vehicle Load Road & Weather Conditions	MANUAL AND VISUAL INSPECTION
Ignition Timing	Base plus Advance and Retard Functions	IGNITION SYSTEMS

### Poor Fuel Economy

214	HIGH OIL CONSUMPTION	
System	Component	Reference
External Leaks		VISUAL INSPECTION
Proper Dipstick	Overfilling (sometimes accomplished by the "short stick" gas station procedure).	MANUAL AND VISUAL INSPECTION
Induction	Air Cleaner Element (Sealing)	FUEL SYSTEMS
PCV	Valve	EMISSION CONTROLS
Turbocharger	Compressor-Turbine Bearing, Seals, Center Drain, Etc.	FUEL SYSTEMS
Internal Leaks (blue smoke from tailpipe)	Valve Guides Valve Stem Seals Intake Manifold and Gasket Cylinder Head Drain Passages Piston Rings	ENGINE MECHANICAL

If the condition cannot be verified, clean engine, if necessary, change oil and filter (at customer's expense), seal and have customer drive 804.5 Km (500 miles) or enough distance to consume two quarts before returning for re-examination.

### High Oil Consumption

215	SPARK KNOCK/PINGING	
System	Component	Reference
EGR	Verify correct application, then diagnose.	EMISSION CONTROLS
Induction	Air Cleaner Duct and Valve Assembly	FUEL SYSTEMS
Vacuum Distribution	Vacuum Leaks Spark Delay Valve PVS	VISUAL AND AUDIBLE INSPECTION
Basic Engine	Oil Level Compression Check Intake Manifold Gasket	ENGINE MECHANICAL
Cooling	Overheating	ENGINE MECHANICAL
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Turbocharger		FUEL SYSTEMS
Thermactor		EMISSION CONTROLS
Ignition Timing	Initial plus Advance and Retard Functions	IGNITION SYSTEMS

If the above fails to correct the condition, it is recommended that the owner change his source of fuel and use higher octane fuel.

### Spark Knock/Ping

216	ENGINE VIBRATES AT NORMAL SPEEDS	
System	Component	Reference
Engine Accessories	Fan Belt Driven Components Engine Mounts Engine Vibration Damper	MANUAL AND VISUAL INSPECTION
Otherwise	Non-Engine Components: Drive Line, Tires, Wheel Balance	MANUAL AND VISUAL INSPECTION

### Engine Vibrates At Normal Speed

217	ENGINE RUNS COLD	
System	Component	Reference
Gauge System	Gauge, Sender	BODY ELECTRICAL
Cooling	Thermostat	ENGINE MECHANICAL

### Engine Runs Cold

218	ENGINE RUNS HOT	
System	Component	Reference
Cooling	Coolant Level Radiator or A/C Condenser Pressure Cap and Overflow System External Leaks Belts and Belt Tension Fan and Fan Clutch Electric Fan (If So Equipped)	VISUAL INSPECTION
Gauge System	Gauge, Sender	BODY ELECTRICAL
Cooling	Thermostat	ENGINE MECHANICAL
Ignition Timing	Base Plus Advance and Retard Functions	IGNITION SYSTEMS
Vacuum Distribution	Spark Delay Valve	EMISSION CONTROLS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Cooling	PVS	EMISSION CONTROLS
Basic Engine	Oil Level Internal Leak(s) Core Sand in Head/Block Water Pump	ENGINE MECHANICAL
Brake	Brakes (dragging)	BRAKES

### Engine Runs Hot

219	EXHAUST SMOKE	
Symptom	Component	Reference
Black Smoke (rich mixture)	Choke Plate and Linkage Cold Enrichment Rod and Linkage (7200)	FUEL SYSTEMS
	Air Cleaner Element (Restricted)	VISUAL INSPECTION
	Internal Carburetor Components: Basic: Idle, Main and Accelerator Pump Metering Systems Enrichment Systems Fuel Inlet Needle/Seat Float	FUEL SYSTEMS
	EEC Components	QUICK TEST
	MCU Components	QUICK TEST
Blue Smoke (burning oil)	PCV Valve	EMISSION CONTROLS
	Valve Guides/Stems/Seals Oil Drain Passages in Head	ENGINE MECHANICAL
	Turbo Bearing Seals	FUEL SYSTEMS
	Rings (not seated) Cylinder bores (scuffed)	ENGINE MECHANICAL
White Smoke (coolant in combustion)	Thermaxtor Vacuum Delay Valve (restricted) EGR Cooler Intake Manifold Cylinder Head/Gasket (leaks) Block (cracked/porous)	ENGINE MECHANICAL

**NOTE:** White Smoke is normal during warm-up.

### Exhaust Smoke

<b>220 GAS SMELL</b>		
<b>System</b>	<b>Component</b>	<b>Reference</b>
Fuel Delivery	Fuel Filter (leaks) Fuel Line to Carburetor (leaks) Fuel Pump (leaks) Fuel Line, Pump to Tank (leaks) Fuel Tank (leaks) Fuel Tank Filler Neck/Cap (leaks) Fuel Return Line (Blocked)	FUEL SYSTEMS
Internal Carburetor	Float/Inlet Needle (stuck)	FUEL SYSTEMS
EVAP	Component (leaks)	EMISSION CONTROLS

### Gas Smell

<b>204 ROUGH IDLE</b>		
<b>System</b>	<b>Component</b>	<b>Reference</b>
Cooling	Fan or Electric Fan (Loose or Cracked)	VISUAL INSPECTION
Vacuum Distribution	Vacuum Leaks	VISUAL AND AUDIBLE INSPECTION
External Carburetor/Fuel Charging Assy Throttle Body	Curb or Fast Idle Speeds Electrical and Vacuum Connections Choke Plate and Linkage Cold Enrichment Rod and Linkage (7200) Venturi Valve (7200) Choke Pulldown Bowl Vent Feedback Solenoid (YFA)	FUEL SYSTEMS
Ignition	Scope Engine For: Spark Plug, Coil, Secondary Wires, Distributor Cap, Adapter and Rotor	IGNITION SYSTEMS
Carburetor	Idle Mixture	FUEL SYSTEMS
EGR	Valve Vacuum Regulator	EMISSION CONTROLS
PCV	Valve	EMISSION CONTROLS
EVAP	Components	EMISSION CONTROLS
Ignition Timing	Base plus Advance and Retard Functions	IGNITION SYSTEMS
Internal Carburetor	Idle, Air Bleeds or Fuel Passages Float/Inlet Needle and Seat Stepper Motor (7200) Hot Idle Compensator (may be external) Altitude Compensator Cold Enrichment (7200)	FUEL SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST
Turbocharger		FUEL SYSTEMS
Exhaust	Pipes, Muffler, Catalyst Resonator, Heat Control Valve	EMISSION CONTROLS
Basic Engine	Compression Valve Train Camshaft Intake Manifold Gaskets	ENGINE MECHANICAL

### Rough Idle

<b>206 STALLS ON DECEL OR QUICK STOP</b>		
<b>System</b>	<b>Component</b>	<b>Reference</b>
External Carburetor/Fuel Charging Assy/Throttle Body	Curb or Fast Idle Speed Electrical and Vacuum Connections Throttle Devices Venturi Valve (7200)	FUEL SYSTEMS
EGR	Valve	EMISSION CONTROLS
Internal Carburetor	Idle Airbleeds or Fuel Passages Stepper Motor (7200) Hot Idle Compensator (may be external) Float/Inlet Needle and Seat Cold Enrichment (7200)	FUEL SYSTEMS
Turbocharger	Retard Switches	FUEL SYSTEMS
EEC	Component Diagnostics	QUICK TEST
MCU	Component Diagnostics	QUICK TEST

### Stalls On Decel Or Quick Stop