

## TUNE-UP TROUBLE SHOOTING

CONDITION & POSSIBLE CAUSE	CONDITION & POSSIBLE CAUSE
<p style="text-align: center;"><b>SPARK PLUG DIAGNOSIS</b></p> <p><b>Normal Spark Plug Condition</b></p> <ul style="list-style-type: none"> <li>• Light tan or gray deposits on insulator.</li> <li>• Electrode not burned or fouled.</li> <li>• Gap tolerance not significantly changed.</li> </ul> <p><b>Cold Fouling or Carbon Deposits</b></p> <ul style="list-style-type: none"> <li>• Over rich air-fuel mixture, possibly from a faulty choke, clogged air cleaner, improper idle adjustment or dirty carburetor.</li> <li>• Faulty ignition wires.</li> <li>• Prolonged operation at idle.</li> <li>• Sticking valves or worn valve guide seals.</li> </ul> <p><b>Wet Fouling or Oil Deposits</b></p> <ul style="list-style-type: none"> <li>• Worn rings and pistons.</li> <li>• Excessive cylinder wear.</li> <li>• Excessive valve guide clearance.</li> <li>• Worn or loose bearings.</li> </ul> <p><b>Gap Bridged</b></p> <ul style="list-style-type: none"> <li>• Deposits in combustion chamber becoming fused to electrode under high heat.</li> </ul> <p><b>Blistered Electrode or Overheating</b></p> <ul style="list-style-type: none"> <li>• Engine overheating.</li> <li>• Wrong type of fuel.</li> <li>• Loose spark plugs.</li> <li>• Over-advanced ignition timing.</li> </ul> <p><b>Pre-ignition or Melted Electrodes</b></p> <ul style="list-style-type: none"> <li>• Incorrect type of gasoline.</li> <li>• Incorrect ignition timing.</li> <li>• Burned valves.</li> <li>• Engine overheating.</li> <li>• Wrong type of spark plug, too hot.</li> </ul> <p><b>Chipped Insulators</b></p> <ul style="list-style-type: none"> <li>• Severe detonation.</li> <li>• Improper gapping procedure.</li> </ul> <p><b>Rust Colored Deposits</b></p> <ul style="list-style-type: none"> <li>• Additives in unleaded fuel may create this condition. It may be misdiagnosed as water in the combustion chamber. These deposits do not affect plug performance.</li> </ul>	<p style="text-align: center;"><b>ELECTRONIC IGNITION DIAGNOSIS</b></p> <p><i>Before diagnosing an electronic ignition system, ensure that all wiring is connected properly between distributor, wiring connector and spark plugs. Ignition problems will show up either as: engine will not start or engine runs rough.</i></p> <p><b>Engine Will Not Start</b></p> <ul style="list-style-type: none"> <li>• Open circuit between distributor and bulkhead connector.</li> <li>• Open circuit between bulkhead connector and ignition switch.</li> <li>• Open circuit between ignition switch and starter solenoid.</li> </ul> <p><b>Engine Runs Rough</b></p> <ul style="list-style-type: none"> <li>• Fuel lines leaking or clogged.</li> <li>• Initial timing incorrect.</li> <li>• Centrifugal advance malfunction.</li> <li>• Worn or defective spark plugs.</li> <li>• Worn or defective secondary wiring.</li> </ul> <p><i>If the above checks do not locate the problem, check the components listed below.</i></p> <p><b>Component Failure</b></p> <ul style="list-style-type: none"> <li>• Spark arc-over on distributor cap, rotor or coil.</li> <li>• Defective pick-up coil.</li> <li>• Defective ignition coil.</li> <li>• Defective vacuum unit.</li> <li>• Defective control module.</li> </ul> <p style="text-align: center;"><b>ELECTRONIC IGNITION DIAGNOSIS BY OSCILLOSCOPE PATTERN</b></p> <p><b>Firing Voltage Lines are the Same, but Abnormally High</b></p> <ul style="list-style-type: none"> <li>• Retarded ignition timing.</li> <li>• Too lean of a fuel mixture.</li> <li>• High resistance in coil wire.</li> <li>• Corrosion in coil tower terminal.</li> <li>• Corrosion in distributor coil terminal.</li> </ul> <p><b>Firing Voltage Lines are the Same, but Abnormally Low</b></p> <ul style="list-style-type: none"> <li>• Too rich of a fuel mixture.</li> <li>• Breaks in coil wire causing arcing.</li> <li>• Cracked coil tower causing arcing.</li> <li>• Low coil output.</li> <li>• Low engine compression.</li> </ul>

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<p><b>One or More, but Not All Firing Voltage Lines are Higher Than the Others</b></p> <ul style="list-style-type: none"> <li>● Carburetor idle mixture not balanced.</li> <li>● EGR valve stuck open.</li> <li>● High resistance in spark plug wire.</li> <li>● Cracked or broken spark plug insulator.</li> <li>● Intake vacuum leak.</li> <li>● Defective spark plugs.</li> <li>● Corroded spark plug terminals.</li> </ul> <p><b>One or More, but Not All Firing Voltage Lines are Lower Than the Others</b></p> <ul style="list-style-type: none"> <li>● Curb idle mixture not balanced.</li> <li>● Breaks in spark plug wires causing arcing.</li> <li>● Cracked coil tower causing arcing.</li> <li>● Low compression.</li> <li>● Defective spark plugs, or spark plugs fouled.</li> </ul> <p><b>One or More Cylinders Not Firing</b></p> <ul style="list-style-type: none"> <li>● Cracked distributor cap terminals.</li> <li>● Shorted spark plug wire.</li> <li>● Mechanical problem in engine.</li> <li>● Defective spark plugs.</li> <li>● Spark plugs fouled.</li> </ul> <p style="text-align: center;"><b>GENERAL DIAGNOSIS</b></p> <p><b>Hard Starting</b></p> <ul style="list-style-type: none"> <li>● Binding carburetor linkage, choke linkage or choke piston.</li> <li>● Restricted choke vacuum.</li> <li>● Worn or dirty needle valve and seat.</li> <li>● Float sticking.</li> <li>● Incorrect choke adjustment.</li> <li>● Defective coil.</li> <li>● Improper spark plug gap.</li> <li>● Incorrect ignition timing.</li> </ul> <p><b>Detonation</b></p> <ul style="list-style-type: none"> <li>● Over-advanced ignition timing.</li> <li>● Defective spark plugs.</li> <li>● Fuel lines clogged.</li> <li>● EGR system malfunction.</li> <li>● PCV system malfunction.</li> <li>● Vacuum leaks.</li> <li>● Loose fan belts.</li> <li>● Restricted air flow.</li> <li>● Vacuum advance malfunction.</li> </ul>	<p><b>Dieseling</b></p> <ul style="list-style-type: none"> <li>● Binding carburetor linkage, throttle linkage, choke linkage or fast idle cam.</li> <li>● Defective idle solenoid.</li> <li>● Improper base idle speed.</li> <li>● Incorrect ignition timing.</li> <li>● Incorrect idle mixture setting.</li> </ul> <p><b>Faulty Acceleration</b></p> <ul style="list-style-type: none"> <li>● Incorrect ignition timing.</li> <li>● Engine cold and choke too lean.</li> <li>● Defective spark plugs.</li> <li>● Defective coil.</li> </ul> <p><b>Faulty Low Speed Operation</b></p> <ul style="list-style-type: none"> <li>● Clogged idle transfer slots.</li> <li>● Restricted idle air bleeds and passages.</li> <li>● Clogged air cleaner.</li> <li>● Defective spark plugs.</li> <li>● Defective ignition cables.</li> <li>● Defective distributor cap.</li> </ul> <p><b>Faulty High Speed Operation</b></p> <ul style="list-style-type: none"> <li>● Incorrect ignition timing.</li> <li>● Defective distributor centrifugal advance.</li> <li>● Defective distributor vacuum advance.</li> <li>● Incorrect spark plugs or plug gap.</li> <li>● Faulty choke operation.</li> <li>● Clogged vacuum passages.</li> <li>● Improper size or clogged main jet.</li> <li>● Restricted air cleaner.</li> <li>● Defective distributor cap, rotor or coil.</li> <li>● Worn distributor shaft.</li> </ul> <p><b>Misfire at All Speeds</b></p> <ul style="list-style-type: none"> <li>● Defective spark plugs.</li> <li>● Defective spark plug wires.</li> <li>● Defective distributor cap, rotor or coil.</li> <li>● Cracked or broken vacuum hoses.</li> <li>● Vacuum leaks.</li> <li>● Fuel lines clogged.</li> </ul> <p><b>Hesitation</b></p> <ul style="list-style-type: none"> <li>● Cracked or broken vacuum hoses.</li> <li>● Vacuum leaks.</li> <li>● Binding carburetor linkage, throttle linkage, choke linkage or fast idle cam.</li> <li>● Improper float setting.</li> <li>● Cracked or broken ignition wires.</li> </ul>

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<p><b>Rough Idle, Missing or Stalling</b></p> <ul style="list-style-type: none"> <li>● Incorrect curb idle or fast idle speed.</li> <li>● Incorrect basic timing.</li> <li>● Improper idle mixture adjustment.</li> <li>● Improper feedback system operation.</li> <li>● Incorrect spark plug gap.</li> <li>● Moisture in ignition components.</li> <li>● Loose or broken ignition wires.</li> <li>● Damaged distributor cap or rotor.</li> <li>● Faulty ignition coil.</li> <li>● Fuel filter clogged or worn.</li> <li>● Damaged idle mixture screw.</li> <li>● Improper fast idle cam adjustment.</li> <li>● Improper EGR valve operation.</li> <li>● Faulty PCV valve air flow.</li> <li>● Choke binding, or improper choke setting.</li> <li>● Vacuum leak.</li> <li>● Improper float bowl fuel level.</li> <li>● Clogged air bleed or idle passages.</li> <li>● Clogged or worn air cleaner.</li> <li>● Faulty choke vacuum diaphragm.</li> <li>● Exhaust manifold heat valve inoperative.</li> <li>● Improper distributor spark advance.</li> <li>● Leaking valves or valve components.</li> <li>● Improper carburetor mounting.</li> <li>● Excessive play in distributor shaft.</li> <li>● Loose or corroded wiring connections.</li> </ul> <p><b>Engine Surges</b></p> <ul style="list-style-type: none"> <li>● Improper PCV valve air flow.</li> <li>● Vacuum leaks.</li> <li>● Clogged main jets.</li> <li>● Clogged air bleeds.</li> <li>● EGR valve malfunction.</li> <li>● Restricted air cleaner.</li> <li>● Cracked or broken vacuum hoses.</li> <li>● Cracked or broken ignition wires.</li> <li>● Vacuum advance malfunction.</li> <li>● Defective or fouled spark plugs.</li> </ul>	<p><b>Ping or Spark Knock</b></p> <ul style="list-style-type: none"> <li>● Incorrect ignition timing.</li> <li>● Distributor centrifugal or vacuum advance malfunction.</li> <li>● Carburetor setting too lean.</li> <li>● Vacuum leak.</li> <li>● EGR valve malfunction.</li> </ul> <p><b>Poor Gasoline Mileage</b></p> <ul style="list-style-type: none"> <li>● Cracked or broken vacuum hoses.</li> <li>● Vacuum leaks.</li> <li>● Defective ignition wires.</li> <li>● Incorrect choke setting.</li> <li>● Defective vacuum advance.</li> <li>● Defective spark plugs.</li> <li>● Binding carburetor power piston.</li> <li>● Dirt in carburetor jets.</li> <li>● Incorrect float adjustment.</li> <li>● Defective power valves.</li> </ul> <p><b>Power Not Up to Normal</b></p> <ul style="list-style-type: none"> <li>● Incorrect ignition timing.</li> <li>● Defective distributor cap, rotor, coil or ignition wires.</li> <li>● Incorrect spark plug gap.</li> <li>● Incorrect idle speeds.</li> <li>● Improper float level.</li> <li>● Leaking needle valve and seat.</li> <li>● Choke sticking.</li> </ul> <p><b>Engine Stalls</b></p> <ul style="list-style-type: none"> <li>● Incorrect idle speed.</li> <li>● Improper float level.</li> <li>● Leaking needle valve and seat.</li> <li>● Sticking choke.</li> <li>● Carburetor mounting gasket air leaks.</li> <li>● Vacuum leaks.</li> <li>● Defective ignition wires, distributor cap or rotor.</li> <li>● Loose condenser.</li> <li>● Shorted distributor wires.</li> <li>● Defective spark plugs.</li> <li>● Clogged fuel filter.</li> </ul>