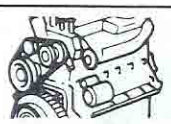

ENGINES

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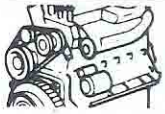

SEE I.S. NOTES

ENGINES

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GENERAL

The 2.46 liter (150 CID) four-cylinder engine and the 4.2 liter (258 CID) six-cylinder engine are in-line, lightweight, overhead valve engines.

Both engines are designed for unleaded fuel.

The cylinder heads have dual quench-type combustion chambers that create turbulence and fast burning of the air/fuel mixture, which results in good fuel economy.

The cylinders in the four-cylinder engine are numbered 1 through 4 from front to rear. The firing order is 1-3-4-2.

The crankshaft rotation is clockwise, when viewed from the front of the engine. The crankshaft rotates within five main bearings and the camshaft rotates within four line-bored bearings.

The cylinders in the six-cylinder engine are numbered 1 through 6 from front to rear. The firing order is 1-5-3-6-2-4.

The crankshaft rotation is clockwise, when viewed from the front of the engine. The crankshaft rotates within seven main bearings and the camshaft rotates within four line-bored bearings.

SEE I.S. NOTES

SPECIAL TOOLS

SEE I.S. NOTES

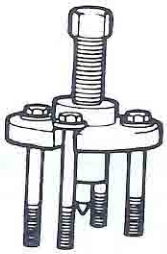
Tool Ref.	Description	Required	Recommended
J-22248	Timing Case Cover Alignment and Seal Installation Tool	■	
J-21882	Oil Pump Inlet Tube Installation Tool	■	
J-22534-01	Valve Spring Removal and Installation Tool	■	
J-22534-04		■	
J-22534-05		■	
J-9256	Timing Case Cover Oil Seal Removal Tool		■
J-22794	Air Hose Adapter		■
J-21884	Hydraulic Valve Tappet Removal and Installation Tool		■
J-8520	Dial Indicator Set		■
J-21791	Vibration Damper Removal Tool		■
J-5959-04	C-Clamp and Rod Extension		■
J-9163	Screw (used with J-22248)		■
J-5601	Piston Ring Compressor		■
J-23600	Belt Tension Gauge		■
J-23600-B	Belt Tension Gauge		■
J-29550	Belt Tension Gauge		■
J-24460-01	Cooling System Pressure Tester and Adapter		■
J-9789-C	Universal Carburetor Gauge Kit		■
J-10174-01	Main Jet Removal and Installation Tool		■
J-23738	Hand Operated Vacuum Pump		■
ET-501-82	Fuel Feedback System Tester	■	
ET-501-84	Fuel Feedback System Tester Adapter	■	
	Tach/Dwell Meter		■


J-9163


J-21882


J-9256


J-22534-5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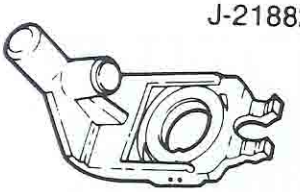
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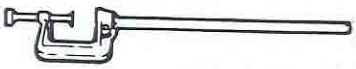
J-22534-4


J-21884


J-5601


J-22794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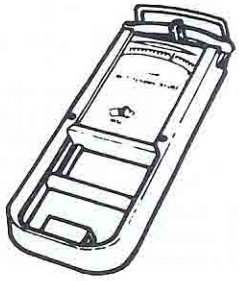
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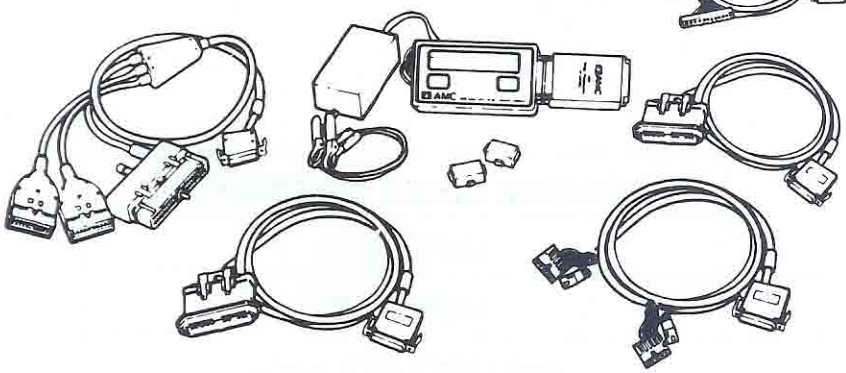
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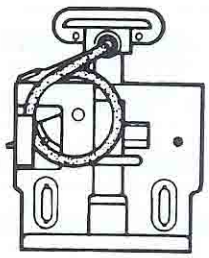
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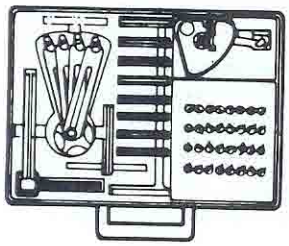
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J-23600-B


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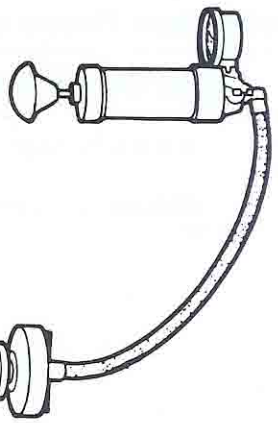

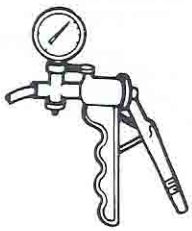
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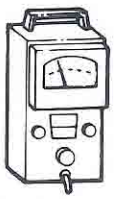
TACH/DWELL METER


J-24460-01

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SEE I.S. NOTES

EMISSION CONTROL COMPONENTS

SEE I.S. NOTES

Emission Control Components

Engine and Carb.	Series	Transmission	Pulse Air Injection	Air Control Valve (Downstream)	Pulse Air Check Valve (Upstream)	Pulse Air Check Valve (Downstream)	Air Control Valve (Upstream)	Air Switch Solenoid	Catalytic Converter	Coolant Temp. Switch (Intake Manifold Heater)	EGR Valve	EGR TVS	Canister Purge/ EGR CTO Valve Temp.	TAC Type	TAC TVS	TAC Delay Valve (R) And Check Valve	Ignition Elect. Spark Retard	Carb Vent To Canister	Electric Choke	SOLE-VAC Idle Control	Thermal Electric Switch (TES)	Oxygen Sensor	Microprocessor	Vacuum Switch Assembly	PCV System	PCV Solenoid	Control Valve	Coolant Temperature Switch	Knock Sensor
150 CID 1V	87 88	M	•	•	•	•	•	•	•	•	•	•	115° 155°F 46°/68°C	V	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
258 CID 2V	87 88	M	•	•	•	•	•	•	•	•	•	•	115° 155°F 46°/68°C	V	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
		A	•	•	•	•	•	•	•	•	•	•	115° 155°F 46°/68°C	V	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

840100(J)

V – Vacuum
F – Forward
R – Reverse

TVS – Thermal Vacuum Switch
EGR – Exhaust Gas Recirculation
CTO – Coolant Temperature Override

TAC – Thermostatically Controlled Air Cleaner
PCV – Positive Crankcase Ventilation

COMPONENT	OPERATING RANGE SPECIFICATION
Coolant Temperature Switch	135°F (57°C)
Manifold Heater Switch	160°F (71°C)
Thermal Electric Switch	50°F (10°C) 65°F (18°C)
4-inch Hg. Switch	4-inch vacuum and less
10-inch Hg. Switch	10-inch vacuum and greater
Wide Open Throttle Switch	15° from W.O.T.
Closed Throttle Switch	At closed throttle
Knock Sensor	5550 Hz.
Altitude Jumper	4000-foot elevation and above

840101

DIAGNOSIS PROCEDURES

General

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine tune-ups.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to the Service Diagnosis – Mechanical chart and the Service Diagnosis – Performance chart for possible causes and corrections of malfunctions.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts.

Information concerning additional tests and diagnosis is provided within the Diagnosis With A Scope Analyzer, Cylinder Compression Pressure Test, Cylinder Combustion Pressure Leakage Test, Cylinder Head Gasket Failure Diagnosis and Intake Manifold Leakage Diagnosis.

Service Diagnosis – Mechanical

Condition	Possible Cause	Correction
EXTERNAL OIL LEAKS	(1) Fuel pump gasket broken or improperly seated.	(1) Replace gasket.
SEE I.S. NOTES	(2) Cylinder head cover RTV sealant broken or improperly seated.	(2) Replace sealant; inspect cylinder head cover sealant flange and cylinder head sealant surface for distortion and cracks.
	(3) Oil filler cap leaking or missing.	(3) Replace cap.
	(4) Oil filter gasket broken or improperly seated.	(4) Replace oil filter.
	(5) Oil pan side gasket broken, improperly seated or opening in RTV sealant.	(5) Replace gasket or repair opening in sealant; inspect oil pan gasket flange for distortion.
	(6) Oil pan front oil seal broken or improperly seated.	(6) Replace seal; inspect timing case cover and oil pan seal flange for distortion.
	(7) Oil pan rear oil seal broken or improperly seated.	(7) Replace seal; inspect oil pan rear oil seal flange; inspect rear main bearing cap for cracks, plugged oil return channels, or distortion in seal groove.
	(8) Timing case cover oil seal broken or improperly seated.	(8) Replace seal.
	(9) Excess oil pressure because of restricted PCV valve.	(9) Replace PCV valve.
	(10) Oil pan drain plug loose or has stripped threads.	(10) Repair as necessary and tighten.
	(11) Rear oil gallery plug loose.	(11) Use appropriate sealant on gallery plug and tighten.

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Service Diagnosis – Mechanical (Continued)

Condition	Possible Cause	Correction
EXTERNAL OIL LEAKS (Continued)	(12) Rear camshaft plug loose or improperly seated.	(12) Seat camshaft plug or replace and seal, as necessary.
	(13) Distributor base gasket damaged.	(13) Replace gasket.
EXCESSIVE OIL CONSUMPTION	(1) Oil level too high.	(1) Drain oil to specified level.
	(2) Oil with wrong viscosity being used.	(2) Replace with specified oil.
	(3) PCV valve stuck closed.	(3) Replace PCV valve.
	(4) Valve stem oil deflectors (or seals) are damaged, missing, or incorrect type.	(4) Replace valve stem oil deflectors.
	(5) Valve stems or valve guides worn.	(5) Measure stem-to-guide clearance and repair as necessary.
	(6) Poorly fitted or missing valve cover baffles.	(6) Replace valve cover.
	(7) Piston rings broken or missing.	(7) Replace broken or missing rings.
	(8) Scuffed piston.	(8) Replace piston.
	(9) Incorrect piston ring gap.	(9) Measure ring gap, repair as necessary.
	(10) Piston rings sticking or excessively loose in grooves.	(10) Measure ring side clearance, repair as necessary.
	(11) Compression rings installed upside down.	(11) Repair as necessary.
	(12) Cylinder walls worn, scored, or glazed.	(12) Repair as necessary.
	(13) Piston ring gaps not properly staggered.	(13) Repair as necessary.
	(14) Excessive main or connecting rod bearing clearance.	(14) Measure bearing clearance, repair as necessary.
NO OIL PRESSURE	(1) Low oil level.	(1) Add oil to correct level.

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SEE I.S. NOTES

Service Diagnosis – Mechanical (Continued)

Condition	Possible Cause	Correction
NO OIL PRESSURE (Continued)	(2) Oil pressure gauge, warning lamp or sending unit inaccurate.	(2) Refer to Oil Pressure Gauge or Warning Lamp.
	(3) Oil pump malfunction.	(3) Refer to Oil Pump.
	(4) Oil pressure relief valve sticking.	(4) Remove and inspect oil pressure relief valve assembly.
	(5) Oil passages on pressure side of pump obstructed.	(5) Inspect oil passages for obstructions.
	(6) Oil pickup screen or tube obstructed.	(6) Inspect oil pickup for obstructions.
	(7) Loose oil inlet tube.	(7) Tighten or seal inlet tube.
LOW OIL PRESSURE	(1) Low oil level.	(1) Add oil to correct level.
	(2) Inaccurate gauge, warning lamp or sending unit.	(2) Refer to Oil Pressure Gauge or Warning Lamp.
	(3) Oil excessively thin because of dilution, poor quality, or improper grade.	(3) Drain and refill crankcase with recommended oil.
	(4) Excessive oil temperature.	(4) Correct cause of overheating engine.
	(5) Oil pressure relief spring weak or sticking.	(5) Remove and inspect oil pressure relief valve assembly.
	(6) Oil inlet tube and screen assembly has restriction or air leak.	(6) Remove and inspect oil inlet tube and screen assembly. (Fill inlet tube with lacquer thinner to locate leaks.)
	(7) Excessive oil pump clearance.	(7) Measure clearances; refer to Oil Pump.
	(8) Excessive main, rod, or camshaft bearing clearance.	(8) Measure bearing clearances, repair as necessary.
HIGH OIL PRESSURE	(1) Improper oil viscosity.	(1) Drain and refill crankcase with correct viscosity oil.
	(2) Oil pressure gauge or sending unit inaccurate.	(2) Refer to Oil Pressure Gauge.

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Service Diagnosis – Mechanical (Continued)

Condition	Possible Cause	Correction
HIGH OIL PRESSURE (Continued)	(3) Oil pressure relief valve sticking closed.	(3) Remove and inspect oil pressure relief valve assembly.
MAIN BEARING NOISE	(1) Insufficient oil supply.	(1) Inspect for low oil level and low oil pressure.
	(2) Main bearing clearance excessive.	(2) Measure main bearing clearance, repair as necessary.
	(3) Bearing insert missing.	(3) Replace missing insert.
	(4) Crankshaft end play excessive.	(4) Measure end play, repair as necessary.
	(5) Improperly tightened main bearing cap bolts.	(5) Tighten bolts with specified torque.
	(6) Loose flywheel or drive plate.	(6) Tighten flywheel or drive plate attaching bolts.
	(7) Loose or damaged vibration damper.	(7) Repair as necessary.
CONNECTING ROD BEARING NOISE	(1) Insufficient oil supply.	(1) Inspect for low oil level and low oil pressure.
	(2) Carbon build-up on piston.	(2) Remove carbon from piston crown.
	(3) Bearing clearance excessive or bearing missing.	(3) Measure clearance, repair as necessary.
	(4) Crankshaft connecting rod journal out-of-round.	(4) Measure journal dimensions, repair or replace as necessary.
	(5) Misaligned connecting rod or cap.	(5) Repair as necessary.
	(6) Connecting rod bolts tightened improperly.	(6) Tighten bolts with specified torque.
PISTON NOISE	(1) Piston-to-cylinder wall clearance excessive (scuffed piston).	(1) Measure clearance and examine piston.
	(2) Cylinder walls excessively tapered or out-of-round.	(2) Measure cylinder wall dimensions, rebore cylinder.

SEE I.S. NOTES

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Service Diagnosis – Mechanical (Continued)

SEE I.S. NOTES

Condition	Possible Cause	Correction
PISTON NOISE (Continued)	(3) Piston ring broken.	(3) Replace all rings on piston.
	(4) Loose or seized piston pin.	(4) Measure piston-to-pin clearance, repair as necessary.
	(5) Connecting rods misaligned.	(5) Measure rod alignment, straighten or replace.
	(6) Piston ring side clearance excessively loose or tight.	(6) Measure ring side clearance, repair as necessary.
	(7) Carbon build-up on piston is excessive.	(7) Remove carbon from piston.
VALVE ACTUATING COMPONENT NOISE	(1) Insufficient oil supply.	(1) Check for: (a) Low oil level. (b) Low oil pressure. (c) Plugged push rods. (d) Wrong hydraulic tappets. (e) Restricted oil gallery. (f) Excessive tappet to bore clearance.
	(2) Push rods worn or bent.	(2) Replace worn or bent push rods.
	(3) Rocker arms or pivots worn.	(3) Replace worn rocker arms or pivots.
	(4) Foreign objects or chips in hydraulic tappets.	(4) Clean tappets.
	(5) Excessive tappet leak-down.	(5) Replace valve tappet.
	(6) Tappet face worn.	(6) Replace tappet; inspect corresponding cam lobe for wear.
	(7) Broken or cocked valve springs.	(7) Properly seat cocked springs; replace broken springs.
	(8) Stem-to-guide clearance excessive.	(8) Measure stem-to-guide clearance, repair as required.
	(9) Valve bent.	(9) Replace valve.
	(10) Loose rocker arms.	(10) Tighten bolts with specified torque.
	(11) Valve seat runout excessive.	(11) Regrind valve seat/valves.

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Service Diagnosis—Mechanical (Continued)

Condition	Possible Cause	Correction
VALVE ACTUATING COMPONENT NOISE (Continued)	(12) Missing valve lock.	(12) Install valve lock.
	(13) Push rod rubbing or contacting cylinder head.	(13) Remove cylinder head and remove obstruction in head.
	(14) Excessive engine oil (four-cylinder engine).	(14) Correct oil level.

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SE I.S NOTES

SEE I.S. NOTES

Service Diagnosis – Performance

Condition	Possible Cause	Correction
HARD STARTING (ENGINE CRANKS NORMALLY)	(1) Binding linkage, choke valve or choke piston.	(1) Repair as necessary.
	(2) Restricted choke vacuum diaphragm.	(2) Clean passages.
	(3) Improper fuel level.	(3) Adjust float level.
	(4) Dirty, worn or faulty needle valve and seat.	(4) Repair as necessary.
	(5) Float sticking.	(5) Repair as necessary.
	(6) Faulty fuel pump.	(6) Replace fuel pump.
	(7) Incorrect choke cover adjustment.	(7) Adjust choke cover.
	(8) Inadequate choke unloader adjustment.	(8) Adjust choke unloader.
	(9) Faulty ignition coil.	(9) Test and replace as necessary.
	(10) Improper spark plug gap.	(10) Adjust gap.
	(11) Incorrect ignition timing.	(11) Adjust timing.
	(12) Incorrect valve timing.	(12) Check valve timing; repair as necessary.
ROUGH IDLE OR STALLING	(1) Incorrect curb or fast idle speed.	(1) Adjust curb or fast idle speed.
	(2) Incorrect ignition timing.	(2) Adjust timing to specification.
	(3) Improper feedback system operation.	(3) Refer to Feedback System Diagnosis.
	(4) Improper fast idle cam adjustment.	(4) Adjust fast idle cam.
	(5) Faulty EGR valve operation.	(5) Test EGR system and replace as necessary.
	(6) Faulty PCV valve air flow.	(6) Test PCV valve and replace as necessary.

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Service Diagnosis – Performance (Continued)

Condition	Possible Cause	Correction
ROUGH IDLE OR STALLING (Continued)	(7) Choke binding.	(7) Locate and eliminate binding condition.
	(8) Faulty TAC vacuum motor or valve.	(8) Repair as necessary.
	(9) Air leak into manifold vacuum.	(9) Inspect manifold vacuum connections and repair as necessary.
	(10) Improper fuel level.	(10) Adjust fuel level.
	(11) Faulty distributor rotor or cap.	(11) Replace rotor or cap.
	(12) Improperly seated valves.	(12) Test cylinder compression, repair as necessary.
	(13) Incorrect ignition wiring.	(13) Inspect wiring and correct as necessary.
	(14) Faulty ignition coil.	(14) Test coil and replace as necessary.
	(15) Restricted air vent or idle passages.	(15) Clean passages.
	(16) Restricted air cleaner.	(16) Clean or replace air cleaner filler element.
	(17) Faulty choke vacuum diaphragm.	(17) Repair as necessary.
FAULTY LOW-SPEED OPERATION	(1) Restricted idle transfer slots.	(1) Clean transfer slots.
	(2) Restricted idle air vents and passages.	(2) Clean air vents and passages.
	(3) Restricted air cleaner.	(3) Clean or replace air cleaner filter element.
	(4) Improper fuel level.	(4) Adjust fuel level.
	(5) Faulty spark plugs.	(5) Clean or replace spark plugs.
	(6) Dirty, corroded, or loose ignition secondary circuit wire connections.	(6) Clean or tighten secondary circuit wire connections.
	(7) Improper feedback system operation.	(7) Refer to Feedback System Diagnosis.
	(8) Faulty ignition coil high voltage wire.	(8) Replace ignition coil high voltage wire.
	(9) Faulty distributor cap.	(9) Replace cap.
FAULTY ACCELERATION	(1) Improper accelerator pump stroke.	(1) Adjust accelerator pump stroke.
	(2) Incorrect ignition timing.	(2) Adjust timing.
	(3) Inoperative pump discharge check ball or needle.	(3) Clean or replace as necessary.

SEE I.S. NOTES

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Service Diagnosis – Performance (Continued)

Condition	Possible Cause	Correction
FAULTY ACCELERATION (Continued)	(4) Worn or damaged pump diaphragm or piston.	(4) Replace diaphragm or piston.
	(5) Leaking carburetor main body cover gasket.	(5) Replace gasket.
	(6) Engine cold and choke set too lean.	(6) Adjust choke cover.
	(7) Improper metering rod adjustment (BBD Model carburetor).	(7) Adjust metering rod.
	(8) Faulty spark plug(s).	(8) Clean or replace spark plug(s).
	(9) Improperly seated valves.	(9) Test cylinder compression, repair as necessary.
	(10) Faulty ignition coil.	(10) Test coil and replace as necessary.
	(11) Improper feedback system operation.	(11) Refer to Feedback System Diagnosis.
FAULTY HIGH SPEED OPERATION	(1) Incorrect ignition timing.	(1) Adjust timing.
	(2) Faulty distributor centrifugal advance mechanism.	(2) Check centrifugal advance mechanism and repair as necessary.
	(3) Faulty distributor vacuum advance mechanism.	(3) Check vacuum advance mechanism and repair as necessary.
	(4) Low fuel pump volume.	(4) Replace fuel pump.
	(5) Wrong spark plug air gap or wrong plug.	(5) Adjust air gap or install correct plug.
	(6) Faulty choke operation.	(6) Adjust choke cover.
	(7) Partially restricted exhaust manifold, exhaust pipe, catalytic converter, muffler, or tailpipe.	(7) Eliminate restriction.
	(8) Restricted vacuum passages.	(8) Clean passages.
	(9) Improper size or restricted main jet.	(9) Clean or replace as necessary.
	(10) Restricted air cleaner.	(10) Clean or replace filter element as necessary.
	(11) Faulty distributor rotor or cap.	(11) Replace rotor or cap.
	(12) Faulty ignition coil.	(12) Test coil and replace as necessary.
	(13) Improperly seated valve(s).	(13) Test cylinder compression, repair as necessary.
	(14) Faulty valve spring(s).	(14) Inspect and test valve spring tension, replace as necessary.
	(15) Incorrect valve timing.	(15) Check valve timing and repair as necessary.

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Service Diagnosis – Performance (Continued)

Condition	Possible Cause	Correction
FAULTY HIGH SPEED OPERATION (Continued)	(16) Intake manifold restricted.	(16) Remove restriction or replace manifold.
	(17) Worn distributor shaft.	(17) Replace shaft.
	(18) Improper feedback system operation.	(18) Refer to Feedback System Diagnosis.
MISFIRE AT ALL SPEEDS	(1) Faulty spark plug(s).	(1) Clean or replace spark plug(s).
	(2) Faulty spark plug wire(s).	(2) Replace as necessary.
	(3) Faulty distributor cap or rotor.	(3) Replace cap or rotor.
	(4) Faulty ignition coil.	(4) Test coil and replace as necessary.
	(5) Primary ignition circuit shorted or open intermittently.	(5) Troubleshoot primary circuit and repair as necessary.
	(6) Improperly seated valve(s).	(6) Test cylinder compression, repair as necessary.
	(7) Faulty hydraulic tappet(s).	(7) Clean or replace tappet(s).
	(8) Improper feedback system operation.	(8) Refer to Feedback System Diagnosis.
	(9) Faulty valve spring(s).	(9) Inspect and test valve spring tension, repair as necessary.
	(10) Worn camshaft lobes.	(10) Replace camshaft.
	(11) Air leak into manifold.	(11) Check manifold vacuum and repair as necessary.
	(12) Improper carburetor adjustment.	(12) Adjust carburetor.
	(13) Fuel pump volume or pressure low.	(13) Replace fuel pump.
	(14) Blown cylinder head gasket.	(14) Replace gasket.
	(15) Intake or exhaust manifold passage(s) restricted.	(15) Pass chain through passage(s) and repair as necessary.
	(16) Incorrect trigger wheel installed in distributor.	(16) Install correct trigger wheel.
POWER NOT UP TO NORMAL	(1) Incorrect ignition timing.	(1) Adjust timing.
	(2) Faulty distributor rotor.	(2) Replace rotor.
	(3) Trigger wheel loose on shaft.	(3) Reposition or replace trigger wheel.
	(4) Incorrect spark plug gap.	(4) Adjust gap.
	(5) Faulty fuel pump.	(5) Replace fuel pump.

SEE I.S. NOTES

Service Diagnosis – Performance (Continued)

SEE I.S. NOTES

Condition	Possible Cause	Correction
POWER NOT UP TO NORMAL (Continued)	(6) Incorrect valve timing.	(6) Check valve timing and repair as necessary.
	(7) Faulty ignition coil.	(7) Test coil and replace as necessary.
	(8) Faulty ignition wires.	(8) Test wires and replace as necessary.
	(9) Improperly seated valves.	(9) Test cylinder compression and repair as necessary.
	(10) Blown cylinder head gasket.	(10) Replace gasket.
	(11) Leaking piston rings.	(11) Test compression and repair as necessary.
	(12) Worn distributor shaft.	(12) Replace shaft.
	(13) Improper feedback system operation.	(13) Refer to Feedback System Diagnosis.
INTAKE BACKFIRE	(1) Improper ignition timing.	(1) Adjust timing.
	(2) Faulty accelerator pump discharge.	(2) Repair as necessary.
	(3) Defective EGR CTO valve.	(3) Replace EGR CTO valve..
	(4) Defective TAC vacuum motor or valve.	(4) Repair as necessary.
	(5) Lean air/fuel mixture.	(5) Check float level or manifold vacuum for air leak. Remove sediment from bowl.
EXHAUST BACKFIRE	(1) Air leak into manifold vacuum.	(1) Check manifold vacuum and repair as necessary.
	(2) Faulty air injection diverter valve.	(2) Test diverter valve and replace as necessary.
	(3) Exhaust leak.	(3) Locate and eliminate leak.
PING OR SPARK KNOCK	(1) Incorrect ignition timing.	(1) Adjust timing.
	(2) Distributor centrifugal or vacuum advance malfunction.	(2) Inspect advance mechanism and repair as necessary.
	(3) Excessive combustion chamber deposits.	(3) Remove with combustion chamber cleaner.
	(4) Air leak into manifold vacuum.	(4) Check manifold vacuum and repair as necessary.
	(5) Excessively high compression.	(5) Test compression and repair as necessary.
	(6) Fuel octane rating excessively low.	(6) Try alternate fuel source.

80652E

Service Diagnosis—Performance (Continued)

Condition	Possible Cause	Correction
PING OR SPARK KNOCK (Continued)	(7) Sharp edges in combustion chamber.	(7) Grind smooth.
	(8) EGR Valve not functioning properly.	(8) Test EGR System and replace as necessary.
SURGING (AT CRUISING TO TOP SPEEDS)	(1) Low carburetor fuel level.	(1) Adjust fuel level.
	(2) Low fuel pump pressure or volume.	(2) Replace fuel pump.
	(3) Metering rod(s) not adjusted properly (BBD Model Carburetor).	(3) Adjust metering rod.
	(4) Improper PCV valve air flow.	(4) Test PCV valve and replace as necessary.
	(5) Air leak into manifold vacuum.	(5) Check manifold vacuum and repair as necessary.
	(6) Incorrect spark advance.	(6) Test and replace as necessary.
	(7) Restricted main jet(s).	(7) Clean main jet(s).
	(8) Undersize main jet(s).	(8) Replace main jet(s).
	(9) Restricted air vents.	(9) Clean air vents.
	(10) Restricted fuel filter.	(10) Replace fuel filter.
	(11) Restricted air cleaner.	(11) Clean or replace air cleaner filter element.
	(12) EGR valve not functioning properly.	(12) Test EGR System and replace as necessary.
	(13) Improper feedback system operation.	(13) Refer to Feedback System Diagnosis.

80652F

SEI I.S NOTES

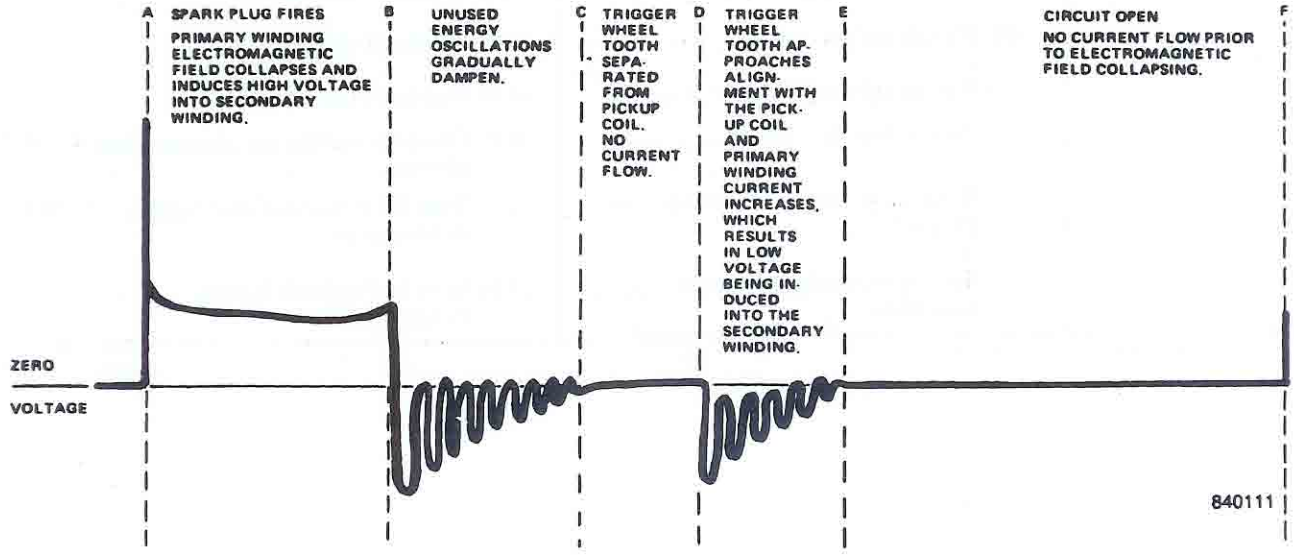
DIAGNOSIS WITH A SCOPE ANALYZER

EE S. NOTES

A scope analyzer is an ignition system tester that provides a means for quick and accurate diagnosis of ignition system performance problems. All phases of the ignition cycle are displayed graphically on an oscilloscope (cathode ray tube) as they occur during engine operation.

The manufacturers of scope analyzer equipment provide descriptions of the test procedures that are possible with their equipment. This manual is not intended to describe all the possible uses of scope analyzer equipment, but to illustrate a typical display of the Solid State Ignition (SSI) system.

SSI SYSTEM



CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

NOTE: Ensure the battery is completely charged and the starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

Clean the spark plug recesses with compressed air.

Remove the spark plugs.

Secure the throttle in the wide-open position.

Insert a compression pressure gauge and rotate the engine with the starter motor for three revolutions.

Record the compression pressure on the third revolution. Continue the test for the remaining cylinders.

Refer to the Specifications chart for the correct engine compression pressures.

CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will ascertain exhaust and intake valve leaks (improper seating), leaks between adjacent cylinders or into the water jacket, or any causes for combustion/compression pressure loss.

WARNING: Do not remove the radiator cap with the system hot and under pressure because serious burns from coolant can occur.

Check the coolant level and fill as required. Do not install the radiator cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

Position the carburetor fast idle speed adjustment screw on the top step of the fast idle cam.

Calibrate the tester according to the manufacturer's instructions.

NOTE: The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1 379 kPa (200 psi) maximum, and 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions.

NOTE: While testing, listen for pressurized air escaping through the carburetor, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with no more than 25 percent leakage. For example, at 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

SEE I.S. NOTES

Refer to the Cylinder Combustion Pressure Leakage Test Diagnosis.

CYLINDER HEAD GASKET FAILURE DIAGNOSIS

A leaking cylinder head gasket usually results in a loss of power, loss of coolant and engine misfire.

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

A cylinder head gasket leaking between two adjacent cylinders is indicated by a loss of power and/or engine misfire.

A cylinder head gasket leaking between a cylinder and an adjacent water jacket is indicated by coolant foaming or overheating and loss of coolant.

Cylinder-to-Cylinder Leakage Test

To determine if a cylinder head gasket is leaking between any two adjacent cylinders, follow the procedures outlined in Cylinder Compression Pressure Test.

A cylinder head gasket leaking between two adjacent cylinders will result in approximately a 50 to 70 percent reduction in compression pressure (in comparison to the other cylinders) in the two affected cylinders.

Cylinder-to-Water Jacket Leakage Test

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or the fan. Do not wear loose clothing.

Remove the radiator cap. Start the engine and allow it to warm up until the thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

If bubbles are not visible, install a radiator pressure tester and pressurize the coolant system.

If a cylinder is leaking combustion pressure into the water jacket, the tester pointer will pulsate with every combustion stroke of the cylinder.

INTAKE MANIFOLD LEAKAGE DIAGNOSIS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

Exterior Leak

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or the fan. Do not wear loose clothing.

Start the engine.

Apply engine oil to the exposed gasket area (edge) between the manifold and the cylinder head.

If oil is forced into the manifold and if smoke is visible from the exhaust tailpipe, the manifold has an air leak.

Open the acetylene valve of an oxyacetylene torch. Do not ignite.

Pass the torch tip over the exposed gasket area (edge) between the manifold and the cylinder head.

If the engine speed increases, the manifold has an air leak.

SEE I.S. NOTES

Cylinder Combustion Pressure Leakage Test Diagnosis

Condition	Possible Cause	Correction
AIR ESCAPES THROUGH CARBURETOR	(1) Intake valve not seated properly.	(1) Refer to Valve Reconditioning – MOT. 2.46L or MOT. 4.2L.
AIR ESCAPES THROUGH TAILPIPE	(1) Exhaust valve not seated properly.	(1) Refer to Valve Reconditioning – MOT. 2.46L or MOT. 4.2L.
AIR ESCAPES THROUGH RADIATOR	(1) Head gasket leaks or crack in cylinder block.	(1) Remove cylinder head and inspect.
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	(1) Head gasket leaks or crack in cylinder block or head between adjacent cylinders.	(1) Remove cylinder head and inspect.
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	(1) Stuck or broken piston ring(s); cracked piston; worn rings and/or cylinder wall.	(1) Inspect for broken ring(s) or piston. Measure ring gap and cylinder diameter, taper, and out-of-round.

840112

GENERAL

An engine tune-up is recommended every 48 000 km (30,000 mi).

A tune-up ensures the engine is operating as efficiently and economically as it was designed to operate. Also, it ensures that undesirable exhaust and fuel system emission to the atmosphere are within the limits defined by regulations.

For convenience, when performing a tune-up, the necessary services are grouped together by either major assembly or system.

ENGINE

Drive Belts

Inspect the belts for defects such as fraying and cracks.

Test the belt tension. Belt tension testing, adjustment, arrangements and tension specifications are listed in the Cooling Systems section.

Vacuum Hoses and Fittings

Inspect the vacuum hose fittings for looseness and corrosion. Inspect the hoses for brittleness and cracks.

Thoroughly inspect the hose ends that are slipped onto nipples.

Engine performance may be adversely affected by air leaks into such unlikely places as the heater and air conditioner control vacuum hoses or the power brake booster vacuum hose.

IGNITION SYSTEM

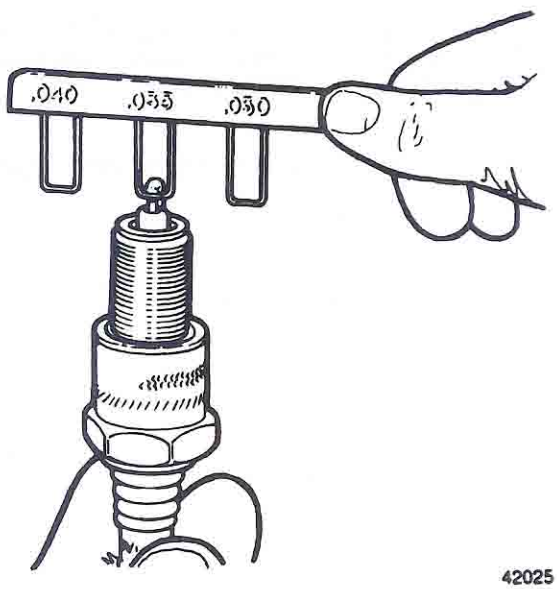
Spark Plugs

Remove and examine the spark plugs for burned electrodes and fouled, cracked or broken porcelain insulators.

Retain the plugs arranged in the order in which they were removed from the engine. A specific plug displaying an abnormal condition indicates that a problem exists in the cylinder from which it was removed.

Replace the plugs at the interval recommended in the Engine Maintenance Schedule. Plugs with less engine mileage may be cleaned and reused in some circumstances. Refer to Spark Plug Condition.

After cleaning, file the center electrode tip flat with a point file. Adjust the gap (separation) between the electrodes to the specified dimension.



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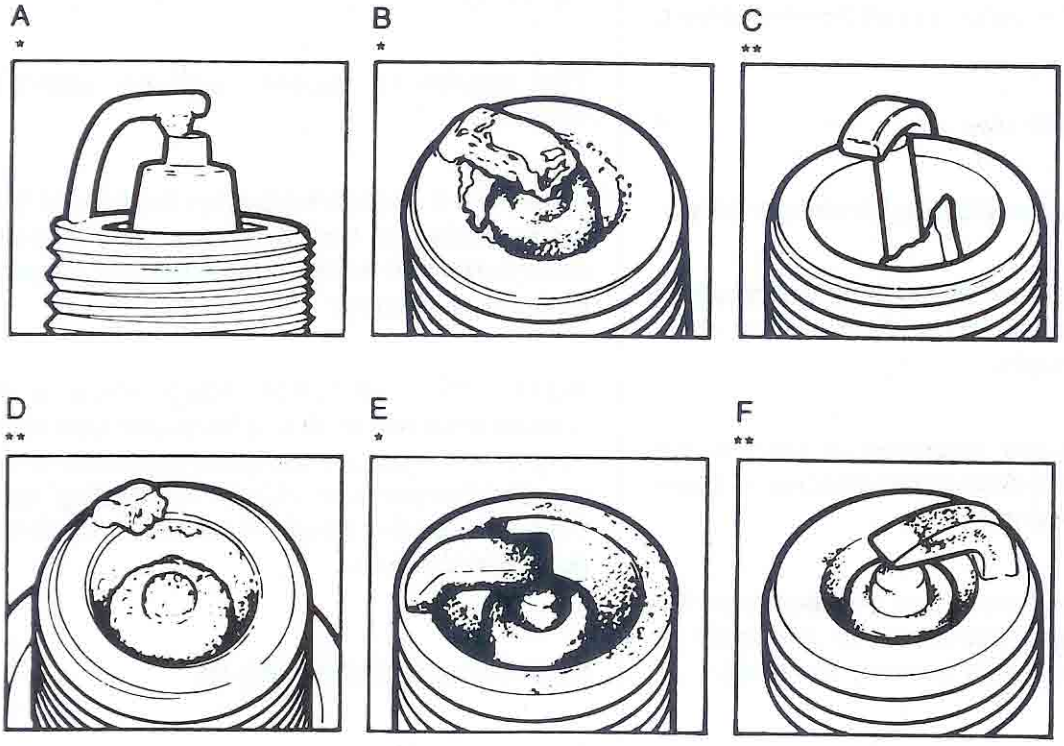
Always use a torque wrench when installing the spark plugs. Distortion from overtightening will change the plug electrode gap. For all engines, tighten the plugs with 9.5 - 20 N·m (7 - 15 ft-lbs) torque.

Spark Plug Condition

Compare the spark plug condition with the illustrated examples and the following descriptions.

SEE I.S. NOTES



*LOW MILEAGE PLUGS WITH THIS CONDITION MAY BE CLEANED
**PLUGS WITH THIS CONDITION MUST BE REPLACED

60770

Electrode Gap Bridging (A)

Electrode gap bridging can result from loose deposits in the combustion chamber.

SEE I.S. NOTES

Fluffy deposits may accumulate on the plug electrodes during stop-and-go driving.

When the engine is suddenly operated with a high torque load, this material can liquefy and bridge the gap (i.e., short circuit the electrodes).

Scavenger Deposits (B)

Fuel scavenger deposits may be white or yellow.

They may appear to be harmful, but this is a normal appearance caused by chemical additives in certain fuels.

Such additives are designed to change the chemical nature of deposits and decrease spark plug misfire tendencies.

Notice that the accumulation of deposits on the ground (side) electrode and shell area may be heavy, but the material is easily removed.

Spark plugs with this type of deposit can be considered normal in condition and can be cleaned using standard procedures.

Chipped Electrode Insulator (C)

A chipped electrode insulator usually results from bending the center electrode while adjusting the spark plug electrode gap.

Under certain conditions, severe detonation can also separate the insulator from the center electrode.

Preignition Damage (D)

Preignition damage is caused by excessive engine temperature. First the center electrode liquefies, and somewhat later, the ground (side) electrode.

The insulators appear relatively clean of deposits.

Determine if the spark plug has the correct heat range rating, if the ignition timing is over-advanced or if other conditions are causing engine overheating.

NOTE: The heat range rating refers to the operating temperature of a particular type spark plug. Spark plugs are designed to operate within specific temperature ranges depending upon the thickness and length of the center electrode porcelain insulator.

Cold Fouling/Carbon Fouling (E)

The deposits that cause cold fouling are basically carbon.

A dry, black appearance of one or two plugs in a set may be caused by sticking valves or faulty spark plug wires.

Cold (carbon) fouling of the entire set may be caused by a clogged air cleaner or a faulty carburetor choke.

Spark Plug Overheating (F)

Overheating is indicated by a white or gray electrode insulator that also appears blistered.

The increase in electrode gap will be considerably in excess of 0.025 mm per 1 609 km (0.001 in. per 1000 mi) of engine operation. This suggests that a spark plug with a cooler heat range rating should be used.

Overadvanced ignition timing, detonation and cooling system malfunctions can also cause spark plug overheating.

NOTE: Fuel refiners in several parts of the United States have introduced a manganese compound additive (MMT) for unleaded fuel. During combustion, fuel with MMT causes the entire tip of the spark plug to be coated with a rust-colored deposit. This rust color may be misdiagnosed as being caused by coolant in the combustion chamber. Spark plug performance is not affected by MMT deposits.

Spark Plug and Ignition Coil Wires

To remove the wires from the spark plugs, twist the rubber protector boot approximately 1/2 turn to break the seal.

Grasp the boot and pull it away from the plug with a constant force.

Do not pull on the wire itself because this will damage the conductor and terminal connection.

To remove the wires from the distributor cap or ignition coil tower, loosen the boot first, then grasp the upper part of the boot and the wire and gently pull straight up.

Wire Test

Do not puncture the spark plug wires with a probe while performing any test. This may cause a separation in the conductor.

The preferred method is to remove the suspected wire and use an ohmmeter to determine if the resistance is correct for the length of the particular wire.

Refer to the Spark Plug and Coil Wire Resistance Values chart.

SEE I.S. NOTES

Spark Plug and Coil Wire Resistance Values

Cm (Inches)	Ohms
0-38 (0-15)	3,000-10,000
38-63 (15-25)	4,000-15,000
63-90 (25-35)	6,000-20,000
over 90 (Over 35)	8,000-25,000

840113

When installing the spark plug wires and the ignition coil high voltage wire, ensure that mechanically tight connections are made at the spark plugs, distributor cap towers and ignition coil tower.

The wire protector boots at the spark plugs, distributor cap towers and coil tower must also fit tightly.

A partially seated wire terminal creates an air separation (resistance) in the high voltage circuit and the resulting arcing will cause terminal corrosion and wire conductor damage.

When replacing spark plug wires, route the wires correctly and secure them within the proper retainers.

Failure to route the wires properly can result in radio ignition noise and cross ignition of the plugs, or short circuit the wires to ground.

SEE I.S. NOTES

Ignition Coil

Always test a suspected malfunctioning ignition coil while installed in the automobile. Because a coil may break down only after it has reached normal operating temperature, it is important that the coil be at normal operating temperature, when tested.

If using an ignition coil tester (not an ohmmeter), perform the tests according to the instructions provided by the manufacturer of the equipment.

Refer to the Ignition Systems section within Chapter C for additional information.

Distributor

The distributor is the Solid State Ignition (SSI) type.

Other than cap and rotor inspection, there is no scheduled maintenance for the distributor.

Refer to the Ignition Systems section within Chapter C for distributor service procedures.

Distributor Rotor Inspection

Visually inspect the rotor for cracks (1), evidence of corrosion (2) and the effects of arcing on the metal tip, and evidence of mechanical interference with the cap (3).

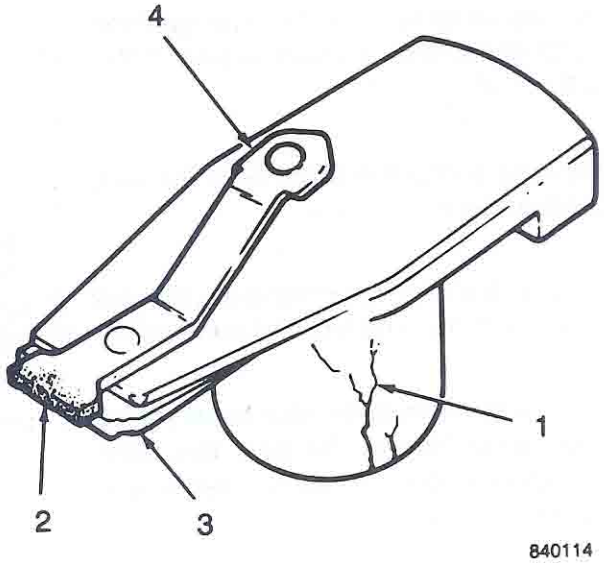
A small quantity of silicone dielectric compound is applied to the rotor tips during manufacture to reduce radio ignition noise and interference.

After a few thousand miles of engine operation, this compound becomes charred. This is normal. Do not scrape the residue from the rotor tip.

Inspect the spring (4) for insufficient tension.

Replace a rotor displaying any adverse condition.

Coat the tip of the replacement rotor with AMC/Jeep Silicone Dielectric Compound, or equivalent.



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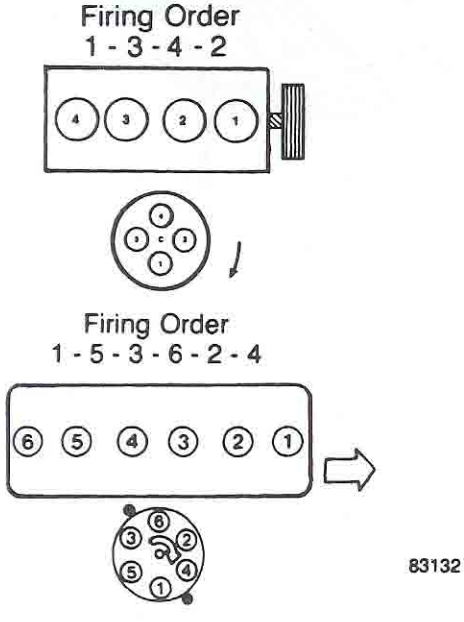
Distributor Cap Inspection

Remove the distributor cap and clean it with a clean, dry cloth. Visually inspect for cracks (1), carbon paths (2), broken towers (3), charred or eroded terminals (4) and a damaged rotor button (5). Replace any cap that has any of these discrepancies.

When replacing a cap, transfer one ignition wire at a time to the replacement cap. If necessary, refer to the Distributor Wiring Diagram.

Ensure each wire is installed in the tower corresponding to the tower from which it was removed. Insert the wire terminals firmly into the towers.



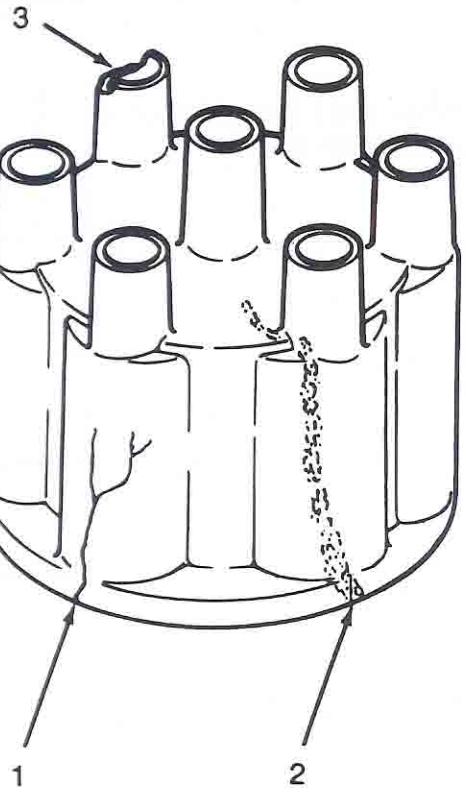
Replace the cap if the terminal ends inside the cap are excessively eroded (4).

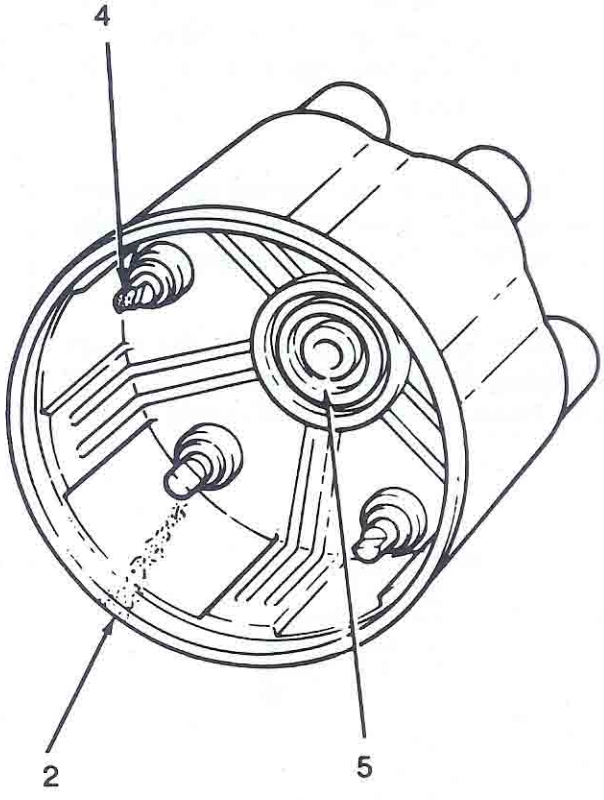
The vertical face of the terminal end will have some evidence of erosion from normal operation.

Examine the terminal ends for evidence of mechanical interference with the rotor tip.

SEE I.S. NOTES

SEE I.S. NOTES



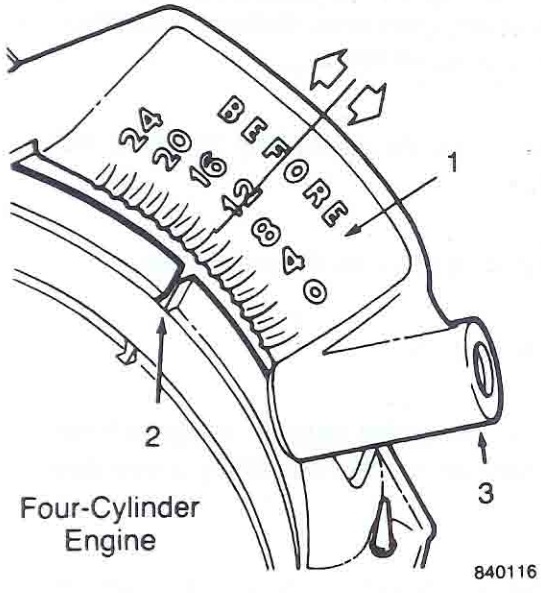


840115

Ignition System Timing

With both four- and six-cylinder engines, a graduated timing degree scale (1) located on the timing case cover is used for reference when timing the ignition system.

A milled index notch (2) in the vibration damper is used to align the No. 1 cylinder ignition position of the crankshaft with the correct timing degree mark on the graduated scale.



Four-Cylinder Engine

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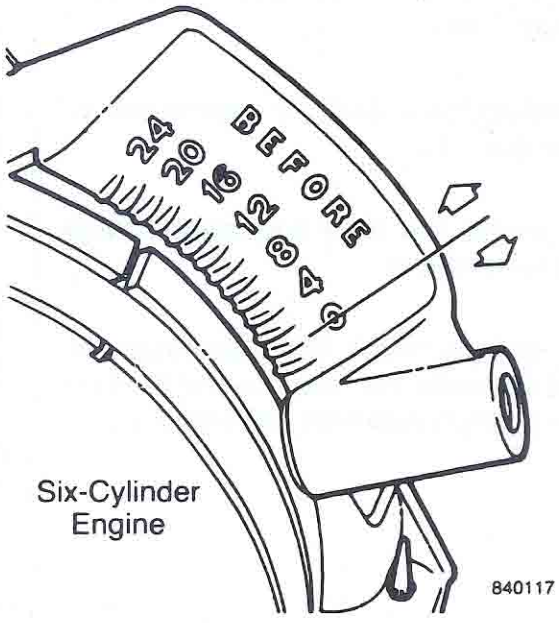

Six-Cylinder Engine

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Magnetic Timing Probe

With both four- and six-cylinder engines, a magnetic timing probe socket (3) is provided integral with the timing degree scale for use with a special magnetic timing probe.

This special probe detects the milled notch on the vibration damper. The probe is inserted through the probe socket until it contacts the vibration damper.

Ignition timing can then be obtained from a meter or computer printout, depending on the type of equipment being used.

The probe socket is located at 9.5° ATDC, and the equipment is calibrated to compensate for this location.

Do not use the timing probe socket as a reference to check the ignition timing when using a conventional timing light.

SEE I.S. NOTES

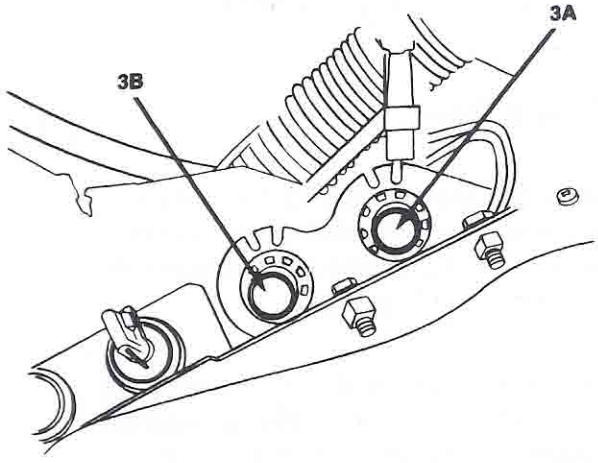
Ignition Timing Procedure – 2.46 Liter (150 CID) Four-Cylinder Engine

SEE I.S. NOTES

Set the parking brake. Shift the transmission to the neutral position.

Start the engine and allow it to attain normal operating temperature.

With the ignition switch Off, disconnect the three-wire connector from the four- and ten-inch Hg vacuum switch assembly (3A and 3B).



85054

Disconnect and plug the vacuum hose connected to the distributor vacuum advance mechanism.

Connect a timing light between the number one spark plug and wire. Connect the timing light power wire connectors according to the manufacturer's instructions.

Connect a calibrated, expanded scale tachometer to the coil negative (TACH) terminal.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

Start the engine and slowly increase the speed to the specified rpm (1600 rpm) while observing the timing mark and index with the timing light.

The ignition timing should advance smoothly as the engine speed increases. Refer to the ignition advance curve illustrations.

Adjust the timing as necessary to attain 12° BTDC.

Tighten the distributor hold-down clamp.

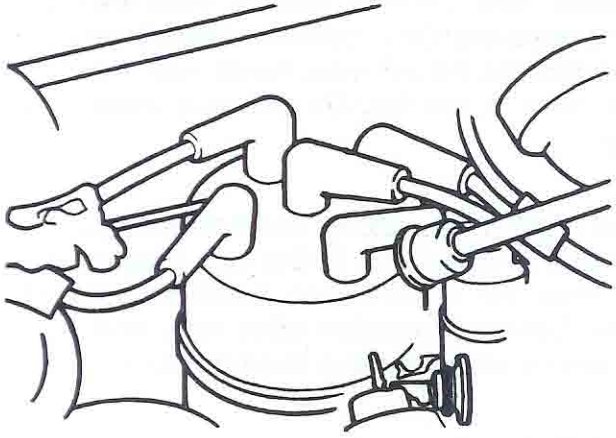
Turn off the engine.

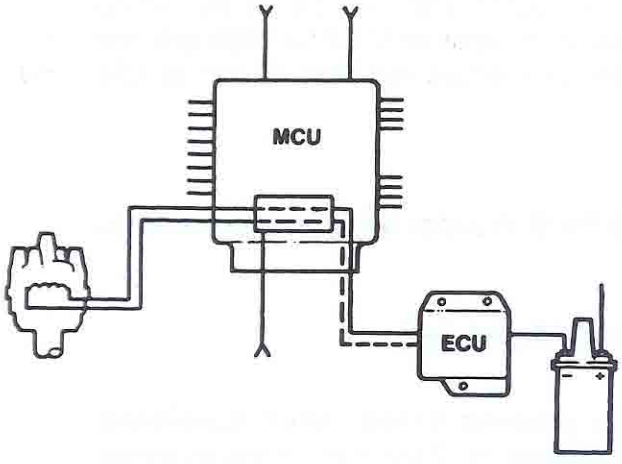
Connect the distributor vacuum advance hose and the vacuum switch assembly three-wire connector.

Remove the timing light and connect the number one cylinder spark plug wire.

Remove the tachometer.

NOTE: A defective FFB system micro computer unit (MCU) or ignition system electronic control unit (ECU) can alter the ignition timing. Ensure that they are operating normally before attempting any adjustments to the ignition timing.





85060

Ignition Timing Procedure – 4.2 Liter (258 CID) Six-Cylinder Engine

The ignition timing can be adjusted according to the following primary timing procedure.

Set the parking brake. Shift automatic transmissions to PARK and manual transmissions to the neutral position.

Start the engine and allow it to attain normal operating temperature. Ensure that the A/C is turned Off, if equipped.

With the ignition switch Off, connect an ignition timing light and a calibrated, expanded scale tachometer.

NOTE: If the timing light has an adjustable advance control feature, turn the control to the OFF position.

Disconnect the four- and ten-inch Hg (CEC System) vacuum switch assembly wire connector (located at the top of the cylinder head cover).

Disconnect and plug the distributor vacuum advance hose.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or the fan. Do not wear loose clothing.

Start the engine.

Increase the engine speed to 1600 rpm and check the ignition timing. If necessary, adjust the timing to the specification listed on the Emission Control Information label. Also, refer to the ignition advance curve illustrations.

Tighten the distributor hold-down clamp and verify that the ignition timing is correct.

Turn the engine Off and remove the timing light and tachometer.

Connect the number one spark plug wire, if disconnected. Connect the hose to the distributor vacuum advance mechanism. Connect the wire connector to the vacuum switch assembly.

SEE I.S. NOTES

The ignition timing can also be adjusted according to the following alternate procedure.

The Alternate Timing Procedure does not require that the engine speed be increased to 1600 rpm.

SEE I.S. NOTES

Set the parking brake. Shift automatic transmissions to PARK and manual transmissions to the neutral position.

Start the engine and allow it to attain normal operating temperature. Ensure that the A/C is turned Off, if equipped.

With the ignition switch Off, connect an ignition timing light and a calibrated, expanded scale tachometer.

NOTE: If the timing light has an adjustable advance control feature, turn the control to the OFF position.

Disconnect the four-inch Hg vacuum switch hose (located at the top of the cylinder head cover) and plug the hose opening.

NOTE: The four-inch Hg vacuum switch has black and red wires connected to it.

Disconnect the distributor vacuum advance hose and connect the hose to the four-inch Hg vacuum switch.

Disconnect the knock sensor wire connector and connect the wire connector to the cylinder block (ground) with a jumper wire.

NOTE: Grounding the knock sensor wire connector prevents electromagnetic interference (EMI) from causing erroneous reactions by the FFB system micro computer unit (MCU).

Start the engine.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or the fan. Do not wear loose clothing.

With the engine at idle speed, check the timing. If necessary, adjust the timing one degree higher than the specification listed on the Emission Control Information label. Also, refer to the ignition advance curve illustrations.

NOTE: With the alternate timing procedure, the basic timing must be one degree higher than the specification listed on the Emission Control Information label. For example, if the timing specification is listed as 6° ± 2° at 1600 rpm, the alternate procedure requires 7° ± 2° at idle speed.

Testing the Distributor Advance Mechanisms

Centrifugal Advance Test

Set the parking brake. Shift automatic transmissions to Park and manual transmissions to Neutral.

Start the engine and allow it to attain normal operating temperature. Ensure that the A/C is turned Off, if equipped.

With the ignition switch Off, disconnect the three-wire connector from the four- and ten-inch Hg vacuum switch assembly (CEC system).

Disconnect and plug the vacuum hose connected to the distributor vacuum advance mechanism.

Connect a timing light between the number one spark plug and wire.

Connect the timing light power wire connectors according to the manufacturer's instructions.

Connect a calibrated, expanded scale tachometer to the coil negative (TACH) terminal.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

Start the engine and slowly increase the speed while observing the timing mark and index with the timing light.

The ignition timing should advance smoothly as the engine speed increases. Refer to the ignition advance curve illustrations.

If the ignition timing advances unevenly, check and repair the centrifugal advance mechanism.

Connect the distributor vacuum advance hose and the vacuum switch assembly three-wire connector.

Remove the timing light and connect the number one cylinder spark plug wire.

Remove the tachometer.

Vacuum Advance Test

Set the parking brake. Shift automatic transmissions to Park and manual transmissions to the neutral position.

Start the engine and allow it to attain normal operating temperature. Ensure that the A/C is turned Off, if equipped.

With the ignition switch Off, disconnect the three-wire connector from the four- and ten-inch vacuum switch assembly.

Disconnect and plug the vacuum hose connected to the distributor vacuum advance mechanism.

Connect Vacuum Pump J-23738 to the distributor vacuum advance mechanism.

Connect a timing light between the number one spark plug and wire.

Connect the timing light power wire connectors according to the manufacturer's instructions.

Connect a calibrated, expanded scale tachometer to the coil negative (TACH) terminal.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

Start the engine.

Increase the engine speed and apply 60.9 kPa (18 in. Hg) vacuum.

Observe the ignition timing degree scale and index with the timing light.

SEE I.S. NOTES

The ignition timing should advance smoothly. Refer to the ignition advance curve illustrations.

NOTE: A defective FFB system MCU or ignition system ECU can alter the ignition timing.

SEE I.S. NOTES

Remove the timing light and tachometer. Connect the spark plug wire.

Testing the Distributor Advance Mechanisms – Off-Engine

The distributor ignition advance may also be tested with the distributor removed from the engine. Follow the distributor test equipment manufacturer's instructions.

The information provided within the ignition advance curve illustrations is for on-engine testing.

If the distributor ignition advance is being tested with a distributor tester, convert the information within the ignition advance curves from engine rpm to distributor rpm and from engine degrees to distributor degrees.

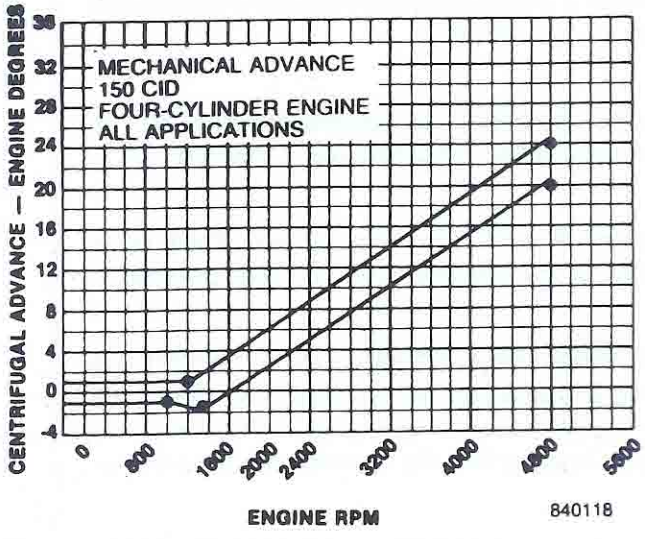
Divide the engine rpm by two to obtain the distributor rpm. Divide the engine degrees advance by two to obtain the distributor degrees advance.

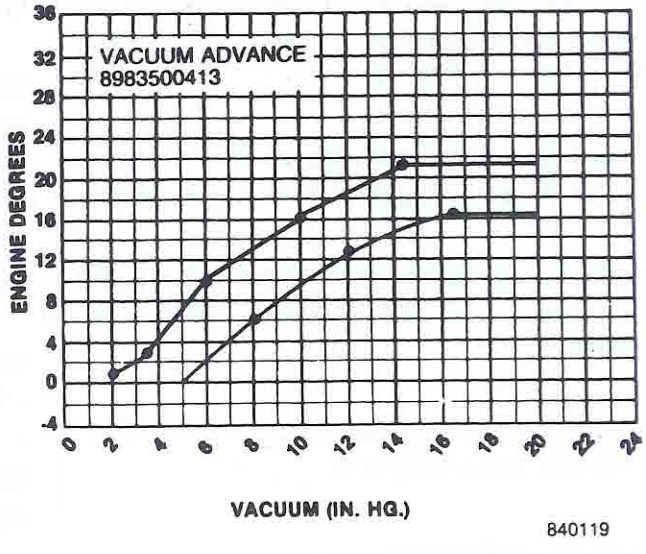
For example, if the ignition advance curve indicates 8 - 12 degrees advance at 2000 rpm, the corresponding on-tester specifications would be 4 - 6 degrees advance at 1000 rpm.

NOTE: The specified kPa (in. Hg) of vacuum is the same, regardless if the test is on-engine or off-engine.

DISTRIBUTOR IGNITION ADVANCE CURVES

Distributor Curves — Four-Cylinder Engine





Tune-Up Specifications – On-Vehicle – Four-Cylinder Engine

Engine Displacement Carburetion And Application	Series	Trans.	Initial Timing BTDC at 1600 RPM With Vacuum Advance Hose and 4-in Vacuum Switch Disconnected	Sole-Vac Idle Speed (Manual In Neutral)		Distributor Model Number	Vacuum Advance Mechanism	Centrifugal Degrees Advance At 2000 RPM	Vacuum Advance	Spark Plug Type And Gap
					Curb Idle					
			Set To	Vacuum Actuator Energized	Holding Solenoid Energized					
150 1V 50 State	87 88	M	12° ± 1°	950 ± 50	750 ± 50	3242700	8983500413	2°-6°	Refer To Distributor Curves	Champion RFN14LY (Alternate FN14LY) 0.85mm (0.035-in) Gap 0.84 to 0.97 mm (0.033 to 0.038-in)
150 1V High Alt.	87 88	M	19° ± 1°	950 ± 50	750 ± 50					

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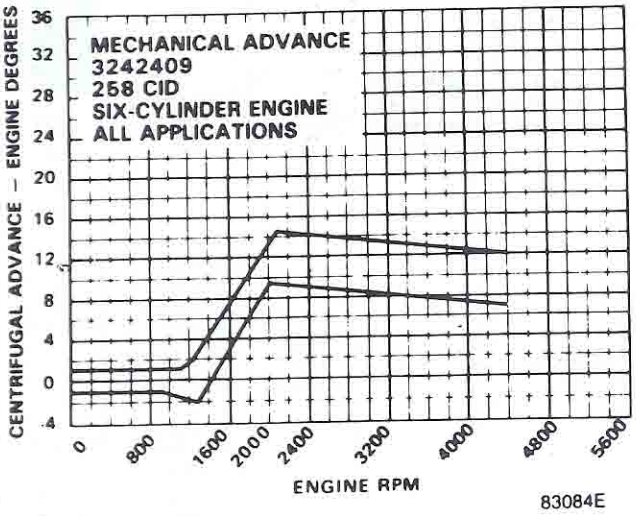
SEE I.S. NOTES

SEE I.S. NOTES

Distributor Curves – Six-Cylinder Engine



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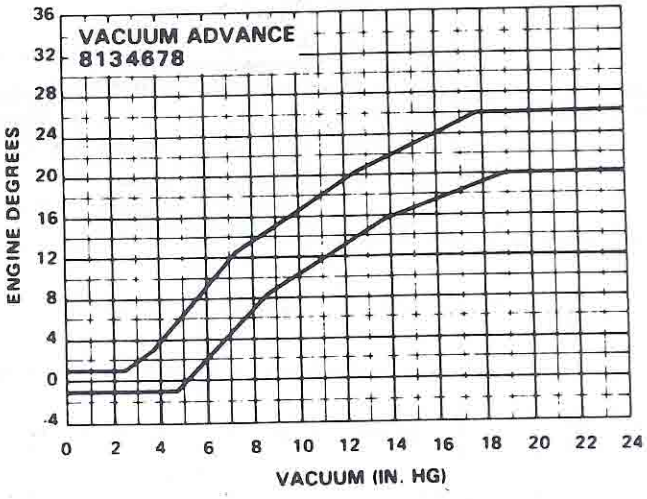

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TUNE-UP SPECIFICATIONS

Tune-Up Specifications – On-Vehicle – Six-Cylinder Engine

Engine Displacement Carburetion And Application	Series	Trans.	Initial Timing BTDC at 1600 RPM With Vacuum Advance Hose Disconnected And Plugged And Vacuum Switch Assembly 3-Wire Connector Disconnected	Curb Idle Speed – RPM (Auto. in Drive, Manual in Neutral)	Sole-Vac Idle Speed (Auto. in Drive, Manual in Neutral)		Distributor Model Number	Vacuum Advance Mechanism	Centrifugal Degrees Advance At 2000 RPM	Vacuum Advance	Spark Plug Type And Gap
			Set To	Set To	Vacuum Actuator Energized	Holding Solenoid Energized					
258 2V 49 State	87 88	M	9° ± 2°	680	1100	900	3242409	8134678	7.5-12.5	Refer To Distributor Curves	Champion RFN14LY (Alternate FN14LY) 0.85mm (0.035-in) Gap 0.84 to 0.97mm (0.033 to 0.038-in)
		A	9° ± 2°	600	900	800					
258 2V Calif.	87 88	M	9° ± 2°	680	1100	900					
		A	9° ± 2°	600	900	800					
258 2V High Alt.	87 88	M	16 ± 2	700 ± 70	1100	900					
		A	16 ± 2	650 ± 70	900	800					

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SEE I.S. NOTES

FUEL SYSTEM

General Inspection

SEE I.S. NOTES

The fuel system depends on hoses and tubing to route liquid fuel, fuel vapor and vacuum.

Fuel vapor leaks and air leaks into the vacuum hoses and fittings upset the operation of the engine and may reduce the effectiveness of the emission control devices.

Liquid fuel leaks not only waste fuel but also create a fire hazard.

Carefully inspect the hoses and fuel pipes for cracks, dents, corrosion and abnormal bends.

Inspect the fittings for corrosion and looseness.

Inspect the fuel tank for leaks caused by loose mounting straps, broken seams, dents or corrosion.

Inspect the filler neck grommets and hoses for the proper condition.

Air Cleaner

Replace the dry-type air cleaner filter element during each tune-up. Under extreme engine operating conditions, more frequent replacement is recommended.

Fuel Filter

All Jeep vehicles have two fuel filters.

The in-tank filter is designed to be maintenance-free.

The in-line filter located between the fuel pump and the carburetor requires periodic replacement.

When installing a replacement filter, ensure the fuel return nipple is positioned above the filter.

Carburetor Idle Speed Adjustment Procedures

Idle mixture adjustments are not required as a normal service adjustment.

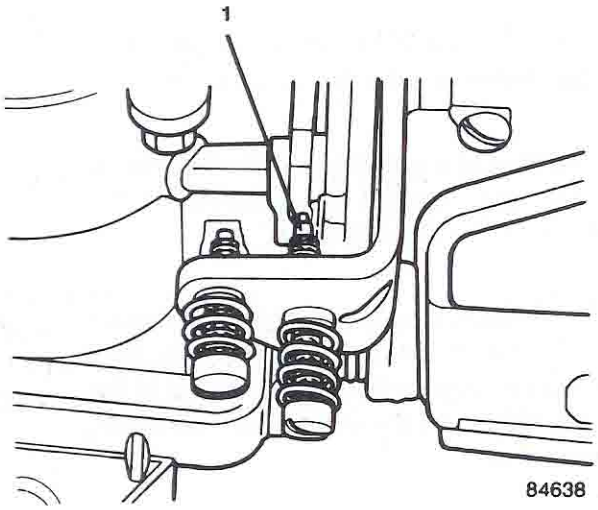
The engine and related systems must be operating properly before performing the idle speed adjustments.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or the fan. Do not wear loose clothing.

Fast Idle Speed Adjustment – Four-Cylinder Engine

Adjust the fast idle speed with the engine at normal operating temperature and the EGR valve vacuum hose disconnected and plugged.

Connect a calibrated, expanded scale tachometer to the coil negative (TACH) terminal.

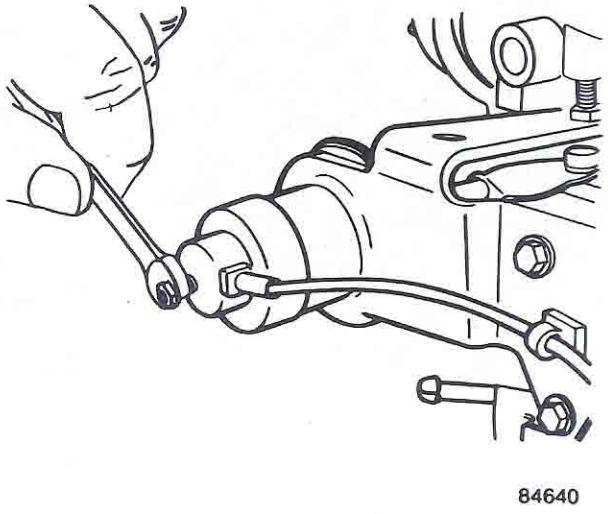


Turn the fast idle adjustment screw (1) in to contact with the fast idle cam until an engine speed of approximately 1500 rpm is achieved.

NOTE: Check the specifications on the Vehicle Emission Control Information label located under the hood.

Sole-Vac Curb Idle Speed Adjustment – Four-Cylinder Engine

Connect a calibrated, expanded scale tachometer to the coil negative (TACH) terminal.



Turn the hex head adjustment screw until an engine speed of approximately 750 (N) rpm is achieved.

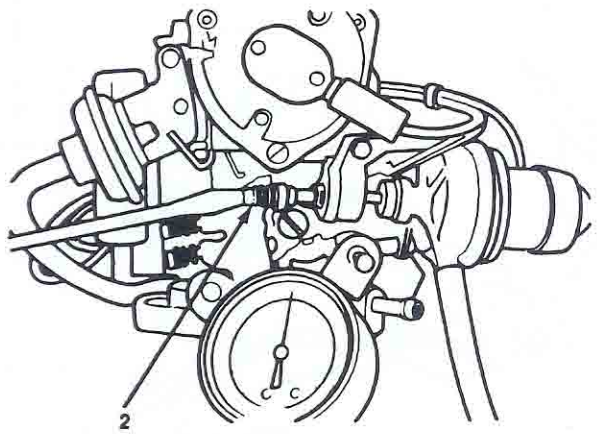
NOTE: Check the specifications on the Vehicle Emission Control Information label located under the hood.

SEE I.S. NOTES

SEE I.S. NOTES

Sole-Vac Vacuum Actuator Adjustment – Four-Cylinder Engine

Connect a calibrated, expanded scale tachometer to the coil negative (TACH) terminal.



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Using an outside vacuum source, apply 34 to 50 kPa (10 to 15 in. Hg) of vacuum to the Sole-Vac vacuum actuator.

Adjust the vacuum actuator adjustment screw (2) until an engine speed of approximately 1000 rpm is achieved.

NOTE: Check the specifications listed on the Vehicle Emission Control Information label located under the hood.

Fast Idle Speed Adjustment – Six-Cylinder Engine

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

Adjust the fast idle speed with the engine at normal operating temperature and the EGR valve vacuum hose disconnected and plugged.

Connect a calibrated, expanded scale tachometer and observe it for the adjustment.

Position the fast idle speed adjustment screw in contact with and against the shoulder of the second step of the fast idle cam.

Refer to the Specifications chart and the Vehicle Emission Control Information label located under the hood. Adjust the engine speed to the correct rpm. Adjust by turning the fast idle speed adjustment screw.

Disconnect the tachometer.

Idle Speed Adjustment – Six-Cylinder Engine

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing.

Connect a calibrated, expanded scale tachometer to the ignition coil negative (TACH) terminal.

Start and allow the engine to attain normal operating temperature.

The carburetor choke and intake manifold heater must be off. This occurs when the engine coolant heats to approximately 71°C (160°F).

NOTE: When adjusting the idle speed, place manual transmissions in the neutral position and automatic transmissions in DRIVE. Turn all accessories off.

WARNING: Set the parking brake firmly. Do not accelerate the engine.

Disconnect and plug the vacuum hose connected to the Sole-Vac vacuum actuator. Disconnect the holding solenoid wire connector.

Adjust the carburetor curb (slow) idle speed adjustment screw to obtain the specified curb (slow) idle speed rpm, if not within specifications. Refer to the Specifications chart and the Vehicle Emission Control Information label located under the hood.

Apply a direct source of vacuum to the vacuum actuator. Use Vacuum Pump Tool J-23738, or equivalent.

When the throttle positioner is fully extended, turn the vacuum actuator adjustment screw on the throttle lever until the specified engine rpm is obtained.

Disconnect the vacuum source from the vacuum actuator.

If equipped, turn the air conditioner ON.

With a jumper wire, apply voltage (12V) to energize the holding solenoid. Hold the throttle open manually to allow the throttle positioner to fully extend.

NOTE: Without the vacuum actuator, the throttle must be opened manually to allow the Sole-Vac throttle positioner to fully extend.

If the holding solenoid idle speed is not within specification, adjust the Sole-Vac (hex-head adjustment screw) to obtain the specified engine rpm. Refer to the Specifications chart and the Vehicle Emission Control Information label located under the hood.

Remove the jumper wire from the Sole-Vac holding solenoid wire connector.

Connect the Sole-Vac holding solenoid wire connector.

Connect the original hose to th · vacuum actuator.

Remove the tachometer.

SEE I.S. NOTES