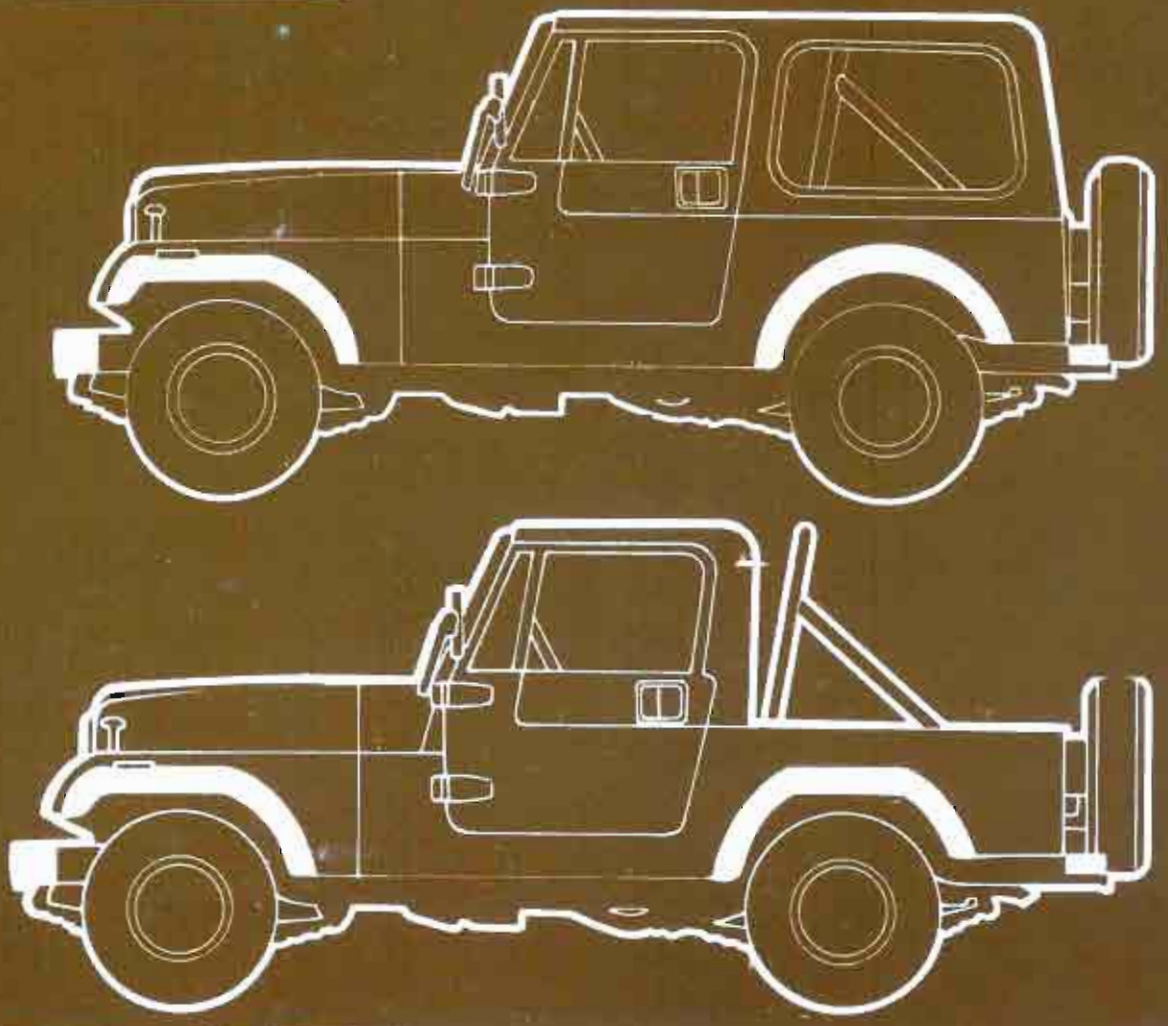
1984 - 1986
M.R.252

8981 320 374 U.S.A./Canada Edition

Includes I.S. Notes
1E - 9E



Jeep®

CJ-7/Scrambler

TOWING PROCEDURES

Safety Precautions

- secure loose or protruding parts of a damaged vehicle
- the end of the vehicle being towed should be lifted a minimum of 100 km (4 in) off the ground; check the opposite end for adequate ground clearance
- always use a safety chain system that is independent of the lifting and towing attachment
- do not allow any of the towing equipment to bear on the fuel tank
- do not go under the vehicle while it is lifted by the towing equipment
- do not allow passengers to ride in a towed vehicle
- always observe all state and local laws regarding such items as warning signals, night illumination, speed, etc.
- do not attempt a towing operation that could jeopardize the operator, any bystanders or other motorists

CAUTION: To prevent driveline damage, shift the transmission and transfer case into the positions outlined in the general towing instructions.

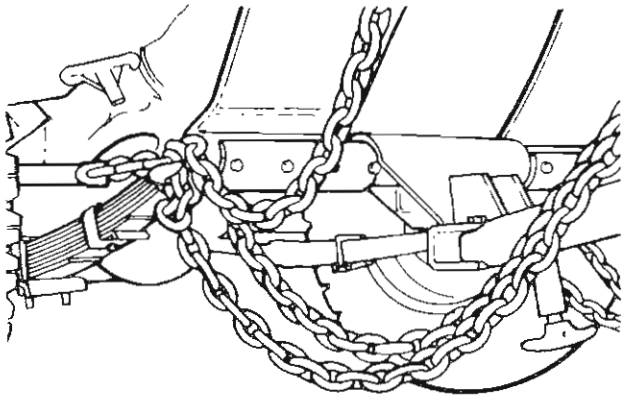
Front Towing – Front End Raised

Attach J-hooks over the axle outboard of the springs.

Tow hooks or chains must not be attached to the bumper or to the constant velocity (CV) joints.

Place a tow bar under the spring shackles.

Attach safety chains around the spring shackles.



86368

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		■

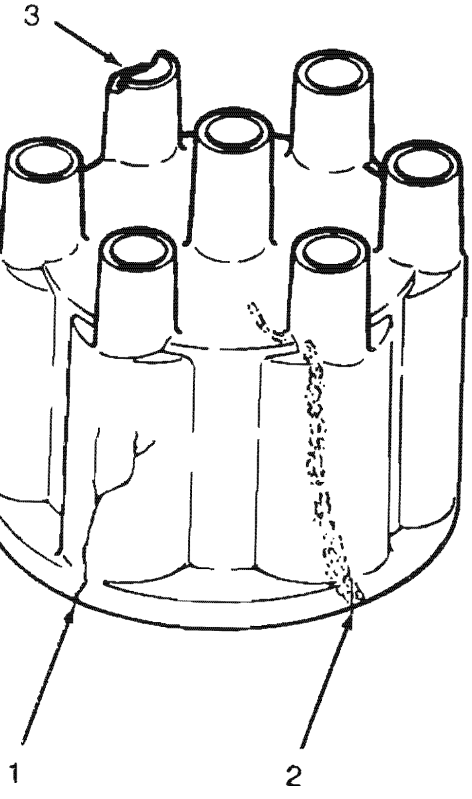
Service Diagnosis – Performance (Continued)

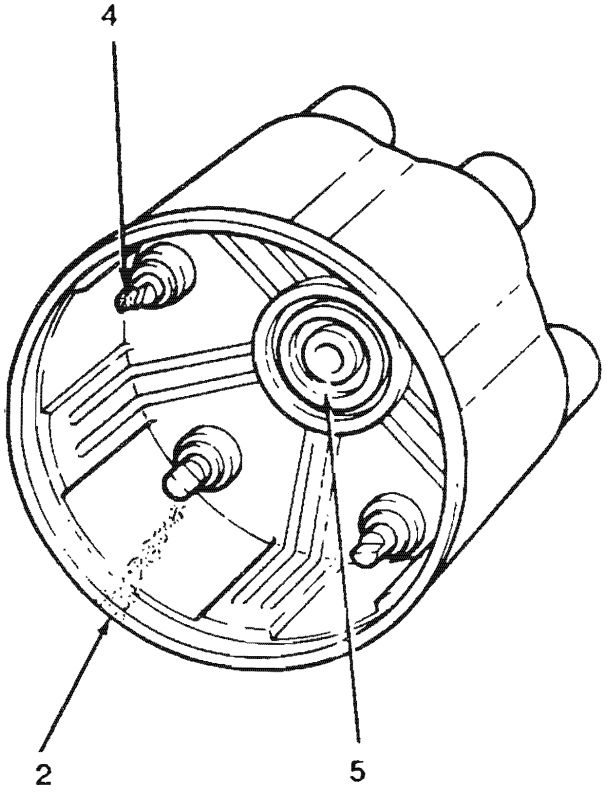
Condition	Possible Cause	Correction
FAULTY HIGH SPEED OPERATION (Continued)	(16) Intake manifold restricted.	(16) Remove restriction or replace manifold.
	(17) Worn distributor shaft.	(17) Replace shaft.
	(18) Improper feedback system operation.	(18) Refer to Feedback System Diagnosis.
MISFIRE AT ALL 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

80652D

SEE I.S. NOTES





840115

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

SHORT ENGINE ASSEMBLY (SHORT BLOCK)

SEE I.S. NOTES

A service replacement short engine assembly (short block) may be installed whenever the original cylinder block is defective or damaged beyond repair. It consists of the cylinder block, piston and rod assemblies and crankshaft.

NOTE: The camshaft must be procured separately and installed before the engine is installed in the vehicle.

NOTE: For identification, short engine assemblies have the letter S stamped on the same machined surface where the build date code is stamped for complete engine assemblies.

Installation includes the transfer of components from the defective or damaged original engine.

Follow the appropriate procedures for cleaning, inspection and torque tightening as outlined in this chapter.

ENGINE MOUNTING

Resilient rubber cushions support the engine and transmission at three points: at each side on the centerline of the engine and at the rear between the transmission extension housing and the rear support crossmember.

Replacement of a cushion may be accomplished by supporting the weight of the engine or transmission at the area of the cushion.

Remove the bridge and pivot assembly and rocker arms from above the No. 1 cylinder.

Rotate the crankshaft until No. 4 piston is at top dead center (TDC) on the compression stroke.

Rotate the crankshaft counterclockwise (viewed from the front of the engine) 90 degrees.

Install Dial Indicator Set J-8520 (or equivalent) on the end of the No. 1 cylinder intake valve push rod. Use rubber tubing to secure the stem on the push rod.

Set the dial indicator pointer at zero.

Rotate the crankshaft clockwise (viewed from the front of the engine) until the dial indicator pointer indicates 0.305-mm (0.012-in) travel distance (lift).

The timing notch index on the vibration damper should be aligned with the TDC mark on the timing degree scale.

If the timing notch is more than 13 mm (1/2 in) away from the TDC mark in either direction, the valve timing is incorrect.

If the valve timing is incorrect, the cause may be a broken camshaft pin. It is not necessary to replace the camshaft because of pin failure. A spring pin is available for service replacement.

VIBRATION DAMPER AND PULLEY

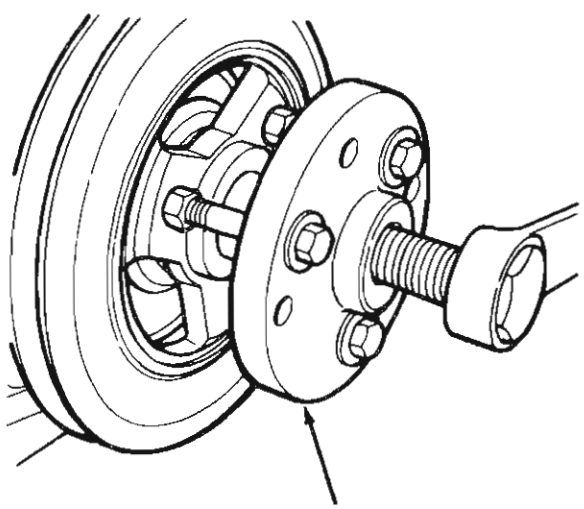
Removal

Remove the drive belt(s).

Remove the retaining bolts and separate the vibration damper pulley from the vibration damper.

Remove the vibration damper retaining bolt and washer.

Use Vibration Damper Removal Tool J-21791-01 to remove the damper from the crankshaft.



J-21791-01 84179

SEE I.S. NOTES

Installation

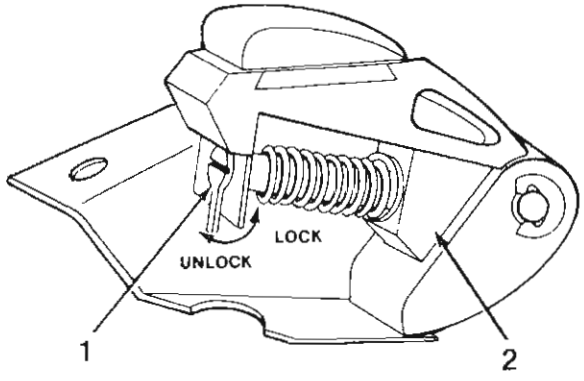
SEE I.S. NOTES

Lubricate the camshaft with AMC Engine Oil Supplement (EOS), or equivalent.

Install the camshaft carefully to prevent damaging the camshaft bearings.

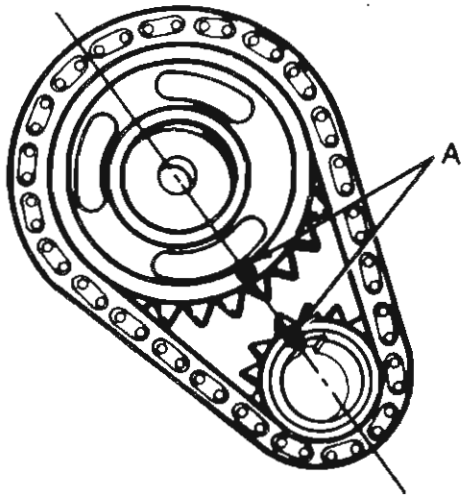
Turn the tensioner lever (1) to the unlocked (down) position.

Pull the tensioner block (2) toward the tensioner lever to compress the spring. Hold the block and turn the tensioner lever to the locked (up) position.



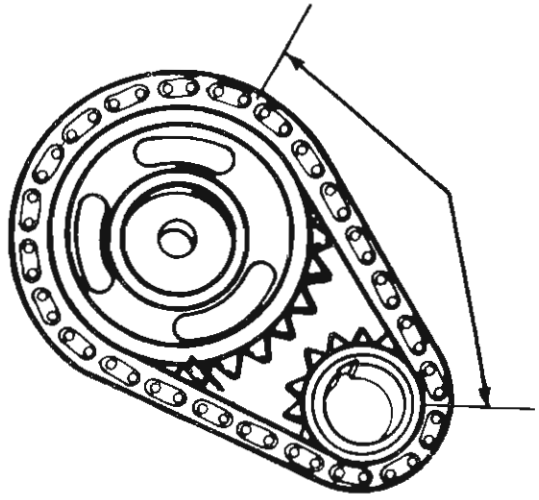
84186

Install the timing chain, crankshaft sprocket and camshaft sprocket with the timing marks (A) aligned.



84184

NOTE: To verify correct installation of the timing chain, turn the crankshaft to position the camshaft sprocket timing mark at approximately the one o'clock position. This positions the crankshaft sprocket timing mark where the adjacent tooth meshes with the chain at the three o'clock position. Count the number of chain pins between the timing marks on both sprockets. There must be 20 pins.



84187

Installation

NOTE: To ensure self-priming of the oil pump, fill the pump with petroleum jelly before installing the oil pump cover. Do not use grease.

Apply a bead of Loctite 515 sealant, or equivalent, and install the pump cover. Tighten the cover screws with 8 N·m (70 in-lbs) torque.

NOTE: Rotate the gears to ensure that a binding condition does not exist before installing the oil pump.

Install the oil pump (2) with a replacement gasket (3). Tighten the short screw with 14 N·m (10 ft-lbs) torque and long screw with 23 N·m (17 ft-lbs) torque.

Install the oil pan with replacement gaskets and seals. Refer to Oil Pan Installation.

Fill the oil pan with replacement engine oil to the specified level.

Oil Pump Overhaul

Refer to the MOT. 2.46L manual for the oil pump overhaul procedure.

Oil Pressure Gauge

Refer to Chapter C – Electrical for operation, diagnosis and replacement of the oil pressure gauge.

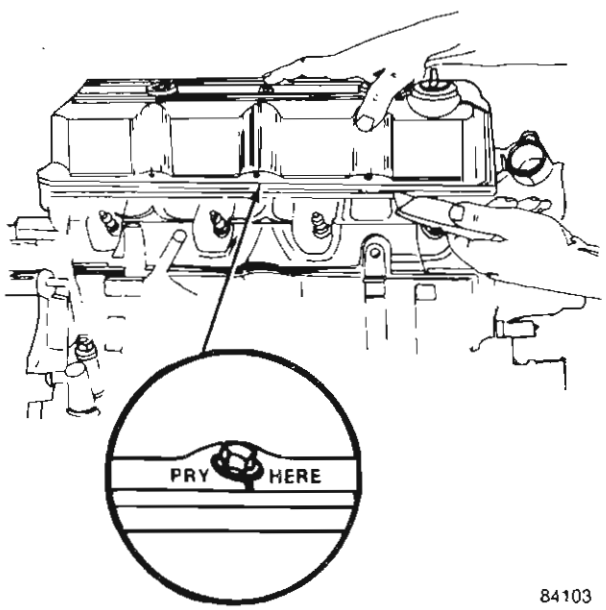
PISTONS AND CONNECTING RODS

Replacement as an Assembly

NOTE: The following procedure is used to service the piston and connecting rod assemblies with the engine installed in the vehicle.

Removal

Remove the cylinder head cover. Refer to Cylinder Head Cover Removal for the procedure.



84103

SEE I.S. NOTES

GENERAL

SEE I.S. NOTES

Description

Vehicle	Engine	Displacement	Bore mm (in)	Stroke mm (in)	Comp. Ratio	Carburetor	Oil Capacity
87 88	6-cylinder	4.2L 258 CID	95.25 (3.75)	98.93 (3.895)	9.2:1	2-Venturi	4.75L 5.0 qts. 4.1 imp qts. (w/o filter change)

86348(J)

SHORT ENGINE ASSEMBLY (SHORT BLOCK)

A service replacement short engine assembly (short block) may be installed whenever the original cylinder block is defective or damaged beyond repair.

It consists of a cylinder block, piston and rod assemblies and crankshaft.

NOTE: The camshaft must be procured separately and installed before the engine is installed in the vehicle.

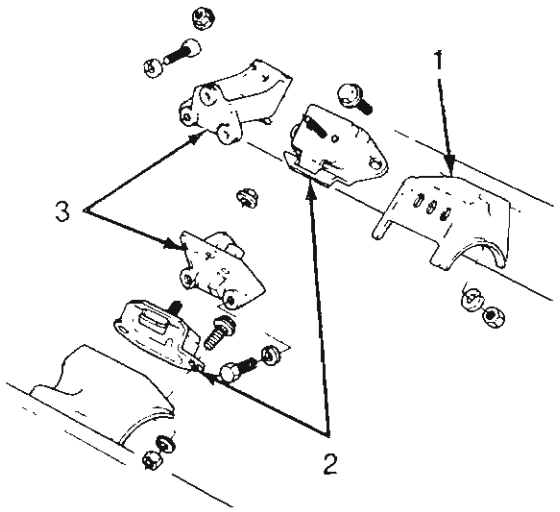
NOTE: For identification, short engine assemblies have the letter S stamped on the same machined surface where the build date code is stamped for complete engine assemblies.

Installation includes the transfer of components from the defective or damaged original engine.

Follow the appropriate procedures for cleaning, inspection and torque tightening as outlined in this manual and the MOT. 4.2L manual.

ENGINE MOUNTING

Resilient rubber cushions support the engine and transmission at three points: at each side on the centerline of the engine (1 and 2) and at the rear between the transmission adapter housing and the rear support crossmember.



1 - Frame Support
2 - Cushions
3 - Engine Mounting Brackets

42578

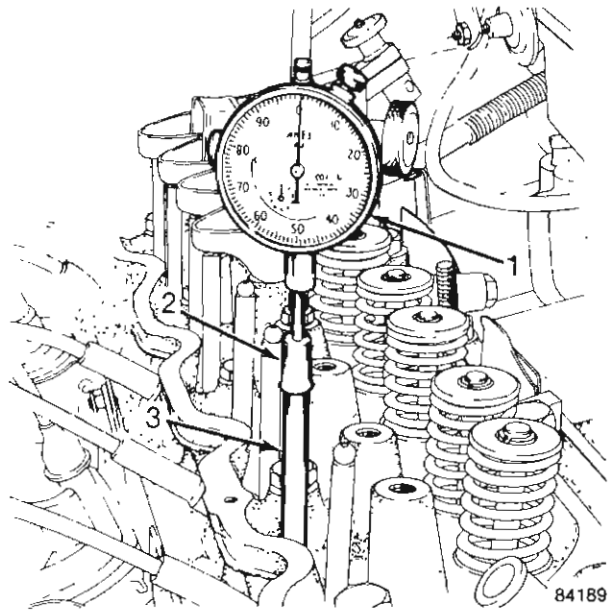
Replacement of a cushion may be accomplished by supporting the weight of the engine or transmission at the area of the cushion.

CAUTION: Before raising the engine, remove the screws that attach the fan shroud to the radiator to prevent damage to the shroud by the fan.

SEE I.S. NOTES

SEE I.S. NOTES

Install a dial indicator (1) with a piece of rubber tubing (2) between the dial indicator plunger and the push rod (3).



Rotate the crankshaft until the heel of the cam lobe (push rod in the down position) is under the valve tappet. Set the dial indicator pointer at zero.

Rotate the crankshaft until the push rod is at its maximum upward position. Note the travel distance on the dial indicator. Refer to the Specifications chart for the correct cam lobe lift.

Repeat the procedure for each cam lobe.

Valve Timing

Disconnect the spark plug wires and remove the spark plugs.

Remove the cylinder head cover. Refer to Cylinder Head Cover Removal for the procedure.

Remove the capscrews, bridge and pivot assembly, and rocker arms from above the No. 1 cylinder.

Alternately loosen each capscrew, one turn at a time, to avoid damaging the bridge.

Rotate the crankshaft until the No. 6 piston is at top dead center (TDC) on the compression stroke.

Rotate the crankshaft counterclockwise (viewed from the front of the engine) 90 degrees.

Install a dial indicator (J-8520 or equivalent) on the end of the No. 1 cylinder intake valve push rod. Use rubber tubing to secure the indicator stem on the push rod.

Set the dial indicator pointer at zero.

Rotate the crankshaft clockwise (viewed from the front of the engine) until the dial indicator pointer indicates 0.305-mm (0.012-in) travel distance (lift).

The timing notch index on the vibration damper should be aligned with the TDC mark on the timing degree scale.

If the timing notch is more than 13 mm (1/2 in) away from the TDC mark in either direction, the valve timing is incorrect.

If the valve timing is incorrect, the cause may be a broken camshaft pin. It is not necessary to replace the camshaft because of pin failure. A spring pin is available for service replacement.

Remove the fan and shroud.

Disconnect the radiator overflow tube (or coolant recovery bottle tube), radiator hoses and automatic transmission fluid cooler pipes (if equipped).

Remove the radiator.

If equipped with air conditioning:

- remove the A/C compressor drive belt idler pulley
- disconnect and remove the alternator

CAUTION: Do not loosen or disconnect any air conditioner system fittings. Move the condenser and receiver/drier aside as a complete assembly.

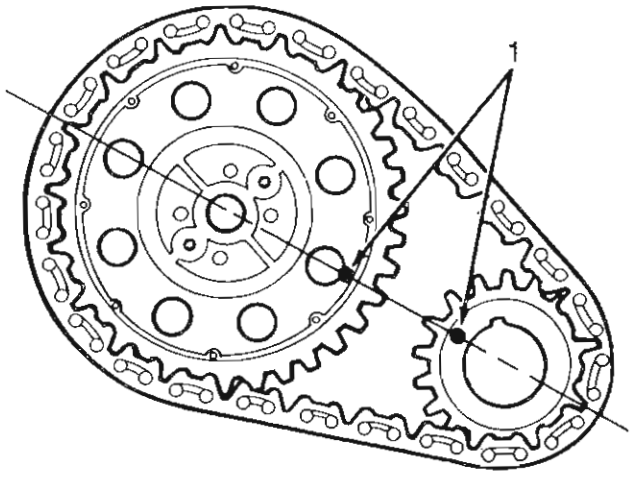
- remove the A/C condenser attaching bolts and move the condenser and receiver/drier assembly up and out of the way

Remove the drive belt(s).

Remove the crankshaft vibration damper and pulley (V-belt drive only). Refer to the removal procedure.

Remove the timing case cover. Refer to the removal procedure.

Rotate the crankshaft until the zero degree (0°) timing mark on the crankshaft sprocket is closest to and on the center line with the timing mark on the camshaft sprocket (1).

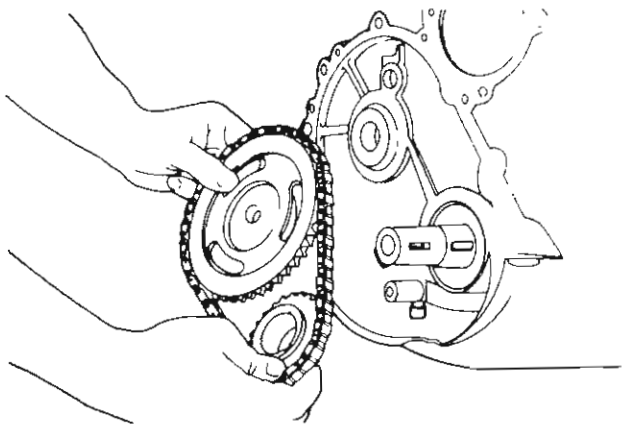


86210

Remove camshaft sprocket retaining bolt.

Remove the crankshaft oil slinger.

Remove the sprockets and chain as an assembly.



86177

Installation

SEE I.S. NOTES

NOTE: To ensure self-priming of the oil pump, fill the pump with petroleum jelly before installing the oil pump cover. Do not use grease.

Install the oil pump with a replacement gasket. Tighten the short screws with 14 N·m (10 ft-lbs) torque and the long screws with 23 N·m (17 ft-lbs) torque.

NOTE: Rotate the gears to ensure that a binding condition does not exist before installing the oil pump.

Install the oil pan with replacement gaskets and seals. Refer to Oil Pan Installation for the procedure. Fill the oil pan with replacement engine oil to the specified level.

Oil Pump Overhaul

Refer to the MOT. 4.2L manual for the oil pump overhaul procedure.

Oil Pressure Gauge

Refer to Chapter C – Electrical for operation, diagnosis and replacement of the oil pressure gauge.

PISTONS AND CONNECTING RODS

Replacement As An Assembly

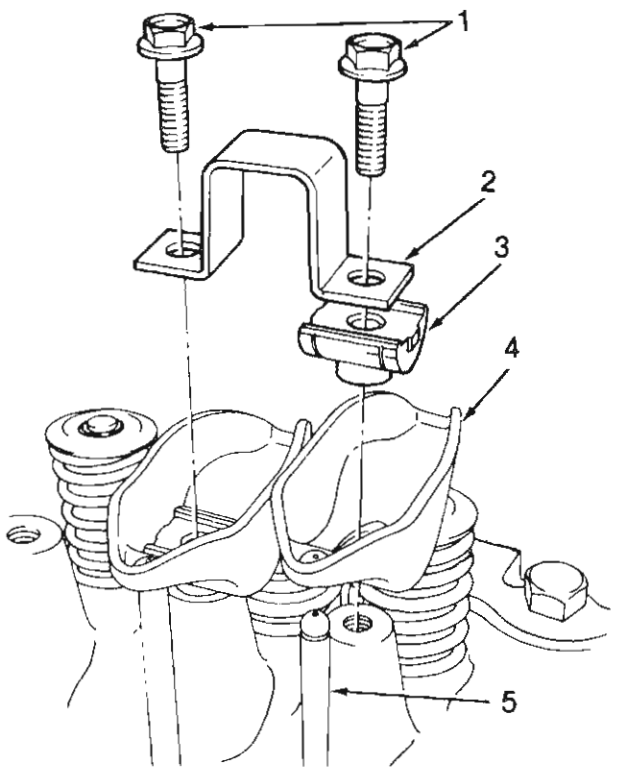
NOTE: The following procedure is for servicing the piston and connecting rod assemblies with the engine installed.

Removal

Remove the cylinder head cover. Refer to Cylinder Head Cover Removal for the procedure.

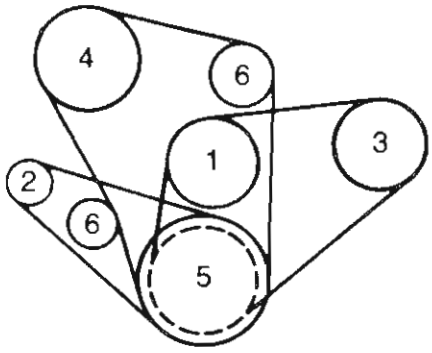
Remove the capscrews (1), bridge (2) and pivot (3) assemblies and rocker arms (4). Alternately loosen the capscrews, one turn at a time, to avoid damaging the bridge.

Remove the push rods (5).

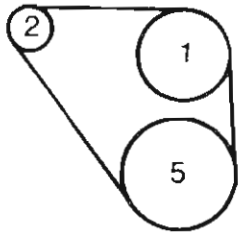


86162

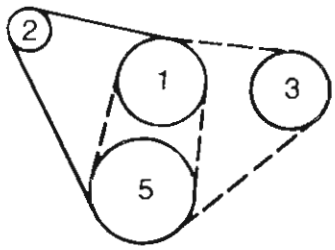
ENGINE DRIVE BELT ARRANGEMENTS



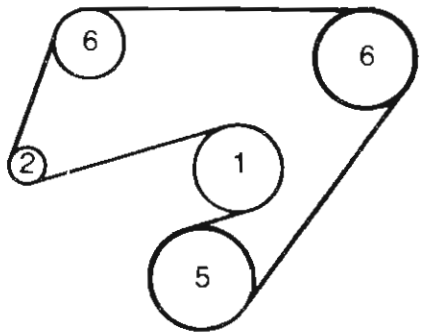
SIX-CYLINDER ENGINE WITH ALTERNATOR, POWER STEERING PUMP, AND A/C COMPRESSOR



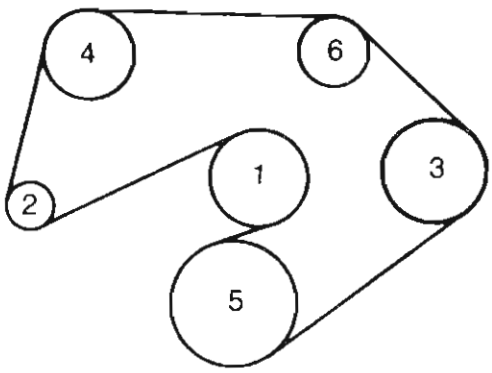
FOUR- AND SIX-CYLINDER ENGINE WITH ALTERNATOR



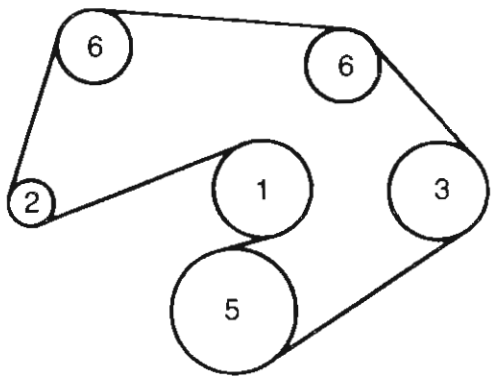
FOUR- AND SIX-CYLINDER ENGINE WITH ALTERNATOR AND POWER STEERING PUMP



SIX-CYLINDER ENGINE WITH SERPENTINE DRIVE AND ALTERNATOR (CALIFORNIA ONLY)



SIX-CYLINDER ENGINE WITH SERPENTINE DRIVE, ALTERNATOR, A/C COMPRESSOR AND POWER STEERING PUMP (CALIFORNIA ONLY)



SIX-CYLINDER ENGINE WITH SERPENTINE DRIVE, ALTERNATOR AND POWER STEERING PUMP (CALIFORNIA ONLY)

1. Water Pump
2. Alternator
3. Power Steering Pump
4. A/C Compressor
5. Drive Pulley
6. Idler Pulley

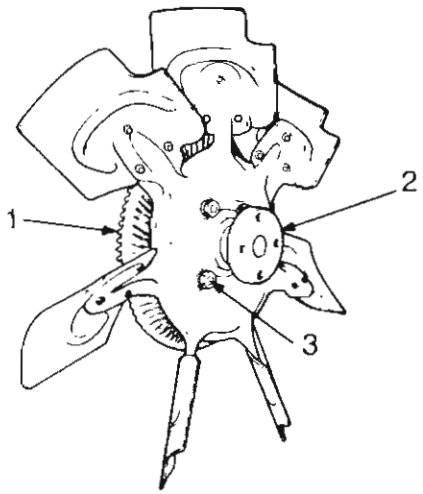
LEGEND
FRONT BELT ——
REAR BELT — — —

840171(J)

FAN

SEE I.S. NOTES

There are several types of metal fans available for all engines. Most engines with a standard cooling system use a four-bladed rigid fan. Certain engines are fitted with standard equipment multi-bladed viscous drive (Tempatrol) fans.



1 - Silicone Fluid Chamber
2 - Mounting Flange
3 - Fan Blade Attaching Bolts (4)

42415

Fan blade assemblies are balanced within 0.25 ounce and should not be altered in any way. Replace a damaged or bent fan. Do not attempt repair. Refer to the Cooling System Components chart for fan applications.

CAUTION: Fans are designed to be compatible with certain applications only. Do not attempt to increase the cooling capacity by installing a fan not intended for a given engine. Fan or water pump damage and noise may result.

Replacement

Removal

Disconnect the fan shroud from the radiator, if equipped.

Remove the belt(s).

Remove the attaching nuts and remove the fan and drive as a unit.

Remove the fan shroud.

The Tempatrol drive unit should be replaced if there is an indication of a fluid leak, noise or if roughness is detected when turning by hand. If the drive cannot be turned by hand, or if the leading edge of the fan can be moved more than 6.35 mm (1/4 in) front to rear, replace the drive unit.

If it is necessary to replace either the Tempatrol fan blade unit or the drive unit separately, use the following procedure.

CAUTION: Engines equipped with a serpentine (single) drive belt have a reverse rotating water pump and viscous (Tempatrol) fan drive assembly. The components are identified by the words REVERSE stamped on the cover of the viscous drive and inner side of the fan, and REV cast into the water pump body. Do not install components that are intended for non-serpentine drive belts.

CAUTION: To prevent silicone fluid from draining into the fan drive bearing and contaminating the lubricant, do not place the Tempatrol fan unit on the work bench with the rear mounting flange down.

Drops Slowly: indicates a small leak or seepage is occurring. Examine all connections for seepage or slight leakage with a flashlight. Inspect the radiator, hoses, gasket edges and heater. Seal small leak holes with AMC Sealer Lubricant, or equivalent. Repair the leak holes and reinspect the system with pressure applied.

Drops Quickly: indicates that a serious leakage is occurring. Examine the system for serious external leakage. If no leaks are visible, inspect for internal leakage.

NOTE: Large radiator leak holes should be repaired by a reputable radiator repair shop.

Internal Leakage Inspection

Remove the oil pan drain plug and drain a small amount of engine oil. Coolant, being heavier, will drain first, or operate the engine to churn the oil, then examine the dipstick for water globules.

Inspect the transmission dipstick for water globules.

Inspect the transmission fluid cooler for leakage. Refer to Transmission Fluid Cooler 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 fan. Do not wear loose clothing.

Operate the engine without the pressure cap on the radiator until the thermostat opens.

Attach a pressure tester (J-24460-01) to the filler neck. If the pressure builds up quickly, a leak exists as result of a faulty cylinder head gasket or crack. Repair as necessary.

WARNING: Do not allow pressure to exceed 103.4 kPa (15 psi). Turn the engine Off. To release the pressure, rock the tester from side to side. When removing the tester, do not turn the tester more than 1/2 turn if the system is under pressure.

If there is no immediate pressure increase, pump the pressure tester until the indicated pressure is within the system range.

Vibration of the gauge pointer indicates compression or combustion leakage into the cooling system.

CAUTION: Do not disconnect the spark plug wires while the engine is operating.

Isolate the compression leak by shorting each spark plug to the cylinder block. The tester gauge pointer should stop or decrease vibration when the spark plug for the leaking cylinder is shorted because of the absence of combustion pressure.

CAUTION: Do not operate the engine with a spark plug shorted for more than a minute, otherwise the catalytic converter may be damaged.

Combustion Leakage Test (Without Pressure Tester)

NOTE: Do not waste reusable coolant. If the solution is clean and is being drained only to service the cooling system, drain the coolant into a clean container for reuse.

WARNING: Do not remove the cylinder block drain plugs or loosen the radiator draincock with the system hot and pressurized because serious burns from coolant can occur.

SEE I.S. NOTES

SEE I.S. NOTES

The following procedures apply to a complete overhaul with the carburetor removed from the engine.

A complete disassembly is not necessary when performing adjustments.

In most instances, service adjustments of the individual circuits can be completed without removing the carburetor from the engine.

A complete carburetor overhaul includes disassembly, thorough cleaning, inspection, and replacement of all gaskets and worn or damaged parts.

It also includes curb idle speed adjustment, idle mixture adjustment (if removal of the adjustment screw was necessary) and fast idle speed adjustment after the carburetor is installed.

NOTE: When using an overhaul kit, use all the parts included in the kit.

NOTE: Flooding, hesitation on acceleration, and other performance problems are in many instances caused by the presence of dirt, water or other foreign matter in the carburetor. To aid in diagnosing a problem, carefully remove the carburetor from the engine without removing the fuel from the bowl. Examine the bowl contents and filter for contamination as the carburetor is disassembled.

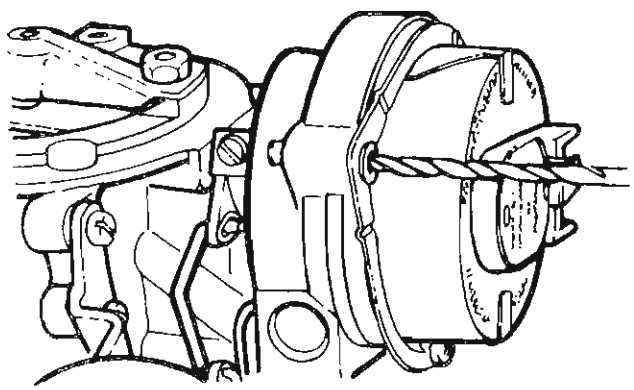
Disassembly

NOTE: The choke cover is not adjustable.

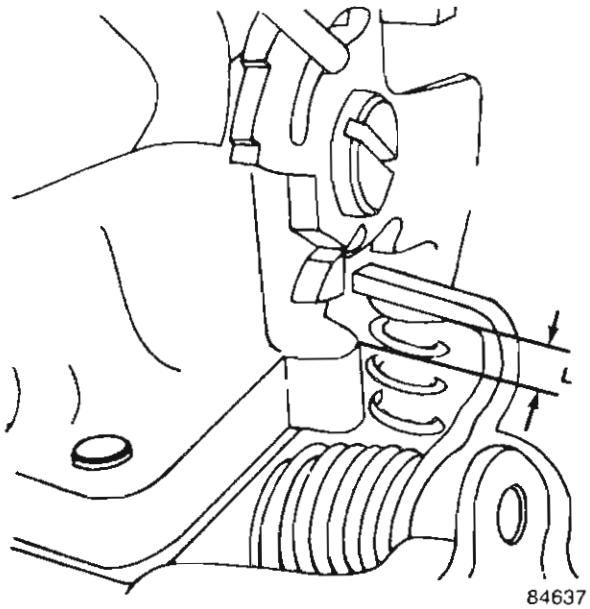
CAUTION: This procedure below must be followed to retain the original rivet hole size.

Remove the choke cover:

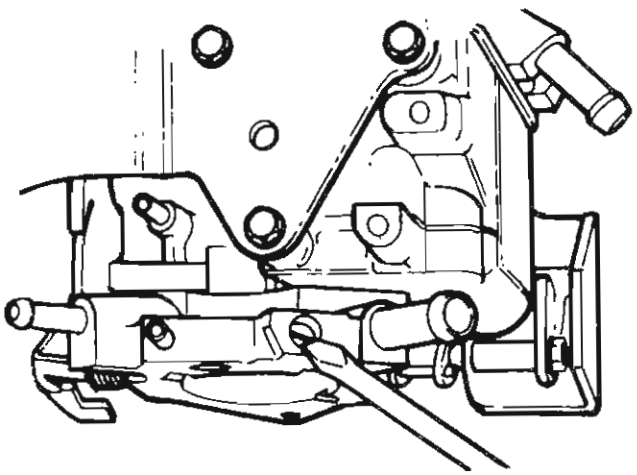
- drill out the rivet heads with a 3-mm (1/8-in) or No. 30 drill bit
- after the rivet heads are removed, drive out the remaining portion of the rivets with a 3-mm (1/8-in) punch



840178



Initial Idle Mixture Adjustment –



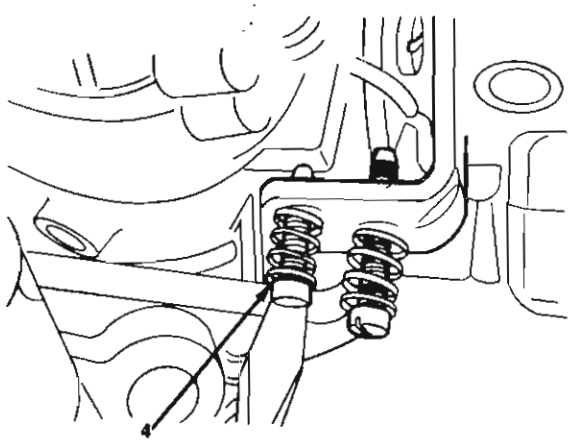
Install and position the idle mixture adjustment screw at the same number of turns from the lightly seated position as recorded during disassembly.

After carburetor installation, refer to the Service Adjustment Procedures for the final idle mixture adjustment.

TRC (Anti-Diesel) Adjustment –

The TRC (anti-diesel) adjustment screw is statically set at 3/4 of a turn from the throttle valve closed position during factory assembly and normally does not require readjustment.

To adjust, turn the adjustment screw (4) counterclockwise to the throttle valve closed position and then clockwise 3/4 of a turn.

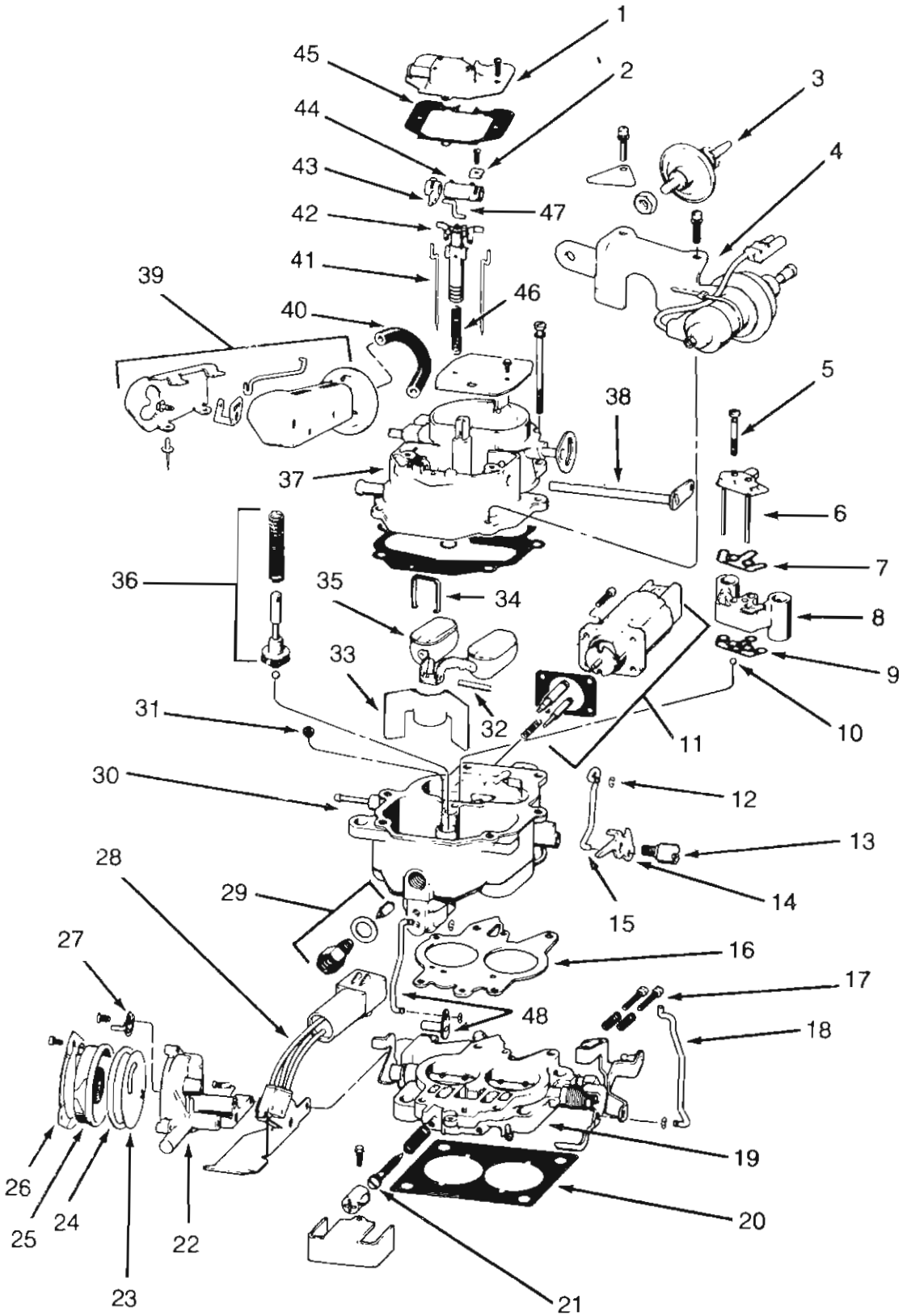


Install the carburetor on the engine and perform the idle speed and mixture adjustments. Refer to the Service Adjustment Procedures.

SEE I.S. NOTES

MODEL BBD CARBURETOR (EXPLODED)

SEE I.S. NOTES



840217

Choke Adjustment (On- or Off-Engine)

NOTE: The choke adjustment is preset during factory assembly and should not normally require readjustment. The choke should be serviced only if absolutely necessary or during major carburetor overhaul.

The automatic choke adjustment is accomplished by removing the housing cover retainers and rotating the cover in the desired direction as indicated by the arrow on the face of the cover.

NOTE: Break-away torq-head cover retaining screws are used to discourage indiscriminate choke adjustment.

Position the choke cover at the following basic setting as indicated by index key color:

- gold index key – set the choke index at 0
- red index key – set the choke index at one-notch rich
- green index key – set the choke index at two-notches rich

NOTE: The richer the choke setting, the greater length of time that spring tension is exerted against the linkage to hold the choke valve in a closed position. As the electric heater relaxes the spring tension, the fast idle cam weight opens the choke valve.

Fast Idle Speed Adjustment

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 tachometer to the ignition coil negative (TACH) terminal 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 adjust the engine speed for the correct rpm. Adjust by turning the fast idle speed adjustment screw.

Disconnect the tachometer.

Idle Speed Adjustment

Install the carburetor, fuel pipe, vacuum hoses etc., if removed. Refer to the installation procedure.

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 tachometer to the ignition coil negative (TACH) terminal.

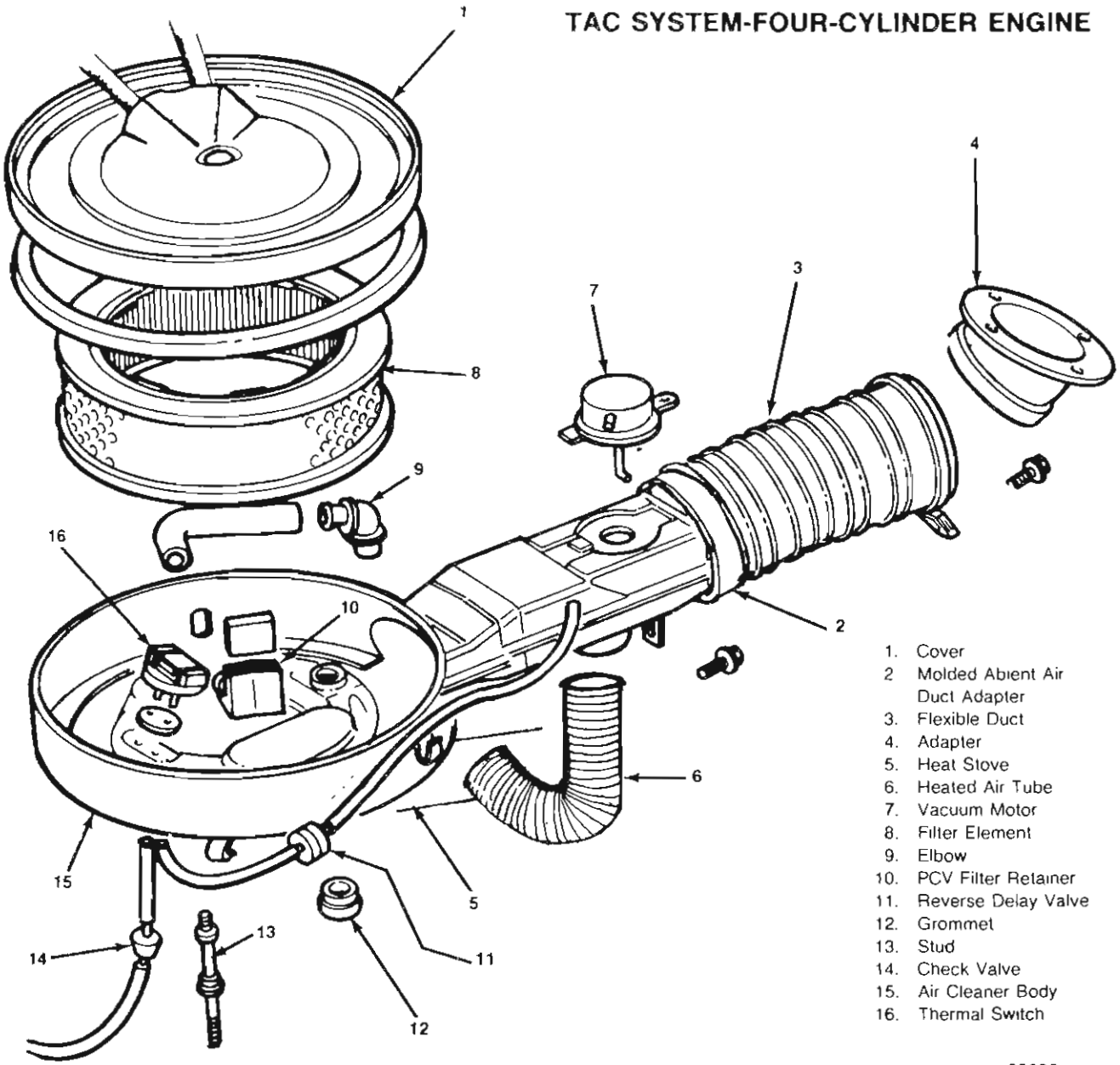
Start and allow the engine to attain the normal operating temperature.

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

SEE I.S. NOTES

SEE I.S. NOTES

TAC SYSTEM-FOUR-CYLINDER ENGINE



1. Cover
2. Molded Ambient Air Duct Adapter
3. Flexible Duct
4. Adapter
5. Heat Stove
6. Heated Air Tube
7. Vacuum Motor
8. Filter Element
9. Elbow
10. PCV Filter Retainer
11. Reverse Delay Valve
12. Grommet
13. Stud
14. Check Valve
15. Air Cleaner Body
16. Thermal Switch

85035

Altitude Jumper Wire

The altitude jumper wire is located in the engine compartment taped to the CEC system wire harness.

The jumper wire provides the MCU with an indication of whether or not the vehicle is being operated above or below a 6 400-meter (4,000-foot) altitude.

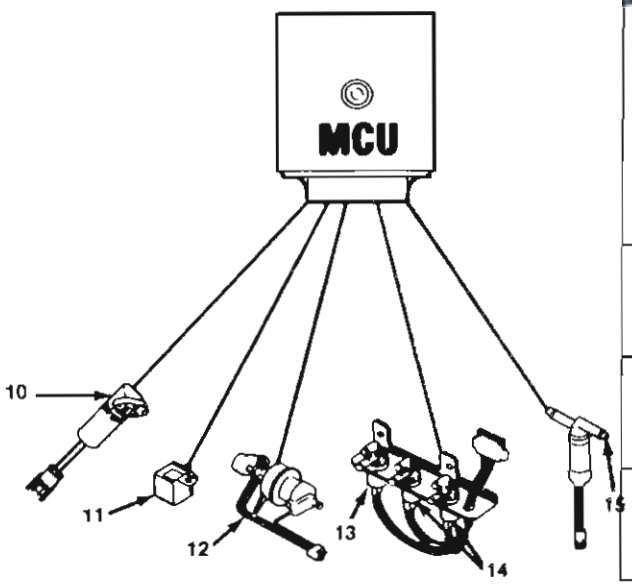
The jumper wire is normally not connected to engine ground. For vehicles operated above 6 400 meters (4,000 feet), the jumper wire must be connected to engine ground.

To connect the altitude jumper wire, remove the tape and extend the wire to the engine ground screw located next to the ignition coil. Remove the screw and attach the eyelet terminal to the engine.

NOTE: Additional engine ground wire connectors are also attached to the engine with the screw.

MCU Outputs

Based on the information received from the various MCU inputs, the MCU generates a number of outputs that provide the correct air/fuel mixture, ignition timing and engine idle speed.

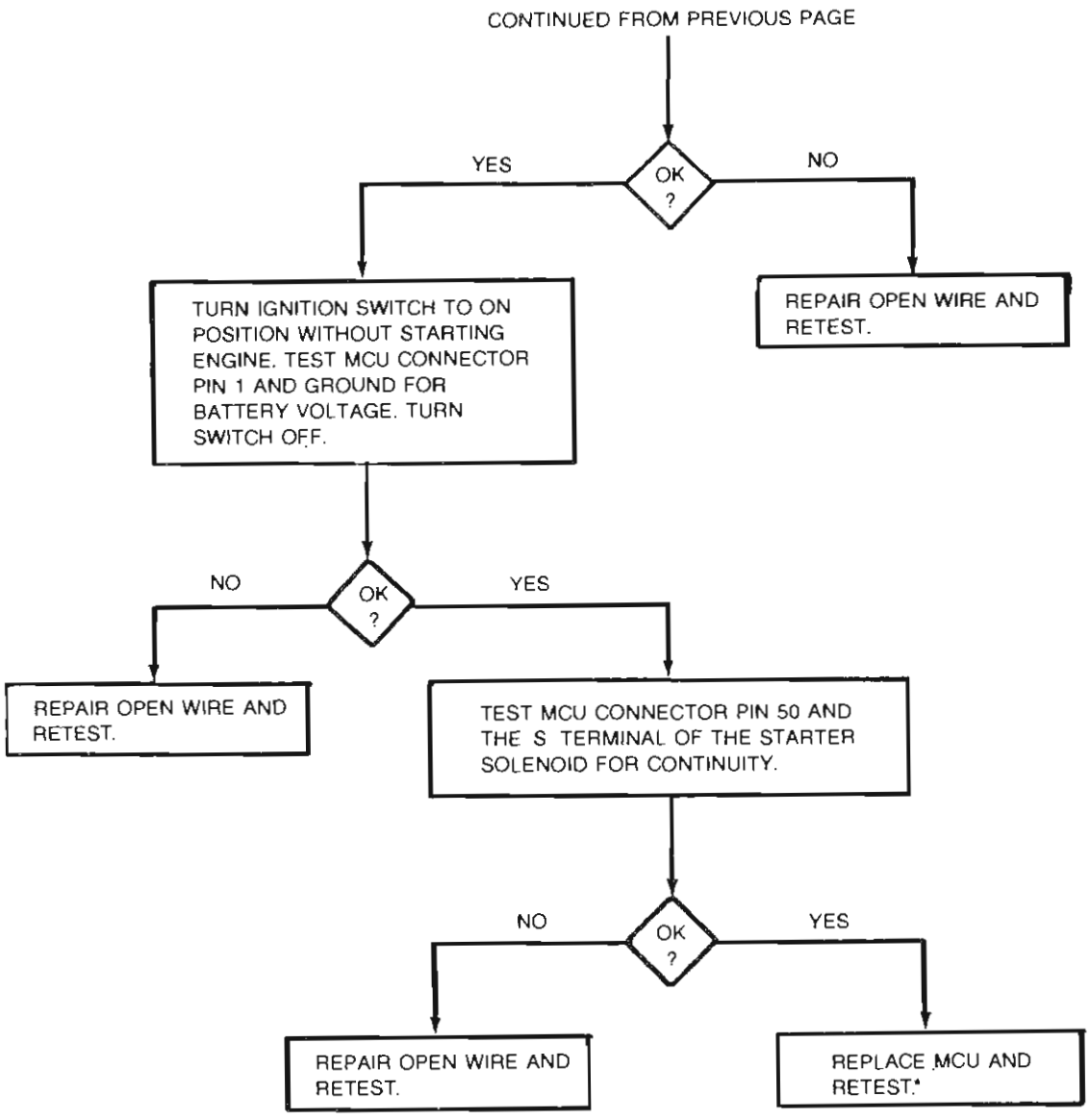


10. Mixture Control Solenoid/Stepper Motor
11 Idle Relay
12 Sole-Vac Throttle Positioner
13. Idle Solenoid
14 Upstream and Downstream Solenoids
15 P C V Solenoid

85062

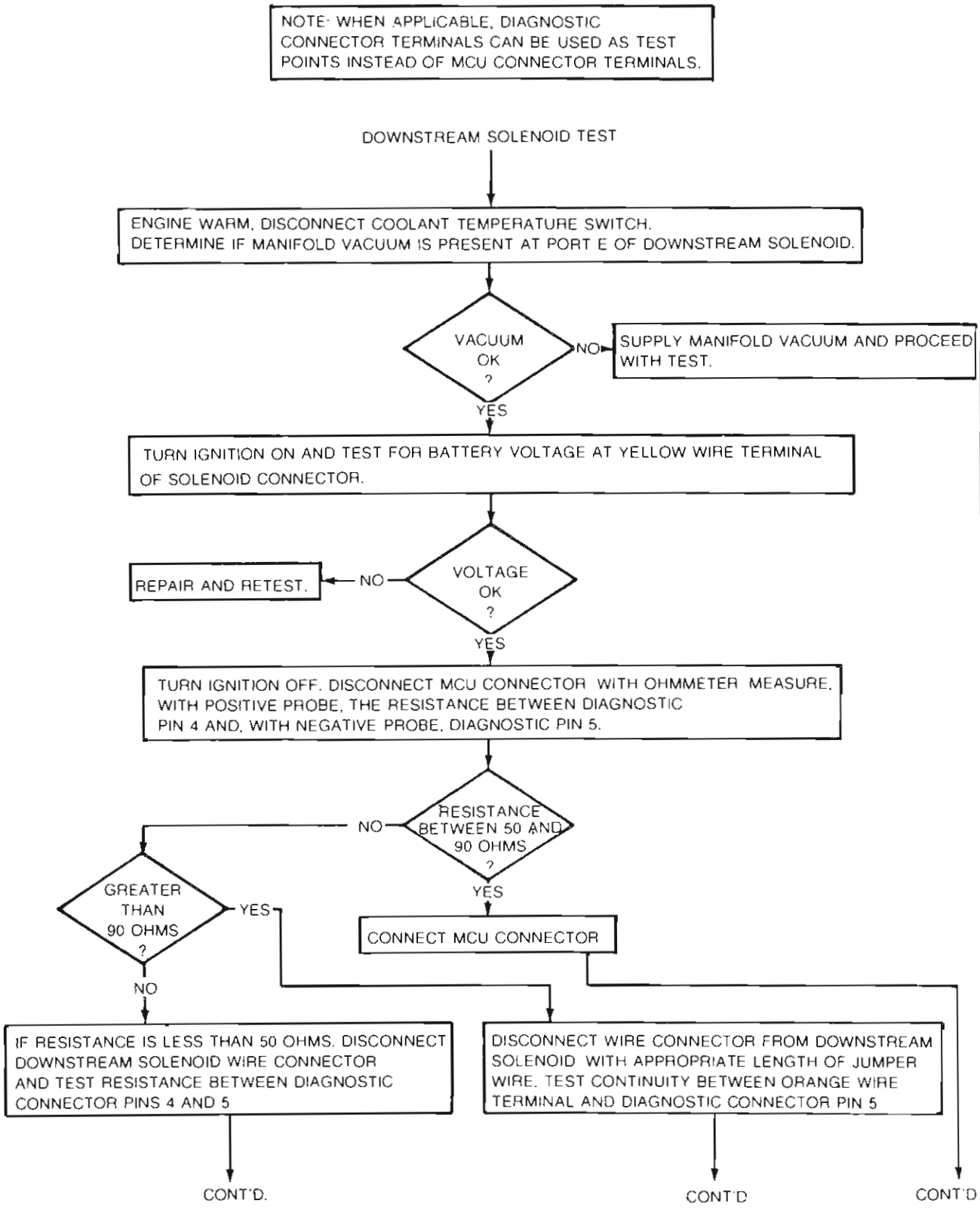
SEE I.S. NOTES

SEE I.S. NOTES



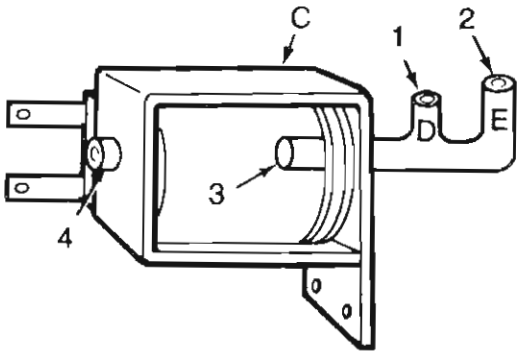
*NOTE: BEFORE REPLACING MCU, IF ENGINE FAILS TO START, CHECK FOR FAILURE OF IGNITION MODULE, COIL, DISTRIBUTOR, ETC. REFER TO IGNITION SYSTEMS –CHAPTER C.

DIAGNOSTIC TEST 6



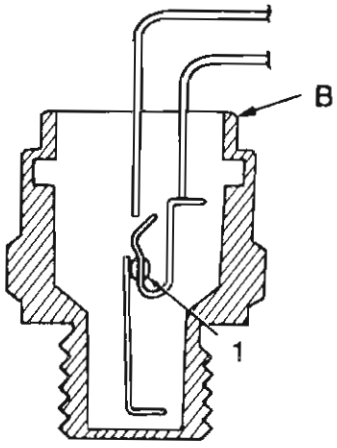
SEE I.S. NOTES

SEE I.S. NOTES



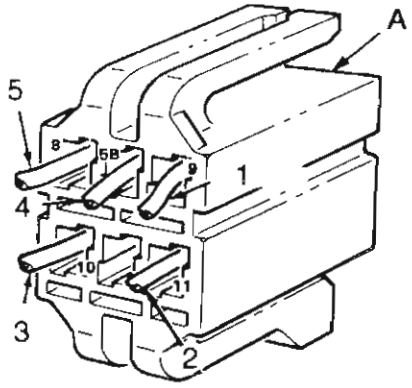
C - Vacuum Switch Solenoid
1 - Common (D)
2 - Normally Closed - NC (E)
3 - Springloaded Pin
4 - Normally Open - NO (Vent)

81147A



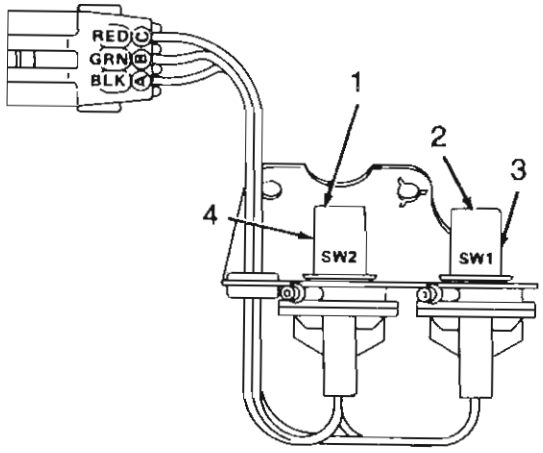
B - Coolant Temperature Switch
1 - Insulator

81146



A - Stepper Motor Connector
1 - Orange
2 - Tan
3 - Violet
4 - Red
5 - Brown

81144

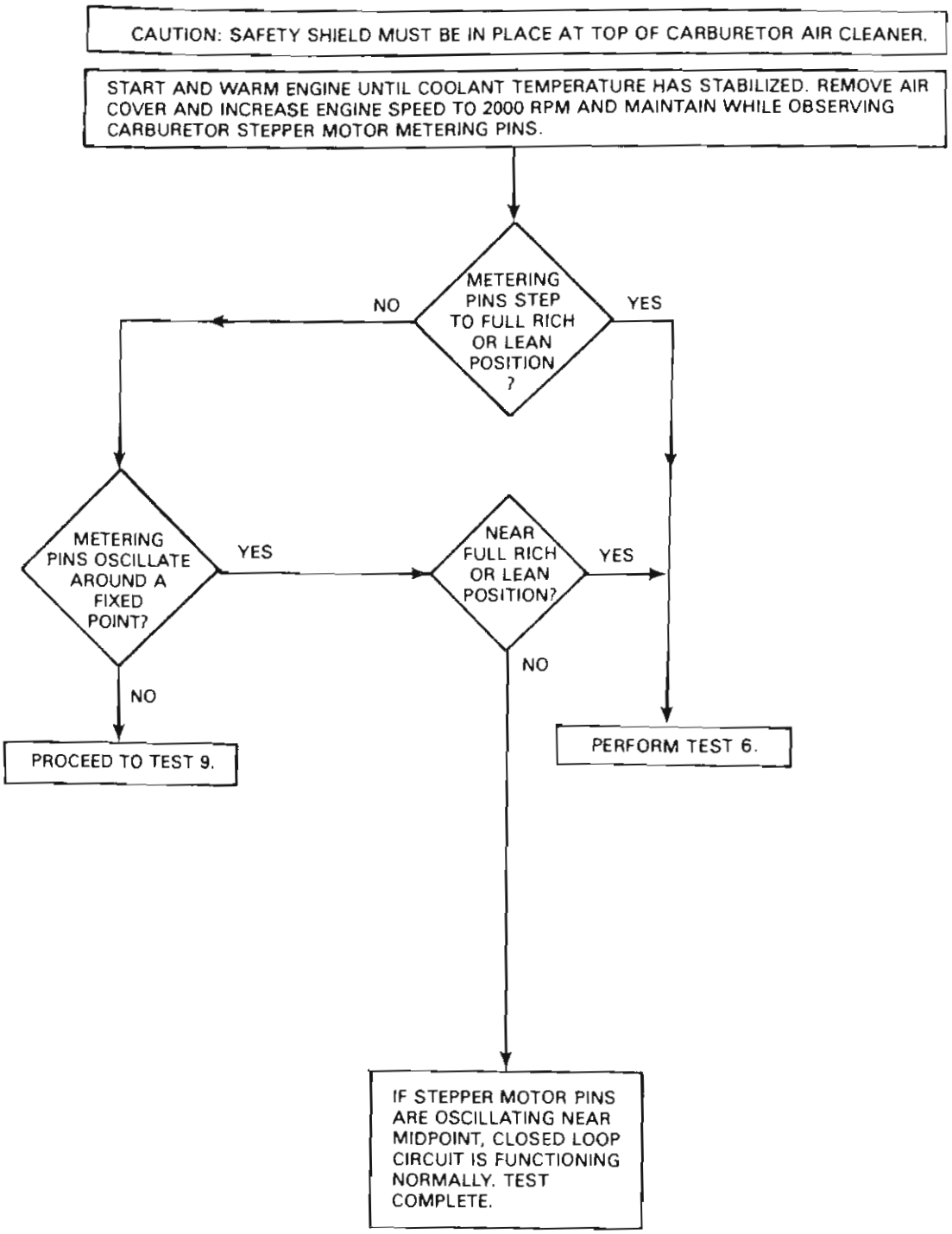


1 - 4-in Hg Vacuum Switch
2 - 10-in Hg Vacuum Switch
3 - Green Color
4 - Natural Color

81147B

DIAGNOSTIC TEST 4

CLOSED LOOP OPERATIONAL TEST



81133

SEE I.S. NOTES

RESTRICTED EXHAUST SYSTEM DIAGNOSIS

SEE I.S. NOTES

A partially restricted or blocked exhaust system usually results in loss of power and/or backfire up through the carburetor.

Verify that the condition is not caused by ignition or fuel system problems, then perform a visual inspection of the exhaust system.

If the restriction cannot be located by visual inspection, perform the following procedure.

Attach a vacuum gauge to the intake manifold.

Connect a tachometer to the ignition 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 observe the vacuum gauge. The gauge should indicate a vacuum of 53.88 - 70.73 kPa (16 - 21 in. Hg).

Increase the engine speed to 2000 rpm and observe the vacuum gauge.

The vacuum will decrease when the speed is increased rapidly, but should stabilize at 53.88 - 70.73 kPa (16 - 21 in. Hg) and remain constant.

If the vacuum remains below 53.88 kPa (16 in. Hg), the exhaust system is restricted or blocked. Stop the engine and proceed with the next step.

Disconnect the exhaust pipe at the manifold.

Start the engine and increase the speed to 2000 rpm. Observe the vacuum gauge.

If the vacuum stabilizes at 53.88 - 70.73 kPa (16 - 21 in. Hg), the restriction or blockage is either in the exhaust pipe, catalytic converter, muffler or tail pipe.

If the vacuum stabilizes below the 53.88 kPa (16 in. Hg) with the exhaust pipe disconnected, the exhaust manifold is restricted.

Stop the engine, connect the exhaust pipe and remove the muffler.

Start the engine and increase the engine speed to 2000 rpm. Observe the vacuum gauge.

If the vacuum stabilizes below 53.88 kPa (16 in. Hg), the restriction or blockage is in the catalytic converter.

If the vacuum is normal, the muffler or tail pipe is restricted.

NOTE: In the event of a catalytic converter failure, always inspect the muffler and ensure converter debris has not entered the muffler.

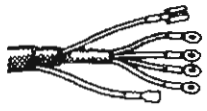
Stop the engine.

Disconnect the tachometer and vacuum gauge.

Remove the exhaust manifold. Refer to the removal procedure.

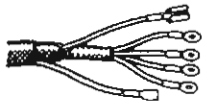
Inspect the ports of the exhaust manifold for casting flash by dropping a length of chain into each port.

NOTE: Do not use a wire or a light to inspect the ports. The restricted opening may be large enough for a wire or light to pass through but small enough to cause excessive back pressure at high engine rpm.



ELECTRICAL

CONTENTS



SEE I.S. NOTES

- 38.8°C divided by 5.5°C (70°F divided by 10°F), each 5.5°C (10°F) difference equals 7
- 7 multiplied by 0.004 (temperature correction factor) equals 0.028
- temperature is below 26.6°C (80°F), therefore, the temperature correction is subtracted
- temperature corrected specific gravity is 1.212 (1.240 minus 0.028)
- a fully charged battery should have a temperature corrected specific gravity of 1.250 - 1.265

SEE I.S. NOTES

State of Charge	Specific Gravity (Cold and Temperate Climates)
Fully Charged	1.265
75% Charged	1.225
50% Charged	1.190
25% Charged	1.155
Discharged	1.120

60340

If the specific gravity of all cells is above 1.235, but the variation between cells is more than 50 points (0.050), it is an indication that the battery is unserviceable. Remove the battery from the vehicle for additional testing.

If the specific gravity of one or more cells is less than 1.235, recharge the battery at a rate of approximately five amps until three consecutive specific gravity tests, taken at one-hour intervals, are constant.

If the cell specific gravity variation is more than 50 points (0.050) at the end of the charge period, replace the battery.

When the specific gravity of all cells is above 1.235 and variation between cells is less than 50 points (0.050), the battery may be tested under heavy load.

Heavy Load Test

NOTE: The following instructions refer to Amserv Battery-Alternator-Regulator-Starter Motor Tester, model AMA 21-317, or equivalent.

Before performing the Heavy Load Test, the battery must be fully charged. Refer to Slow Charge.

Test Results

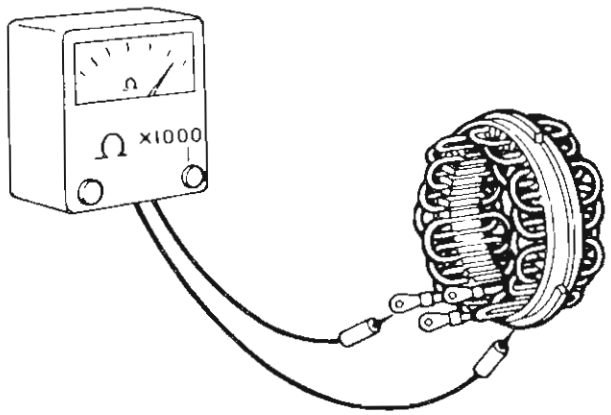
Current flow exceeding 5.0 amps indicates internally shorted windings.

NOTE: The winding resistance and ammeter indication will vary slightly with winding temperature changes. A current flow that is the less than the specified value indicates excessive winding resistance. An alternate test method is to determine the field winding resistance by connecting an ohmmeter to the two slip rings. If the resistance is less than 2.2 ohms at 27°C (80°F), the windings are internally shorted. If the resistance is more than 3.0 ohms at 27°C (80°F), the windings have excessive resistance.

Stator Windings Short Circuit-to-Ground Test

To perform this test, separate the rear housing and stator from the rotor and front housing assembly. Disconnect the stator winding terminals from the bridge rectifier (and diode trio) terminal studs. Refer to Alternator Overhaul for the procedure. The test is performed with an ohmmeter set for the x1000 scale or with a 110-volt test lamp.

Touch one test lead probe to the bare metal surface of the stator core and the other test lead probe to the end of one stator winding. Because all three stator winding terminals are soldered together, it is not necessary to test each winding. The ohmmeter should indicate infinite resistance (no pointer movement) or the test lamp should not light.



Test Results

If the ohmmeter indicates other than an infinite resistance or the test lamp lights, the stator windings have a short circuit to the core (ground) and must be replaced.

SEE I.S. NOTES

TROUBLESHOOTING

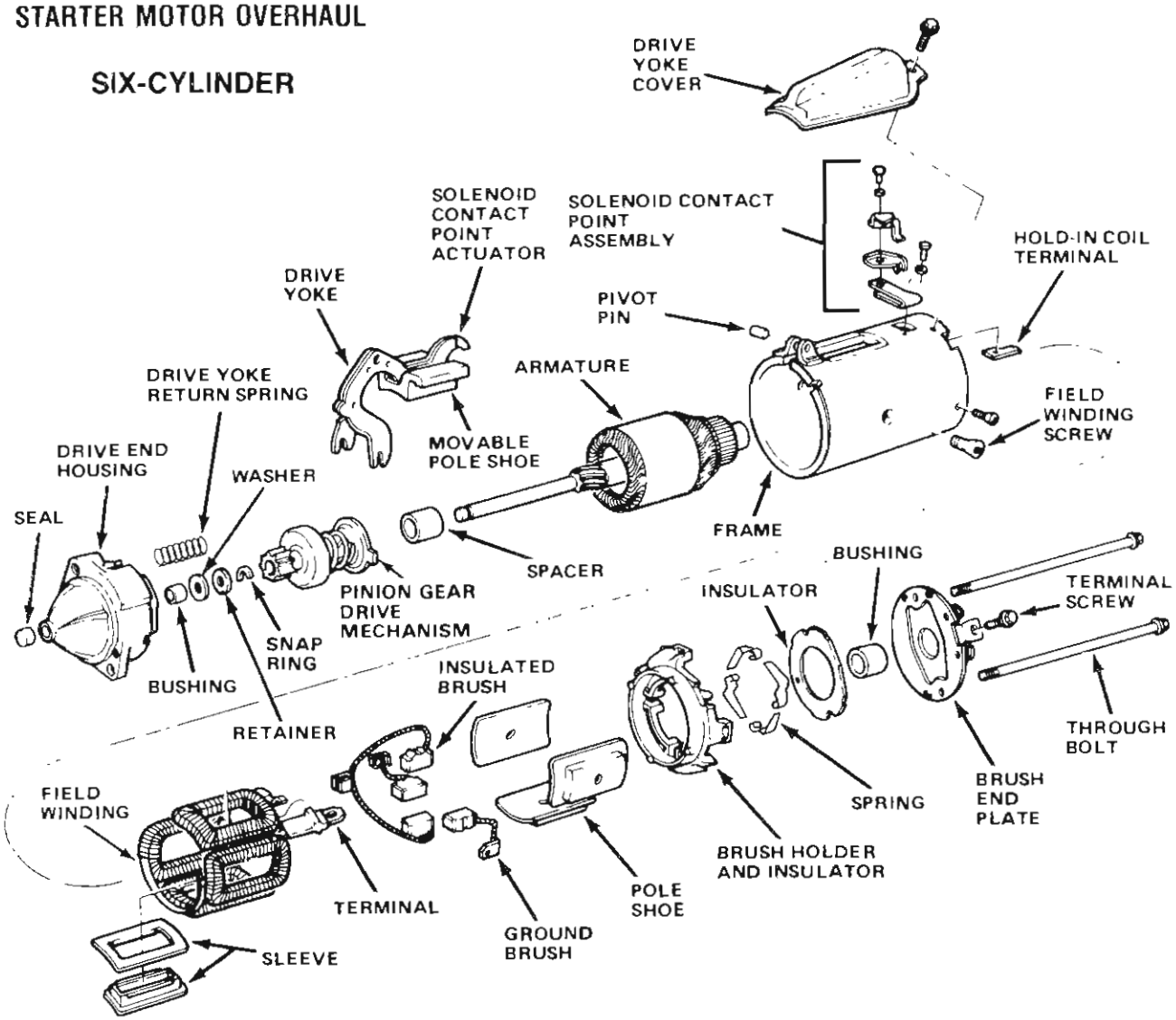
The Service Diagnosis chart may be used to isolate the source of the problem when the starter motor either rotates the engine too slowly, will not rotate the engine or has abnormal drive engagement.

If the starter motor rotating speed is normal and the drive pinion gear engages properly with the ring gear but the engine does not start, a problem exists either in the fuel system or ignition system.

SEE I.S. NOTES

STARTER MOTOR OVERHAUL

SIX-CYLINDER



Starter Motor—Exploded View

1. Seal
2. Drive End Housing
3. Bushing
4. Drive Yoke Return Spring
5. Washer
6. Retainer
7. Snap Ring
8. Pinion Gear Drive Mechanism
9. Drive Yoke
10. Solenoid Contact Point Actuator
11. Spacer
12. Movable Pole Shoe
13. Armature
14. Pivot Pin
15. Solenoid Contact Point Assembly
16. Drive Yoke Cover
17. Hold-In Coil Terminal
18. Field Winding Screw
19. Bushing
20. Frame
21. Insulator
22. Insulated Brush
23. Field Winding
24. Sleeve
25. Terminal
26. Ground Brush
27. Pole Shoe
28. Brush Holder and Insulator
29. Spring
30. Brush End Plate
31. Through Bolt
32. Terminal Screw

SEE I.S. NOTES

840245

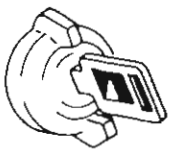
Chart 1

STEP | SEQUENCE | RESULT

SEE I.S. NOTES

6

- TURN IGNITION OFF



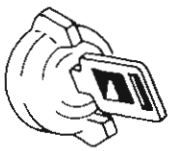
CONNECT OHMMETER BETWEEN COIL POSITIVE TERMINAL AND DASH CONNECTOR FW

OK → RESISTANCE TOO HIGH (1.40 OHMS OR MORE) → REPAIR RESISTANCE WIRE → STOP

OK → RESISTANCE ACCEPTABLE (1.35 ± .05 OHMS) → **7**

7

CONNECT OHMMETER BETWEEN DASH CONNECTOR FW AND IGNITION SWITCH TERMINAL I1



- IGNITION REMAINS OFF

OK → RESISTANCE ACCEPTABLE (LESS THAN 0.1 OHM) → REPLACE IGNITION SWITCH OR REPAIR SWITCH WIRE FROM BATTERY → STOP

RESISTANCE TOO HIGH (MORE THAN 0.1 OHM) → ✓ → REPAIR DEFECT → STOP

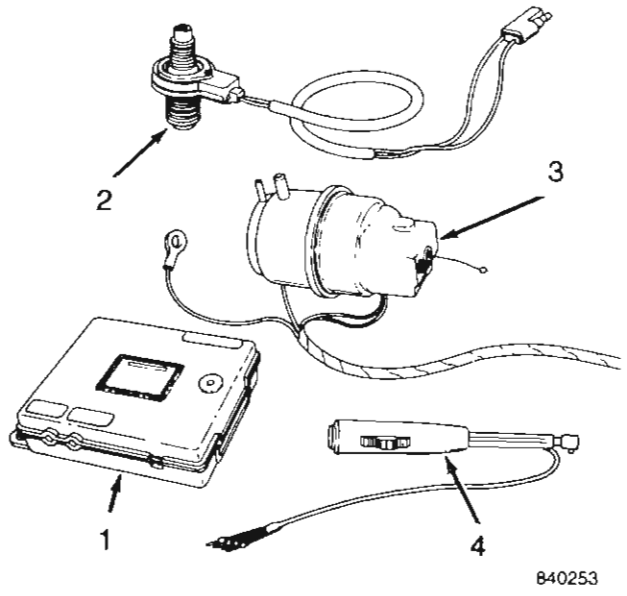
- POOR TERMINAL CONNECTIONS AT DASH CONNECTOR OR IGNITION SWITCH
- DEFECTIVE WIRING

- PROCEED TO COIL TEST

80699C

GENERAL

The cruise command is a closed loop electro-mechanical servo system that consists of the following components: electronic regulator (1), speed sensor (2), servo (3), control switch (4), vacuum storage can and check valve and the release mechanisms, which consist of a mechanical vacuum vent and brake lamp switch.



Cruise Command operation is limited to speeds above 48 km/h (30 mph).

WARNING: Do not use the Cruise Command when driving on slippery or congested roads.

SEE I.S. NOTES

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
AM PC-1-R	Tester		■
J-21008	Continuity Test Lamp		■

To adjust the regulator for engagement speed complaints, drive the vehicle on a level road surface and check operation.

If the actual engagement speed is 3.2 km/h (2 mph) or more above the selected engagement speed, stop the vehicle, turn the regulator centering screw approximately 1/16 of a turn counterclockwise and check the engagement speed again. Readjust the speed as needed. If the actual engagement speed is 3.2 km/h (2 mph) or more below the selected engagement speed, stop the vehicle, turn the regulator centering screw 1/16 of a turn clockwise and check the engagement speed again.

SEE I.S. NOTES

Vacuum (Mechanical) Vent Valve Adjustment

Depress the brake or clutch pedal and hold in the depressed position.

Move the vacuum vent valve toward the bracket on the pedal as far as possible.

Release the brake or clutch pedal.

COMPONENT REPLACEMENT

Regulator Replacement

The regulator is mounted on a bracket under the instrument panel near the headlamp switch. Remove the screws or tie straps and unplug the connector. Insert a suitable thin tool to depress the tab inside the hole on the regulator identified by "Terminal Release." To install, plug the connector into the regulator and install the screws.

Servo Replacement

Removal

Remove the retaining nuts and cable housing from the servo.

Spread the clip that connects the cable to the servo and remove.

Disconnect the vacuum hoses from the servo.

Remove the retaining nut and servo from the bracket. Note the position of the ground cable.

Disconnect the wire harness connector under the instrument panel. Carefully maneuver the wire harness through the dash panel and remove the servo.

Installation

Install the servo and nut on the bracket. Tighten with 7 N·m (60 in-lbs) torque. Ensure the ground cable is positioned on the stud.

Maneuver the wire harness through the dash panel and connect the connector.

Attach the cable to the servo and squeeze the clip to retain the cable.

NOTE: Mounting studs are not equally spaced from the hole in the servo. Ensure the housing is installed correctly.

Connect the vacuum hoses.

DIAGNOSIS AND REPAIR SIMPLIFICATION (DARS) CHARTS

PROBLEM: FUEL GAUGE NOT FUNCTIONING PROPERLY

Chart 1

STEP	SEQUENCE	RESULT
1	● NOTE POSITION OF FUEL GAUGE POINTER ● TURN IGNITION SWITCH ON AND WAIT 2 MINUTES FOR GAUGE TO WARM UP ● OBSERVE POINTER BEFORE STARTING TEST: ENGINE MUST BE WARM FUEL TANK MUST BE NEITHER COMPLETELY FULL NOR COMPLETELY EMPTY	POINTER DOES NOT MOVE → 2 POINTER MOVES TO INCORRECT POSITION → 17 POINTER MOVES TO MAXIMUM AND STAYS → 9 POINTER PULSATES MORE THAN WIDTH OF POINTER → REPLACE CVR → STOP
2	CHECK 3-AMP FUSE AT FUSE PANEL	FUSE BLOWN → GO TO CHART 2 STEP 1 FUSE NOT BLOWN → 3
3	OBSERVE TEMPERATURE GAUGE	TEMPERATURE GAUGE POINTER DOES NOT MOVE → GO TO CHART 3 STEP 1 TEMPERATURE GAUGE POINTER INDICATES PROPERLY → 4

SEE I.S. NOTES

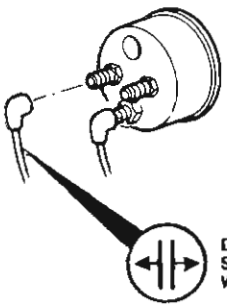
86377A

Chart 4

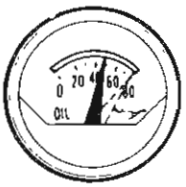
STEP | SEQUENCE | RESULT

SEE I.S. NOTES

10



DISCONNECT SENDING UNIT WIRE FROM GAUGE



POINTER DROPS FROM MAXIMUM

REPLACE SENDING UNIT WIRE

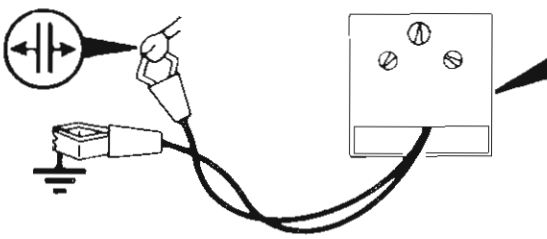
STOP

POINTER REMAINS AT MAXIMUM

REPLACE GAUGE

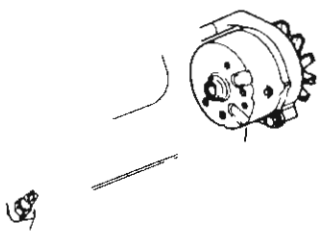
STOP

11



DISCONNECT SENDING UNIT WIRE

CONNECT ONE TESTER LEAD TO GROUND AND ONE LEAD TO SENDING UNIT WIRE



- TURN IGNITION SWITCH ON
- ADJUST TESTER TO SELECT OHM VALUES LISTED IN SENDING UNIT RESISTANCE CHART.

OBSERVE GAUGE INDICATION AT EACH OHM SETTING.

OK

GAUGE INDICATIONS NOT ACCURATE AT EACH OHM SETTING

12

OK

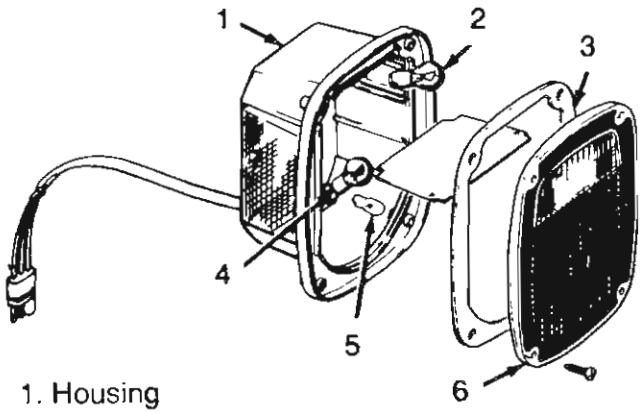
GAUGE INDICATIONS ACCURATE AT EACH OHM SETTING

REPLACE SENDING UNIT

STOP

80314D

bulb. Clean the lens and reflector before installing.



1. Housing
2. Backup Lamp Bulb
3. Gasket
4. Tail-Stop Directional Lamp Bulb
5. Side Marker Lamp Bulb
6. Lens

841291

Taillamp Housing Replacement

Disconnect the wiring, remove the taillamp lens, and remove the screws attaching the taillamp assembly body and remove.

Side Marker Bulb Replacement

Remove the lens attaching screws, lens and gasket. Clean the lens and reflector before installing.

Pull the side marker bulb straight out of the socket.

To install the new bulb, push straight into the socket.

Position the lens gasket and lens and install the screws.

Back Up Lamp

To replace the bulb remove the taillamp lens.

Remove old bulb and install new bulb.

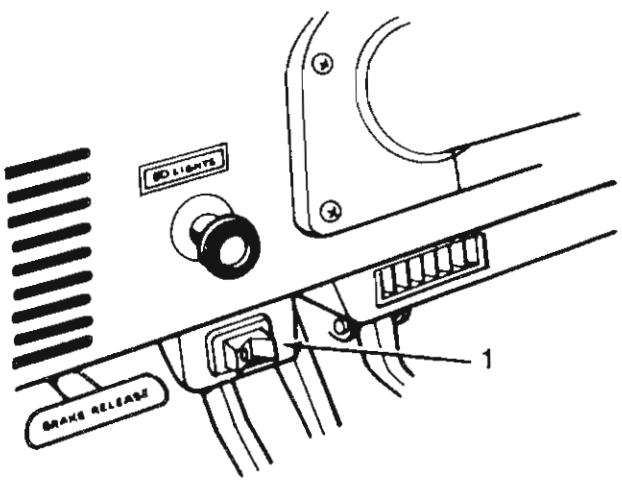
License Plate Lamp

The left taillamp illuminates the license plate.

Fog Lamps

The switch (1) is located on the far left side of the instrument panel.

NOTE: Fog lamps are turned off by the circuit relay when the high beam driving lamps are turned on. The circuit relay is located on the right front wheelhouse panel near the blower motor.



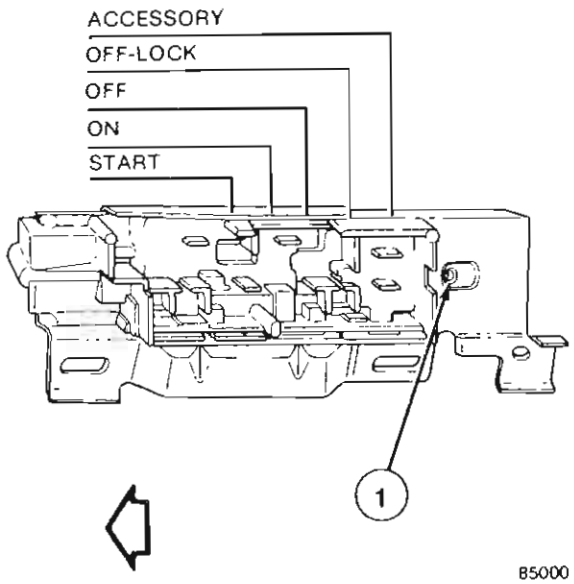
841262

SEE I.S. NOTES

Move the slider to the extreme right (ACCESSORY position).

NOTE: The right side of the ignition switch is downward from the steering wheel.

Position the actuator rod in the slider hole (1).



Install the switch to the steering column but do not tighten the attaching screws.

Lightly push the switch down the column (away from the steering wheel) to remove the lash in the actuator rod, while holding the key in the ACCESSORY position. Be careful not to move the slider out of the detent.

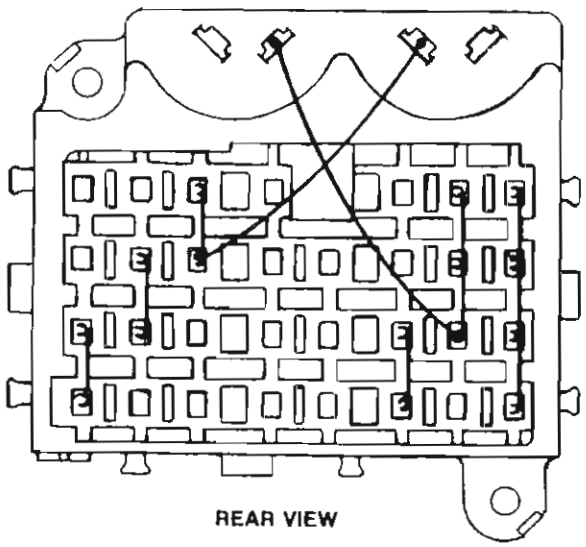
Tighten the attaching screws securely.

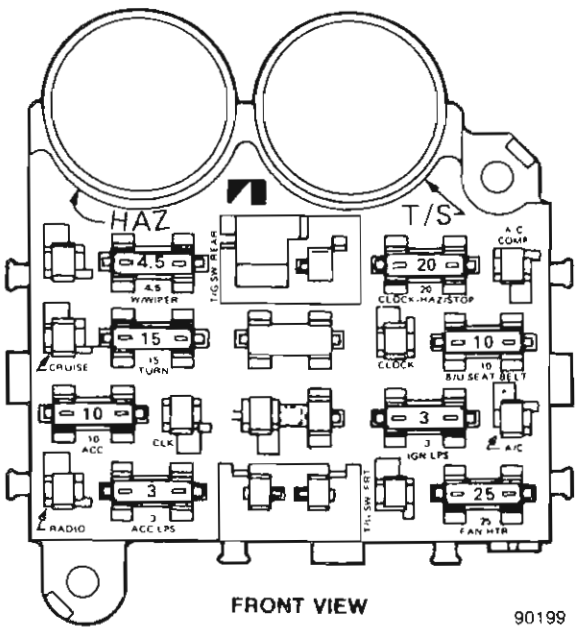
Connect the white connector and then the black connector to the ignition switch.

Install the steering tube cover, if removed.

FUSE PANEL

The fuse panel is located on the passenger compartment side of the dash panel, attached to the main harness connector.



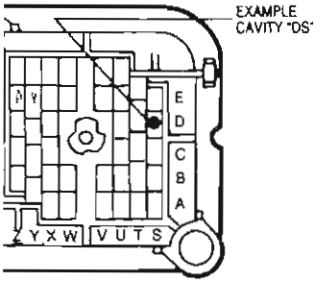


CIRCUIT BREAKERS

Headlamps are protected by a 24-amp circuit breaker located in the headlamp switch.

IE CONNECTORS

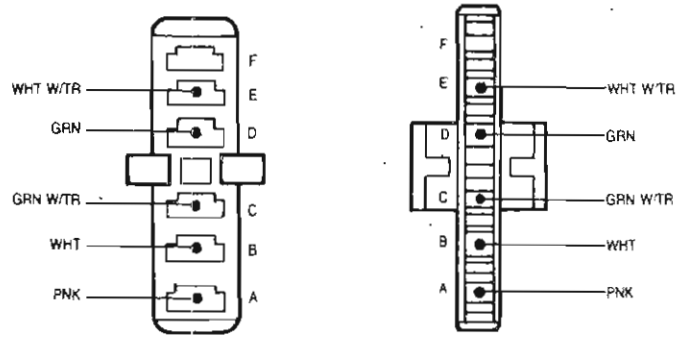
C100



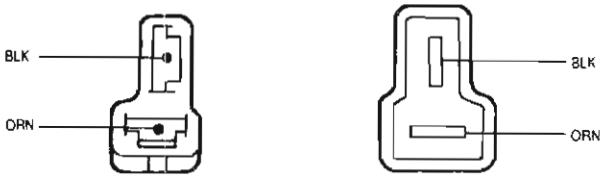
VIEWED FROM DASH PANEL

ENGINE	FUNCTION
V10 W/TR	ENGINE TEMPERATURE
LT BLU	START
BLACK	BRAKE WARNING
BLACK	BRAKE WARNING
RED W/TR	IGNITION FEED
BRN	A/C COMPRESSOR
	HEADLAMP ON
V10	ENGINE OIL PRESSURE
ORN	FOG LAMP FEED
RED	ELECTRONIC ENGINE CONTROL FEED
LT BRN	HEATER BLOWER MOTOR FEED
RED	FUSED IGNITION ON FEED
YEL	WINDSHIELD WASHER PUMP FEED
ORN	UNDERHOOD LAMP FEED
WHT W/TR	BACKUP LAMP FEED
GRN W/TR	LH FRONT TURN LAMP FEED
GRY	LH HEADLAMP LO BEAM FEED
RED W/TR	HORN FEED
GRY W/TR	LH HEADLAMP HI BEAM FEED
RED	BATTERY FEED
ORN	4-WHEEL DR IND LAMP
WHT	PARK AND MARKER LAMP FEED
GRN	RH FRONT TURN LAMP FEED
DK GRN	TACHOMETER COIL SIGNAL
	EMISSION MAINT. LAMP

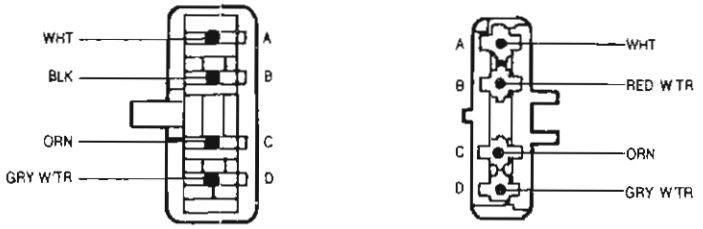
C102



C103



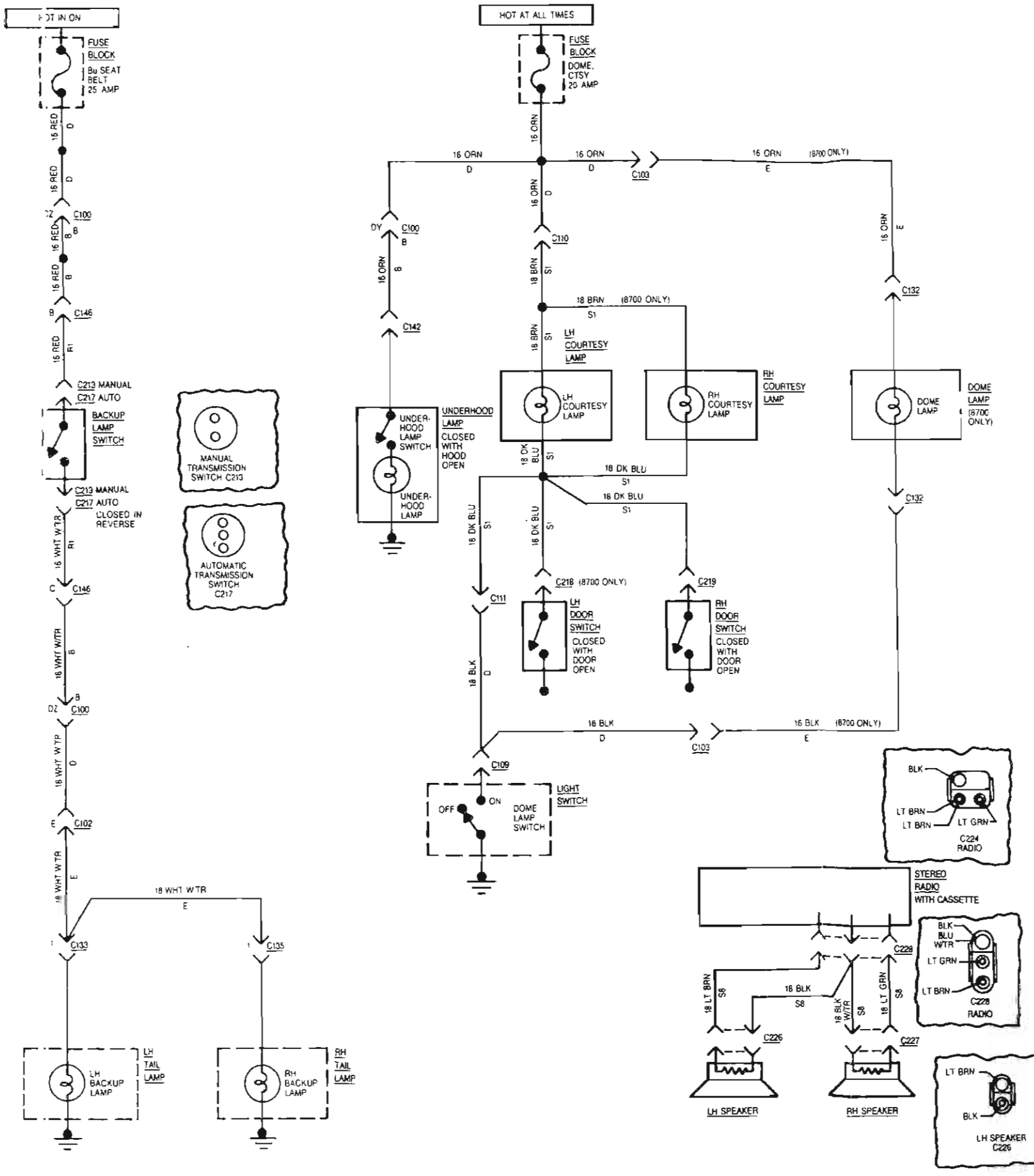
C108



C123

BACKUP LAMP

UNDERHOOD LAMP, COURTESY LAMPS, DOME LAMP



Clean oil and dirt from the clutch cover with a solvent and allow the cover to air dry.

Sand the pressure plate surface lightly using a fine emery cloth.

Lubricate the cover release lever pivots with chassis grease.

NOTE: Apply lubricant to the pivots sparingly. Excessive lubricant could result in grease contamination of the pressure plate and driven plate surfaces.

SEE I.S. NOTES

Inspect the crankshaft pilot bushing for heavy scoring, an angular wear pattern, or discoloration. Replace as necessary. Be sure to soak the bushing in engine oil before installation.

NOTE: If the pilot bushing displays an angular-type wear pattern, check and correct the clutch housing alignment before proceeding.

Inspect the condition of the splines on the transmission clutch shaft and in the driven plate hub. If severely worn, galled, or corroded, replace the clutch shaft or driven plate. Corrosion, rust, or burrs can be removed from the splines using an oilstone or fine-tooth file. Install the driven plate on the clutch shaft. The driven plate must move freely on the shaft.

If the components inspected in the previous steps are in good condition, proceed to the next step. If one or more problems were discovered during the inspection procedure, repair as necessary and proceed to the next step.

Check the clutch housing alignment. Correct the alignment if necessary and proceed to the next step.

Apply a thin film of chassis grease to the transmission clutch shaft splines. Do not apply grease to the shaft pilot hub.

Install the pilot bushing lubricating wick.

Install the transmission and clutch components.

Lower the vehicle.

CLUTCH PEDAL PULSATION

Clutch pedal pulsation can be described as a rapid up-and-down or pumping-type movement of the pedal that is not accompanied by any noise.

Pulsation is usually caused by incorrect clutch release lever height or clutch housing misalignment. Check the clutch operation as follows.

Start the engine, slowly depress the clutch pedal until the throwout bearing makes initial contact with the clutch release levers, and check for pulsation.

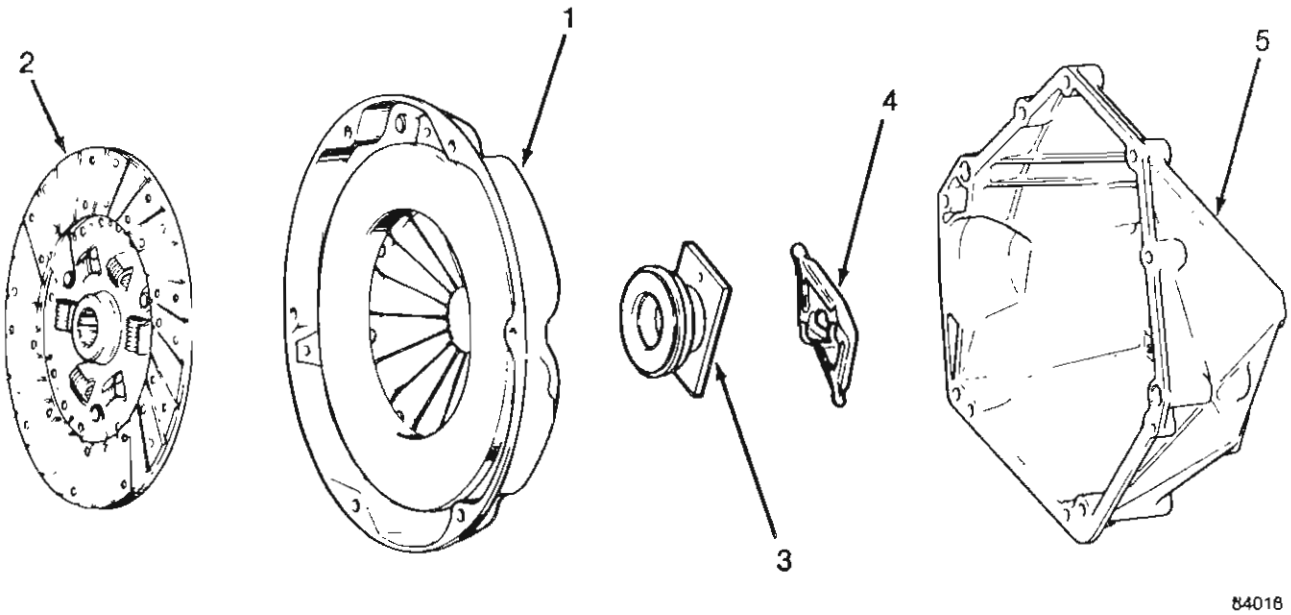
NOTE: Some minor pulsation is normal.

Continue to depress the clutch pedal while checking for pulsation until the pedal is fully depressed.

If pulsation is not evident or is minor, discontinue the repair. If pulsation is very rapid and can be felt throughout the vehicle, refer to Clutch Related Vibrations. If the vehicle displays pulsation symptoms, proceed to the next step.

Remove the transmission and the clutch components.

Remove the pilot bushing lubricating wick and soak the wick in engine oil.



CLUTCH ASSEMBLY INSTALLATION

Install the pilot bushing lubricating wick.

Insert Clutch Alignment Tool J-33169 in the hub of the clutch driven plate (2) and position the plate on the flywheel. Be sure that the alignment tool is fully seated in the pilot bushing.

NOTE: Be sure that the side of the driven plate, marked flywheel side, is positioned against the flywheel.

Position the clutch cover (1) on the flywheel and over the driven plate.

Align the driven plate and the clutch cover using the alignment tool and install the cover attaching bolts finger-tight only.

CAUTION: To avoid warping the clutch cover, tighten the cover attaching bolts a few turns at a time only.

Tighten the clutch cover bolts alternately and evenly with the specified torque.

CLUTCH COMPONENT INSPECTION AND SERVICE

Clutch Pilot Bushing Removal

Remove the clutch assembly. Refer to Clutch Assembly Removal in this section.

Obtain and lubricate the replacement pilot bushing with engine oil.

Remove the pilot bushing lubricating wick and soak the wick in engine oil.

Remove the old bushing using Removal Tool J-5822 and Slide Hammer J-2619-01.

TORQUE SPECIFICATIONS

Component	Service Set-To Torque	Service Recheck Torque
Model T4/T5 Transmission		
Backup Lamp Switch	20 N·m (15 ft-lbs)	20-34 N·m (15-25 ft-lbs)
Fill Plug	31 N·m (23 ft-lbs)	20-41 N·m (15-30 ft-lbs)
Shift Control Housing Bolt	18 N·m (13 ft-lbs)	15-20 N·m (11-15 ft-lbs)
Transmission-to-Clutch Housing Bolt	75 N·m (55 ft-lbs)	61-65 N·m (45-65 ft-lbs)
Universal Joint Clamp Strap Bolt	19 N·m (14 ft-lbs)	16-24 N·m (12-18 ft-lbs)
Model T-176 Transmission		
Backup Lamp Switch	20 N·m (15 ft-lbs)	14-27 N·m (10-20 ft-lbs)
Drain and Fill Plugs	20 N·m (15 ft-lbs)	14-27 N·m (10-20 ft-lbs)
Front Bearing Cap Bolts	18 N·m (13 ft-lbs)	15-20 N·m (11-15 ft-lbs)
Shift Housing-to-Transmission Case Bolts	18 N·m (13 ft-lbs)	15-20 N·m (11-15 ft-lbs)
Support Plate Bolts	24 N·m (18 ft-lbs)	20-27 N·m (15-20 ft-lbs)
Model 300 Transfer Case		
Bottom Cover Bolts	20 N·m (15 ft-lbs)	14-27 N·m (10-20 ft-lbs)
Cover Plate Bolts	47 N·m (35 ft-lbs)	34-54 N·m (25-40 ft-lbs)
Front Bearing Cap Bolts	47 N·m (35 ft-lbs)	34-54 N·m (25-40 ft-lbs)
Front/Rear Yoke Locknuts	163 N·m (120 ft-lbs)	163-203 N·m (120-150 ft-lbs)
Input Shaft Support Screws	14 N·m (10 ft-lbs)	9-14 N·m (7-10 ft-lbs)
Lockplate Bolts	31 N·m (23 ft-lbs)	27-34 N·m (20-25 ft-lbs)
Shift Fork Setscrews	19 N·m (14 ft-lbs)	16-24 N·m (12-18 ft-lbs)

SEE I.S. NOTES

Install:

- the transfer case shift lever
- the shifter shaft
- the link pins
- the control link assembly

Connect the front propeller shaft to the transfer case yoke. Tighten the clamp strap bolts with 20 N·m (15 ft-lbs) torque. Be sure the shaft and yoke are aligned according to the reference marks made during disassembly.

Connect the vent hose to the transfer case.

Connect the wire to the four-wheel drive indicator switch.

Connect the speedometer cable.

Install the rear crossmember. Tighten the crossmember attaching nuts and bolts with 41 N·m (30 ft-lbs) torque.

Remove the safety stand used to support the engine.

Connect the rear propeller shaft to the transfer case yoke. Tighten the clamp strap bolts with 20 N·m (15 ft-lbs) torque. Be sure the shaft and yoke are aligned according to the reference marks made during disassembly.

Check and correct the transmission and transfer case lubricant levels, if necessary.

Lower the vehicle.

Install the shift lever and housing on the transmission and tighten the housing bolts with 14 N·m (10 ft-lbs) torque.

Use RTV sealant, or an equivalent, to seal the housing to the transmission case. Be sure the shift lever is properly engaged with the offset lever before tightening the housing bolts.

Position the shift lever boot on the floorpan and install the boot attaching screws.

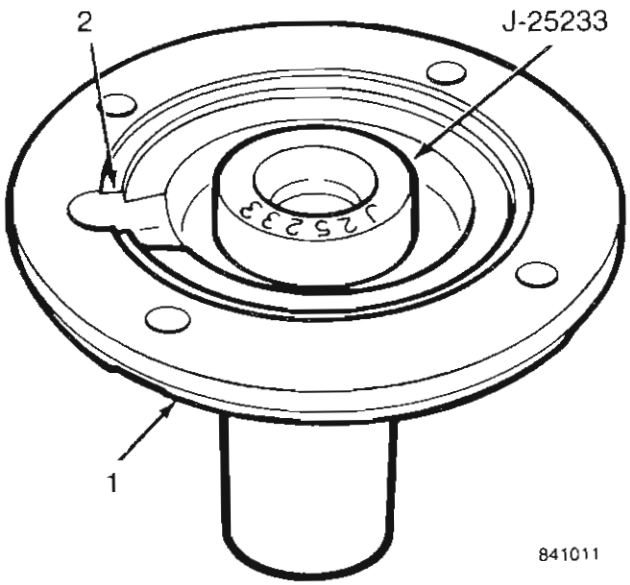
NOTE: For overhaul procedures, refer to B.V. T4/5.

SEE I.S. NOTES

Remove the front bearing cap (1), seat the front bearing fully on the clutch shaft and install the bearing retaining snap ring.

Apply a thin film of sealer to the front bearing cap gasket and position the gasket on the case. Be sure the gasket notch is aligned with the oil return hole in the case.

Remove the front bearing cap oil seal using a screwdriver and install the replacement oil seal using Tool J-25233.



Install the front bearing cap. Tighten the cap bolts with 16 N·m (12 ft-lbs) torque.

Install the locating ring on the rear bearing. If necessary, reseat the bearing in the case using a rawhide mallet.

CAUTION: When installing the countershaft, be careful not to damage the thrust washers. Be sure they are aligned with the case bores and gear bores before tapping the countershaft into place.

Install the countershaft as follows:

- turn the transmission case on end, positioning the case at the edge of the workbench with the clutch shaft pointing downward; be sure the countershaft bore in the front of the case is accessible
- have an assistant hold the case in position
- align the countershaft gear bores with the thrust washers and case bores and tap the shaft into place; do not let the arbor tool drop on the floor while the shaft is being installed

Shift the synchronizer sleeves into all the gear positions and check the operation. If the clutch shaft and mainshaft appear to bind in the Neutral position, check for synchronizer rings sticking on the tapered portion of the gears. Use a screwdriver to free any sticking blocking rings.

Fill the transmission with 1.7 liters (3.5 pts) of AMC/Jeep Manual Transmission Fluid, Part no. 8983 000 000.

Position the new shift control housing gasket on the case and install the control housing. Tighten the housing bolts with 16 N·m (12-ft-lbs) torque.

Remove the socket head screws attaching the input shaft support (1) to the case and remove the support, rear output shaft gear (2) and input shaft (3) as an assembly.

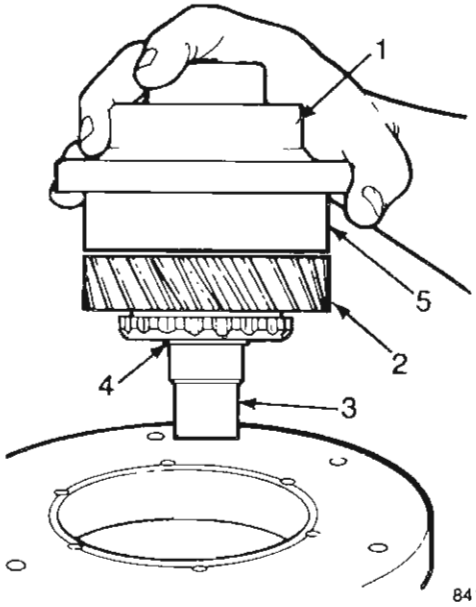
NOTE: The support has been coated with a sealant. Use a putty knife to break the seal, and work the knife around the support to loosen and remove it.

Remove the rear output shaft clutch sleeve from the case.

Remove and discard the snap ring (4) retaining the rear output shaft gear on the input shaft and remove the gear.

Remove and discard the input shaft bearing snap ring.

Remove the input shaft and bearing (5) from the support. Tap the end of the input shaft with a plastic mallet to aid removal.



841118

Remove the input shaft bearing and end play shims from the shaft using an arbor press.

Remove the input shaft oil seal from the support. Discard the seal.

Remove the intermediate shaft lockplate bolt and lockplate.

Remove the intermediate shaft. Tap the shaft out of the case using a brass punch and plastic mallet.

Remove and discard the intermediate shaft O-ring seal.

Remove the intermediate gear assembly and thrust washers.

NOTE: The thrust washers have locating tabs which must fit in the notches in the case at assembly.

Remove the needle bearings and bearing spacers from the intermediate gear.

NOTE: There are 48 needle bearings and three bearing spacers in the intermediate gear.

Remove the rear bearing cap attaching bolts and remove the cap. Use a plastic mallet to tap on the output shaft to aid in the cap removal.

NOTE: The rear bearing cap has been coated with a sealant. Use a putty knife to break the seal, and work the knife around the cap to loosen and remove it.

Remove the end play shims and speedometer drive gear from the rear output shaft.

Remove and discard the rear output shaft oil seal. Remove the bearings and bearing races from the rear bearing cap.

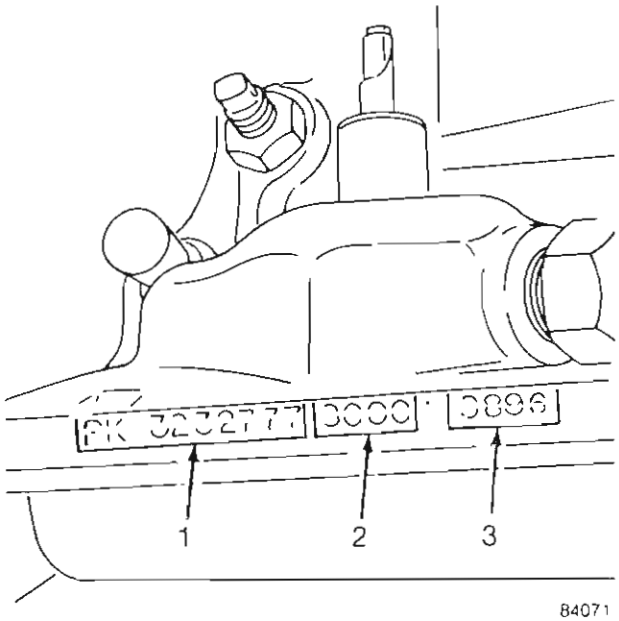
SEE I.S. NOTES

Band Adjustments

	999
Front Band Turns*	2
Rear Band Turns*	4

NOTE: *999 backed off from 8 N·m (72 in-lb)

840604



84071

Fluid Capacity

The fluid capacity for the Model 999 transmission is 8 liters (17 pints) and reflects the combined or total amount required for both the transmission and torque converter.

TRANSMISSION AND TORQUE CONVERTER IDENTIFICATION

Transmission Code and Part Numbers

A seven-digit transmission part number (1) is stamped on the left side of the case just above the oil pan mating surface. This number is followed by a four-digit code number (2) which indicates the date of manufacture. The final four-digit number group (3) stamped on the case represents the transmission serial number.

Torque Converter Identification

Because the lockup mechanism is completely enclosed within the converter and not visible, lockup converters have an identifying decal attached to the front cover. The decal is circular in shape and states the converter type and stall ratio, such as Lockup and LS (low stall) or HS (high stall).

Torque Converter Service

The torque converter is a welded assembly and is not serviceable. If diagnosis indicates a malfunction has occurred, or if the converter becomes contaminated with foreign material, replace the converter as an assembly only. Do not attempt to repair or flush the unit. In addition, never attempt to interchange lockup and conventional converters. The transmission input shaft and valve body required for lockup operation are different.

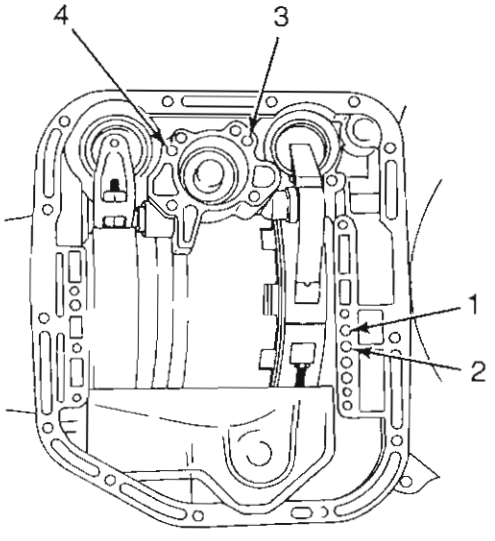
SEE I.S. NOTES

AIR PRESSURE TESTS

CAUTION: Use dry, filtered compressed air only when performing air pressure tests. Pressures of 207 - 689 kPa (30 - 100 psi) are required to perform the tests.

Air pressure testing is used as a diagnostic tool before transmission removal and also as a method of confirming proper clutch, band and servo operation after repair. The tests involve substituting air pressure for fluid pressure by applying air pressure to the appropriate case passages after the valve body has been removed.

SEE I.S. NOTES



84082

Front Clutch Test

Place one or two fingers on the clutch housing and apply air pressure to the front clutch apply passage (1).

Movement of the piston can be felt and a soft thud may be heard as the clutch applies. While air pressure is applied, check for excessive air leakage.

Rear Clutch Test

Place one or two fingers on the clutch housing and apply air pressure to the rear clutch apply passage (2). Movement of the piston can be felt and a soft thud may be heard as the clutch applies. While air pressure is applied, check for excessive or unusual air leakage.

Front Servo Test

Apply air pressure to the front servo apply passage (3). The servo rod should extend and cause the band to tighten around the drum. While air pressure is applied, check for excessive air leakage. Spring tension should release the servo when air pressure is removed.

Rear Servo Test

Apply air pressure to the rear servo apply passage (4). The servo rod should extend and cause the band to tighten around the drum. While air pressure is applied, check for excessive air leakage. Spring tension should release the servo when air pressure is removed.

CONVERTER HOUSING FLUID LEAK DIAGNOSIS

When diagnosing converter housing fluid leaks, two facts must be established before attempting repair. First, it must be verified that a leak condition does actually exist and second, the real source of the leak must be determined. Failure to establish these facts beforehand can result in incorrect and unnecessary repairs.

In some cases, suspected converter housing fluid leaks may not be leaks at all. They may be the result of residual fluid in the converter housing or excess fluid spilled during factory filling or initial transmission operation. These

REMOVAL

Raise the vehicle.

Remove the oil pan and drain the fluid.

Inspect the fluid and the filter for friction material or metal particles which indicate worn or damaged parts.

Remove the three screws attaching the filter to the valve body and remove the filter.

INSTALLATION

Install a replacement filter and tighten the filter attaching screws with 4 N·m (35 in-lbs) torque.

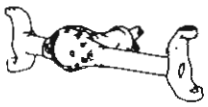
Clean and install the oil pan and a replacement pan gasket. Tighten the pan bolts with 17 N·m (150 in-lbs) torque.

Lower the vehicle.

Fill the transmission with AMC/Jeep/Renault Automatic Transmission Fluid or equivalent labeled Dexron II®. Refer to Fluid Level and Condition for the refill procedure.

SEE I.S. NOTES

STEERING AND FRONT AXLE



CONTENTS

SEE I.S. NOTES

Service Diagnosis—Turn Signal

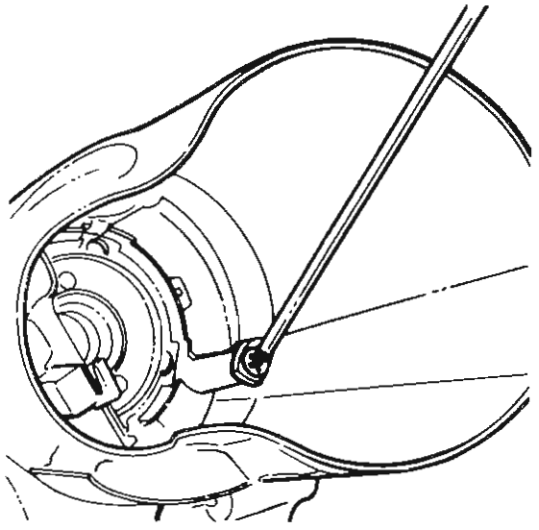
Condition	Possible Cause	Correction
TURN SIGNAL WILL NOT CANCEL	(1) Loose switch mounting screws.	(1) Tighten screws.
	(2) Switch or anchor bosses broken.	(2) Replace switch.
	(3) Broken, missing or out of position detent, or cancelling spring.	(3) Reposition springs or replace switch as required.
TURN SIGNAL DIFFICULT TO OPERATE	(1) Turn signal lever loose.	(1) Tighten mounting screw.
	(2) Switch yoke broken or distorted.	(2) Replace switch.
	(3) Loose or misplaced springs.	(3) Reposition springs or replace switch.
	(4) Foreign parts and/or materials in switch.	(4) Remove foreign parts and/or material.
	(5) Switch mounted loosely.	(5) Tighten mounting screws.
TURN SIGNAL WILL NOT INDICATE LANE CHANGE	(1) Broken lane change pressure pad or spring hanger.	(1) Replace switch.
	(2) Broken, missing or misplaced lane change spring.	(2) Replace or reposition as required.
	(3) Jammed wires.	(3) Loosen mounting screws, reposition wires and retighten screws.
TURN SIGNAL WILL NOT STAY IN TURN POSITION	(1) Foreign material or loose parts impeding movement of switch yoke.	(1) Remove material and/or parts.
	(2) Defective switch.	(2) Replace switch.

SEE I.S. NOTES

60659F

Disengage the remote rod from the lock rack.

Remove the screws attaching the shroud to the housing and remove the housing from the shroud.

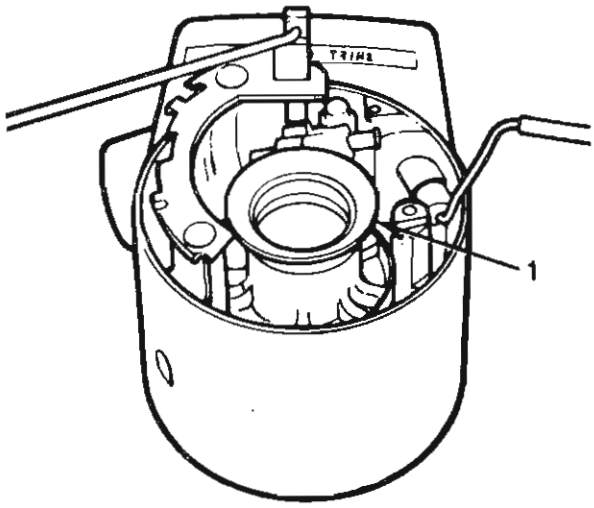


84700

SEE I.S. NOTES

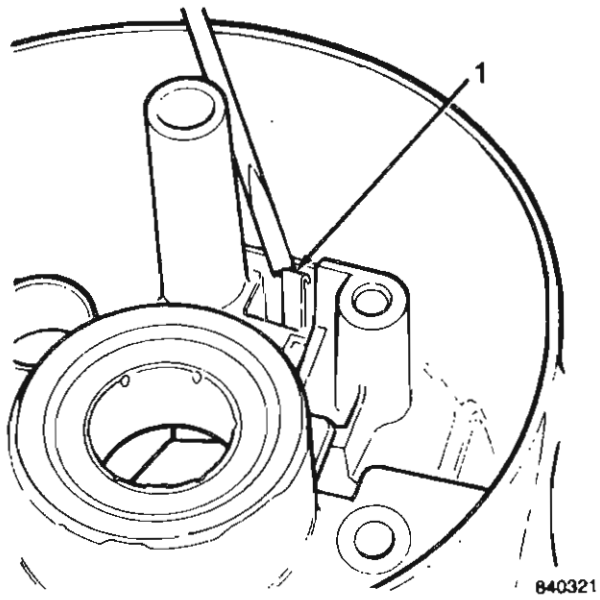
NOTE: On vehicles with automatic transmission, the remote rod and shift quadrant light wire will be removed as an assembly along with the upper housing.

Remove the thrust cup (1) from the upper housing.



840770

Remove the wave washer from the key release lever pivot. Remove the key release lever and spring (1).

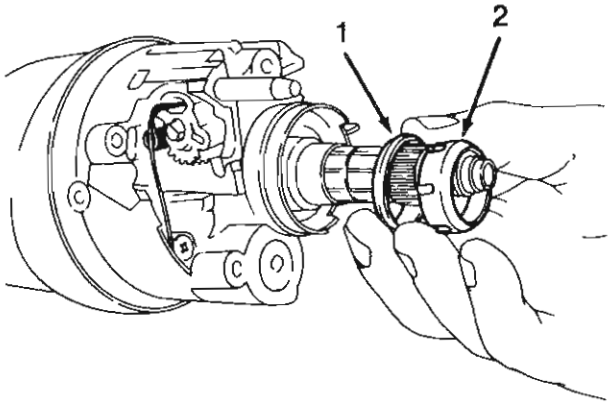


840321

Disengage the remote rod from the lock rack.

NOTE: On vehicles with automatic transmission, the remote rod and shift quadrant light wire will be removed as an assembly along with the upper housing.

Remove the upper bearing race (1) and bearing seat (2) from the steering shaft.

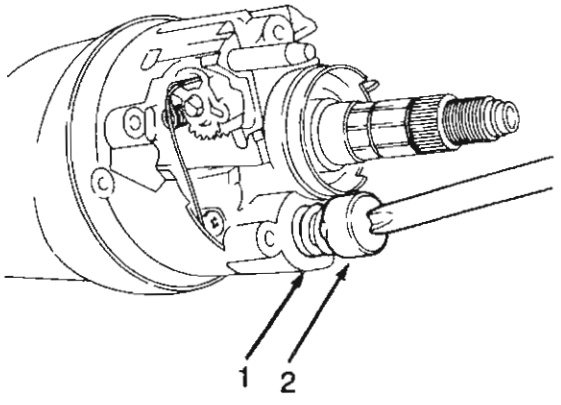


84745

Reinstall the tilt lever and place the column in the full upward tilt position.

WARNING: The tilt spring guide is under strong spring pressure.

Remove the tilt spring (1), guide and retainer (2) using a screwdriver. Press the retainer in and turn it counterclockwise until the retainer tabs align with the housing lugs. Be sure the screwdriver blade just fits into the retainer slot.



840334

Place the housing in the center (nontilt) position.

Remove the housing pivot pins using Tool J-21854-1 or equivalent.

SEE I.S. NOTES

GENERAL

The manual steering gear used on Jeep vehicles is a recirculating ball design. The steering gear wormshaft and ball nut are in line with the steering shaft in the column. The steering ratio of this unit is 24:1.

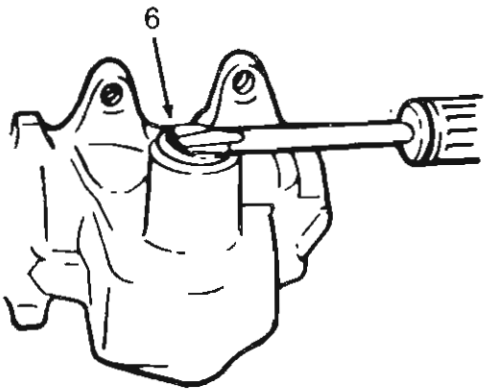
The steering gear wormshaft and column steering shaft are connected by a removable flexible coupling. The coupling permits independent removal of the steering gear or column.

The steering gear ball nut is mounted on the wormshaft and is driven through steel ball bearings which circulate in the spiral grooves machined in the wormshaft and ball nut. The bearings act as a rolling thread between the wormshaft and ball nut. The ball nut is directly engaged by the pitman shaft sector teeth.

SEE I.S. NOTES

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
J-2619-01	Slide Hammer		■
J-5755	Bearing Cup Installer		■
J-5822	Bearing Cup Puller		■
J-6632-01	Pitman Arm Puller		■
J-7754	Torque Wrench		■



84758

Cleaning and Inspection

Clean the housing and pitman shaft with solvent and dry using clean cloths or compressed air.

Inspect the housing for cracks, porosity, damaged threads and gasket surface scoring or distortion.

Inspect the pitman shaft bore contact surface and the sector teeth for wear, pitting, or other damage.

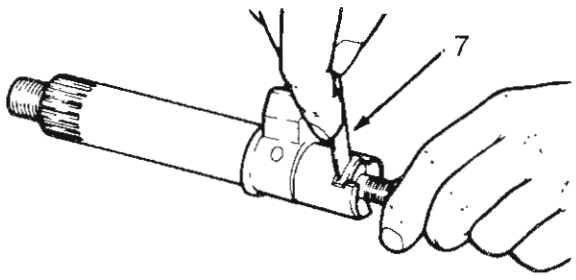
Insert the pitman shaft in the housing bore and check for shaft or housing bore wear. The shaft should exhibit a smooth, bind free fit and not display any visible side play when installed in the bore.

If the shaft appears loose and is not visibly worn, trial fit a replacement shaft in the housing bore. If the replacement shaft is also loose, replace the housing. However, if the replacement shaft fits properly, replace the pitman shaft.

Measure adjuster screw fit and end play in the pitman shaft T-slot. When installed, the screw must rotate freely and not bind in any position.

Measure end play by inserting a feeler gauge (7) between the screw head and the T-slot surface.

End play must not exceed 0.05 mm (0.002 in). If the end play exceeds the specified limit, select and install a replacement shim that will provide the specified clearance.



84759

Inspect the wormshaft upper bearing and bearing cup for wear, looseness, flat spots, pitting, cracks, or other damage. If either the bearing or bearing cup is damaged, both parts must be replaced.

If the cup is loose in the housing, trial fit a replacement cup. If the replacement cup is also loose, replace the housing. If the replacement cup fits properly, replace only the bearing cup.

SEE I.S. NOTES

LEAK INSPECTION

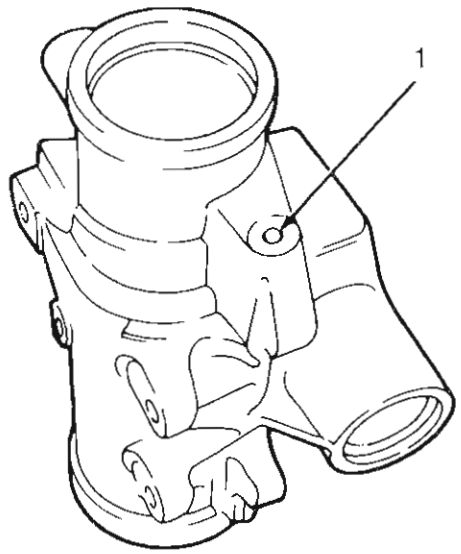
The actual source of steering gear fluid leaks should always be determined before attempting repairs. Because an inaccurate diagnosis can result in ineffective repair, proper inspection procedure is necessary. The most common fluid leak sources are shown in the following diagrams.

SEE I.S. NOTES

Inspect the poppet check valve located under the pressure connector seat. Replace the valve if it is scored, cracked, chipped or deformed.

Inspect the ball plug (1) in the housing. If leakage past the ball occurred before disassembly or if it is raised above the housing surface, seat the ball in the housing using a punch; then spray the ball and housing with Loctite Solvent No. 7559, or an equivalent. Dry with compressed air and cover the ball and housing ball area with Loctite 290, or an equivalent sealer. Allow to cure for about two hours before installation.

Inspect the retaining ring grooves and seal surfaces. If they are chipped, scored, cracked or worn, replace the housing.



840363

Assembly

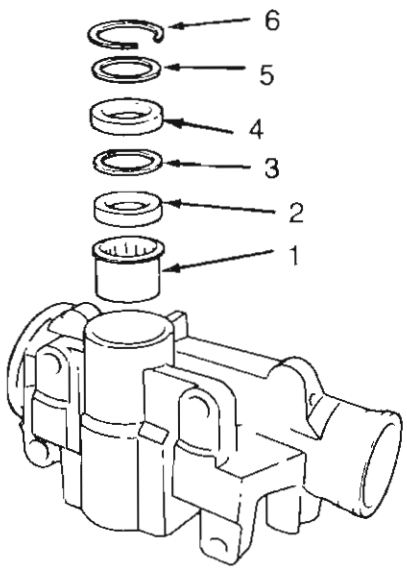
Clean the housing thoroughly in solvent.

Lubricate the housing bore, bearings, seals and washers with power steering fluid.

Install the needle bearing using Bearing Remover/Installer Tool J-21553 and Driver Handle J-8092. Install the bearing (1) in the housing bore until it is approximately 0.76 mm (0.030 in) below the shoulder in the housing bore.

CAUTION: Do not bottom the seal against the end of the housing counterbore.

Insert the single lip seal (2) and backup washer (3) in the housing bore. Using Seal Installer Tool J-21553, install the seal and washer in the bore only far enough to provide clearance for the double lip seal (4), backup washer (5), and retaining ring (6).



840365

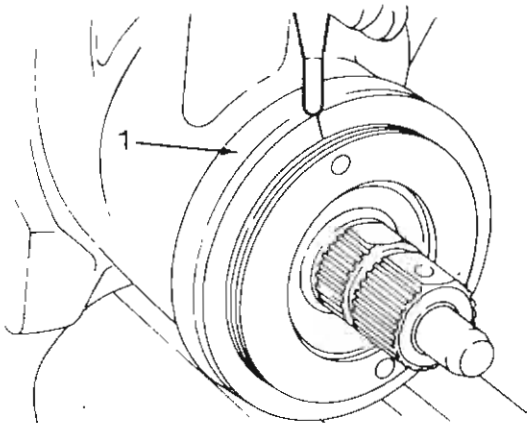
SEE I.S. NOTES

Worm Shaft Bearing Preload

CAUTION: The following adjustment procedures must be performed exactly as described and in the sequence outlined. Failure to do so can result in damage to the gear internal components and improper steering response. Always adjust worm bearing preload first; then adjust pitman shaft overcenter drag torque.

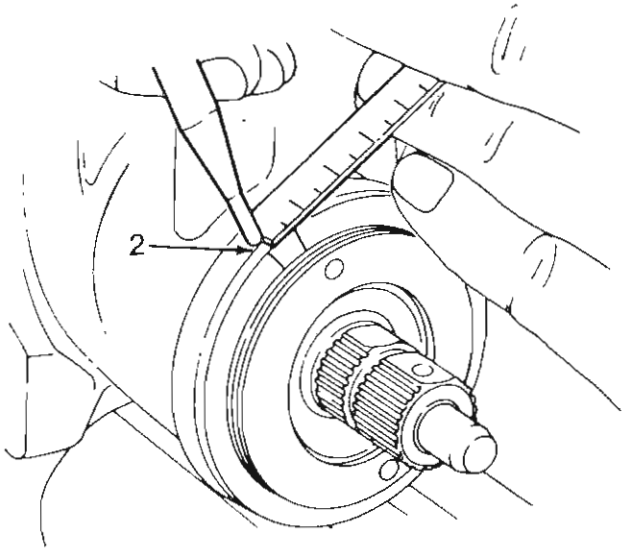
Seat the adjuster plug firmly in the housing using Spanner Tool J-7624. Approximately 27 N·m (20 ft-lbs) torque is required to seat the housing.

Place an index mark (1) on the gear housing opposite one of the holes in the adjuster plug.



84802

Measure back (counterclockwise) 13 mm (1/2 in) from the index mark and remark the housing (2).



84803

Turn the adjuster plug counterclockwise until the hole in the plug is aligned with the second mark on the housing.

Install the adjuster plug locknut and tighten it with 115 N·m (85 ft-lbs) torque. Be sure the adjuster plug does not turn when tightening the locknut.

Turn the stub shaft clockwise to the stop, then turn the shaft back 1/4 turn.

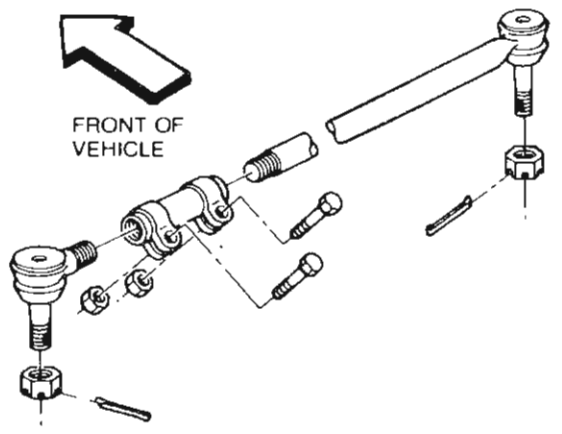
SEE I.S. NOTES

Condition	Possible Cause	Correction
	Further possible causes could be:	
	(6) Sticking flow control valve	In order to diagnose conditions such as listed in (6), (7), (8), (9) a pressure test of the entire power steering system is required.
	(7) Insufficient pump pressure output	
	(8) Excessive internal pump leakage	
	(9) Excessive internal gear leakage	
FOAMING MILKY POWER STEERING FLUID, LOW FLUID LEVEL AND POSSIBLE LOW PRESSURE	(1) Air in the fluid, and loss of fluid due to internal pump leakage causing overflow	(1) Check for leaks and correct. Bleed system. Extremely cold temperatures will cause system aeriation should the oil level be low. If oil level is correct and pump still foams, remove pump from vehicle and separate reservoir from body. Check welsh plug and body for cracks. If plug is loose or body is cracked, replace body
LOW PUMP PRESSURE	(1) Flow control valve stuck or inoperative.	(1) Remove burrs or dirt or replace. Flush system.
	(2) Pressure plate not flat against cam ring	(2) Correct
MOMENTARY INCREASE IN EFFORT WHEN TURNING WHEEL FAST TO RIGHT OR LEFT	(1) Low oil level in pump.	(1) Add power steering fluid as required
	(2) Pump belt slipping	(2) Tighten or replace belt
	(3) High internal leakage	(3) Check pump pressure. (See pressure test)
STEERING WHEEL SURGES OR JERKS WHEN TURNING WITH ENGINE RUNNING ESPECIALLY DURING PARKING	(1) Low oil level	(1) Fill as required
	(2) Loose pump belt	(2) Adjust tension to specification
	(3) Steering linkage hitting engine oil pan at full turn	(3) Correct clearance
	(4) Insufficient pump pressure	(4) Check pump pressure. (See pressure test). Replace flow control valve if defective
	(5) Sticking flow control valve	(5) Inspect for varnish or damage, replace if necessary
EXCESSIVE WHEEL KICKBACK OR LOOSE STEERING	(1) Air in system	(1) Add oil to pump reservoir and bleed by operating steering. Check hose connectors for proper torque and adjust as required

SEE I.S. NOTES

84811B

The connecting rod is threaded on one end and has a ball-end assembly at the opposite end. An adjusting tube and removable ball end complete the connecting rod assembly. It is attached to the right hand steering arm. The threaded end, with the adjusting tube and removable ball end, is attached to the pitman arm.



840811

SEE I.S. NOTES

TORQUE SPECIFICATIONS

Component	Service Set-To Torque	Service Recheck Torque
Connecting Rod Clamp Bolt	16 N·m (12 ft-lbs)	14-20 N·m (10-15 ft-lbs)
Connecting Rod End-to-Pitman Arm Nut (9/16-18)	81 minimum (60 minimum)	
Pitman Arm-to-Pitman Shaft Nut	251 N·m (185 ft-lbs)	217-285 N·m (160-210 ft-lbs)
Steering Damper Bracket U-Bolts	16 N·m (12 ft-lbs)	11-20 N·m (8-15 ft-lbs)
Steering Damper Locknut (3/8-24)	30 N·m (22 ft-lbs)	22-38 N·m (16-28 ft-lbs)
Steering Damper Locknut (7/16-20)	41 N·m (30 ft-lbs)	33-49 N·m (24-36 ft-lbs)
Upper Ball Stud Retaining Nut	136 N·m (100 ft-lbs)	
Lower Ball Stud Jamnut	108 N·m (80 ft-lbs)	
Upper Ball Stud Split Ring Seat	68 N·m (50 ft-lbs)	
Tie Rod Clamp Bolt (5/16-24)	16 N·m (12 ft-lbs)	14-20 N·m (10-15 ft-lbs)
Tie Rod Stud Nuts	54 minimum (40 minimum)	
Wheel Nuts	102 N·m (75 ft-lbs)	88-122 N·m (65-90 ft-lbs)

AXLE HOUSING SERVICE

The front axle housing should be inspected periodically for weld cracks or other damage that could cause loss of lubricant, affect driving characteristics, or result in front end misalignment.

NOTE: If the vehicle is driven through water that is deep enough to cover the front hubs, the steering knuckles and brake components should be disassembled and inspected for water-dirt contamination and water damage. All the components should be cleaned thoroughly, examined carefully, and lubricated as necessary before assembly. During the inspection, pay particular attention to the axle bearings, spindle bearings and brake components. Damaged or contaminated parts should be replaced.

FRONT WHEEL ALIGNMENT

Toe-in and caster are the only adjustable front alignment angles. Camber is built into the axle during manufacture and cannot be adjusted.

An alignment rack should be used to check the alignment angles. The use of a rack will ensure more accurate readings and avoid the possibility of incorrect adjustments.

Toe-in is adjusted by lengthening or shortening the steering tie rod. Caster is adjusted by installing tapered shims between the front axle spring mounting pad and front spring. Refer to Front Wheel Alignment for measurement and adjustment procedures.

HIGH STEERING EFFORT

High steering effort or slow return of the steering mechanism after turns may be the result of excessive steering knuckle ball stud preload. If this condition occurs and all other items affecting the steering effort are functioning normally, the ball stud preload should be checked as follows.

Ball Stud Preload Measurement

Raise the vehicle.

Remove the front wheels.

If the vehicle has a steering damper, disconnect the damper at the tie rod and move the damper aside.

Unlock the steering column.

Disconnect the steering connecting rod. Disconnect the connecting rod at the right-side steering knuckle.

Remove the cotter pin and retaining nut attaching the tie rod to the right-side steering knuckle. Discard the cotter pin.

Rotate both the steering knuckles through a complete arc several times. Work from the right side of the vehicle to rotate the knuckles.

Assemble a socket and 68 N·m (0-50 ft-lbs) capacity torque wrench and install the wrench on the tie rod retaining nut.

NOTE: The torque wrench must be positioned at a 90 degree angle to the steering knuckle arm to obtain an accurate reading.

Rotate the knuckles slowly and steadily through a complete arc and measure the torque required to rotate the knuckles:

- if the reading is less than 34 N·m (25 ft-lbs), turning effort is within the specifications and

SEE I.S. NOTES

Install the wheels.

Remove the support stands and lower the vehicle.

Check the front wheel alignment.

Check the turning angle.

TURNING ANGLE ADJUSTMENT

The turning angle stopscrews are located at the rear of the steering knuckle just above the axle centerline. If adjustment is necessary, proceed as follows.

SEE I.S. NOTES

Loosen the locknut on the turning angle stopscrew.

Using a turntable to measure the angle, adjust the stopscrew to obtain the proper turning angle (see Specifications).

Tighten the stopscrew locknut.

NOTE: Turning the adjusting screw inward increases the turning angle. Turning the screw outward decreases the turning angle.

Turning Angle Specifications

Set the turning angle at 30-31 degrees.

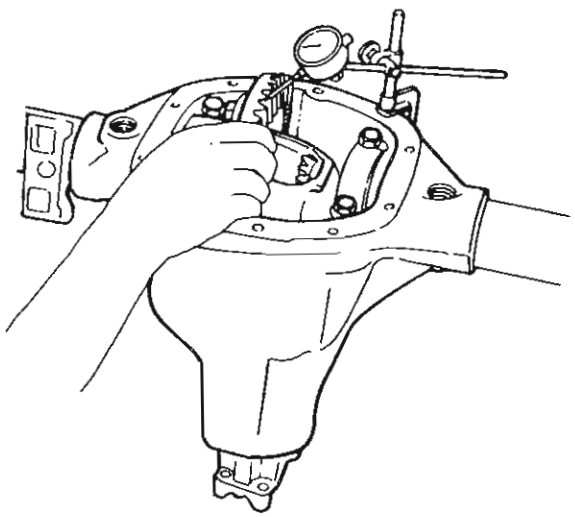
DIFFERENTIAL OVERHAUL

Specifications

Differential Specifications
Model 30 Front Axle

Differential Bearing Preload	0.38mm (.015 in)
Differential Side Gear-to-Case Clearance	0.000-0.15mm (.000-.006 in)
Ring Gear	0.12-0.22mm (.005-.009 in)
Pinion Bearing Break-Away Preload	
Original Bearings	2-3 N·m (15-25 in-lbs)
New Bearings	2-5 N·m (20-40 in-lbs)

841321



84848

Raise the spring and install the front spring shackle to the spring attaching bolts.

Remove the jack stand.

Install the tie plate and U-bolts. Tighten the U-bolt nuts as follows:

1/2-20 – 75 N·m (55 ft-lbs)

9/16-18 – 136 N·m (100 ft-lbs)

Tighten the spring shackle to the spring attaching bolts on CJ and Scrambler models with 33 N·m (24 ft-lbs) torque.

Install the stabilizer bar link to the tie plate attaching nut.

Install the shock absorber. Tighten the shock absorber to the tie plate retaining nut with 61 N·m (45 ft-lbs) torque.

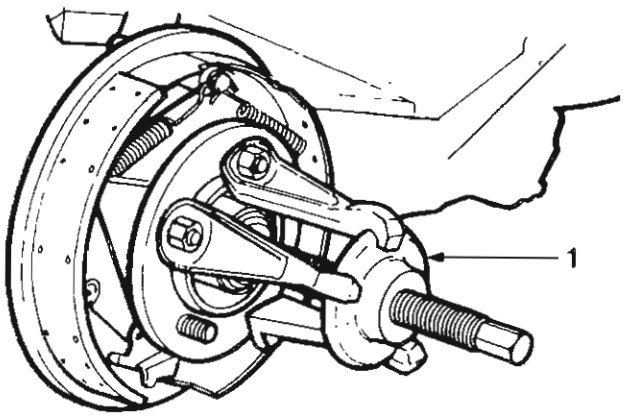
Install the axle shafts.

Install the axle housing cover.

Fill the axle with the specified lubricant.

SEE I.S. NOTES

Remove the axle hub using Puller J-25109-01 (1).



840479

SEE I.S. NOTES

Inspection

Inspect the hub for loose or distorted wheel mounting studs and inspect the keyway and tapered bore for wear, damaged serrations or cracks. Replace the hub if worn or damaged.

Installation

NOTE: The methods for installing original and replacement hubs are different. Refer to the following two procedures for the appropriate installation method.

Original Hub Installation

Align the keyway in the hub with the axle shaft key and slide the hub onto the shaft as far as possible.

Install the axle shaft thrust washer and nut.

Install the brake drum and drum retaining screws. If the brakeshoes were retracted to ease drum removal, adjust the drum-to-brakeshoe clearance before installing the drum. Refer to the Service Brake Adjustment section.

Install the wheel.

Lower the vehicle.

Apply the parking brake.

Tighten the axle shaft nut with 339 N·m (250 ft-lbs) torque.

Install a replacement cotter pin in the nut. If the cotter pin hole is not aligned, tighten the nut to the next castellation. Do not loosen the nut to align the cotter pin hole.

Release the parking brake.

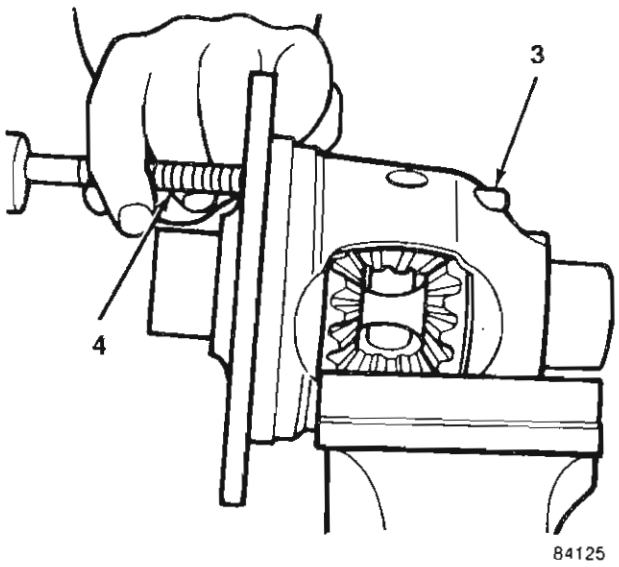
Raise vehicle, remove wheel and install axle shaft dust cap and reinstall the wheel and lower vehicle.

Replacement Hub Installation

NOTE: When a replacement axle shaft is installed, a replacement hub must also be installed. However, a replacement hub may be installed on an original axle shaft if the shaft serrations are not worn or damaged.

Align the keyway in the hub with the axle shaft key and slide the hub onto the shaft as far as possible.

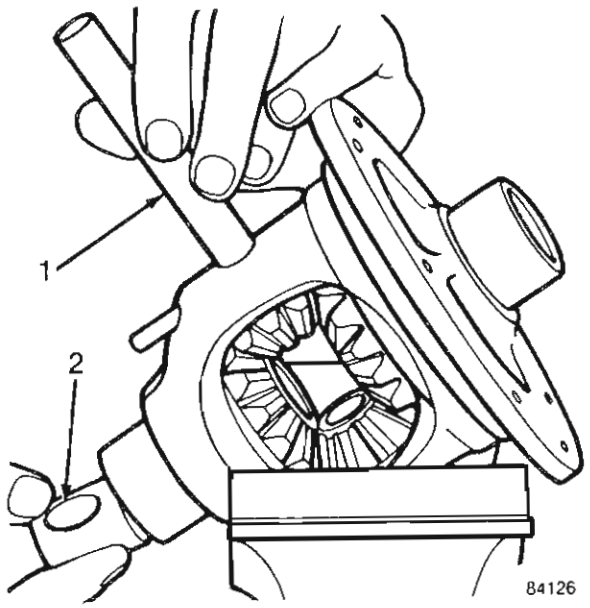
Remove the pinion shaft lockpin (3) using a punch that is 76-mm long by 5-mm in diameter (3-in. long by 3/16-in. in diameter) (4).



Measure and record the differential side gear-to-case, clearance for assembly reference. Insert equal thickness feeler gauges between each gear and case to measure the clearance.

NOTE: To ensure an accurate measurement, do not remove either feeler gauge until the clearance at both gears has been measured.

Remove the pinion shaft (1) using a punch and hammer and remove the thrust block (2).



Rotate the pinion gears on the side gears until the pinion gears are aligned with the case opening. Remove the pinion gears and thrust washers and remove the side gears and thrust washers.

Remove the pinion nut using Tools J-8614-01.

Remove the axle yoke using Tools J-8614-01, 02 and 03.

Install the axle housing cover to prevent the pinion gear from falling out of the housing during removal.

SEE I.S. NOTES

Axle Assembly

Install the axle housing cover.

Install the propeller shaft. Align the yoke and the shaft using the reference marks made at disassembly.

Install the axle shafts, oil seals and retainers, shaft bearing end play shims, brake support plates, hubs, drums and wheels.

Check and correct the axle shaft end play as necessary. Refer to Axle Shaft End Play Adjustment procedure in this chapter.

Fill the axle with AMC/Jeep Rear Axle Lubricant, 75W-90, grade API GL-5.

Connect all brake lines and bleed the brakes.

Remove the supports and lower the Vehicle.

SEE I.S. NOTES

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
J-24649-1	Yoke Runout Gauge		■
J-25512-2	Lube Fitting Adapter Tool		■

TORQUE SPECIFICATIONS

Component	Service Set-To Torque	Service Recheck Torque
Pinion Yoke Nut	Add 0.56 N·m (5 in-lbs) torque measured at disassembly.	
Universal Joint Clamp Strap Bolt	20 N·m (15 ft-lbs)	18-24 N·m (13-18 ft-lbs)

SEE I.S. NOTES

Universal Joint Angle Chart

	Front		Rear	
	OK Range	**Set-To**	**OK Range**	**Set-To**
CJ/ Scrambler	3°-5°	4°	4°-6°	5°

840942

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
J-25103	Wheel Bearing Nut Wrench		■

TORQUE SPECIFICATIONS

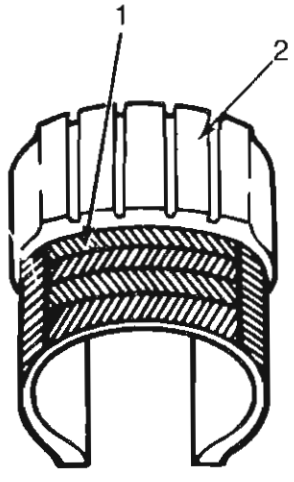
Component	Service Set-To Torque	Service Recheck Torque
Caliper Mounting Pins	20 N·m (15 ft-lbs)	20-24 N·m (15-18 ft-lbs)
Wheel Retaining Nuts	115 N·m (85 ft-lbs)	88-122 N·m (65-90 ft-lbs)
Outer Locknut	68 N·m (50 ft-lbs)	68 N·m min. (50 ft-lbs min)
Inner Locknut (Adjusting Nut)	68 N·m (50 ft-lbs)*	68 N·m min. (50 ft-lbs min)

*Back off 1/6 turn (45° - 65°) while rotating the wheel

GENERAL

Tire Construction

Standard equipment tires on the CJ-7 and Scrambler models are of the radial-ply construction. Radial-ply tires have belts (1) under the tread (2) which encircle the tire and extend from tread shoulder to tread shoulder. However, these tires are constructed with the body cord plies at right angles to the tread centerline. The plies cross the tread centerline at an angle of approximately 90 degrees. Because the body cord plies radiate from the tread centerline, this type of construction is designated radial-ply.

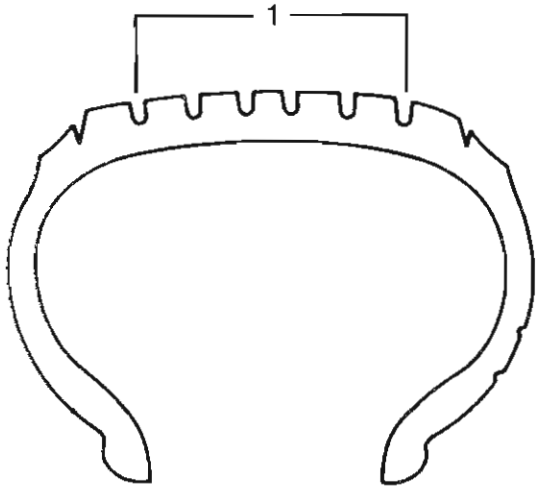


840626

TIRE REPAIR

Punctured tires should be removed from the wheel and permanently repaired from the inside using a combination repair plug and vulcanized patch. When repairing punctures, always follow the manufacturer's instructions for repair kit installation.

Punctures are repairable only in the tread area (1).



84860

Never attempt to repair punctures in the tire shoulders or sidewalls. In addition, never attempt to repair any tire that has sustained the following damage:

- bulges or blisters
- ply separations
- broken, cut or cracked beads
- fabric cracks or cuts
- tires worn to the fabric or if wear indicators are visible
- punctures larger than 6 mm (1/4 in) in diameter

Externally applied repair plugs, blowout patches and aerosol sealants should be considered as emergency-type repairs only. Tires repaired in this fashion should not be driven at speeds over 64 km/h (40 mph) or for more than 121 km (75 mi) before a permanent repair is made.

WHEEL MAINTENANCE AND CONDITION

The condition of the wheels should be checked frequently. Replace any wheel that is cracked, bent, severely dented, has excessive runout or has broken welds. The tire inflation valve should also be inspected frequently for wear, leaks, cuts or looseness and should be replaced if damaged or worn.

Clean all the wheels with a mild soap and water solution only and rinse thoroughly with water. Never use abrasive or caustic materials, especially on aluminum or chrome-plated wheels, as the surface will be etched or the plating severely damaged. After cleaning aluminum or chrome-plated wheels, apply a coating of protective wax to preserve the finish and lustre.

WHEEL BALANCING

Wheel balancing may be performed using on- or off-vehicle equipment. However, when using on-vehicle balancing equipment, observe the following precautions:

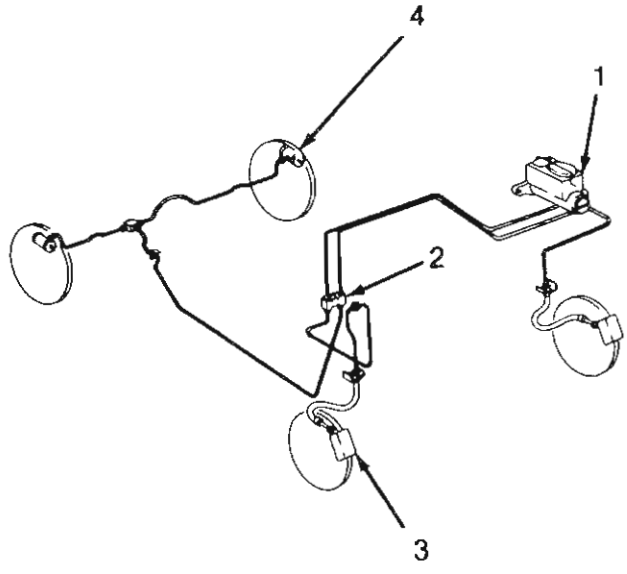
- on vehicles with a Trac-Lok rear axle, do not use on-vehicle equipment to balance the rear wheels; instead, remove the wheels and

SEE I.S. NOTES

The brake system utilizes front disc and rear drum braking surfaces.

The brake hydraulic system consists of a dual reservoir master cylinder (1), combination valve (2), front disc brake calipers (3), rear drum brake wheel cylinders (4), and the connecting brake pipes, hoses and fittings.

The primary piston in the master cylinder transfers pressure to the front brakes. The secondary master cylinder piston transfers pressure to the rear brakes.



70166

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
J-8002	Wheel Cylinder Clamps		■
J-8057	Brake Spring Plier Tool or Equivalent		■
J-21177-01	Drum Brake Clearance Gauge		■
J-25103	Wheel Bearing Nut Wrench		■
J-26869	Metering Valve Tool (Type-W Valve)		■
J-33028	Dust Boot Installer	■	

SEE I.S. NOTES

J. VEHICLE MOVES TO ONE SIDE WHEN BRAKES ARE APPLIED (cont'd.)

POSSIBLE CAUSES	CORRECTIONS
(10) Loose suspension component attaching or mounting bolts.	(10) Tighten suspension bolts. Replace worn suspension components.
(11) Brake combination valve failure.	(11) Replace combination valve.

K. CHATTER OR SHUDDER WHEN BRAKES ARE APPLIED (Pedal pulsation and roughness may also occur.)

POSSIBLE CAUSES	CORRECTIONS
(1) Brakeshoes distorted, bent, contaminated, or worn.	(1) Replace brakeshoes in axle sets.
(2) Caliper anchor plate or support plate loose.	(2) Tighten mounting bolts.
(3) Excessive thickness variation of rotor(s).	(3) Refinish or replace rotors in axle sets.

L. NOISY BRAKES (Squealing, clicking, scraping sound when brakes are applied.)

POSSIBLE CAUSES	CORRECTIONS
(1) Bent, broken, distorted brakeshoes.	(1) Replace brakeshoes in axle sets.
(2) Excessive rust on outer edge of rotor braking surface.	(2) Remove rust.
(3) Brakelining worn out — shoes contacting drum or rotor.	(3) Replace brakeshoes and lining in axle sets. Refinish or replace drums or rotors.
(4) Broken or loose holdown or return springs.	(4) Replace parts as necessary.
(5) Rough or dry drum brake support plate ledges.	(5) Lubricate support plate ledges.
(6) Cracked, grooved, or scored rotor(s) or drum(s).	(6) Replace rotor(s) or drum(s). Replace brakeshoes and lining in axle sets if necessary.
(7) Incorrect brakelining and/or shoes (front or rear).	(7) Install specified shoe and lining assemblies.

M. PULSATING BRAKE PEDAL

POSSIBLE CAUSE	CORRECTION
(1) Out of round drums or excessive lateral runout in disc brake rotor(s).	(1) Refinish or replace drums, re-index rotors or replace.

84030

SEE I.S. NOTES

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
J-25103	Wheel Bearing Nut Wrench		■

TORQUE SPECIFICATIONS

Component	Service Set-To Torque	Service Recheck Torque
Caliper Mounting Pins	40 N·m (30 ft-lbs)	34-47 N·m (25-35 ft-lbs)
Wheel Lug Nuts	102 N·m (75 ft-lbs)	88-108 N·m (65-80 ft-lbs)
Wheel Bearing Outer Locknut	68 N·m (50 ft-lbs) min.	
Outer Bearing Inner Locknut	68 N·m (50 ft-lbs)*	

*Back off 1/6 turn while rotating the wheel.

REMOVAL

Raise and support the vehicle.

Remove the wheel.

Remove the caliper. Refer to Rear Brakeshoe Removal and Installation.

Remove the bolts attaching the hub body to the hub clutch and remove the hub body.

Remove the retaining ring from the axle shaft and remove the hub clutch and bearing assembly.

Straighten the lip of the outer locknut retaining washer.

Remove the outer locknut and retaining washer and remove the inner locknut and retaining washer.

Remove the hub and rotor.

Remove the wheel bearings from the rotor.

INSPECTION

Raise and support the front of the vehicle.

Remove the front wheels.

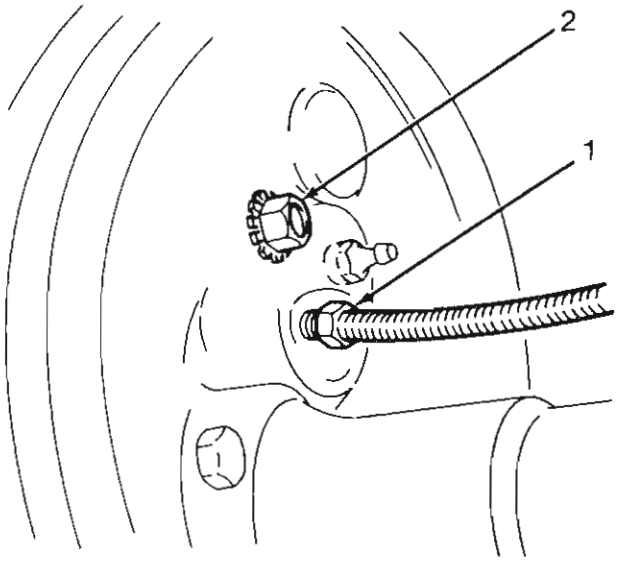
Remove the caliper (do not disconnect the brake line).

SEE I.S. NOTES

REMOVAL

Raise and support the rear of the vehicle and remove:

- the wheel lug nuts
- the wheel
- the brakeshoes
- the pipe fitting (1) from the wheel cylinder
- the wheel cylinder attaching bolts (2), and the wheel cylinder



84047

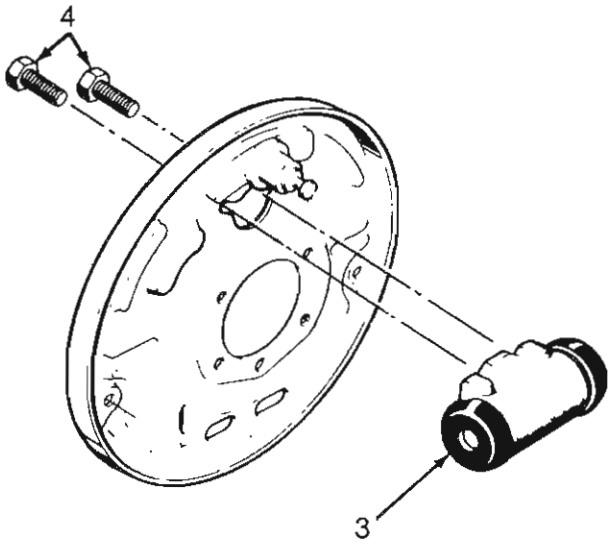
SEE I.S. NOTES

INSTALLATION

CAUTION: Wipe the end of the pipe fitting (1) to remove foreign matter before connecting it to the wheel cylinder.

Position the wheel cylinder (3) on the backing plate and connect the pipe fitting to the wheel cylinder. Hand tighten the connection only.

Install the wheel cylinder attaching bolts (4). Tighten the mounting bolts with the specified torque.



84048

Using a pipe fitting wrench, tighten the brake pipe fitting at the wheel cylinder with the specified torque.

Install the brakeshoes.

Adjust the brakes, center the shoes and install:

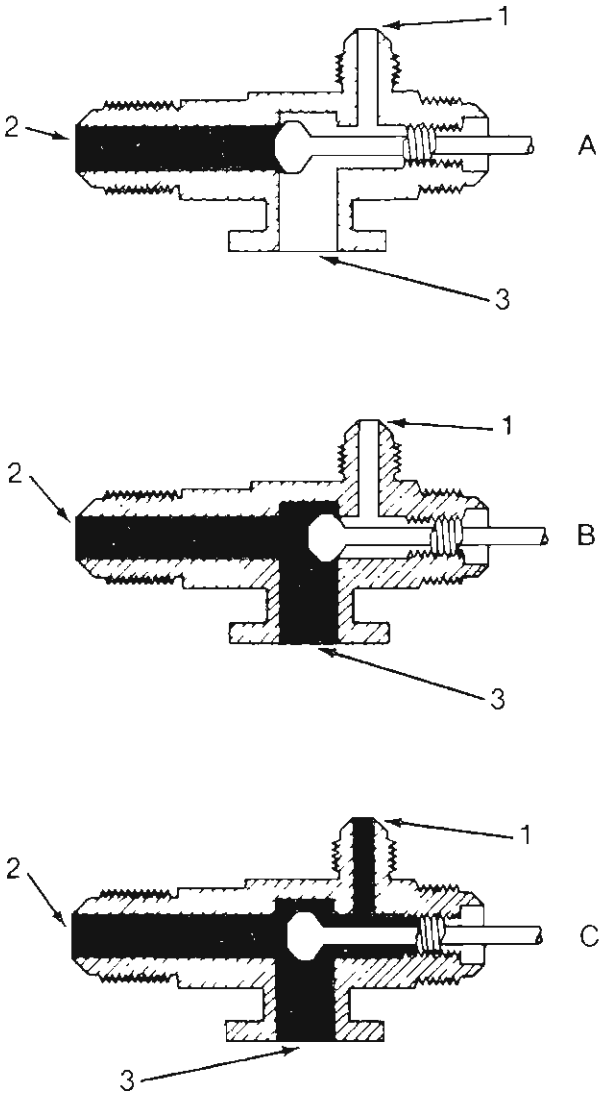
- the brake drum
- the wheel
- the wheel lug nuts

Service Diagnosis

Condition	Possible Cause	Correction
BLOWER MOTOR WILL NOT TURN AT ANY SPEED	(1) Blown fuse	(1) Replace fuse
	(2) Loose connection	(2) Inspect and tighten
	(3) Defective ground	(3) Clean and tighten
	(4) Faulty switch	(4) Replace switch
	(5) Faulty motor	(5) Replace motor
	(6) Faulty resistor	(6) Replace resistor
BLOWER MOTOR TURNS AT ONE SPEED ONLY	(1) Faulty switch	(1) Replace switch
	(2) Faulty resistor	(2) Replace resistor
BLOWER MOTOR TURNS BUT DOES NOT CIRCULATE AIR	(1) Intake blocked	(1) Clean intake
	(2) Fan not secured to the motor shaft	(2) Tighten securely
HEATER WILL NOT HEAT	(1) Coolant does not reach proper temperature	(1) Check and replace thermostat if necessary
	(2) Heater core blocked internally	(2) Flush or replace core if necessary
	(3) Heater core air-bound	(3) Purge air from core
	(4) Blend-air door not in proper position	(4) Adjust cable
HEATER WILL NOT DEFROST	(1) Control cable adjustment incorrect	(1) Adjust control cable
	(2) Defroster hose damaged	(2) Replace defroster hose

80587A

SEE I.S. NOTES



1. To Service Port
2. To Hose
3. To Compressor

85985

When the valve stem (B) is turned clockwise to the front-seated (full-in) position, the the compressor is isolated from the system. This position is used for removing the compressor or for checking the compressor oil level.

When the valve stem (C) is mid-positioned, the gauge port is open. This position is used for charging, discharging, evacuating and checking the system pressure.

Discharge Service Valve Adapters

When it is necessary to connect a service hose to the discharge service valve, one of the adapters listed in the chart is required.

Discharge Service Valve Adapters

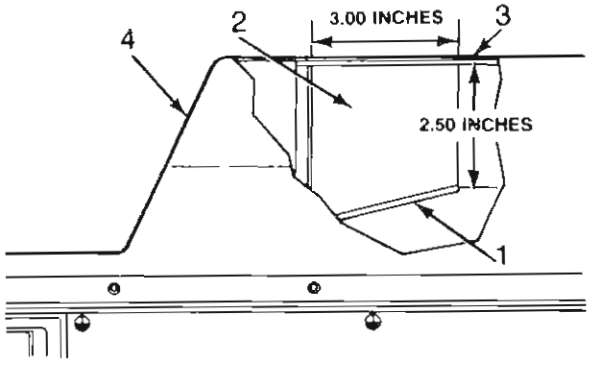
MANUFACTURER	PART NUMBER		
	Straight	Right Angle	Flex
Kent Moore	J-25498	J-25499	—
K-D Tools	KD-2409	—	—
Dral Tools	AC 354	—	AC 355

83093

SEE I.S. NOTES

When installing a replacement temperature control thermostat, insert the capillary tube (1) into the evaporator coil (2) a minimum of 5 cm (2 in).

CAUTION: Handle the tube with care to avoid bends or kinks that could cause the thermostat to malfunction.



1. Capillary Tube – Insert into Coil a Minimum of 5.1 cm (2 in)
2. Evaporator Coil
3. Insulation
4. Upper Part of Case

41094

CONDENSER

Removal

Discharge the refrigerant from the system. Refer to the discharge procedure.

NOTE: Discharge the system slowly to prevent loss of compressor oil.

WARNING: Do not loosen the radiator draincock when the cooling system is hot and pressurized because serious burns from hot coolant can result.

Drain the radiator. Drain the coolant into a clean container.

Remove the fan shroud and radiator.

Disconnect the pressure pipe fitting from the condenser.

Remove the condenser attaching screws and tilt the bottom of the condenser toward the engine.

NOTE: Plug all the open connections to prevent entry of dirt and moisture.

From the underside of the vehicle, disconnect the receiver/drier-to-evaporator hose fitting from the receiver/drier.

Remove the condenser and receiver/drier as an assembly.

Remove the receiver/drier from the condenser, if necessary.

Installation

If removed, attach the receiver/drier to the condenser.

Place the condenser in position and connect the receiver/drier-to-evaporator hose fitting to the receiver/drier.

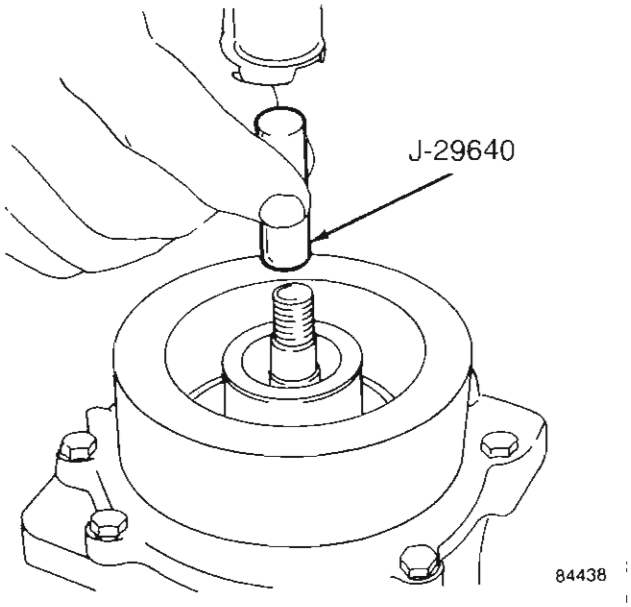
Install the condenser attaching screws.

Connect the pressure pipe fitting to the condenser.

Install the radiator and fan shroud.

SEE I.S. NOTES

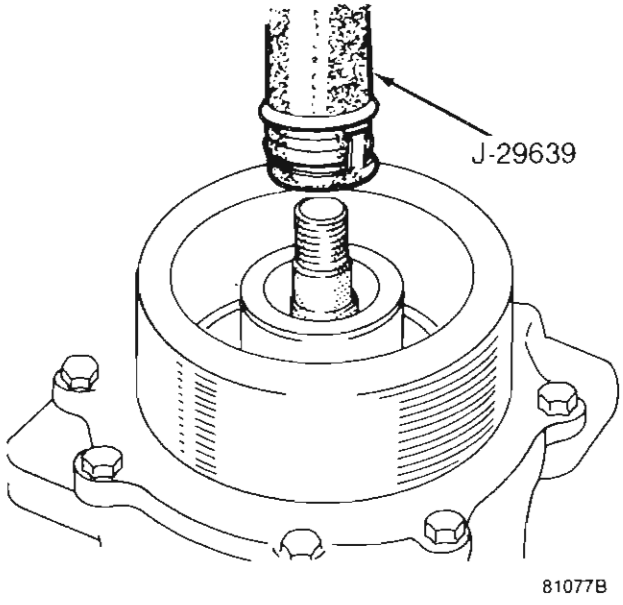
Insert Seal Sleeve Protector J-29640 over the compressor shaft.



CAUTION: Do not touch the replacement seal lapping surfaces.

Dip the mating surfaces of the seal lapping surfaces in clean compressor oil.

Engage the slots of Seal Removal and Installation Tool J-29639 in the slots in the seal cage and insert the seal assembly firmly into place in the compressor seal cavity.



Twist the tool in the opposite direction to disengage the tool from the seal cage.

CAUTION: When installing the shaft seal O-ring, do not scratch the O-ring groove with the O-ring hook.

SEE I.S. NOTES

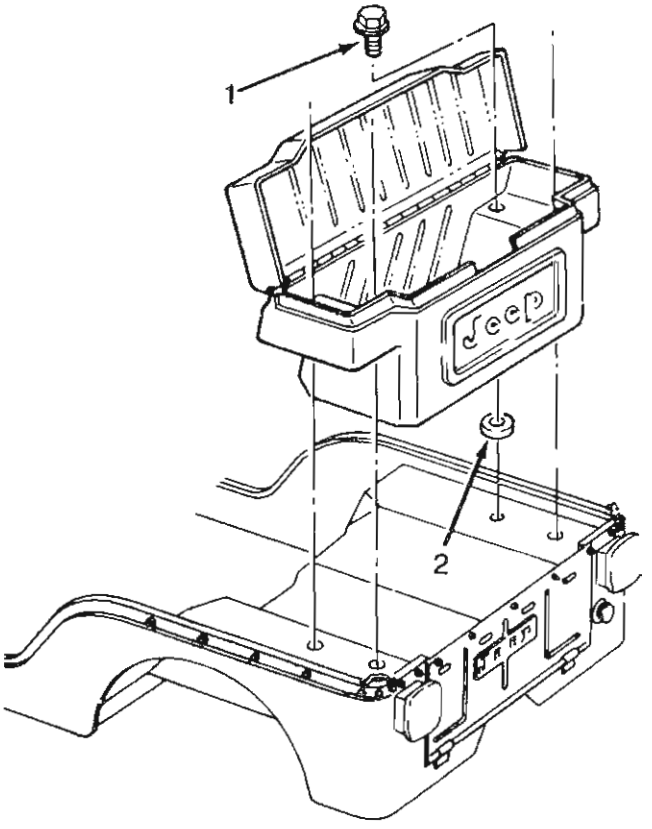
GENERAL

A storage compartment is available on all CJ models.

The storage compartment can be locked with a key. It is also bolted to the body side panels for added security.

Removal

Open the storage compartment and remove the attaching screws and washers (1).



840958

SEE I.S. NOTES

0.5-capacitor installed at the battery connection of the switch or the flasher. It is less likely, but possible, that the low frequency components of the interruptions are reaching audio stages of the radio. The test is to check if the noise is present with the volume control turned down. If so, install a 1000-mfd condenser.

Horn Noise

The diagnosis and cure for a growling noise in the radio when the horn is operated is the same as for Turn Signals and Stop Lamps. The suppressor capacitors are installed at the point where the battery lead feeds the horn relay.

Be sure the horn relay cover is not loose.

Accessories

Electric windshield wipers, blower motors, window regulator motors, or any brush-type motors, generally can be suppressed by installing 0.25-mfd capacitors at the terminals.

ANTENNAS

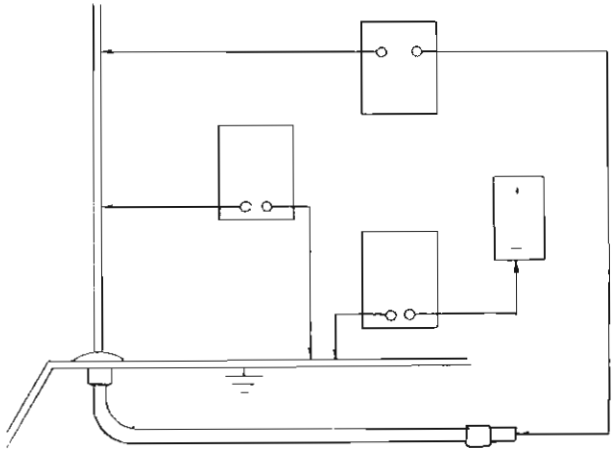
AM and AM/FM Models

The mast of the antenna is not grounded. The base of the antenna is grounded to the vehicle sheet metal. The coaxial shield (the wire mesh) surrounding the center conductor wire of the antenna lead-in cable is grounded to the radio and the antenna base.

Tests

There are three antenna tests to be made with the use of an ohmmeter:

- mast to ground
- tip of the mast to the tip of the conductor
- body ground to the battery ground



85118

SEE I.S. NOTES

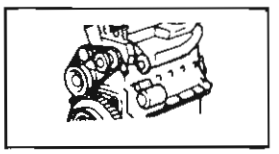
I.S.

INFORMATIONS SERVICE
SERVICE INFORMATION
SERVICE-INFORMATIONEN
SERVICE INFORMATION
INFORMACIONES SERVICIO
INFORMAZIONI SERVIZIO
SERVICEINFORMASJONER
SERVICE INFORMATIE
SERVICEINFORMATION
INFORMAÇAO SERVIÇO

3E

MAY 1984
ENGLISH EDITION

CJ/SCRAMBLER



ENGINES — FUEL SYSTEMS

Attention: Workshop and Parts Department

FOUR-CYLINDER ENGINE COLD OPERATION

Information

The choke on some 1984 four-cylinder YFA carburetors, may open too quickly after cold starts resulting in poor cold engine operation.

Service correction involves changing choke opening time as outlined in the following procedure.

Procedure

1. Remove the carburetor as outlined on page B-208 of the M.R. 252 manual.
2. Disconnect the vacuum break supply hose from the vacuum supply tube in the carburetor base (Fig. 1).
3. Increase the diameter of the orifice in the vacuum supply tube with a 7/64-in. (0.109-in.) drill bit (Fig. 1).

   NOTE: Be sure to remove all chips with compressed air after drilling out the orifice.

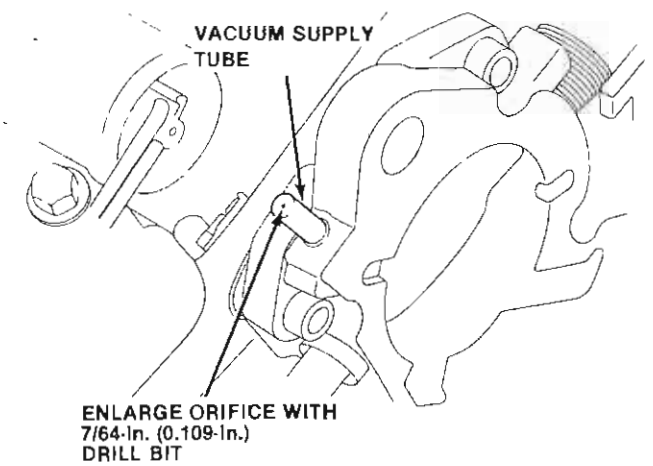


Fig. 1

I.S.

INFORMATIONS SERVICE
SERVICE INFORMATION
SERVICE INFORMATIONEN
SERVICE INFORMATION
INFORMACIONES SERVICIO
INFORMAZIONI SERVIZIO
SERVICEINFORMASJONER
SERVICE INFORMATIE
SERVICEINFORMATION
INFORMAÇAO SERVIÇO

7E

JULY 1985
ENGLISH EDITION

1986 CJ MODELS

R 0000

GENERAL

Attention: Workshop, Parts Department

WORKSHOP MANUAL UPDATE AND REVISIONS

This I.S. Note contains information unique to 1986 Jeep CJ models. Only those items that apply to 1986 CJ models are outlined in this I.S. Note. All other service information in the M.R. 252 remains unchanged. The only M.R. 252 section affected by these updates/revisions is the specification and identification section of the GENERAL chapter.

Filing Instructions

- File this I.S. Note in the M.R. 252 Manual

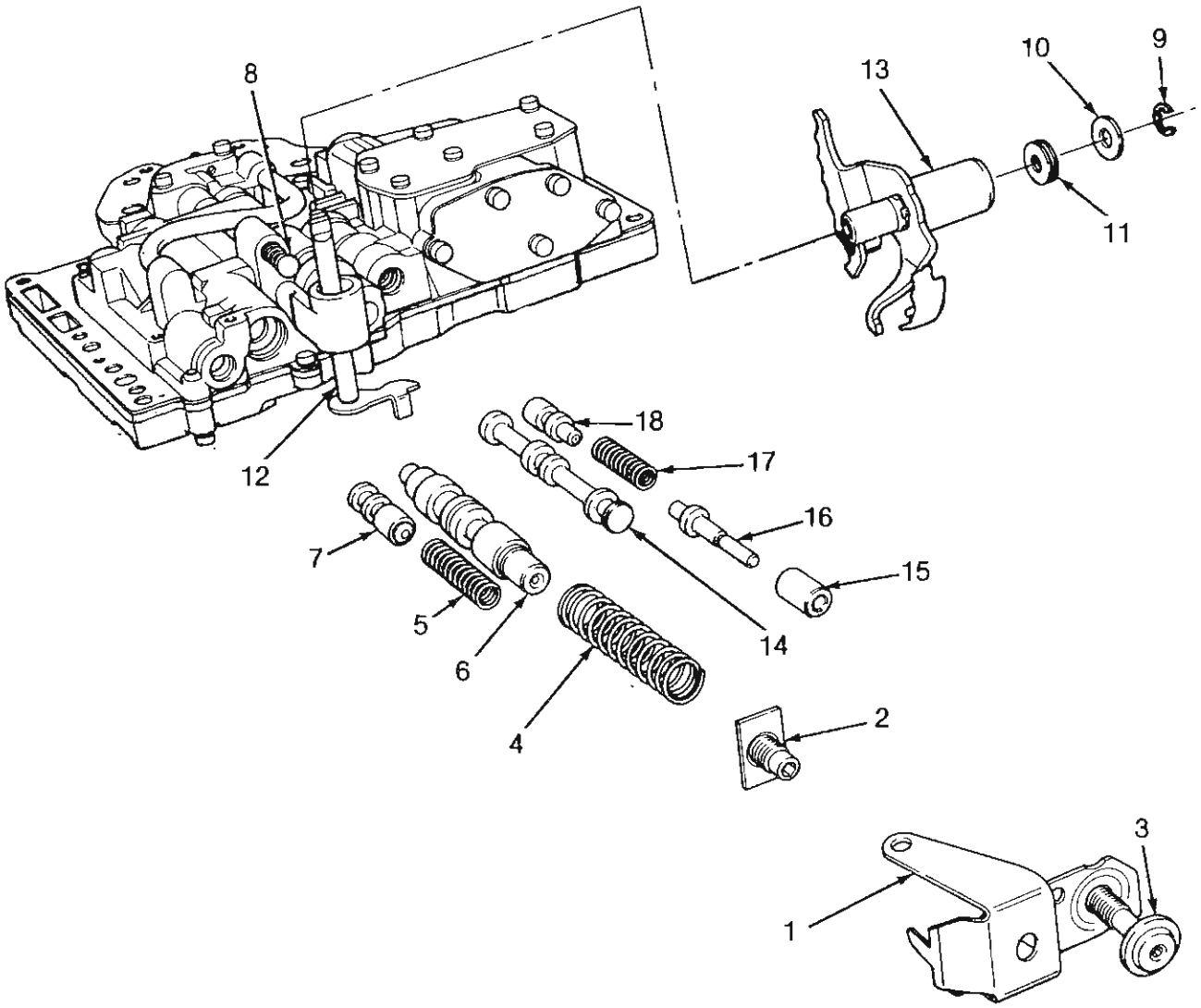
8980 000 757

SPECIAL TOOLS

Tool Ref.	Description	Required	Recommended
J-24040-A	Input Shaft Bushing Installer (727)	■	
J-24041-A	Input Shaft Bushing Remover (727)	■	
J-24042	Front Clutch Spring Compressor and Overrunning Clutch Cam Installer (727)	■	
J-24044	Detent Ball Retainer	■	
J-24045	Pump Rotor Alignment Tool (727)	■	
J-24048	Extension Housing Bushing Remover/ Installer (727)	■	
J-24049-A	Oil Pump Bushing Remover/Installer	■	
J-24055	Oil Pump Bushing Remover/Installer (727)	■	
J-24063-01	Kickdown Band Adjustment Adapter	■	
J-24064	Front Clutch Bushing Remover/ Installer	■	
J-24108-A	Pilot Studs	■	
J-5853-B	Torque Wrench (0-250 in-lbs)		■
J-8001	Dial Indicator Set		■
J-24026	Transmission Holding Fixture		■
J-9617	Front Pump Oil Seal Installer	■	
J-3387-2	Pilot Studs	■	
J-21005-01	Front Pump Oil Seal Installer (727)	■	
J-2l232-01	Front Pump Oil Seal Remover	■	
J-22205	Front Pump Oil Seal Remover (Legs)	■	
J-23327	Front Clutch Spring Compressor	■	
J-24031	Kickdown Valve Gauge	■	

SEE I.S. NOTES

SEE I.S. NOTES



NOTE: Tag the springs and valves for reassembly reference.

Remove the upper and lower screws from the spring retainer and adjustment screw bracket (1). Hold the spring retainer firmly against the spring force while removing the last screw.

Remove the spring retainer line (2) and the throttle pressure adjusting screws (3). Do not disturb the screw settings. Remove the line pressure (4) and torque converter valve regulator springs (5). Tag the springs for assembly reference.

Remove the line pressure regulator (6) and torque converter control valves (7).

Install Detent Ball Retainer Tool J-24044 around detent ball casing (8).

Install the fail-safe valve (7) and spring (8) into the housing.

Install the lockup valve (5) and spring (6) into the housing.

Install the end plate and attaching screws (4).

Install lockup module housing (3) and oil tube (1) to the valve body (2).

Install attaching screws.

Install the oil filter.

Measure the throttle and line pressure settings.

NOTE: If pressures were satisfactory before disassembly, do not change the line or throttle pressure adjusting screw settings.

Valve Body Without Lock-Up

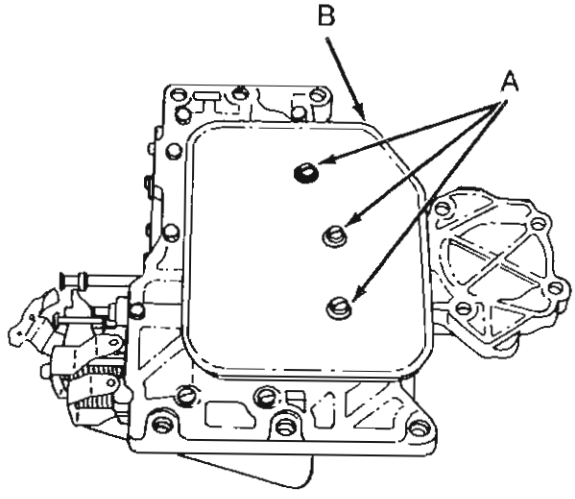
Disassembly

CAUTION: Do not clamp any part of the valve body or transfer plate in a vise. Any slight distortion of the body or plate will cause sticking valves or excessive leakage or both. When removing and installing valves or plugs, slide them in or out very carefully. Do not use force to remove or install valves.

NOTE: When disassembling the valve body, identify all valve springs with a tag for assembly reference.

Remove the oil filter attaching screws (A) and oil filter (B).

NOTE: The oil filter screws are longer than the transfer plate screws.



84476

Remove the transfer plate assembly retaining screws and remove the transfer plate assembly (1).

Remove the screws attaching the stiffener and separator plates to the transfer plate and separate these parts.

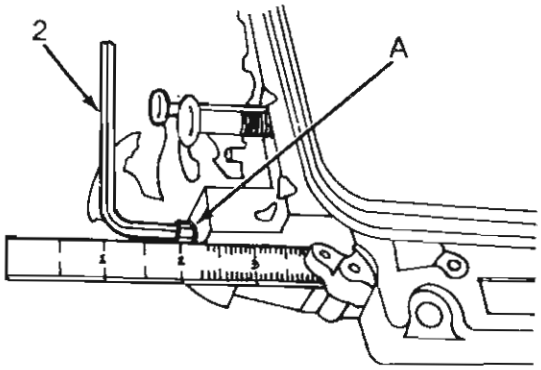
SEE I.S. NOTES

SEE I.S. NOTES

Valve Body Hydraulic Control Pressure Adjustments

There are two hydraulic control pressure adjustments that can be performed on the valve body, they are: Line pressure and throttle pressure adjustment.

Because line and throttle pressure are interdependent (each affects shift quality and timing), both adjustments must be performed properly and in the correct sequence which is; line pressure adjustment first – throttle pressure adjustment last.



84487

Line Pressure Adjustment

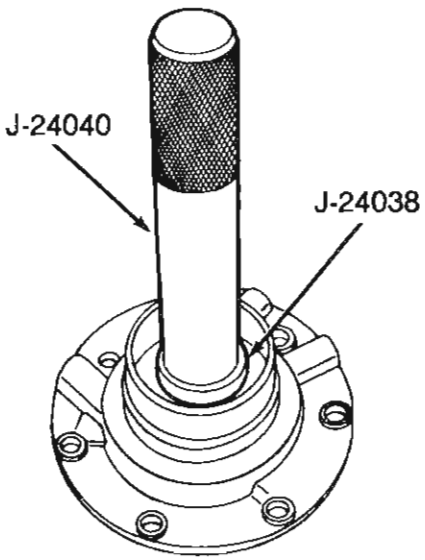
Measure the distance from the valve body to the inner edge of the adjusting screw using the accurate steel scale.

The distance measured should be 33.4 mm (1-5/16 inches).

If adjustment is required, turn the adjusting screw (A) in or out to obtain 33.4 mm (1-5/16 inch) setting.

NOTE: The 33.4 mm (1-5/16 inches) setting is an approximate setting. Because of manufacturing tolerances, it may be necessary to vary from this dimension to obtain the desired pressure. One complete turn of the adjusting screw changes line pressure approximately 9kPa (1-2/3 psi). Turning the adjusting screw counterclockwise increases pressure while turning the screw clockwise decreases pressure.

Thread the Bushing Installer Tool J-24038 onto Driver Handle J-8092.



Position the replacement bushing on the installer tool and install the bushing straight into the shaft bore until the tool bottoms.

Assembly

Install the pump rotors in the housing.

Install the reaction shaft support and tighten the attaching bolts to 18 N·m (160 in-lbs) torque.

Install the O-ring seal around the pump housing flange.

Install the oil seal pump housing with the seal lip facing inward.

Install the oil seal on Installer Tool J-21005.

Install the seal straight into the housing until the tool bottoms.

Thoroughly clean the reaction shaft support assembly.

SEE I.S. NOTES

Inspection

Inspect the friction material on driving discs. Replace all discs that are charred, glazed, heavily pitted, flaking or if the friction material can be scraped off easily. Inspect the driving disc inner splines for wear or other damage.

Inspect the steel plates and pressure plate surfaces for over heating, scoring, and damaged driving lugs. Inspect all discs and plates for distortion. Replace warped or coned discs or plates.

Inspect the steel plate lug grooves in the retainer for smooth surfaces. The plates must slide freely in these grooves. Inspect the clutch piston ball check. The ball should move freely in its cage. Inspect the seal ring surfaces in the clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing. Inspect the piston spring, wave spring, and spacer for distortion or breakage.

Inspect the seal ring grooves in the input shaft and piston retainer for nicks, burrs, and wear.

Inspect the rear clutch to front clutch thrust washer. The washer should be 1.55 to 1.60 mm (0.061 to 0.063 in) thick.

Input Shaft Bushing Replacement – Model 727

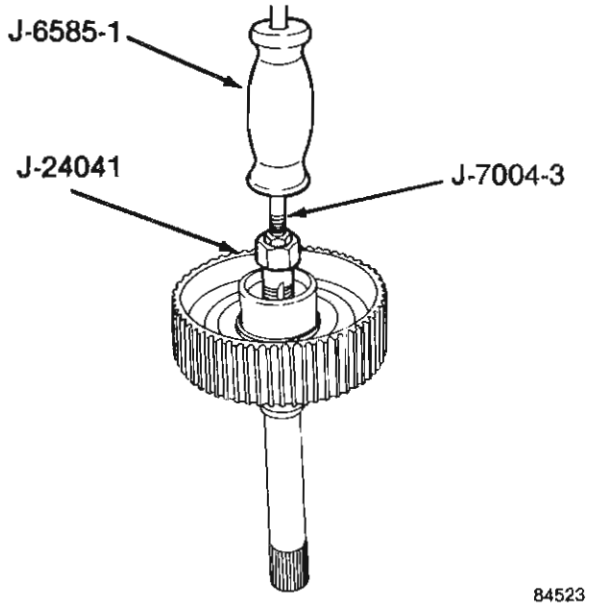
Clamp the input shaft in a vise using brass protective jaws.

CAUTION: Do not clamp the seal ring land or bearing journal.

Thread Bushing Remover Tool J-24041 straight into the bushing as far as possible by hand.

Using a wrench, thread the puller into the bushing three to four additional turns to fully engage the puller threads into the bushing.

Thread Slide Hammer Bolts Tool J-7004-3 into the puller.



Bump outward with the slide hammers to remove the bushing.

Thoroughly clean the input shaft and remove any chips generated by the bushing removal.

Grip the old bushing with pliers and remove it from the tool.

NOTE: Be careful to protect the remover tool threads when using the tool.

Remove the light, position the support (1) over the pilot studs and install the support in the case using a wooden block and hammer.

Install and tighten the support attaching bolts to 17 N·m (150 in-lbs) torque.

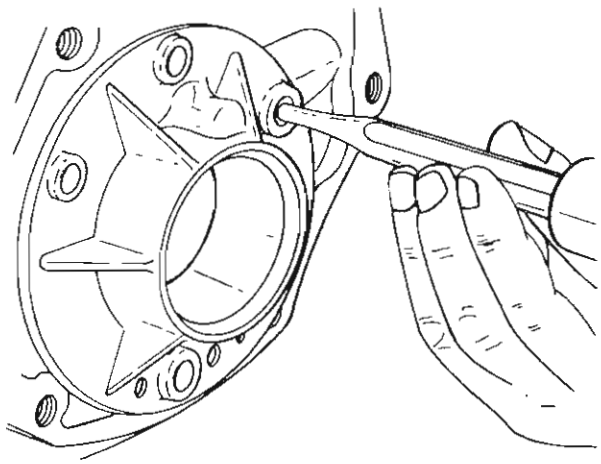
Cam Replacement – Model 727

The overrunning clutch cam and spring retainer should be removed only if replacement is necessary.

Remove the setscrew from the case.

Remove the bolts attaching the output shaft support to the rear of the case.

Insert a punch through the bolt holes and drive the cam (A) out of the case.

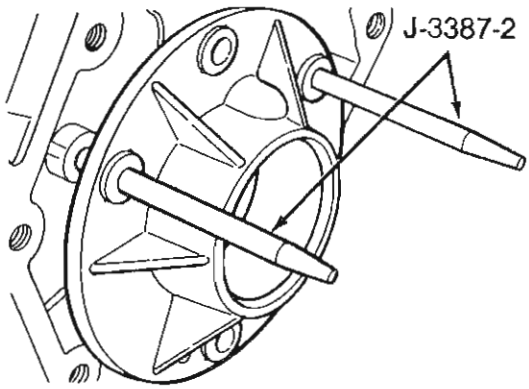


84533

NOTE: Move the punch from one bolt hole to another in a clockwise direction after each punch stroke to drive the cam out of the case evenly.

CAUTION: The output shaft support must be installed in the case before the overrunning clutch cam can be installed. If the support must be replaced, drive it out the rear of the case using a wooden block and hammer.

Thread two Pilot Stud Tools J-3387-2 into the case.



84534

SEE I.S. NOTES

SEE I.S. NOTES

Rear Band Adjustment

Loosen the locknut and back the nut off five turns.

Tighten the band adjusting screw to the specified torque.

CAUTION: If Adapter Tool J-24063 is used to adjust the band, tighten the adjusting screw to one half the specified torque only.

Back off the adjusting screw to specifications.

Hold the adjusting screw in position and tighten the locknut to the specified torque.

Install the oil pan and gasket.

Front Band Adjustment

Loosen the locknut and back the nut off five turns.

Be sure the band adjusting screw turns freely in the case. Lubricate the screw, if necessary.

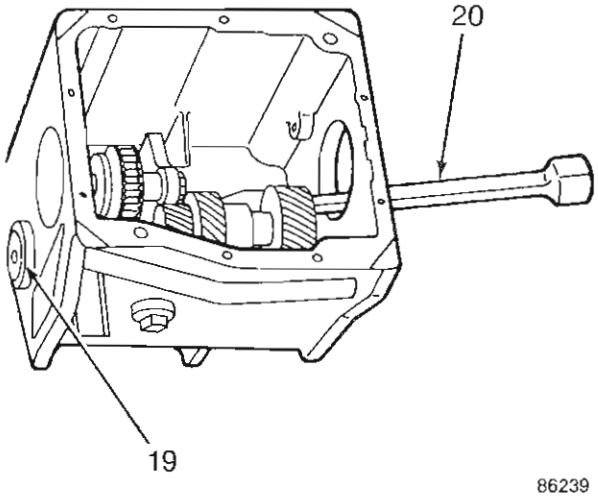
Tighten the band adjusting screw to the specified torque using Torque Wrench J-5853 and an 8 mm (5/16 in) square socket.

CAUTION: If Adapter Tool 2-24063 is used to adjust the band, tighten the adjusting screw to one half the specified torque only.

Back off the adjusting screw to specifications.

Hold the adjusting screw in position and tighten the locknut to the specified torque.

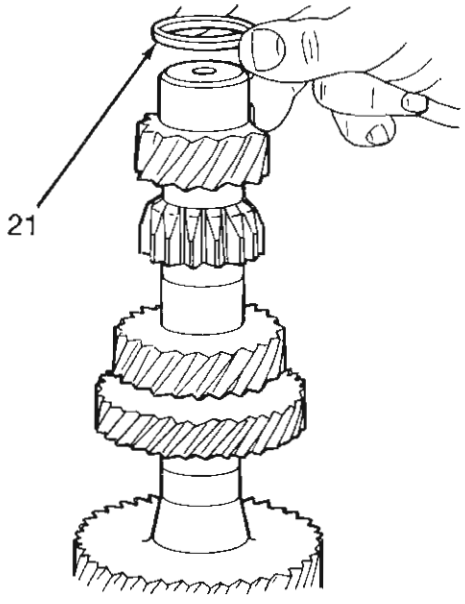
Remove the countershaft rear bearing (19) with a brass drift (20) and arbor press. Note the position of the bearing for assembly reference. The bearing identification numbers face outward when the bearing is correctly installed.



86239

Move the countershaft rearward, tilt it upward and remove it from the case. Remove the countershaft front thrust washer from the case. Note the position of the washer for assembly reference.

Remove the countershaft rear bearing spacer (21).



86240

SEE I.S. NOTES

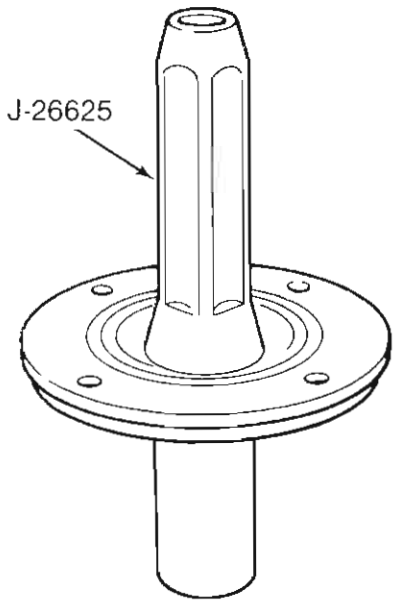
Install the fourth gear blocking ring on the output shaft.

Install the output shaft rear bearing race.

Install the clutch shaft in the transmission case and engage the shaft in the third-fourth gear synchronizer sleeve and blocking ring.

Install a replacement oil seal in the front bearing cap with Tool J-26625.

SEE I.S. NOTES

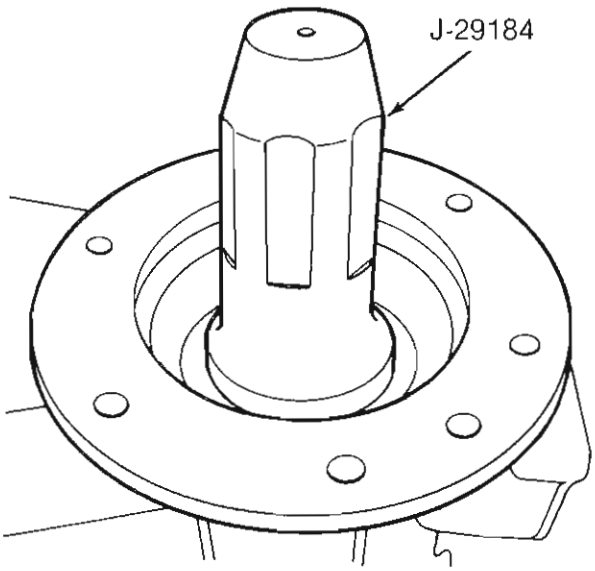


86265

Install a replacement rear oil seal in the adapter housing with Tool J-29184.

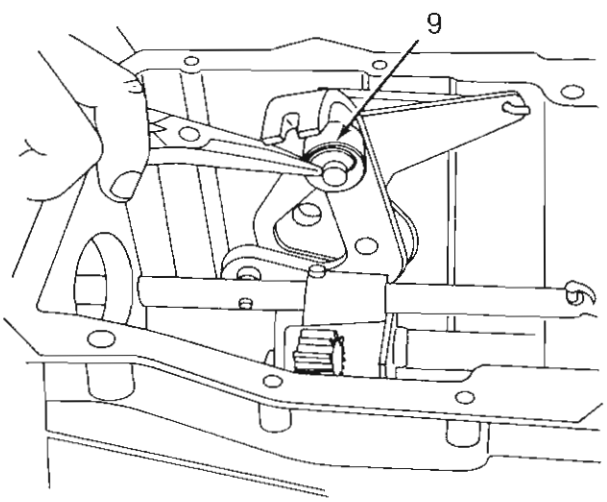
Install the front bearing race in the front bearing cap. Do not install the shims at this time.

Install the front bearing cap. Do not apply sealant at this time.



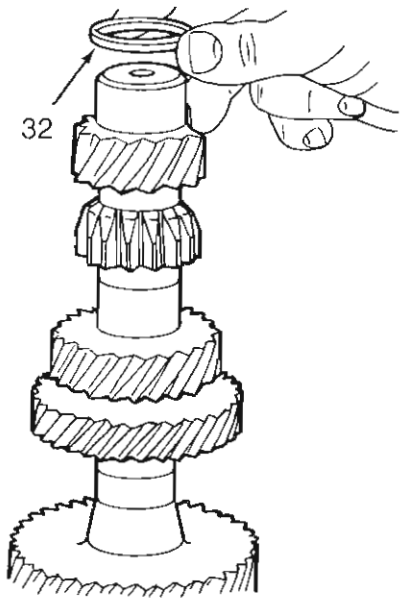
86266

Coat the reverse gear shift lever pivot pin bolt threads with Loctite sealant. Install the reverse gear shift lever, pivot pin bolt and retaining C-clip (9). Ensure that the reverse gear shift lever fork is engaged in the reverse idler gear. Tighten the shift lever pivot pin bolt with 58 N·m (43 ft-lbs) torque.



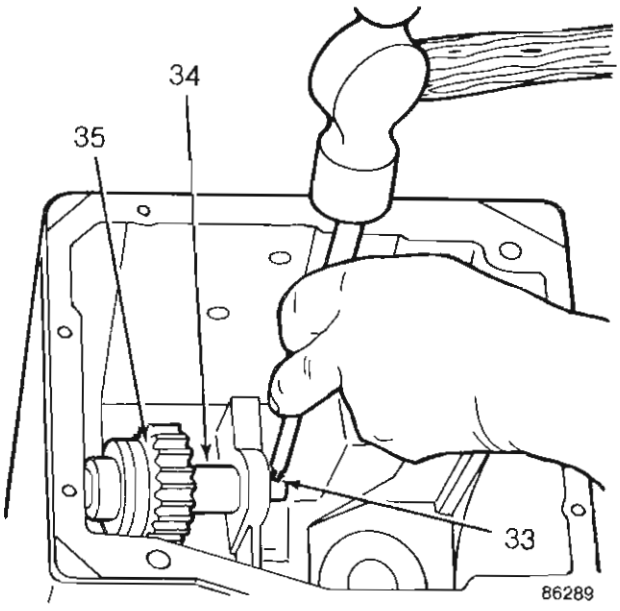
86232

Remove the countershaft rear bearing spacer (32).



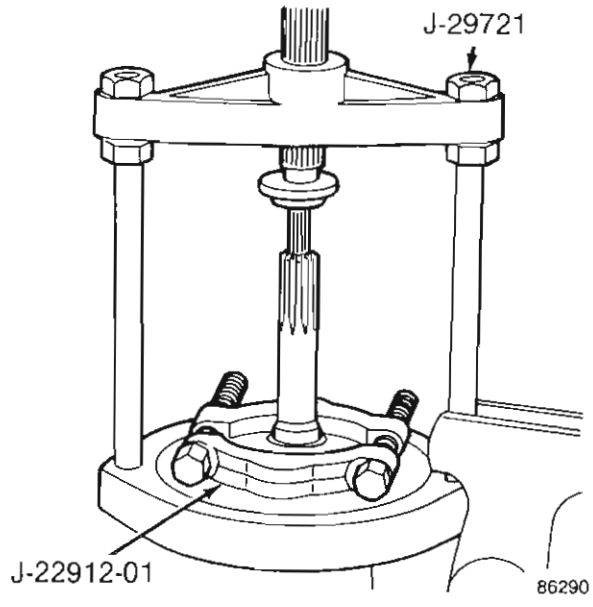
Use a hammer and punch to remove the roll pin (33) from the forward end of the reverse idler gear shaft.

Remove the reverse idler gear shaft (34) and gear (35) from the transmission case. Note the position of the idler gear for assembly reference.



Remove the countershaft front bearing from the transmission case with an arbor press.

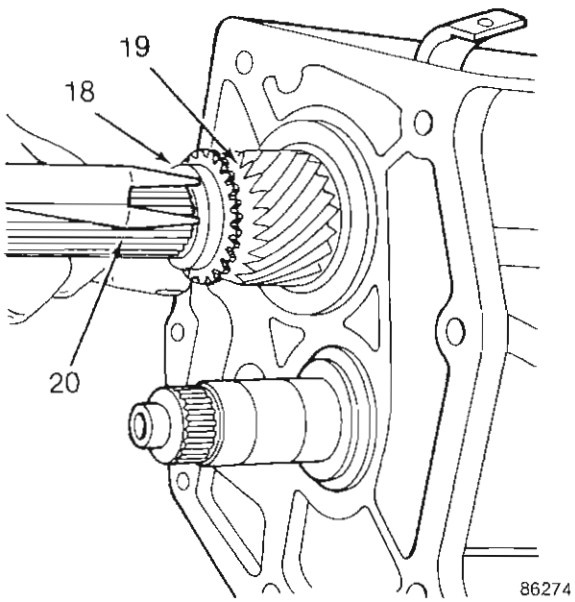
Remove the clutch shaft front bearing with Tools J-29721 and J-22912-01.



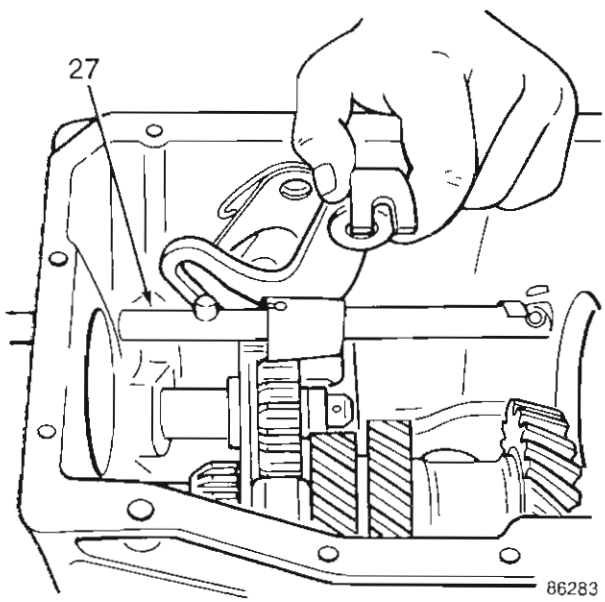
Remove the adapter housing rear oil seal with a flat drift and hammer.

SEE I.S. NOTES

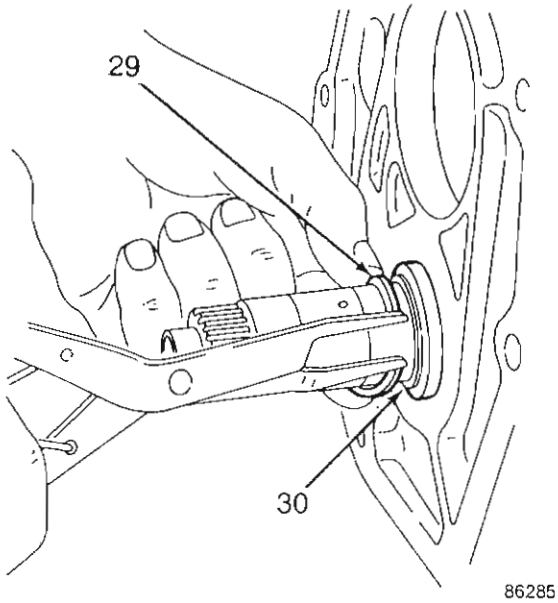
Install the fifth driven gear (19) and retaining snap ring (18) on the rear of the output shaft (20).



Insert the fifth-reverse gear shift rail through the opening in the rear of the case and install it in the fifth-reverse gear shift lever. Rotate the rail (27) during installation to simplify engagement with the lever.

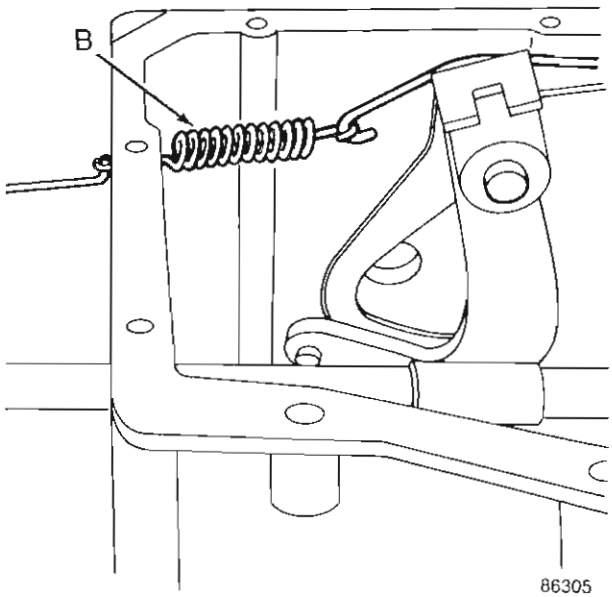


Install the countershaft rear bearing spacer (30) and retaining snap ring (29).



Install the fifth gear on the countershaft.

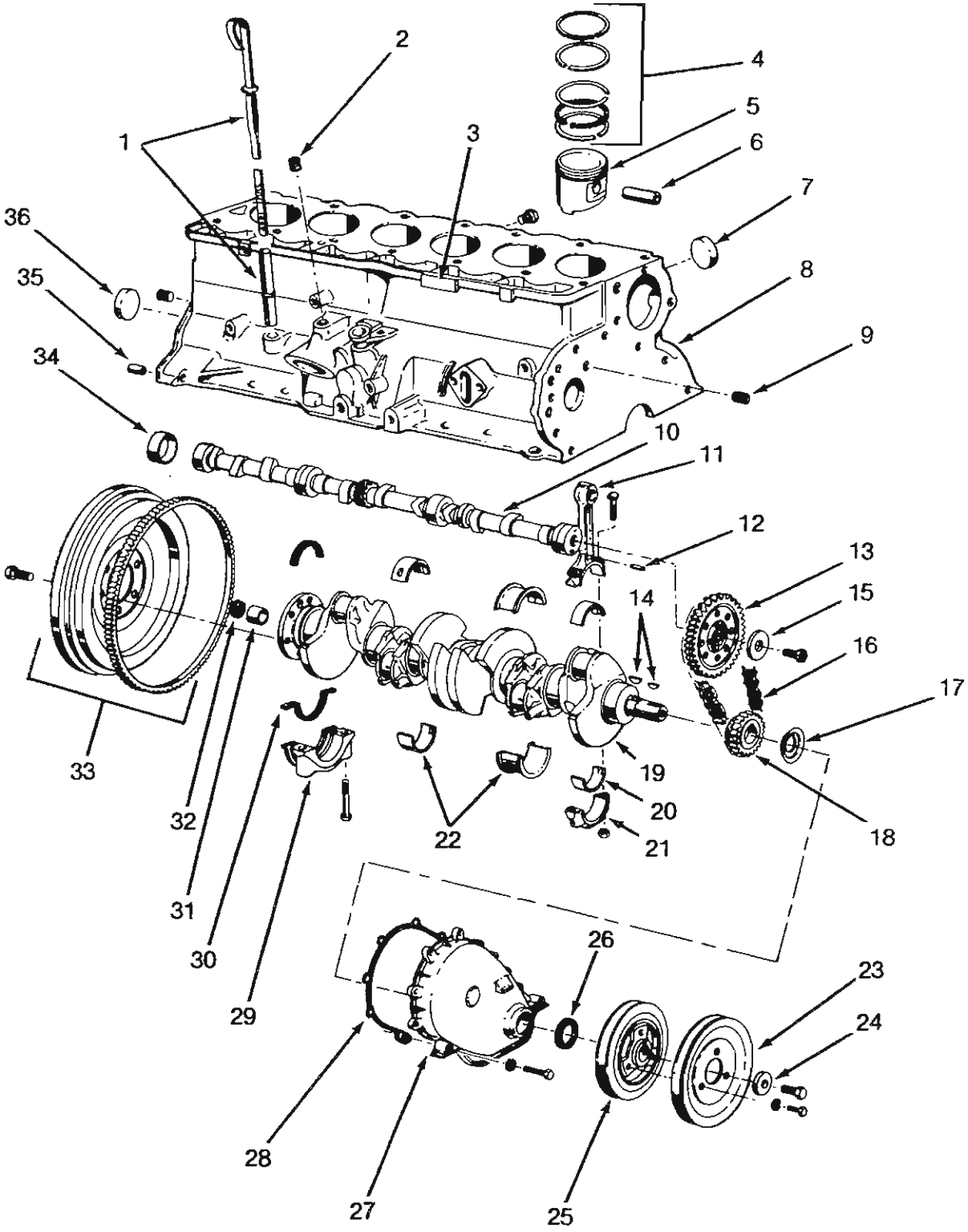
Install the fifth-reverse gear shift lever over-center link spring (B).



SEE I.S. NOTES

CYLINDER BLOCK COMPONENTS – 4.0L/4.2L

SEE I.S. NOTES



86158A

ENGINE SPECIFICATIONS – 4.2L (Continued)

CYLINDER HEAD	USA Inches*	METRIC Millimeters*
Combustion Chamber Volume	64.45-67.45cc	
Valve Arrangement	EI-IE-IE-EI-EI-IE	
Valve Guide ID (Integral)	0.3735-0.3745	9.487-9.512
Valve Stem-to-Guide Clearance	0.001-0.003	0.03-0.08
Intake Valve Seat Angle	30°	
Exhaust Valve Seat Angle	44.5°	
Valve Seat Width	0.040-0.060	1.02-1.52
Valve Seat Runout	0.0025	0.064
Cylinder Head Flatness	0.001/1-0.002/6 (0.008 max)	0.03/25-0.05/152 (0.20 max)

LUBRICATION SYSTEM		
Engine Oil Capacity	4 quarts (Add 1 quart with filter change)	3.8 liters (Add 0.9 liter with filter change)
Normal Operating Pressure	13 psi at 600 rpm; 37-75 psi (max) at 1600+ rpm	89.6 kPa at 600 rpm; 255.1-517.1 kPa (max) at 1600+ rpm
Oil Pressure Relief	75 psi (max)	517.1 kPa (max)
Gear-to-Body Clearance (Radial)	0.002-0.004 (.002 preferred)	0.051-0.102 (.051 preferred)
Gear End Clearance, Plastigage	0.002-0.006 (0.002 preferred)	0.051-0.152 (0.051 preferred)
Gear End Clearance, Feeler Gauge	0.004-0.008 (0.007 preferred)	0.1016-0.2032 (0.1778 preferred)

PISTONS		
Weight (less pin)	510-514 grams	
Piston Pin Bore	1.651-1.655	41.94-42.04
Centerline-to-Piston Top	0.0009-0.0017	0.023-0.043
Piston-to-Bore Clearance	(0.0012-0.0013 preferred)	(0.030-0.033 preferred)
Piston Ring Gap Clearance – Compression (both)	0.010-0.020	0.25-0.51
Piston Ring Gap Clearance – Oil Control Steel Rails	0.010-0.025	0.25-0.64
Piston Ring Side Clearance		
No. 1 Compression	0.0017-0.0032 (0.0017 preferred)	0.043-0.081 (0.043 preferred)
No. 2 Compression	0.0017-0.0032 (0.0017 preferred)	0.043-0.081 (0.043 preferred)
Oil Control	0.001-0.008 (0.003 preferred)	0.03-0.20 (0.08 preferred)
Piston Ring Groove Height		
Compression (both)	0.0795-0.0805	2.019-2.045
Oil Control	0.188-0.1895	4.78-4.80
Piston Ring Groove Diameter		
No. 1 and No. 2	3.324-3.329	84.43-84.56
Oil Control	3.329-3.339	84.56-84.81
Piston Pin Bore Diameter	0.9308-0.9313	23.642-23.655
Piston Pin Diameter	0.9304-0.9309	23.632-23.645
Piston-to-Pin Clearance	0.0003-0.0005 loose (0.0005 preferred)	0.008-0.013 loose (0.013 preferred)
Piston-to-Pin Connecting Rod	2000 lbf press-fit	8.9kN press-fit

ROCKER ARMS, PUSH RODS AND TAPPETS	USA Inches*	METRIC Millimeters*
Rocker Arm Ratio	1.6:1	
Rush Rod Length	9.710-9.730	246.63-247.14
Push Rod Diameter	0.312-0.315	7.92-8.00
Hydraulic Tappet Diameter	0.904-0.9045	22.962-22.974
Tappet-to-Bore Clearance	0.001-0.0025	0.03-0.05

VALVES		
Valve Length (Tip-to-Gauge Dim. Line)	4.7895-4.8045	121.653-122.034
Valve Stem Diameter	0.3715-0.3725	9.436-9.462
Stem-to-Guide Clearance	0.001-0.003	0.03-0.08
Intake Valve Head Diameter	1.782-1.792	45.26-45.52
Intake Valve Face Angle	29°	
Exhaust Valve Head Diameter	1.401-1.411	35.59-35.84
Exhaust Valve Face Angle	44°	
Maximum Allowable Removed for Tip Refinishing	0.010	0.25

VALVE SPRINGS		
Free Length	1.99 approx.	50.55 approx.
Spring Tension		
Valve Closed	64-72 lbf at 1.786	285-320 N at 45.4
Valve Open	188-202 lbf at 1.411	836-898 N at 35.84
Inside Diameter	0.948-0.968	24.08-24.59

*Unless Otherwise Specified

SEE I.S. NOTES

86219B

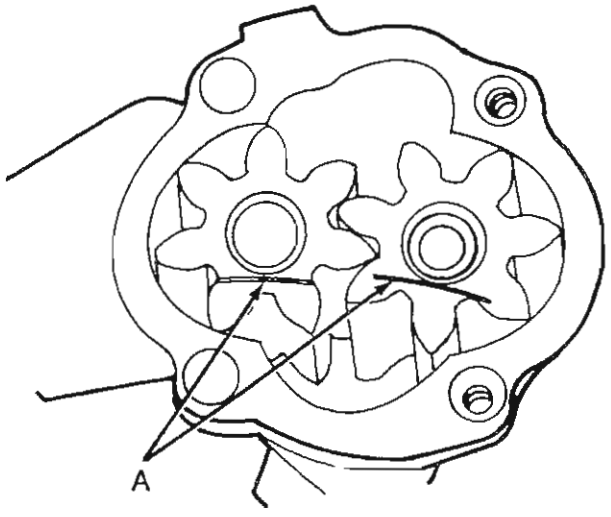
OIL PUMP GEAR END CLEARANCE MEASUREMENT

Remove the cover retaining screws and cover from the pump body.

SEE I.S. NOTES

Preferred Method

Place a strip of Plastigage (A) across the full width of each gear.



86181A

Install the pump cover and tighten the screws to 8 N·m (70 in-lbs) torque.

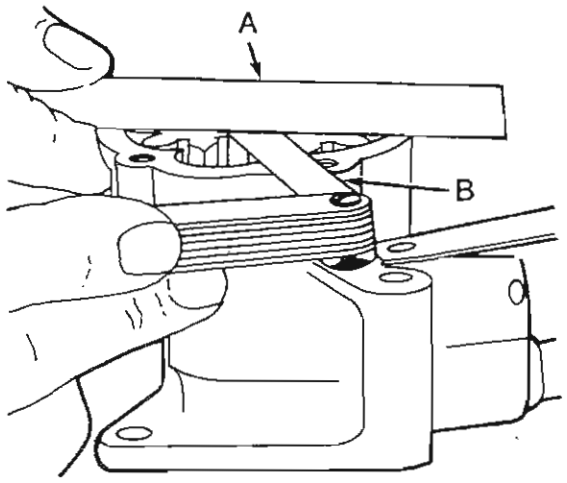
Remove the pump cover and determine the amount of clearance by measuring the width of compressed Plastigage with the scale on the Plastigage envelope.

The correct clearance by this method is 0.051 – 0.152 mm (0.002 – 0.006 in.). The preferred measurement is 0.051 mm (0.002 in.).

Alternate Method

Place a straightedge (A) across the ends of the gears and the pump body.

Select a feeler gauge (B) that fits snugly but freely between the straightedge and the pump gears.



86182A

Using this method the correct clearance is 0.051 – 0.152 mm (0.002 – 0.006 in.), with the preferred measurement being 0.051 mm (0.002 in.).

If the gear end clearance is excessive, replace the oil pump assembly.

CONNECTING ROD INSTALLATION

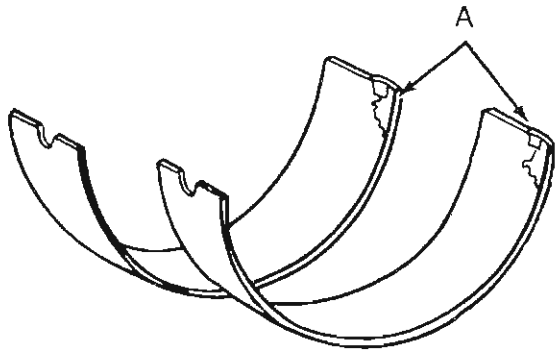
The connecting rods are made of malleable iron and are balanced assemblies with bearing inserts at the crankshaft journal end. The piston pin is 8.9 kN (2 000 pounds-force) press-fitted into the rod.

A squirt hole in the crankshaft end of the connecting rod provides lubrication for the camshaft lobes, distributor drive gear, cylinder walls and piston pins. The squirt hole faces the camshaft when the connecting rod is installed correctly.

Misaligned or bent connecting rods can cause abnormal wear on pistons, piston rings, cylinder walls, connecting rod bearings and crankshaft connecting rod journals. If wear patterns or damage to any of these components indicate the probability of a misaligned connecting rod, inspect it for correct rod alignment.

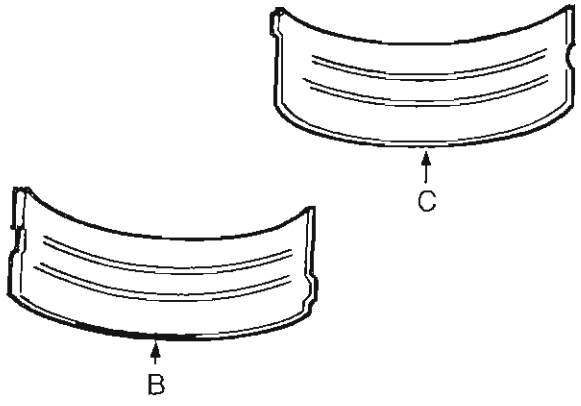
Replace misaligned or bent rods. Refer to Side Clearance Measurement.

Example of abnormal contact areas (A) caused by locking tabs that have not been fully seated or are bent:



86202A

Example of scoring on the lower (B) and upper (C) bearing surfaces:



86203A

SEE I.S. NOTES