

CHRYSLER CORPORATION

SERVICE MANUAL

1994 JEEP® GRAND CHEROKEE

To order the special service tools used and illustrated, please refer to the instructions on inside back cover.



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FLUID CAPACITIES

Gas Station Reference

Fuel Selection

Unleaded Gasoline – 87 octane or higher

Engine Oil – API Quality
SERVICE SG OR SG/CD
(SAE 10W-30 Preferred)



FLUID CAPACITIES

	U.S. Measure	Metric Measure
Fuel (approximate)	23 gal.	87.4 liters
Engine Oil -		
6-Cyl.	6 qt.*	5.7 liters
V-8	5 qt.*	4.7 liters
*with filter change		
Cooling System		
6-Cyl.	9.3 qts.	8.8 liters
V-8	14.9 qts.	14.1 liters
Automatic Transmission Fluid		
6-Cyl. Mopar Mercon/Dexron II preferred		
8-Cyl. Mopar ATF Plus (Type 7176) preferred		
Oil Filter		
Mopar 5281090 or equivalent		
Spark Plug, Gap, Ignition Timing		
Refer to "Vehicle Emission Control Information"		
label in engine compartment.		
TIRE PRESSURES (Full Load)		
P215/75R15	33 psi (227 kPa)	
P225/75R15	33 psi (227 kPa)	
P225/70R15	33 psi (227 kPa)	
	Front	
P235/75R15	33 psi (227 kPa)	
	Rear	
	33 psi (227 kPa)	

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DRIVETRAIN

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CLUTCH AND BRAKE PEDAL BUSHINGS

If clutch and brake pedal mechanism squeaks, pivot bushings should be lubricated. Use MOPAR®Multi-Purpose Lubricant, or an equivalent.

CLUTCH MASTER CYLINDER**HYDRAULIC FLUID LEVEL**

The clutch master cylinder fluid level should be inspected at same time as scheduled underhood maintenance is conducted. The fluid level should be at internal indicating line (Fig. 1). If fluid level is low, locate and correct any possible leaks. Fill reservoir with clean, moisture-free brake fluid.

CAUTION: Do not allow any petroleum base fluids to contaminate clutch hydraulic system because seal damage will result.

FLUID SPECIFICATION

The only fluid recommended for use is MOPAR®Brake Fluid, or an equivalent product. The product is identified as SAE J-1703 or DOT 3 fluid. **Do not use any other type of fluid.**

CAUTION: Never use reclaimed brake fluid or fluid from an unsealed container. Do not use fluid that has been opened and allowed to stand for an extended length of time.

TRANSMISSIONS**SPECIAL ADDITIVES**

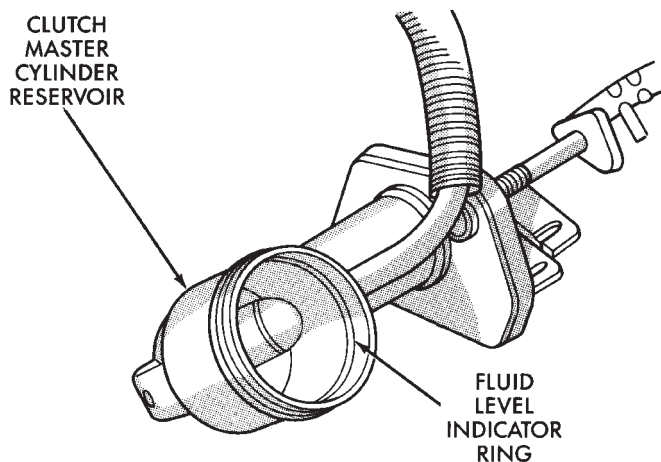
Chrysler Motors does not recommend addition of any special additives to a transmission. Black light detection dye can be used as an aid in detecting fluid leaks.

GEAR SHIFTER BOOTS

Inspect shifter boots periodically for stone and heat damage. Replace, if necessary.

SEVERE DRIVING CONDITIONS

The interval between transmission drain and refill maintenance should be decreased to:



J9106-11

Fig. 1 Fluid Level Indicating Ring

- AX15 manual transmission—every 29 000 km (18,000 miles)
- Automatic transmission—every 19 000 km (12,000 miles)

A severe driving condition includes:

- Extended operation with heavy cargo loads
- Driving in deep mud or snow
- Off-road operation (4WD)
- Trailer towing
- Operation as a commercial vehicle
- Snow plowing

MANUAL TRANSMISSIONS**INSPECTION/LUBE OIL LEVEL**

The manual transmission should be inspected for leakage whenever other service is necessary under vehicle. To check lube oil level, remove fill hole plug (Fig. 2). If level is below bottom of fill hole, raise level to bottom of fill hole with:

- SAE 75W90, API Quality Grade GL-5 gear lubricant

DRAIN AND FILL

The AX15 transmission fluid should be changed according to interval listed in Maintenance Schedule. Also, refer to Fluid Capacities chart.

FASTENER TORQUE			
LETTER	N•m	IN. LBS.	FT. LBS.
⬢	251	—	185
⬢			
⬢	74	—	55
⬢			
⬢	49	—	36
⬢	27	—	20

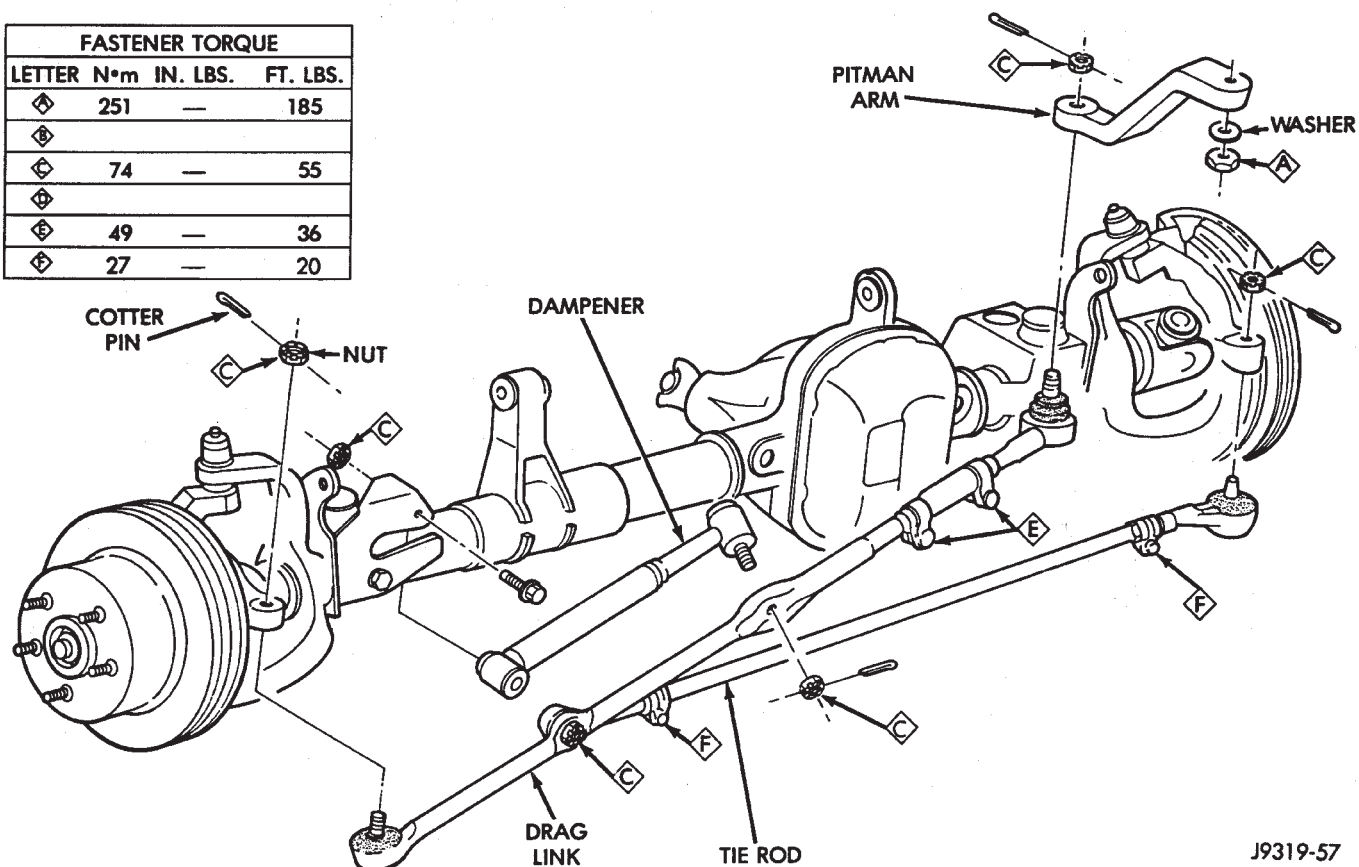


Fig. 3 Steering Linkage

ALIGNMENT SPECIFICATIONS

ADJUSTMENT	SET TO	OK RANGE
CASTER	+7°	6.5° to 7.5°
CAMBER (not adjustable)	-0.25	-0.75 to .50
WHEEL TOE-IN (each side)	0.12	0 to 0.22
OUTSIDE WHEEL TURN ANGLE*	33°	33° to 32°
*Steering stops are not adjustable. J9402-30		

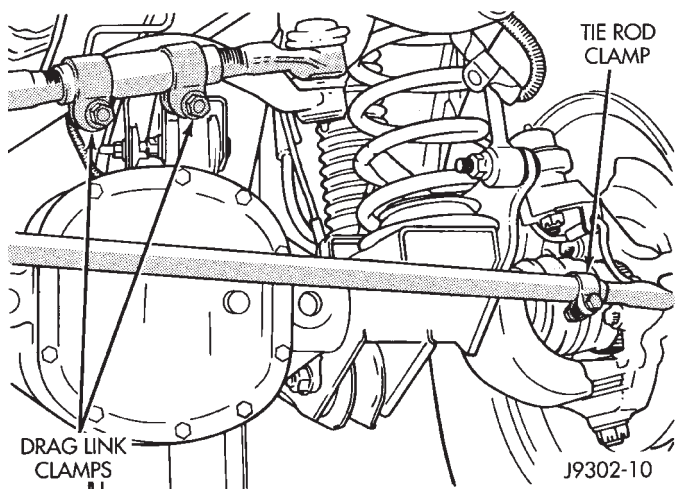
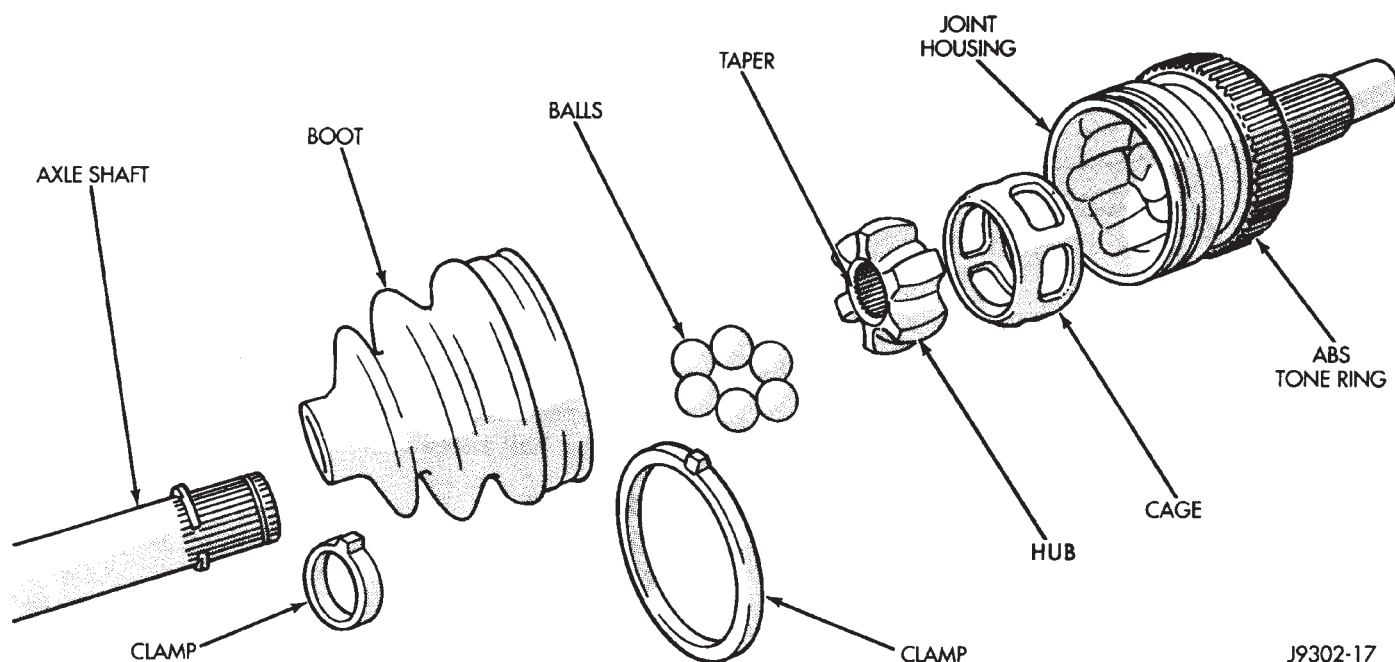


Fig. 4 Drag Link and Tie Rod Clamp Location



J9302-17

Fig. 9 CV Joint Components

AXLE SHAFT— CV-JOINT

HANDLING AND CLEANING PRECAUTIONS

Extreme care must be exercised to avoid puncturing or tearing the boots. Also avoid damage to the ABS tone ring pressed onto the CV-joint.

The rubber material in shaft boots is not compatible with oil, gasoline, or petroleum-based cleaning solvents. Do not expose the rubber boots to any of these fluids. Use only soap and water to clean the rubber boots. After cleaning, the rubber boot must be thoroughly rinsed and dried.

INSPECTION

The most common failure of CV-joints is torn or ripped boots and subsequent lubricant loss or contamination. Look for lubricant around the exterior of boot. Check for a punctured or torn boot or retaining clamp loose. If joint was operating satisfactorily and grease does not appear contaminated, replace boot. When a CV drive shaft is removed from the vehicle for service, the boot should be properly cleaned. Inspect the boot for cracks, tears and scuffed areas on the surfaces. If any of these conditions exist boot replacement is recommended.

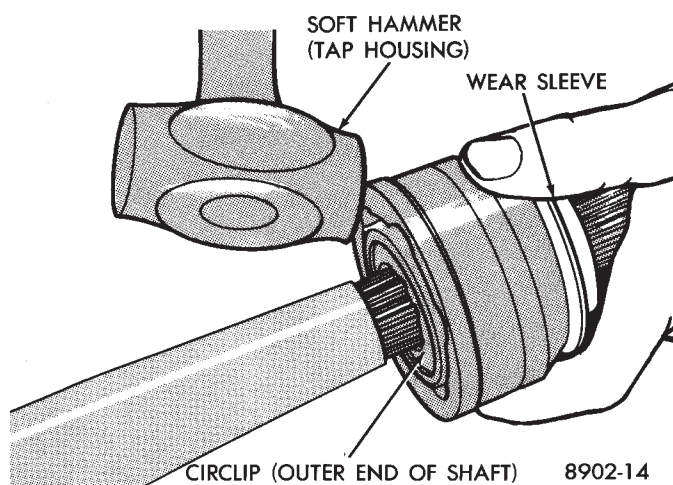
If joint is noisy or worn, bypass following disassembly and replace entire unit and boot.

DISASSEMBLY

(1) Remove retaining clamps from the outer CV joint and discard. Slide the boot off the outer joint and down the shaft.

(2) Remove the lubricant to expose the joint components (Fig. 9).

(3) Clamp the shaft in a vise (with soft jaws). Give a sharp tap to the top of the housing to dislodge joint from internal circlip. Slide the joint from the shaft. (Fig. 10).



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Fig. 10 Joint Removal

(4) Remove the surplus lubricant. Apply installation alignment marks on the bearing hub, bearing cage and housing with dabs of paint (Fig. 11).

(5) Place the stub shaft in a soft-jawed vise to avoid damage to the shaft splines.

(6) Press down on one side of the bearing cage/hub to tilt the cage. This will provide access to a ball at the opposite side of the cage. If the CV joint is tight, use a hammer and brass drift to loosen the bearing hub. **Do not hit the bearing cage with the drift.**

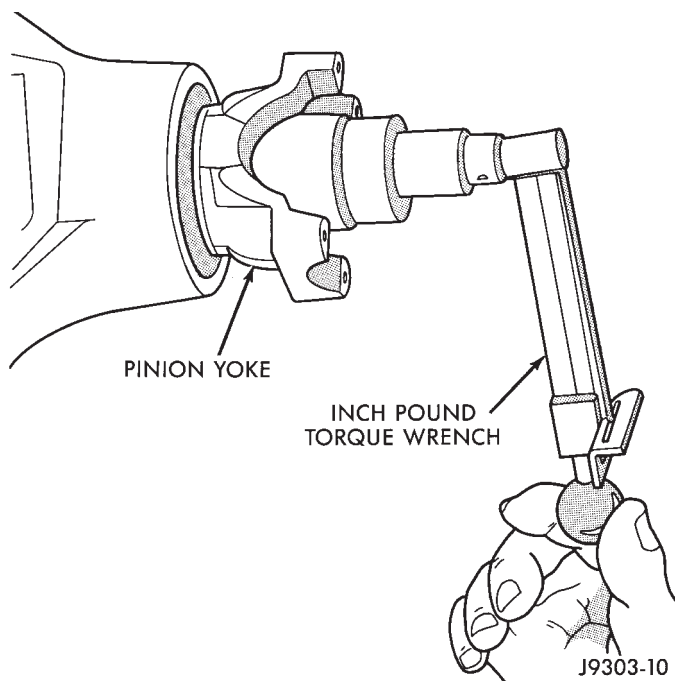


Fig. 57 Check Pinion Gear Torque

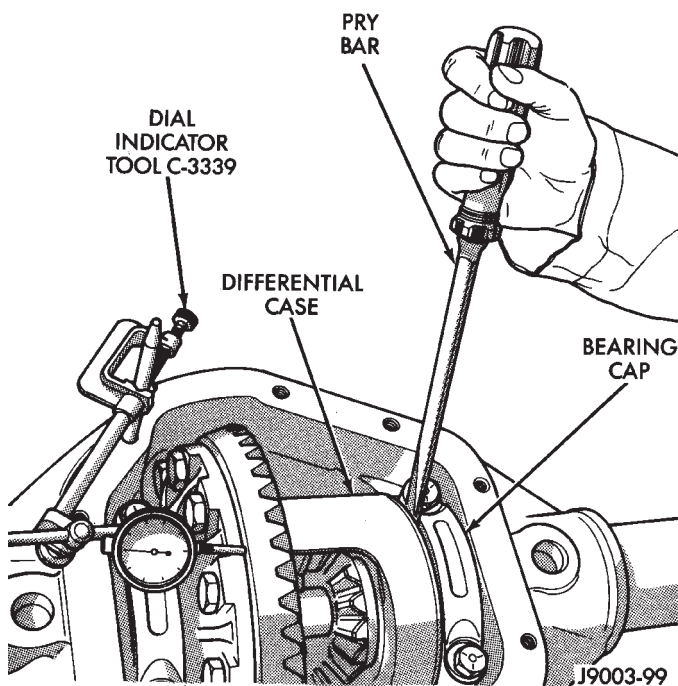


Fig. 58 Shim Pack Measurement

(5) Repeat the measurement several times to check consistency. Record the travel distance.

The measurement above shows shim thickness necessary to eliminate ring gear backlash. Subtract this thickness from case zero end-play shim thickness (Fig. 59). The shims must be placed at the ring gear side between the case and bearing.

- (6) Remove indicator and pilot stud.
- (7) Remove the differential case from housing.

For Example:

Indicator Reading	LESS PINION	0.085 in.	total
Indicator Reading	WITH PINION	0.055 in.	total
BALANCE OF SHIM PACK		0.030 in.	total
Place BALANCE of shims at opposite side of ring gear			
ADD an additional 0.015 in. shim to opposite side of ring gear for bearing preload			
Ring Gear Side (Flange Side)		0.055 in.	←
Opposite Side		0.030 in.	←
Opposite Side Preload		0.015 in.	
Total Opposite Side		0.045 in.	J9302-65

Fig. 59 Shim Pack Calculations

(8) Remove the master bearing tools from the differential case hubs.

(9) Position the backlash shims (with determined thickness) on case hub (ring gear side). Install bearing on the hub with Bearing Installer C-3716-A and Driver Handle C-4171 (Fig. 60).

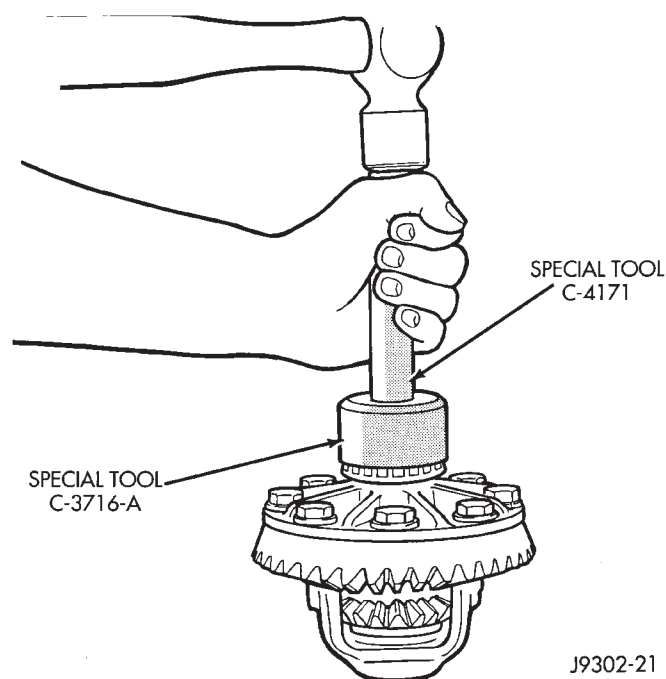


Fig. 60 Differential Bearing Installation

(10) Position the remaining zero end-play shims on hub at opposite side of case. Include an additional 0.015 in. (0.38 mm) thick shim on this hub. This will provide the required differential bearing preload.

SERVICE DIAGNOSIS (CONT'D)

Condition	Possible Cause	Correction
AXLE OVERHEATING	(b) Worn axle shaft seals.	(b) Replace worn seals.
	(c) Cracked differential housing.	(c) Repair or replace housing as necessary.
	(d) Worn drive pinion gear shaft seal.	(d) Replace worn drive pinion gear shaft seal.
	(e) Scored and worn yoke.	(e) Replace worn or scored yoke and seal.
	(f) Axle cover not properly sealed.	(f) Remove cover and clean flange and reseal.
GEAR TEETH BROKE (RING GEAR AND PINION)	(a) Lubricant level too low.	(a) Refill differential housing.
	(b) Incorrect grade of lubricant.	(b) Drain, flush and refill with correct amount of the correct lubricant.
	(c) Bearings adjusted too tight.	(c) Readjust bearings.
	(d) Excessive gear wear.	(d) Inspect gears for excessive wear or scoring. Replace as necessary.
	(e) Insufficient ring gear backlash.	(e) Readjust ring gear backlash and inspect gears for possible scoring.
AXLE NOISE	(a) Overloading.	(a) Replace gears. Examine other gears and bearings for possible damage. Replace parts as needed. Avoid overloading of vehicle.
	(b) Erratic clutch operation.	(b) Replace gears and examine the remaining parts for possible damage. Avoid erratic clutch operation.
	(c) Ice-spotted pavements.	(c) Replace gears. Examine the remaining parts for possible damage. Replace parts as required.
	(d) Improper adjustments.	(d) Replace gears. Examine other parts for possible damage. Ensure ring gear backlash is correct.
	(e) Insufficient lubricant.	(e) Refill axle with correct amount of the proper lubricant. Also inspect for leaks and correct as necessary.
	(b) Improper ring gear and drive pinion gear adjustment.	(b) Check ring gear and pinion gear teeth contact pattern.
	(c) Unmatched ring gear and drive pinion gear.	(c) Remove unmatched ring gear and drive pinion gear. Replace with matched gear and drive pinion gear set.
	(d) Worn teeth on ring gear or drive pinion gear.	(d) Check teeth on ring gear and drive pinion gear for correct contact. If necessary, replace with new matched set.
	(e) Loose drive pinion gear shaft bearings.	(e) Adjust drive pinion gearshaft bearing preload torque.
	(f) Loose differential bearings.	(f) Adjust differential bearing preload torque.
	(g) Misaligned or sprung ring gear.	(g) Measure ring gear runout.
	(h) Loose differential bearing cap bolts.	(h) Tighten with specified torque.

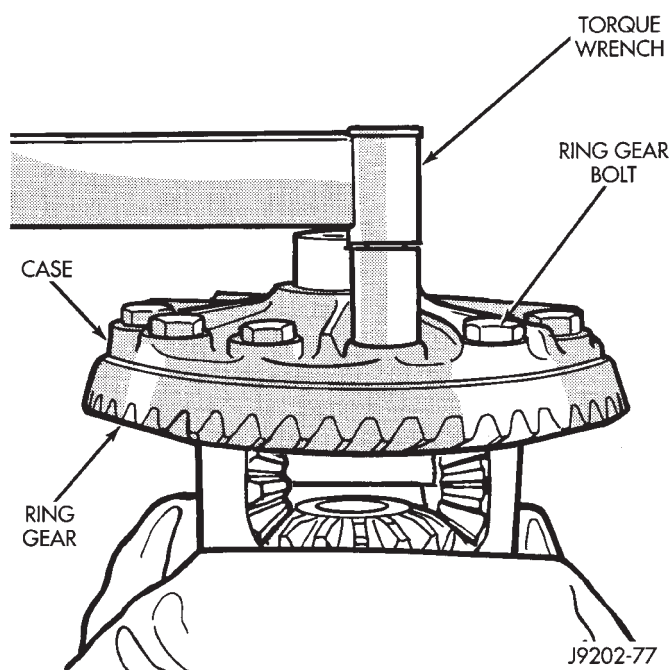


Fig. 40 Ring Gear Bolt Installation

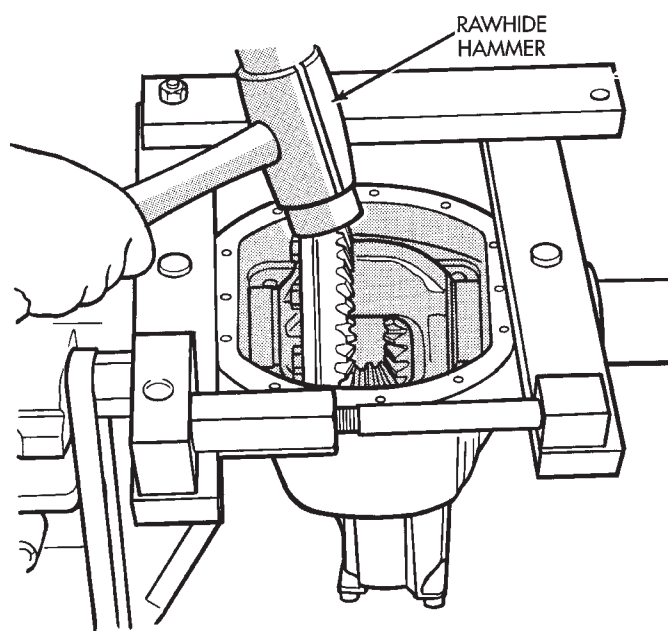


Fig. 42 Differential Installation

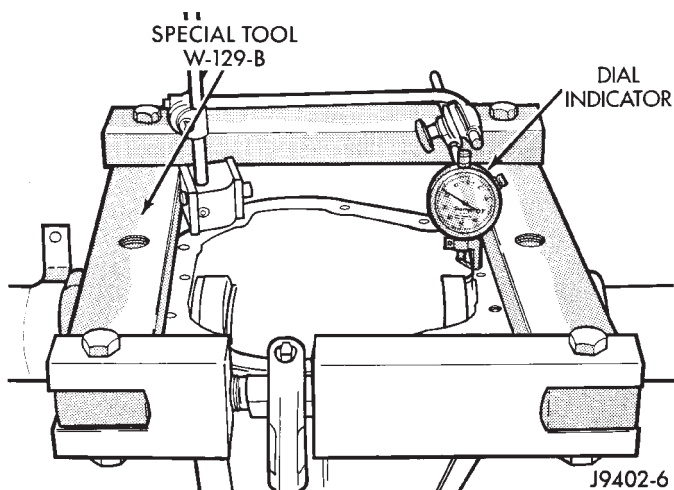


Fig. 41 Spread Differential Housing

(6) Install case in the housing. Tap the differential case to ensure the bearings are fully seated (Fig. 42). Remove the spreader.

(7) Install the bearing caps at their original locations (Fig. 43). Tighten the bearing cap bolts to 77 N·m (57 ft. lbs.) torque.

BACKLASH AND CONTACT PATTERN ANALYSIS

(1) Rotate assembly several revolutions to seat bearings. Measure backlash at three equally spaced locations around the perimeter of the ring gear with a dial indicator (Fig. 44).

The ring gear backlash must be within 0.12 - 0.20 mm (0.005 - 0.008 inch). It cannot vary more than 0.05 mm (0.002 inch) between the points checked.

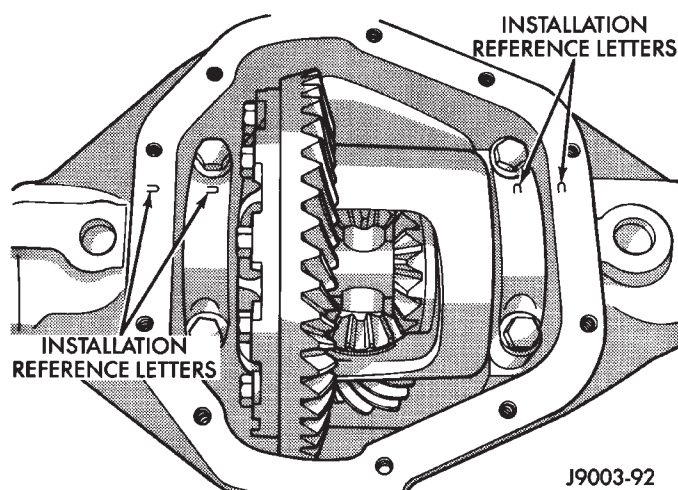


Fig. 43 Differential Bearing Cap Reference Letters

If backlash must be adjusted, spacers are available in various thicknesses. Adjust the backlash accordingly (Fig. 45). **DO NOT INCREASE THE TOTAL SHIM PACK THICKNESS, EXCESSIVE BEARING PRELOAD AND DAMAGE WILL OCCUR.**

The ring gear teeth contact patterns will show if the pinion gear depth shim(s) have the correct thickness. It will also show if the ring gear backlash has been adjusted correctly. The backlash must be maintained within the specified limits until the correct tooth contact patterns are obtained.

(2) Apply a thin coat of **hydrated ferric oxide**, to the ring gear teeth.

(3) Rotate the ring gear one complete revolution in both directions while a load is being applied. Insert a pry bar between the differential housing and the case

ABS BRAKE DIAGNOSIS

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DIAGNOSIS PROCEDURE

Antilock brake system diagnosis involves three basic steps. First is observation of the warning light display. Second is a visual examination for low fluid level, leaks, or obvious damage to system components or wires. The third step involves using the DRB II scan tool to identify a faulty component.

The visual examination requires a check of reservoir fluid level and all system components. Things to look for are leaks, loose connections, or obvious component damage.

The final diagnosis step involves using the DRB II scan tool to determine the specific circuit or component at fault. The tester is connected to the ABS diagnostic connector in the passenger compartment.

The 6-way, ABS diagnostic connector is inside the vehicle. It is located at either the forward end of the console, above the accelerator pedal and under the carpet. Or, it is adjacent to the steering column under the instrument panel. The connector will be black or blue in color.

Refer to the DRB II scan tool manual for test procedures. Also refer to the ABS Fault Diagnosis charts at the end of this section for additional diagnosis information.

Initial faults should be cleared and the vehicle road tested to reset any faults that remain in the system. Faults can be cleared with the scan tool.

REAR SPEED SENSOR AIR GAP

The front wheel sensors are fixed and cannot be adjusted. Only the rear sensor air gap is adjustable. Air gap must be set with a brass feeler gauge.

Correct air gap is important to proper signal generation. An air gap that is too large may cause complete loss of sensor input. Or, a gap that is too small could produce a false input signal, or damaging contact between the sensor and tone ring.

WHEEL/TIRE SIZE AND INPUT SIGNALS

Antilock system operation is dependant on accurate signals from the wheel speed sensors. Ideally, the vehicle wheels and tires should all be the same size and type. However, the Jeep ABS system is designed to function with a compact spare tire installed.

OPERATING SOUND LEVELS

The hydraulic control unit pump and solenoid valves may produce some sound as they cycle on and off. This is a normal condition and should not be mistaken for faulty operation. Under most conditions, pump and solenoid valve operating sounds should not be audible.

VEHICLE RESPONSE IN ANTILOCK MODE

During antilock braking, the hydraulic control unit solenoid valves cycle rapidly in response to antilock electronic control unit inputs.

The driver will experience a pulsing sensation within the vehicle as the solenoids decrease, hold, or increase pressure as needed. Brake pedal pulsing will also be noted and is a normal condition when the solenoids are cycling.

The pulsing sensation occurs as the solenoids cycle during antilock mode braking. A slight pulse in the brake pedal may also be noted during the dynamic self check part of system initialization.

STEERING RESPONSE

A modest amount of steering input is required during extremely high deceleration braking, or when braking on differing traction surfaces. An example of differing traction surfaces would be when the left side wheels are on ice and the right side wheels are on dry pavement.

LOSS OF SENSOR INPUT

Sensor malfunctions will most likely be due to loose connections, damaged sensor wires, incorrect rear sensor air gap, or a malfunctioning sensor. Additional causes of sensor faults would be sensor and tone ring misalignment or damage.

ABS WARNING LIGHT DISPLAY**ABS LIGHT ILLUMINATES AT STARTUP**

The amber antilock light illuminates at startup as part of the system self check feature. The light illuminates for 2-3 seconds then goes off as part of the normal self check routine.

- (8) Fill master cylinder reservoir with fresh Mopar DOT 3 brake fluid, or equivalent.
- (9) Bleed brake system. Refer to brake bleeding and adjustments section for procedure.
- (10) Install air cleaner and hoses.
- (11) Install windshield washer fluid reservoir.
- (12) Check brake pedal action before moving vehicle. Bleed brakes again if pedal is not firm (feels soft/spongy).

COMBINATION VALVE REMOVAL

- (1) Disconnect battery negative cable.
- (2) Remove air induction tube for access to valve, if necessary.
- (3) Unsnap wire harness from bracket at top of combination valve. Then disconnect wire connectors.
- (4) Disconnect pedal travel sensor harness connector and move harness wires aside for working access if necessary.
- (5) Disconnect pressure differential switch wires at terminal on valve (Fig. 10).
- (6) Disconnect hydraulic lines at valve.
- (7) Remove bolt attaching valve bracket to master cylinder and remove valve.

COMBINATION VALVE INSTALLATION

- (1) If a replacement combination valve is being installed and it does not have primary and secondary brakeline adaptor fittings (Fig. 11), transfer original adapters to new valve. Tighten adapters to 25 N·m (220 in. lbs.) torque.
- (2) Connect brakelines lines to combination valve but do not tighten fittings at this time. Start all line fittings by hand to avoid cross threading.

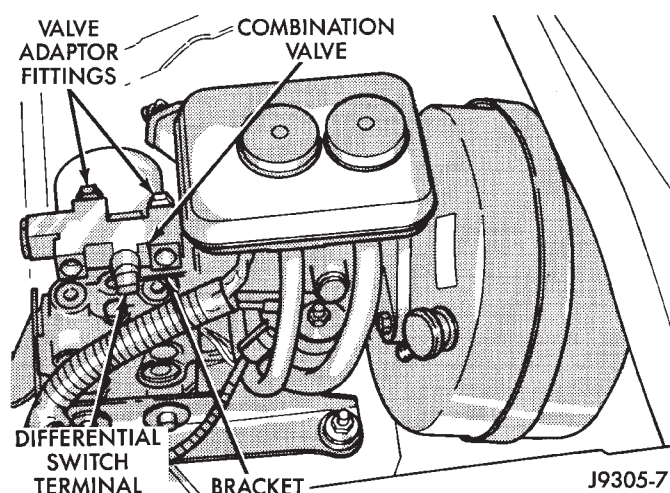
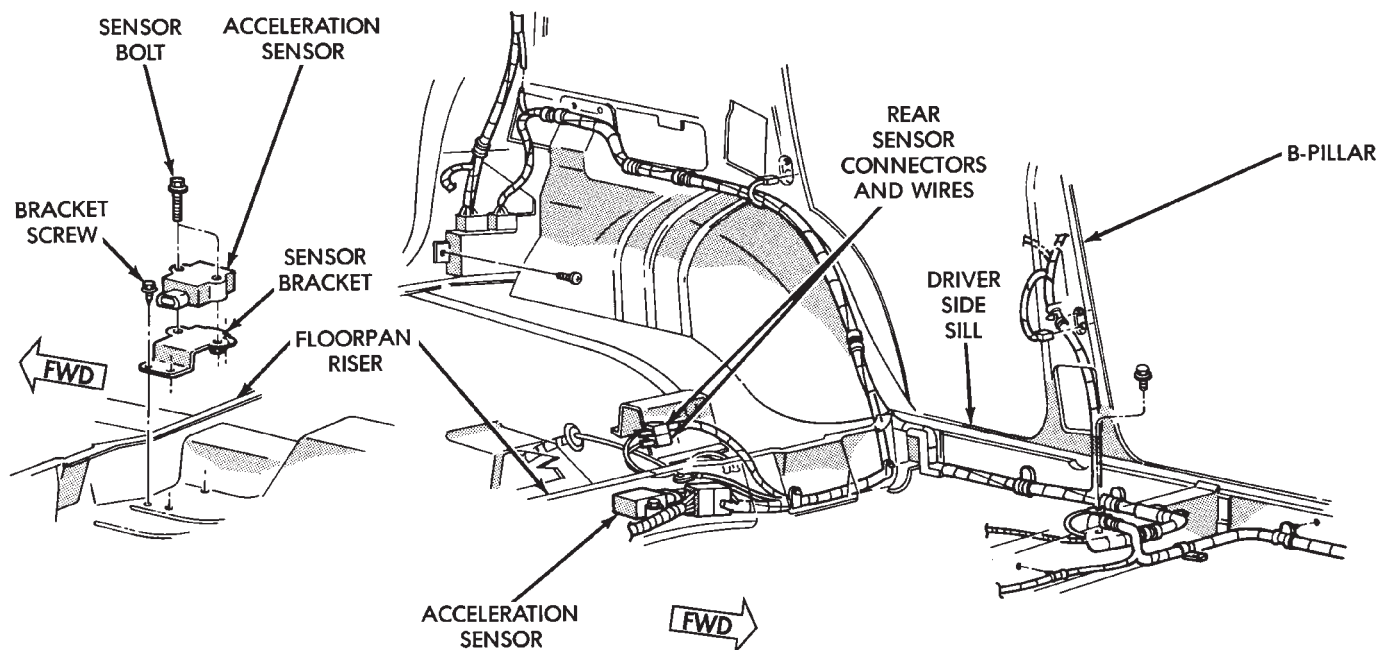


Fig. 10 Combination Valve Mounting

- (3) Position valve mounting bracket on master cylinder and install bracket attaching bolt.
- (4) Reconnect pressure differential switch and pedal travel sensor wires.
- (5) Tighten brakeline fittings at valve to 21 N·m (185 in. lbs.) torque. Use backup wrench to prevent adapters from turning when tightening line fittings.
- (6) Connect and snap harness wire connectors into bracket at top of valve.
- (7) Bleed brake system. Refer to procedure in this section.
- (8) Verify proper valve operation. If red warning light comes on, parking brakes may be still be applied, system may contain air, or a brakeline fitting is loose. Check and correct as needed.



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Fig. 12 Acceleration Sensor Mounting

(4) Connect harness to sensor. Be sure harness connector is firmly seated.

(5) Move rear seat back to normal position.

(6) Connect battery negative cable.

ELECTRONIC CONTROL UNIT (ECU) SERVICE

The antilock system electronic control unit (ECU) should not be replaced unless actually faulty. Always check ECU operation with the DRB II scan tool to confirm or deny a malfunction.

ECU REMOVAL AND INSTALLATION

The antilock ECU is located in the engine compartment. It is attached to a bracket mounted on the driver side inner fender panel or apron (Fig. 13).

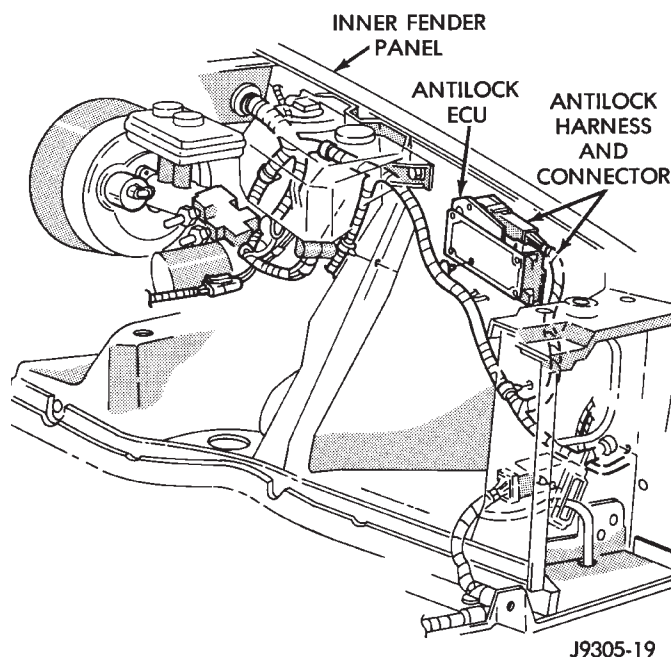
(1) Turn ignition switch to OFF position.

(2) Disconnect battery negative cable.

(3) Remove screws attaching ECU to fender panel bracket.

(4) Lift ECU out of engine compartment for access to harness connector.

(5) Release strap securing harness connector to ECU pin terminals (Fig. 14).



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Fig. 13 Antilock ECU Location And Mounting

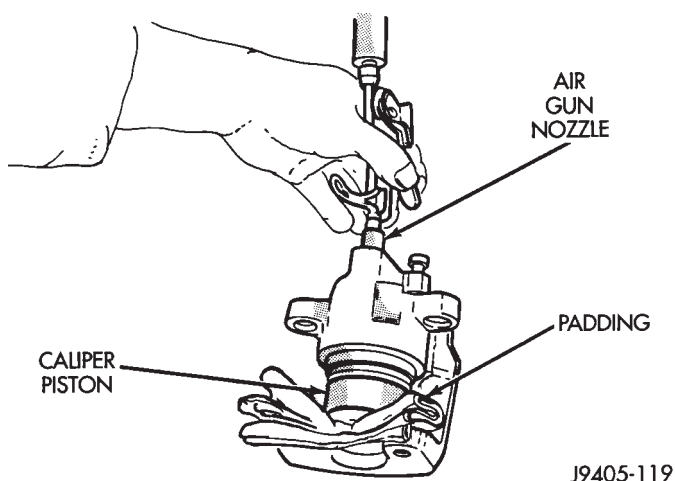


Fig. 13 Caliper Piston Removal

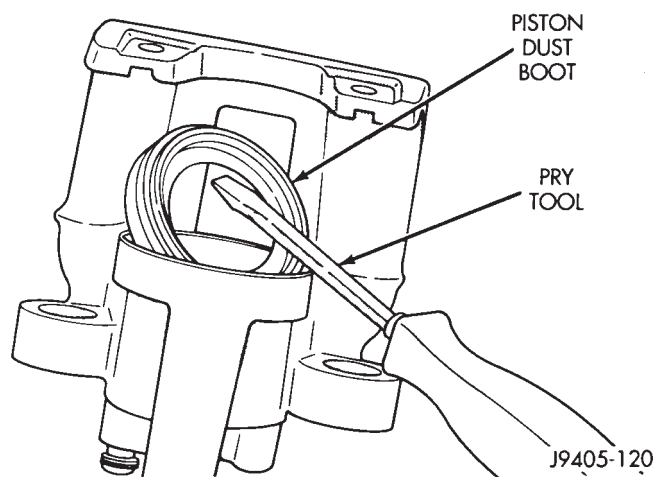


Fig. 14 Removing Caliper Piston Dust Boot

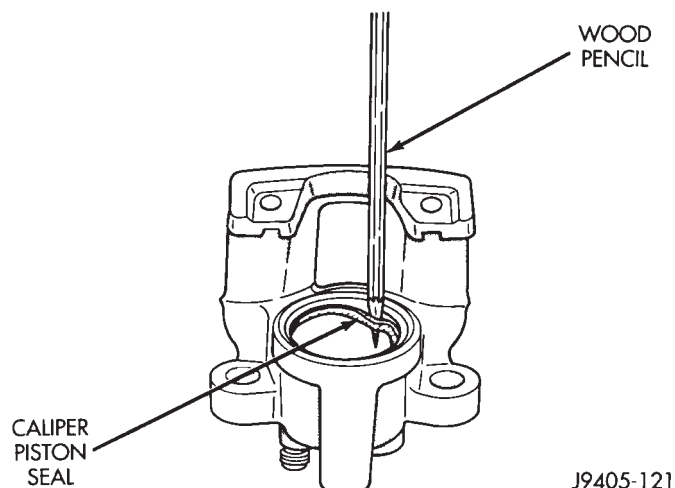


Fig. 15 Removing Caliper Piston Seal

REAR DISC BRAKE CALIPER CLEANING AND INSPECTION

Clean the caliper and piston with clean brake fluid or Mopar brake cleaning solvent only. Do not use gasoline, kerosene, thinner, or any similar type of sol-

vent. These products may leave a residue that could damage the piston and seal.

Wipe the caliper and piston dry with lint free towels or use low pressure compressed air.

Inspect the piston and piston bore. Replace the caliper if the bore is corroded, rusted, or scored. Do not hone the caliper piston bore. Replace the caliper if the bore is damaged.

Inspect the caliper piston (Fig. 16). The piston is made from a phenolic resin (plastic material) and should be smooth and clean. Replace the piston if cracked, chipped, or scored. Do not attempt to restore a scored piston surface by sanding or polishing. The piston must be replaced if damaged.

CAUTION: Never interchange phenolic resin and steel caliper pistons. The seals, seal grooves, caliper bores and piston tolerances are different for resin and steel pistons. Do not intermix these components.

Inspect the caliper bushings and boots (Fig. 16). Replace the boots if cut or torn. Clean and lubricate the bushings with GE 661 or Dow 111 silicone grease if necessary. Replace the bolts if worn, or the threads are damaged.

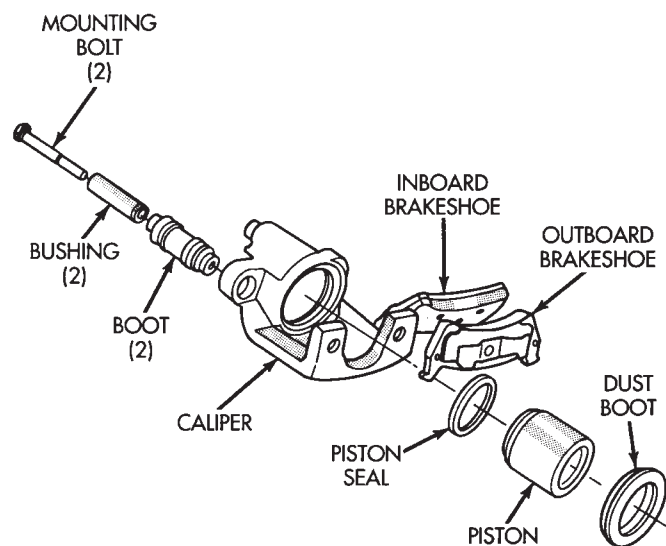


Fig. 16 Rear Disc Brake Caliper Components

REAR DISC BRAKE CALIPER ASSEMBLY

(1) Lubricate caliper piston bore and new piston seal with clean brake fluid.

(2) Install new piston seal in groove machined in piston bore. Be sure seal is fully seated and is not twisted. Press seal into place with fingertips.

(3) Lubricate caliper piston with clean brake fluid and start piston into bore and seal by hand. Use a twisting, rocking motion to start piston into seal. **Keep piston level while starting it in seal otherwise seal can be folded over.**

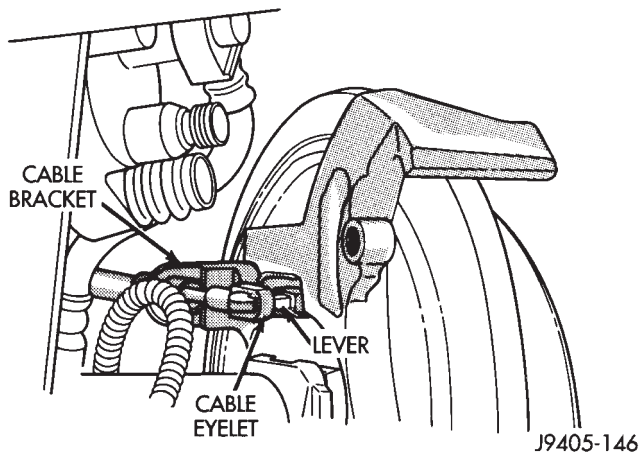


Fig. 11 Parking Brake Cable Attachment (With Disc Brakes)

(4) Check cable routing. Be sure cable is secured in body and chassis clips and retainers. Also be sure cable is not twisted, kinked or touching any rotating components.

(5) Adjust parking brake front cable as described in following procedure.

PARKING BRAKE TENSIONER ADJUSTMENT

Parking brake tensioner adjustment is only necessary when the tensioner, or a cable has been replaced or disconnected for service. When adjustment is necessary, perform adjustment only as described in the following procedure. This is necessary to avoid faulty parking brake operation.

(1) Raise vehicle.
 (2) Back off tensioner adjusting nut at equalizer to create slack in cables.

(3) Remove rear wheel/tire assemblies. Then remove brake drums, or calipers and rotors.

(4) On models with **rear drum brakes**, check rear brakeshoe adjustment with standard brake gauge. Also check condition of brake parts as follows:

(a) Replace worn parts if necessary. **Excessive shoe-to-drum clearance, or worn components will result in faulty parking brake adjustment and operation.**

(b) Verify that parking brake cables operate freely and are not binding, or seized. Replace faulty cables, before proceeding.

(c) Adjust rear brakeshoes to drums.

(d) Install drums and verify that drums rotate freely without drag.

(5) On models with **rear disc brakes**, adjust parking brakeshoes as follows:

(a) Replace worn parts if necessary. **Excessive shoe-to-drum clearance, or worn cam and lever components will result in faulty parking brake adjustment and operation.**

(b) Verify that parking brake cables operate freely and are not binding, or seized. Replace faulty cables, or cam and lever before proceeding.

(c) Install rotors if removed.

(d) Adjust parking brakeshoes to drum surface in rotor by turning adjuster screw star wheel with brake tool. Verify that rotor assembly rotates freely without drag.

(e) Install calipers.

(6) Reinstall wheel/tire assemblies after brakeshoe adjustment is complete.

(7) Lower vehicle enough for access to parking brake lever or foot pedal. **Then fully apply parking brakes. Leave brakes applied until adjustment is complete.**

(8) Raise vehicle again.

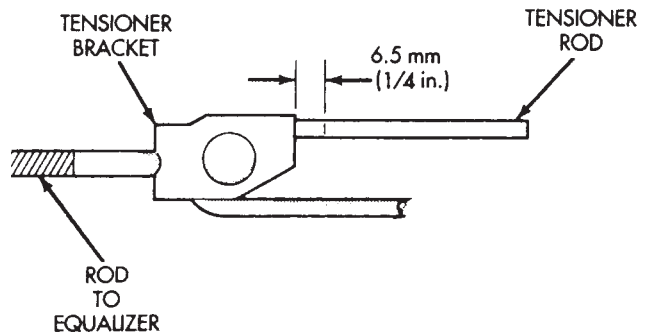
(9) Mark tensioner rod 6.5 mm (1/4 in.) from tensioner bracket (Fig. 12).

(10) **Tighten adjusting nut at equalizer until mark on tensioner rod moves into alignment with tensioner bracket (Fig. 12).**

CAUTION: Do not loosen, or tighten the tensioner adjusting nut for any reason after completing adjustment.

(11) Lower vehicle until rear wheels are 15-20 cm (6-8 in.) off shop floor.

(12) Release parking brake hand lever and verify that rear wheels rotate freely without drag. Then lower vehicle.



J9405-158

Fig. 12 Placing Adjustment Mark On Tensioner Rod

PARKING BRAKESHOE REPLACEMENT (WITH REAR DISC BRAKES)

Models with rear disc brakes are equipped with a drum style, dual-shoe parking brake mechanism. The shoes are expanded mechanically by a cam and lever.

The braking surface for the parking brake shoes is cast and machined into the central hub of the disc

CLUTCH GRAB/CHATTER

Condition Found	Cause	Correction
1. Clutch disc facing covered with oil, grease, or clutch fluid.	a) Oil leak at rear main or input shaft seal. b) Too much grease applied to splines or disc and input shaft.	a) Correct leak and replace disc (do not clean and reuse the disc). b) Apply lighter grease coating to splines and replace disc (do not clean and reuse the disc).
2. Clutch disc and/or cover warped, or disc facings exhibit unusual wear or appear to be wrong type.	Incorrect or substandard parts.	Replace disc and/or cover with correct parts.
3. Clutch master or slave cylinder plunger dragging-binding.	a) Master or slave cylinder components worn or corroded.	a) Replace both cylinders as assembly (and reservoir).
4. No fault found with clutch components.	a) Problem actually related to suspension or driveline component. b) Engine related problem.	a) Further diagnosis required. Check engine/transmission mounts, propeller shafts and U-joints, tires, suspension attaching parts and other driveline components as needed. b) Check EFI and ignition systems.
5. Partial engagement of clutch disc (one side worn-opposite side glazed and lightly worn).	a) Clutch pressure plate position setting incorrect or modified. b) Clutch cover, spring, or release fingers bent, distorted (rough handling, improper assembly). c) Clutch disc damaged or distorted. d) Clutch misalignment.	a) Replace clutch cover and disc. b) Replace clutch cover and disc. c) Replace disc. d) Check alignment and runout of flywheel, disc, or cover and/or clutch housing. Correct as necessary.

SYSTEM DIAGNOSIS (CONT.)

Condition	Possible Cause	Correction
HIGH TEMPERATURE GAUGE INDICATION — OVERHEATING	(1) Coolant level low.	(1) Replenish coolant.
	(2) Fan belt loose.	(2) Adjust fan belt tension. (4.0L eng.) Check auto. belt tensioner (5.2L eng.)
	(3) Radiator hose(s) collapsed.	(3) Replace hose(s).
	(4) Radiator airflow blocked.	(4) Remove restriction (bug screen, fog lamps, etc.).
	(5) Faulty coolant overflow tank cap.	(5) Replace coolant expansion tank cap.
	(6) Air trapped in cooling system.	(6) Purge air.
	(7) Heavy-traffic driving.	(7) Operate at fast idle in neutral intermittently to cool engine.
	(8) Incorrect cooling system component(s) installed.	(8) Install proper component(s).
	(9) Faulty thermostat.	(9) Replace thermostat.
	(10) Water pump shaft broken or impeller loose.	(10) Replace water pump.
	(11) Radiator tubes clogged.	(11) Flush radiator.
	(12) Cooling system clogged.	(12) Flush system.
	(13) Casting flash in cooling passages.	(13) Repair or replace as necessary. Flash may be visible by removing cooling system components or removing core plugs.
	(14) Brakes dragging.	(14) Repair brakes.
	(15) Excessive engine friction.	(15) Repair engine.
	(16) Antifreeze concentration over 68%.	(16) Lower antifreeze concentration percentage.
	(17) Faulty gauge or sending unit.	(17) Repair or replace faulty component.
	(18) Loss of coolant flow caused by leakage or foaming.	(18) Repair or replace leaking component, replace coolant.
	(19) Faulty cooling fan operation.	(19) Check cooling fan operation.
NO COOLANT FLOW THROUGH HEATER CORE	(1) Restricted return inlet in water pump.	(1) Remove restriction.
	(2) Heater hose collapsed or restricted.	(2) Remove restriction or replace hose.
	(3) Restricted heater core.	(3) Remove restriction or replace core.
	(4) Restricted outlet in thermostat housing.	(4) Remove flash or restriction.
	(5) Intake manifold bypass hole in cylinder head restricted.	(5) Remove restriction.
	(6) Intake manifold coolant passage restricted.	(6) Remove restriction or replace intake manifold.
	(7) Heater valve controls not functioning.	(7) Repair controls (see Heating and Air Conditioning, Group 24).

COOLANT PERFORMANCE

The required ethylene-glycol (antifreeze) and water mixture depends upon climate and vehicle operating conditions. The coolant performance of various mixtures follows:

Pure Water-Water can absorb more heat than a mixture of water and ethylene-glycol. This is for purpose of heat transfer only. Water also freezes at a higher temperature and allows corrosion.

100% Ethylene-Glycol-The corrosion inhibiting additives in ethylene-glycol need the presence of water to dissolve. Without water, additives form deposits in system. These act as insulation causing temperature to rise to as high as 149°C (300°F). This temperature is hot enough to melt plastic and soften solder. The increased temperature can result in engine detonation. In addition, 100 percent ethylene-glycol freezes at -22°C (-8°F).

50/50 Ethylene-Glycol and Water-Is the recommended mixture, it provides protection against freezing to -37°C (-35°F). The antifreeze concentration **must always** be a minimum of 44 percent, year-round in all climates. If percentage is lower, engine parts may be eroded by cavitation. Maximum protection against freezing is provided with a 68 percent antifreeze concentration, which prevents freezing down to -67.7°C (-90°F). A higher percentage will freeze at a warmer temperature. Also, a higher percentage of antifreeze can cause the engine to overheat because specific heat of antifreeze is lower than that of water.

CAUTION: Richer antifreeze mixtures cannot be measured with normal field equipment and can cause problems associated with 100 percent ethylene-glycol.

COOLANT SELECTION-ADDITIVES

Coolant should be maintained at the specified level with a mixture of ethylene glycol-based antifreeze and low mineral content water. Only use an antifreeze containing ALUGARD 340-2™.

CAUTION: Do not use coolant additives that are claimed to improve engine cooling.

COOLANT SERVICE

It is recommended that the cooling system be drained and flushed at 84,000 kilometers (52,500 miles), or 3 years, whichever occurs first. Then every two years, or 48,000 kilometers (30,000 miles), whichever occurs first.

COOLANT LEVEL CHECK-ROUTINE

Do not remove radiator cap for routine coolant level inspections. The coolant level can be checked at coolant reserve/overflow tank.

The coolant reserve/overflow system provides a quick visual method for determining coolant level without removing radiator pressure cap. With engine idling and at normal operating temperature, observe coolant level in reserve/overflow tank. The coolant level should be between ADD and FULL marks.

ADDING ADDITIONAL COOLANT-ROUTINE

Do not remove radiator cap to add coolant to system. When adding coolant to maintain correct level, do so at coolant reserve/overflow tank. Use a 50/50 mixture of ethylene-glycol antifreeze containing Alugard 340-2™ and low mineral content water. Remove radiator cap only for testing or when refilling system after service. Removing cap unnecessarily can cause loss of coolant and allow air to enter system, which produces corrosion.

COOLANT LEVEL CHECK-SERVICE

The cooling system is closed and designed to maintain coolant level to top of radiator.

WARNING: DO NOT OPEN RADIATOR DRAINCOCK WITH ENGINE RUNNING OR WHILE ENGINE IS HOT AND COOLING SYSTEM IS UNDER PRESSURE.

When vehicle servicing requires a coolant level check in radiator, drain several ounces of coolant from radiator drain cock. Do this while observing coolant reserve/overflow system tank. The coolant level in reserve/overflow tank should drop slightly. If not, inspect for a leak between radiator and coolant reserve/overflow system connection. Remove radiator cap. The coolant level should be to top of radiator. If not and if coolant level in reserve/overflow tank is at ADD mark, check for:

- An air leak in coolant reserve/overflow tank or its hose
- An air leak in radiator filler neck
- Leak in pressure cap seal to radiator filler neck

LOW COOLANT LEVEL-AERATION

If the coolant level in radiator drops below top of radiator core tubes, air will enter cooling system.

Low coolant level can cause thermostat pellet to be suspended in air instead of coolant. This will cause thermostat to open later, which in turn causes higher coolant temperature. Air trapped in cooling system also reduces amount of coolant circulating in heater core resulting in low heat output.

DEAERATION

As the engine operates, any air trapped in cooling system gathers under the radiator cap. The next time the engine is operated, thermal expansion of coolant will push any trapped air past radiator cap into the coolant reserve/overflow tank. Here it escapes to the atmosphere into the tank. When the engine cools

ENGINE ACCESSORY DRIVE BELTS

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Belt Diagnosis	35	Belt Tension—4.0L Engine	38
Belt Schematics	38	Belt Tension—5.2L Engine	38
Belt Service	38	General Information	35

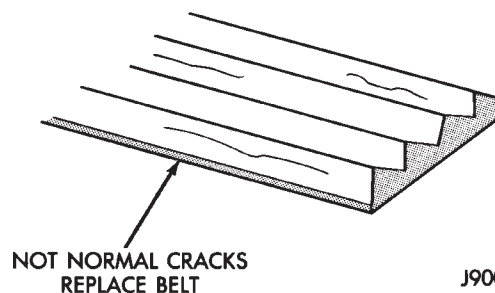
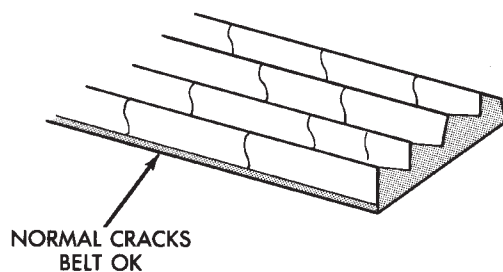
GENERAL INFORMATION

CAUTION: When installing a serpentine accessory drive belt, the belt **MUST** be routed correctly. If not, the engine may overheat due to water pump rotating in wrong direction. Refer to the appropriate engine Belt Schematic in this Group for the correct belt routing. Or, refer to the Belt Routing Label located in the engine compartment.

BELT DIAGNOSIS

When diagnosing serpentine accessory drive belts, small cracks that run across the ribbed surface of the belt from rib to rib (Fig. 1), are considered normal. These are not a reason to replace the belt. However, cracks running along a rib (not across) are **not** normal. Any belt with cracks running along a rib must be replaced (Fig. 1). Also replace the belt if it has excessive wear, frayed cords or severe glazing.

Refer to the Serpentine Accessory Drive Belt Diagnosis charts for further belt diagnosis.



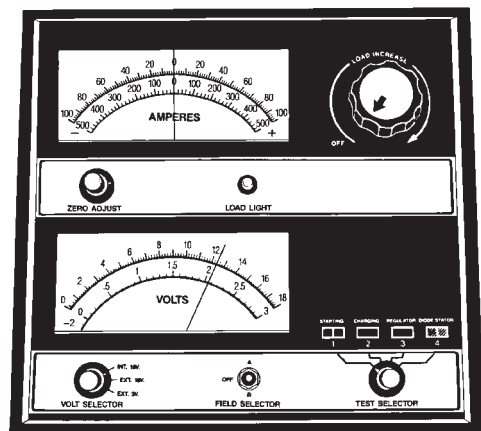
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Fig. 1 Serpentine Belt Wear Patterns

BATTERY OPEN CIRCUIT VOLTAGE

Open Circuit Volts	Percent Charge
11.7 volts or less	0%
12.0	25%
12.2	50%
12.4	75%
12.6 or more	100%

928A-3



898A-7

Fig. 6 Testing Open Circuit Voltage

BATTERY LOAD TEST

WARNING: IF BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, OR LOW ELECTROLYTE LEVEL, DO NOT TEST. ACID BURNS OR EXPLOSIVE CONDITION MAY RESULT.

A battery load test will verify the cranking ability based on the cold crank amperage rating of the battery.

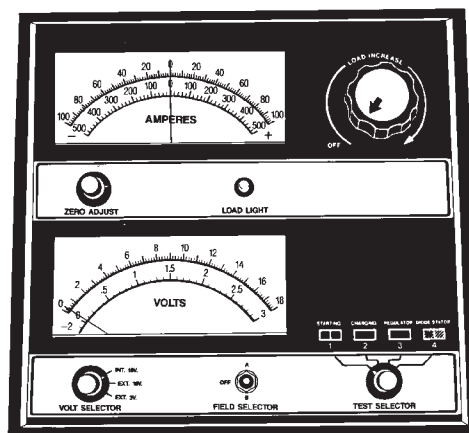
Before performing battery load test, the battery must be FULLY CHARGED.

(1) Remove both battery cables, negative first. Battery top and posts should be clean. If test indicator is not green, charge the battery. See Battery Charging in this group.

(2) Connect a suitable volt-ammeter-load tester (Fig. 7) to the battery posts (Fig. 8). Refer to operating instructions provided with the tester being used. Check the open circuit voltage (no load) of the battery. Voltage should be equal to or greater than 12.4 volts (Fig. 7), with a green test indicator.

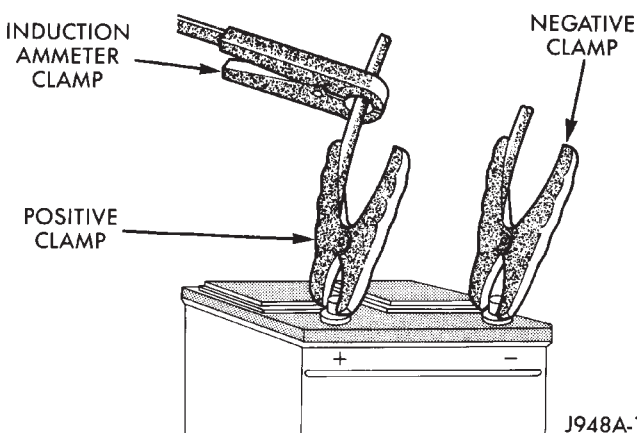
(3) Rotate the load control knob (carbon pile rheostat) to apply a 300 amp load for 15 seconds then return the control knob to OFF (Fig. 9). This will remove the surface charge from the battery.

(4) Allow the battery to stabilize to open circuit voltage (may take up to 5 minutes).



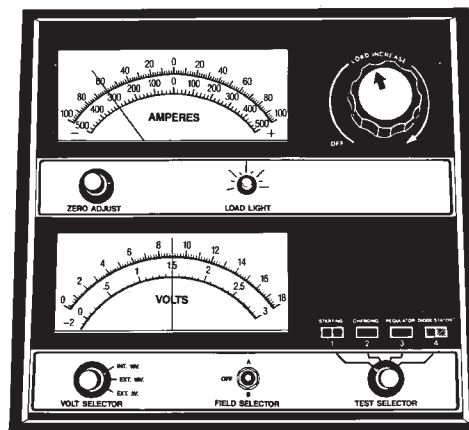
898A-8

Fig. 7 Volt-Amps-Load Tester (Typical)



J948A-13

Fig. 8 Volt-Ammeter-Load Tester Connections



898A-10

Fig. 9 Remove Surface Charge from Battery

(5) Rotate the load control knob to maintain a load (50% of cold crank amperage rating—see Specifications) for a minimum of 15 seconds (Fig. 10). After 15 seconds, record the (loaded) voltage reading and return the load control to OFF.

(6) Voltage drop will vary according to battery temperature at the time of the load test. Battery temperature can be estimated by the ambient temperature

USING ON-BOARD DIAGNOSTIC SYSTEM

OPERATION OF ON-BOARD DIAGNOSTIC (OBD) SYSTEM

The powertrain control module (PCM) monitors critical input and output circuits of the charging system making sure they are OK. Some are checked continuously and some are checked only under certain conditions.

If the OBD system senses that one critical circuit is bad, it will consider this a real problem and put a DTC into memory. Each input and output circuit monitored by the OBD system has its own DTC. The DTC will stay in memory as long as the circuit continues to be bad. If the problem does not happen again after the DTC is put into memory, the powertrain control module will clear the memory after 50 engine starts.

DIAGNOSTIC TROUBLE CODES

Diagnostic trouble codes are two-digit numbers flashed on malfunction indicator (Check Engine) lamp that identify which circuit is bad. In most cases they do not identify which component in a circuit is bad. A DTC description can be read using the DRB scan tool. Refer to Group 14 - Fuel Systems for more information. Therefore, a DTC is only a symptom, not necessarily the cause for the problem. In some cases, because of the design of the driveability test procedure, a DTC can be the reason for the problem. It is important that the test procedure be followed to understand what caused the DTC of the on-board diagnostic system to be set.

HOW TO USE MALFUNCTION INDICATOR LAMP FOR DIAGNOSTIC TROUBLE CODES

To start this function, cycle the ignition switch ON-OFF-ON-OFF-ON within 5 seconds. This will allow any fault stored in the powertrain control module to be displayed. The malfunction indicator (Check Engine) lamp will display a DTC by flashing on and off. There is a short pause between flashes and a longer pause between digits. All codes displayed are two digit numbers with a four second pause between codes.

An example of a code is as follows:

- (1) Lamp on for 2 seconds, then turns off.
- (2) Lamp flashes 4 times pauses and then flashes 1 time.
- (3) Lamp pauses for 4 seconds, flashes 4 times, pauses and then flashes 7 times.

The two codes are 41 and 47. Any number of codes can be displayed as long as they are in memory. The lamp will flash until all are displayed (55 = end of test).

CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES

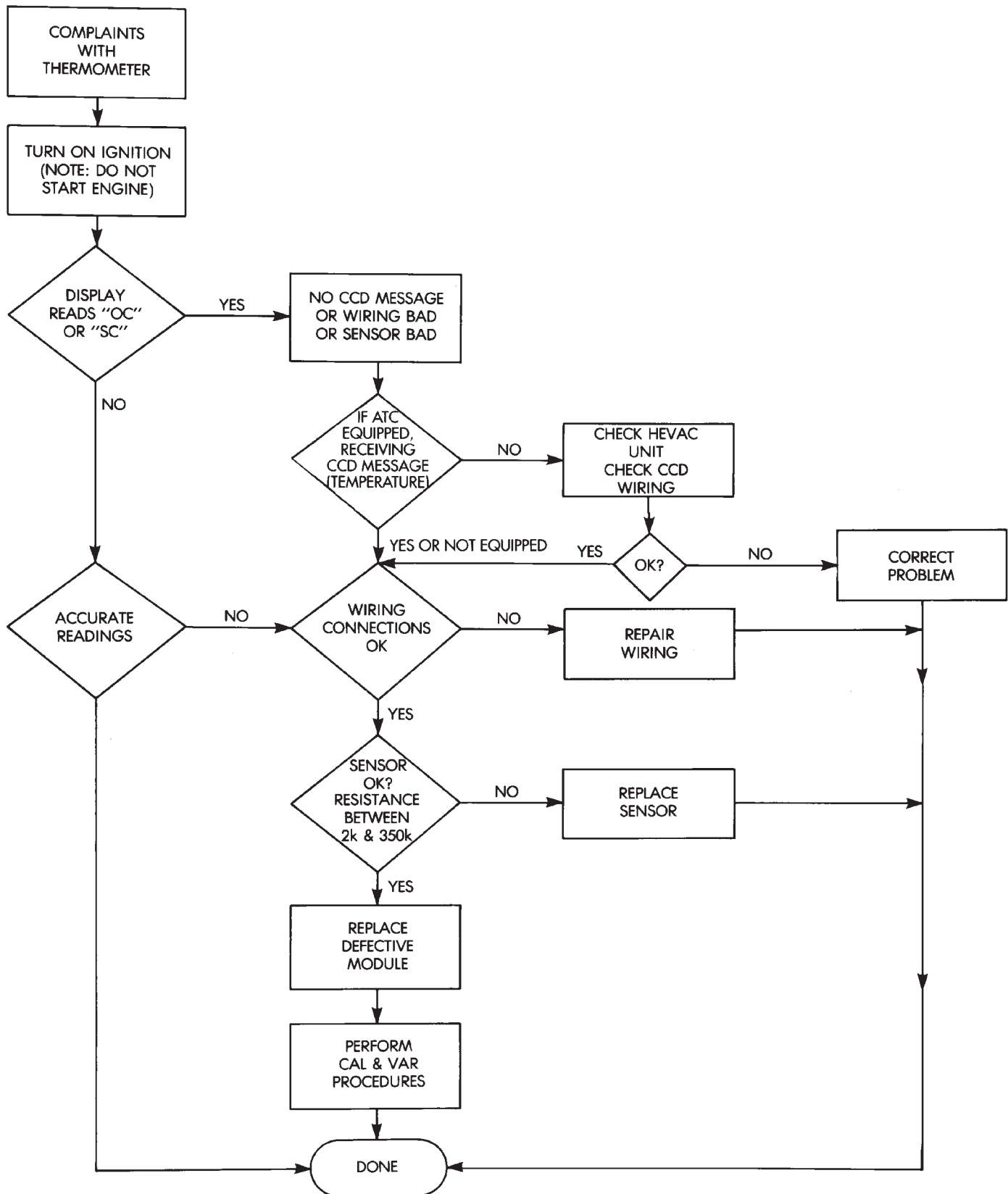
See Generator Diagnostic Trouble Code chart for DTC which apply to the charging system. Refer to the Powertrain Diagnostic Procedures manual to diagnose an on-board diagnostic system trouble code.

GENERATOR DIAGNOSTIC TROUBLE CODE (DTC)

Diagnostic Trouble Code	DRB Scan Tool Display	Description of Diagnostic Trouble Code
12*	Battery Disconnect	Direct battery input to PCM was disconnected within the last 50 Key-on cycles.
41**	Generator Field Not Switching Properly	An open or shorted condition detected in the generator field control circuit.
46**	Charging System Voltage Too High	Battery voltage sense input above target charging voltage during engine operation.
47**	Charging System Voltage Too Low	Battery voltage sense input below target charging during engine operation. Also, no significant change detected in battery voltage during active test of generator output.
55*	N/A	Completion of fault code display on Check Engine lamp.

* Check Engine Lamp will not illuminate at all times if this Diagnostic Trouble Code was recorded. Cycle Ignition key as described in manual and observe code flashed by Check Engine lamp.

** Check Engine Lamp will illuminate during engine operation if this Diagnostic Trouble Code was recorded.



J948C-20

Chart 2

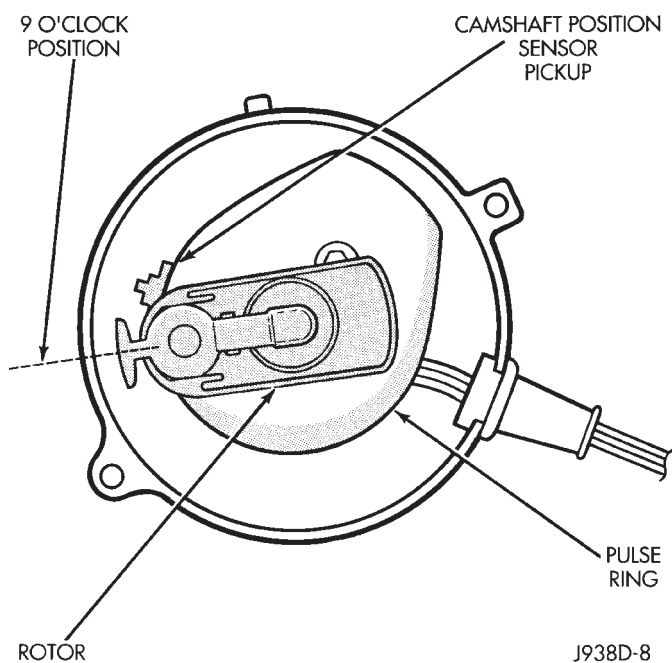


Fig. 1 Pulse Ring/Rotor Position—4.0L Engine

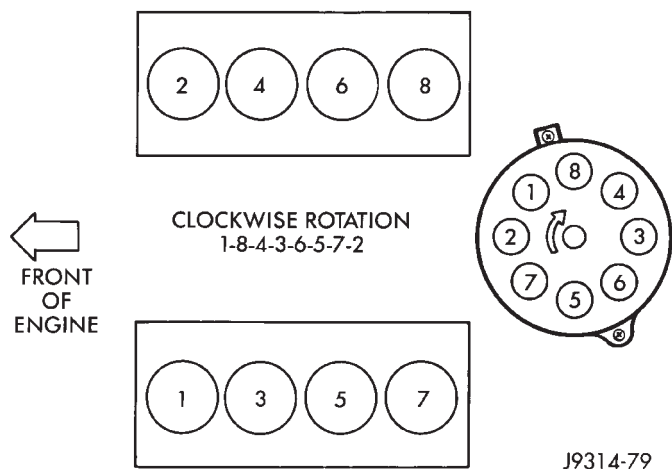


Fig. 2 Engine Firing Order—5.2L Engine

(b) Check for continuity between the camshaft position sensor output wire and pin 44 at the PCM. If continuity is not present, repair the harness as necessary.

(c) Check for continuity between the ground circuit wire at the distributor connector and ground. If continuity is not present, repair the harness as necessary.

(10) While observing the voltmeter, crank the engine with ignition switch. The voltmeter needle should fluctuate between 0 and 5 volts while the engine is cranking. This verifies that the camshaft position sensor in the distributor is operating properly and a sync pulse signal is being generated.

If sync pulse signal is not present, replacement of the camshaft position sensor is necessary.

For removal or installation of ignition system components, refer to the Component Removal/Installation section of this group.

For system operation and component identification, refer to the Component Identification/System Operation section of this group.

CRANKSHAFT POSITION SENSOR TEST

To perform a complete test of this sensor and its circuitry, refer to the DRB scan tool. Also refer to the appropriate Powertrain Diagnostics Procedures manual. To test the sensor only, refer to the following:

On the 4.0L engine, the sensor is located on the transmission bellhousing at the left/rear side of the engine block (Figs. 3 or 4).

On the 5.2L engine, the sensor is located on the top of cylinder block near the rear of right cylinder head (Fig. 5).

(1) Near the rear of intake manifold, disconnect sensor pigtail harness connector from main wiring harness.

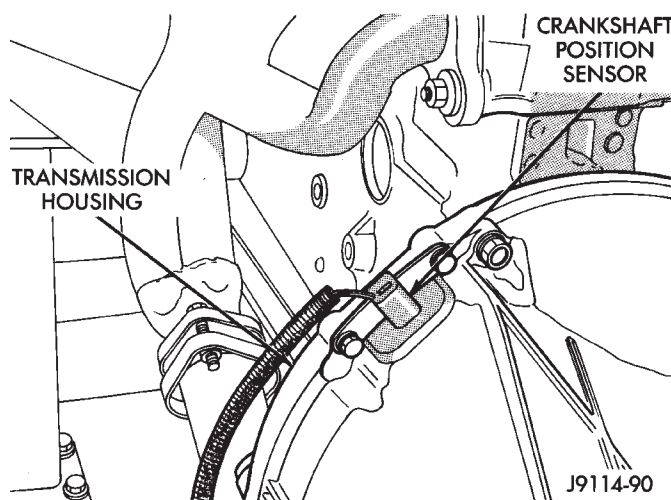


Fig. 3 Crankshaft Position Sensor—4.0L Engine—Without 42RE Transmission

(2) Place an ohmmeter across terminals B and C (Fig. 6). Ohmmeter should be set to 1K-to-10K scale for this test. The meter reading should be open (no resistance). Replace sensor if a low resistance is indicated.

DISTRIBUTOR CAP

INSPECTION

Remove the distributor cap and wipe it clean with a dry lint free cloth. Visually inspect the cap for cracks, carbon paths, broken towers, or damaged rotor button (Figs. 7 and 8). Also check for white deposits on the inside (caused by condensation entering the cap through cracks). Replace any cap that displays charred or eroded terminals. The machined surface of a terminal end (faces toward rotor) will in-

(5) Lightly tap the end of the distributor shaft until distributor gear and thrust washer are removed.

(6) Slide the distributor shaft out of the distributor housing.

(7) Remove the camshaft position sensor mounting bolt and positioning arm (Fig. 3).

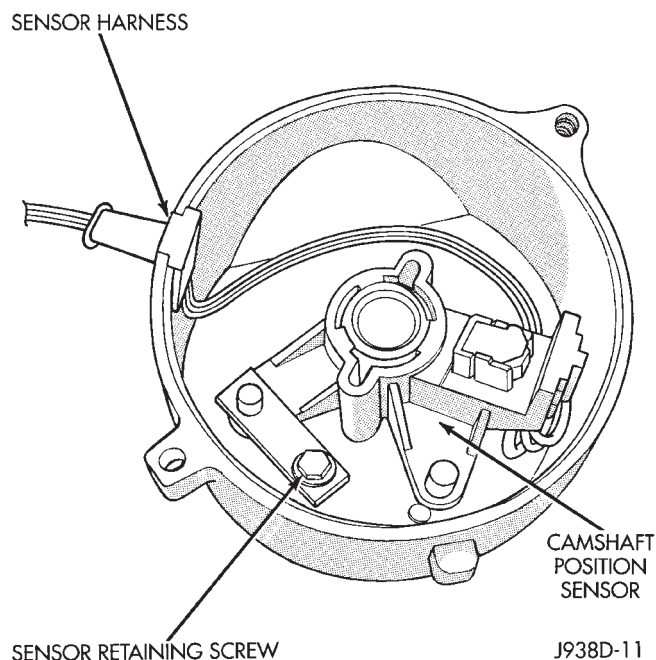


Fig. 3 Camshaft Position Sensor—4.0L Engine

(8) Slide the wire harness grommet out of the distributor housing. Remove the camshaft position sensor.

INSTALLATION—4.0L ENGINE

(1) Position the camshaft position sensor in the distributor housing. Place the wire harness grommet into the opening in the distributor housing.

(2) Install retaining arm and retaining bolt.

(3) Install distributor shaft into distributor housing. Make sure the upper thrust washer is installed on the shaft.

(4) Position thrust washer and drive gear on distributor shaft.

(5) Note the previous **CAUTION** and install distributor drive gear roll pin.

(6) Install rotor.

(7) Install distributor.

REMOVAL—5.2L V-8 ENGINE

Distributor removal is not necessary to remove camshaft position sensor.

(1) Disconnect negative battery cable at battery.

(2) Remove coil high-tension cable and all spark plug cables at distributor cap. Note and mark position of cables (Fig. 4) before removal.

(3) Remove distributor cap from distributor (two screws).

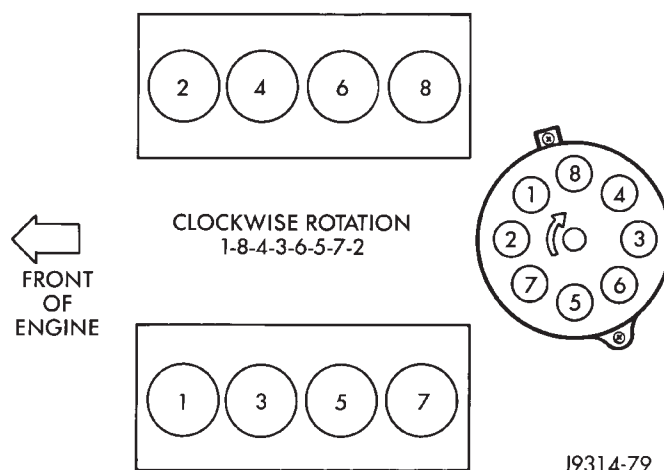


Fig. 4 Engine Firing Order—5.2L V-8 Engine

(4) Disconnect camshaft position sensor wiring harness from main engine wiring harness.

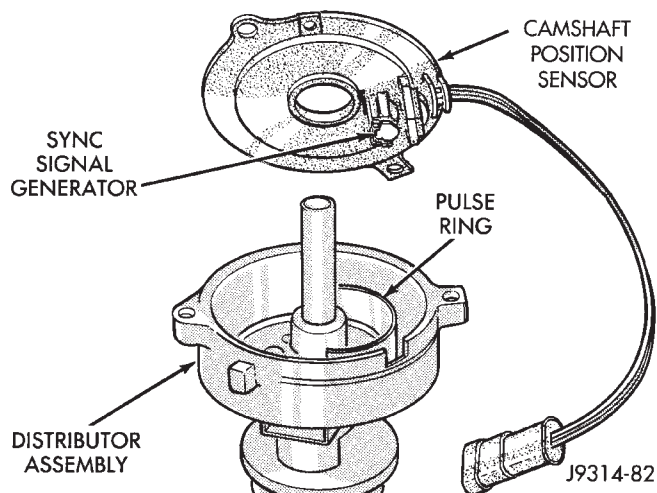


Fig. 5 Camshaft Position Sensor—5.2L Engine

(5) Remove distributor rotor from distributor shaft.

(6) Lift the camshaft position sensor assembly from the distributor housing (Fig. 5).

INSTALLATION—5.2L ENGINE

(1) Install camshaft position sensor to distributor. Align sensor into notch on distributor housing.

(2) Connect wiring harness.

(3) Install rotor.

(4) Install distributor cap. Tighten mounting screws.

(5) Install spark plug cables in correct firing order (Fig. 4) to distributor cap. Be sure all spark plug cables are firmly connected into distributor cap towers.

CRANKSHAFT POSITION SENSOR

REMOVAL—4.0L 6 CYLINDER ENGINE WITHOUT 42RE TRANSMISSION

The crankshaft position sensor is mounted to the transmission bellhousing with two bolts at the left/

IGNITION SWITCH

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Ignition Switch and Key Cylinder Service 37

GENERAL INFORMATION

The ignition switch is located in the steering column. The Key-In-Switch and Halo Light are integral with the ignition switch. Refer to Group 8U for Key-In-Switch and Halo Light diagnosis.

IGNITION SWITCH AND KEY CYLINDER SERVICE

REMOVAL

- (1) Disconnect negative battery cable at battery.
- (2) Tilt column: Remove tilt lever (counterclockwise).
- (3) Remove upper and lower covers (three screws).
- (4) Remove ignition switch mounting screws (Snap-on torx bit tool TTXR20B0 or equivalent required—Fig. 1).

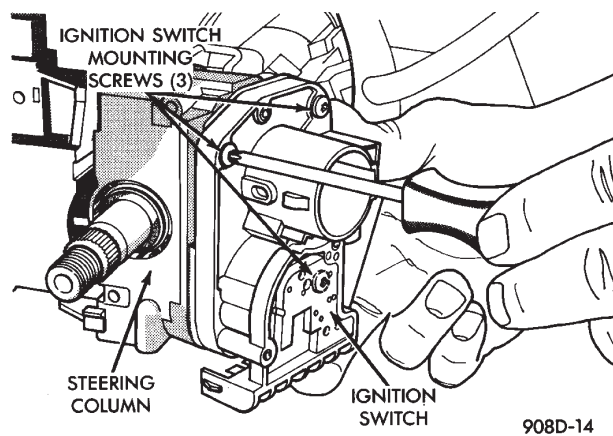


Fig. 1 Ignition Switch Screw Removal

- (5) Gently pull switch away from the column. Release two connector locks on the 7-terminal wiring connector. Remove the connector from the ignition switch.

- (6) Release connector lock on the Key-In-Switch and Halo Light 4-terminal connector. Remove the connector from the ignition switch (Fig. 2).

TYPE I WITH RETAINING PIN

- (7) To remove the lock cylinder with retaining pin from the ignition switch:

- (a) Insert key in the lock cylinder. Turn the key to the LOCK position. Using a small screwdriver, depress the lock cylinder retaining pin until it is flush with the lock cylinder surface (Fig. 3).

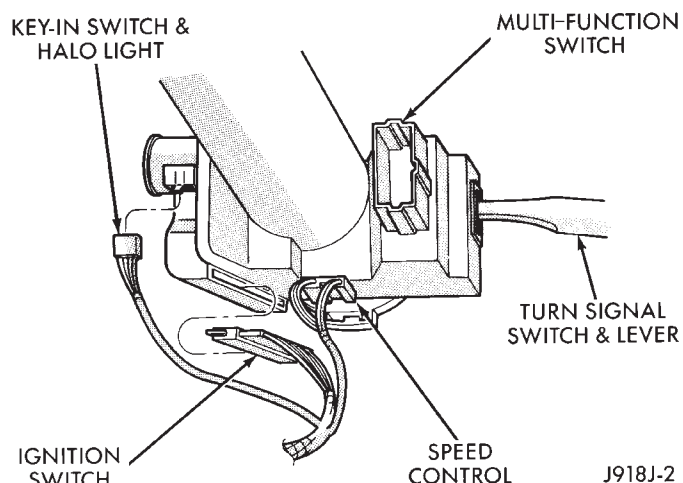


Fig. 2 Key in Switch and Halo Lamp Connector

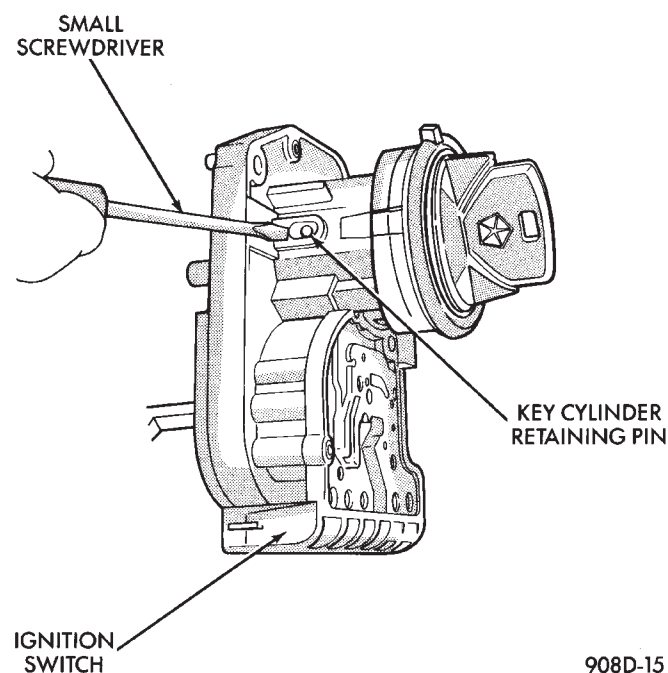


Fig. 3 Lock Cylinder with Retaining Pin Type I

- (b) Rotate the key clockwise to the OFF position. The lock cylinder will unseat from the ignition switch (Fig. 4). When the lock cylinder is unseated, it will be approximately 1/8 inch away from the ignition switch halo light ring. **Do not attempt to remove the lock cylinder at this time.**

CAUTION: Do not touch the face of a gauge or the back of the lens with your finger. It will leave a permanent finger print.

(5) Remove all attaching screws for gauges, tachometer, and speedometer that are contacting the printed circuit (Fig. 6).

(6) Remove 2 screws holding the cluster connector to the bezel (Fig. 7).

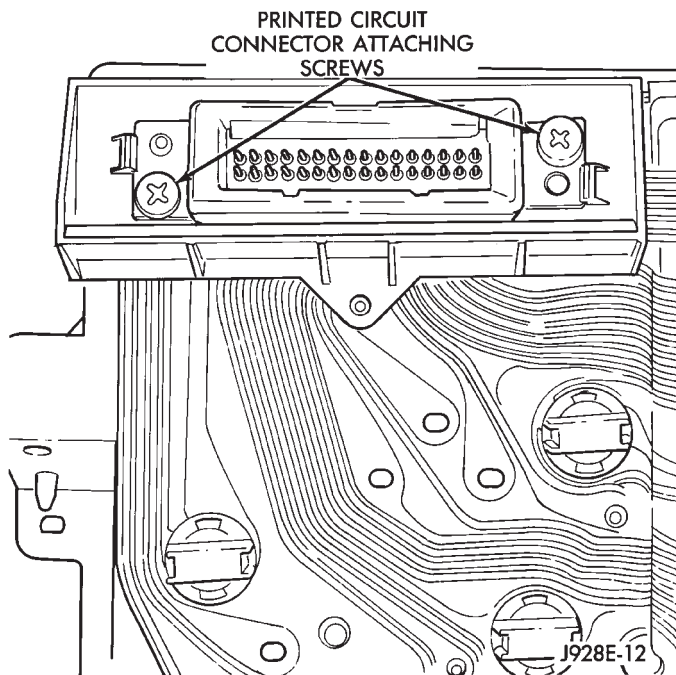


Fig. 7 Cluster Connector Retaining Screws

(7) Remove the lamp sockets from the circuit board.

(8) Lift the connector up to unfold the printed circuit (Fig. 8). Remove the printed circuit including the connector.

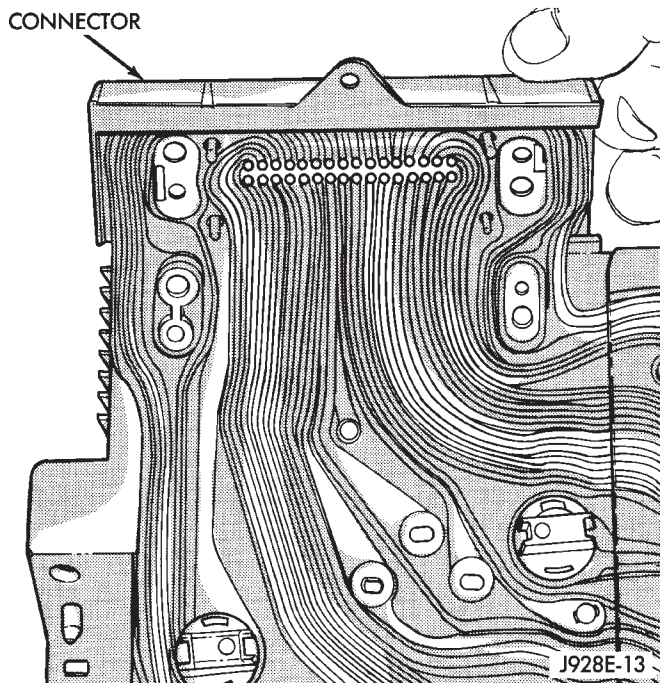


Fig. 8 Printed Circuit And Cluster Connector

ASSEMBLY

(1) Position the printed circuit, including connector, on the back of the instrument panel cluster.

(2) Hold the components in place and install the screws.

(3) Install the lamp sockets.

(4) Pivot the connector into place and install two screws.

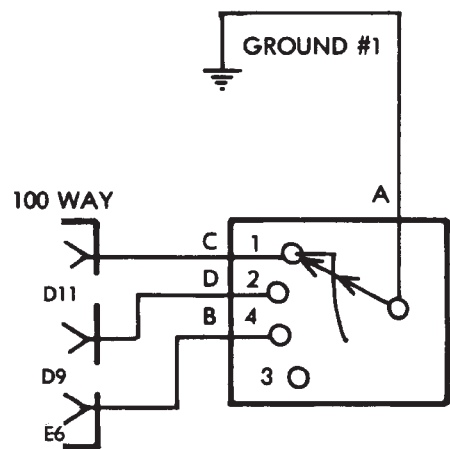
(5) Install the mask.

(6) Install lens with four screws.

(7) Install knob on trip odometer push pin.

TRANSFER CASE SWITCHES

TRANSFER CASE SWITCH CHART



231 TRANSFER CASE

(COMMAND-TRAC)

T/C POSITION	SWITCH POSITION
2WD	1
4 PART TIME	2
N	3
4 LO	2

242 TRANSFER CASE

(SELEC-TRAC)

T/C POSITION	SWITCH POSITION
2WD	1
4 PART TIME	2
4 FULL TIME	4
N	3
4 LO	2

249 TRANSFER CASE

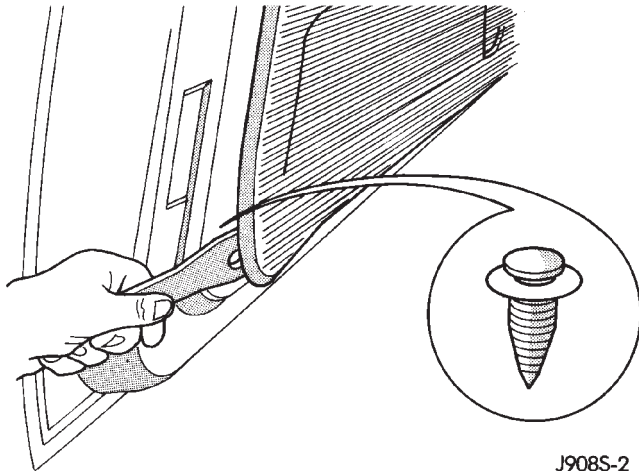
(QUADRA-TRAC)

T/C POSITION	SWITCH POSITION
4 ALL TIME	1
N	3
4 LO	2

(5) Remove screw from bottom of hand hold in arm-rest.

(6) Remove the trim panel with a wide, flat bladed tool (Fig. 5).

To aid in removal of the trim panel, start at the bottom of the panel.



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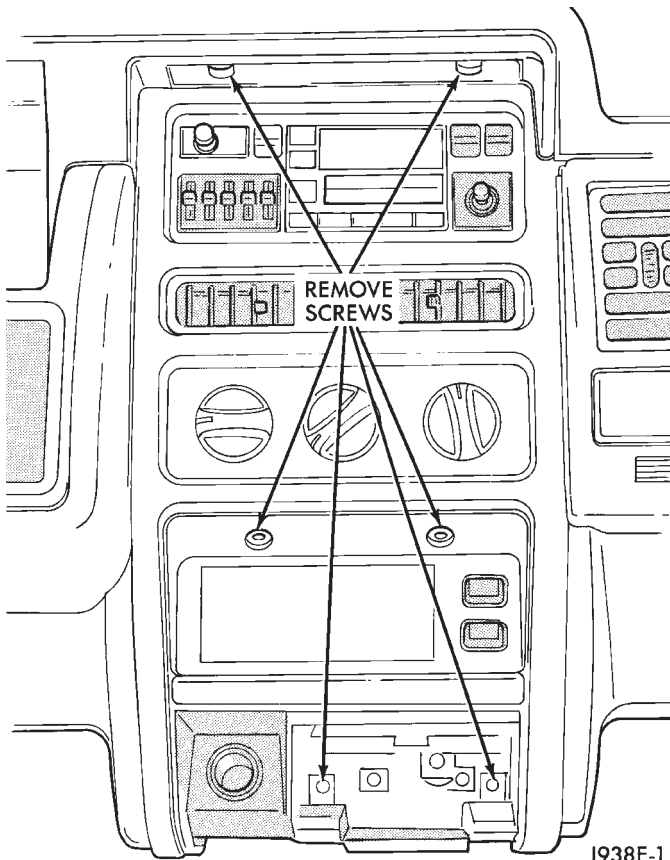
Fig. 5 Door Trim Panel Removal

(7) Remove screws holding speaker in door.

(8) Pull speaker out far enough to unplug connector.

(9) Install a new speaker.

(10) Install door trim panel by reversing the removal procedures.



J938E-1

Fig. 6 Remove Center Bezel Upper Screws

INSTRUMENT PANEL MOUNTED TWEETERS

(1) Disconnect negative cable from the battery.

(2) Remove ash tray.

(3) Remove 6 screws holding center cluster bezel (Fig. 6).

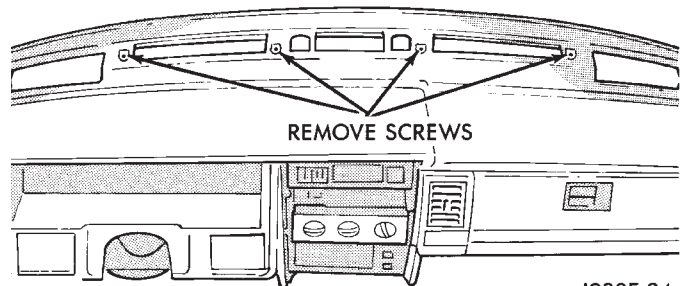
(4) Remove center bezel.

(5) Remove 2 screws holding dash pad located behind top of center bezel.

(6) Gently pry defroster grille out of dash pad.

(7) Unplug auto headlamp and sun sensors (if equipped) and set defroster grille aside.

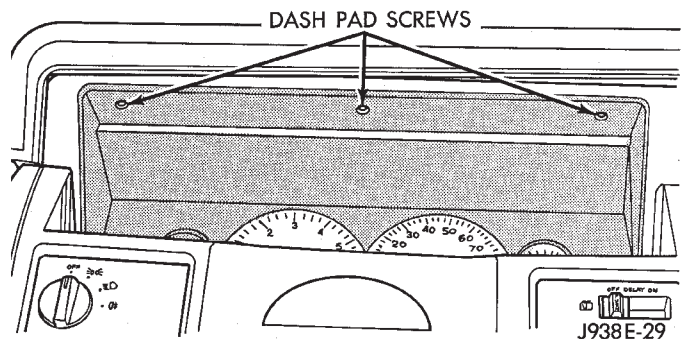
(8) Remove 4 screws in defroster duct opening holding dash pad (Fig. 7).



J938E-24

Fig. 7 Upper Dash Pad Attaching Screws

(9) Remove 3 screws above instrument panel cluster holding dash pad (Fig. 8).



J938E-29

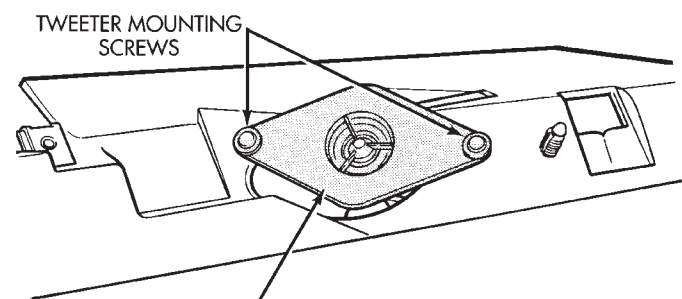
Fig. 8 Remove Screws Holding Dash Pad

(10) Open glove box and remove 2 screws holding dash pad.

(11) Remove dash pad.

(12) Remove 2 screws holding tweeter (Fig. 9).

(13) Unplug tweeter connection and remove tweeter.



TWEETER

J938F-4

Fig. 9 Tweeter Removal

(5) Touch the positive lead of the voltmeter to the terminal in cavity number 48. With the speed control switch in the OFF position, the voltmeter should read zero volts. With the switch in the ON position, the voltmeter should read battery voltage. Pressing the SET button should cause the voltmeter to change from battery voltage to zero volts, for as long as the switch is held. If not, perform the speed control switch test. If the switch is not at fault, then check the main harness and repair as necessary.

(6) Touch the positive lead of the voltmeter to the terminal in cavity number 50. The voltmeter should read zero volts with the speed control switch in either the OFF or ON position. With switch in either RESUME or SET position, the voltmeter should read battery voltage. If not, perform the speed control switch test. If the switch is not at fault, then check the main harness and repair as necessary.

(7) Touch the positive lead of the voltmeter to the terminal in cavity number 49. The voltmeter should read zero volts with the switch in the OFF position. With the switch in the ON position, the voltmeter should read battery voltage. The voltmeter will continue to read battery voltage when either the SET or RESUME switch is pressed. If not, perform the speed control switch test. If the switch is not at fault, then check the main harness and repair as necessary.

(8) Turn ignition switch OFF. Using an ohmmeter, connect one lead to a good body ground and touch the other lead to the terminal in cavity number 29. With the brake pedal released, the meter should show continuity. When the pedal is depressed, the meter should show open circuit.

SPEED CONTROL SWITCH TEST

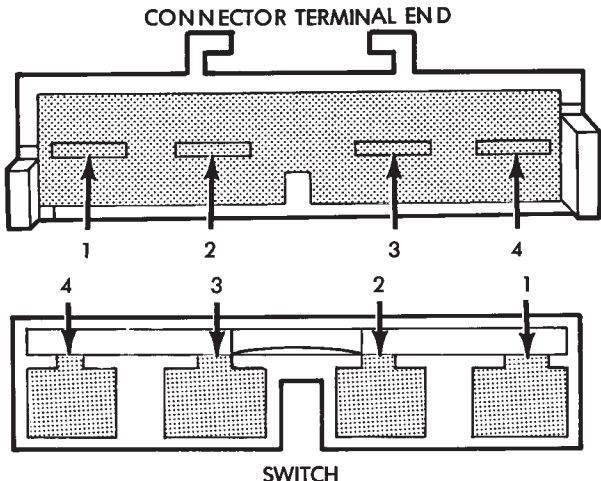
WARNING: BEFORE BEGINNING ANY AIR BAG SYSTEM COMPONENT REMOVAL OR INSTALLATION, REMOVE AND ISOLATE THE NEGATIVE (-) CABLE FROM THE BATTERY. THEN WAIT TWO MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT AND POSSIBLE INJURY.

To check the switch, remove the switch from its mounting position, refer to Service Procedures - Speed Control Switch. Use an ohmmeter and refer to the Speed Control Switch Continuity chart to determine if continuity is correct. If there is no continuity at any one of the switch positions, replace the switch.

STOP LAMP SWITCH TEST

(1) Remove the stop lamp switch from the mounting bracket. Refer to Service Procedures - Stop Lamp Switch.

SPEED CONTROL SWITCH CONTINUITY



SPEED CONTROL SWITCH CONTINUITY	
SWITCH POSITION	CONTINUITY BETWEEN
OFF	PIN 1 AND PIN 4
ON	PIN 1 AND PIN 4 PIN 1 AND PIN 2 PIN 2 AND PIN 4
ON AND SET	PIN 1 AND PIN 2
ON AND RESUME	PIN 1 AND PIN 3

J928H-4

(2) Disconnect switch from wiring harness.

(3) Using an ohmmeter, check switch continuity (Fig. 6) as follows:

(a) With switch plunger released, there should be continuity between pin 5 and pin 6.

(b) With switch plunger depressed, there should be continuity between pin 1 and pin 2.

(c) With switch plunger still depressed, there should be continuity between pin 3 and pin 4.

(4) If the switch fails the above continuity tests, it is defective. Replace switch. If switch is OK, reinstall and check adjustment. Refer to Service Procedures - Stop Lamp Switch for correct installation and adjustment procedures.

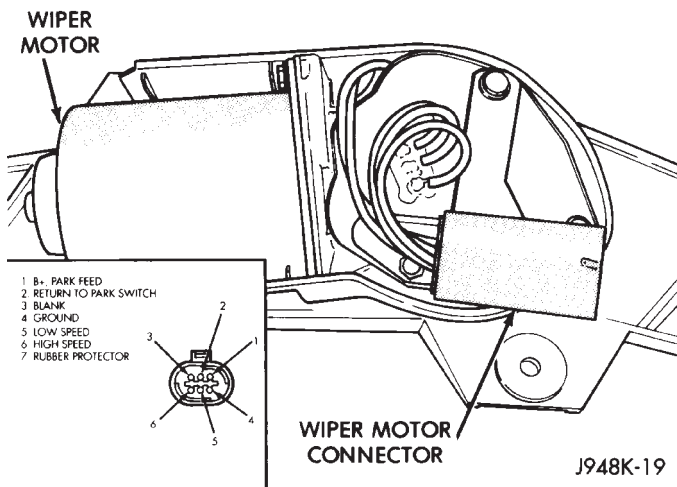


Fig. 1 Wiper Motor Connector

ers do not operate, replace failed wiper motor. If not, repair wiring to intermittent wiper module.

- Wiper switch in HIGH, measure voltage at terminal 6. Meter should read battery voltage. If OK, but wipers do not operate, replace failed wiper motor. If not, repair wiring to intermittent wiper module.
- Wiper switch in LOW or HIGH, voltmeter connected to terminal 2. Turn wiper switch to OFF and observe meter. Meter should read battery voltage when switch goes to OFF, then zero volts after wipers park. If battery voltage present, but wipers fail to park, replace failed wiper motor. If no battery voltage present, repair wiring to intermittent wiper module.

WINDSHIELD WASHER DIAGNOSIS

(1) With ignition switch in OFF position, unplug front washer pump wiring connector.

- Measure resistance from terminal A of front pump connector to a good ground. Meter should read zero ohms. If not, repair wiring to ground.

(2) Remove circuit breaker from fuse block and turn ignition switch to ACCESSORY or ON.

- Measure voltage at battery side of circuit breaker cavity. Meter should read battery voltage. If not, repair wiring from ignition switch.
- Measure resistance across circuit breaker terminals. Meter should read zero ohms. If OK, reinstall circuit breaker. If not, replace failed circuit breaker.

(3) Unplug wiring harness connector (multi-function switch side) from intermittent wiper module, and turn ignition switch to ACCESSORY or ON.

- Measure voltage at unplugged connector terminal B while washer switch is depressed. Meter should read battery voltage. If OK, reinstall connector. If not, repair wiring back to circuit breaker and/or refer to Multi-Function Switch Diagnosis.

(4) Unplug wiring harness connector (washer pump side) from intermittent wiper module, and turn ignition switch to ACCESSORY or ON.

- Measure voltage at unplugged connector terminal B while washer switch is depressed. Meter should read battery voltage. If OK, reinstall connector. If not, replace failed intermittent wiper module.

CAUTION: When replacing intermittent wiper module, be certain to use the correct replacement module. If an incorrect substitution is used, the wiper delay will be incorrect.

(5) With ignition switch in ACCESSORY or ON, unplug connector at front washer pump.

- Measure voltage at washer pump connector terminal A while washer switch is depressed. Meter should read battery voltage. If OK, replace failed front washer pump. If not, repair wiring from intermittent wiper module.

MULTI-FUNCTION SWITCH DIAGNOSIS

The multi-function switch contains circuitry for:

- turn signal
- hazard warning
- headlamp beam select
- headlamp optical horn
- windshield wipers
- delay wiper
- and windshield washers.

This integrated switch assembly is mounted to the left side of the steering column. Should any function of the switch fail, the entire switch assembly must be replaced.

Using an ohmmeter, test for continuity between the terminals of the switch as shown in Multi-Function Switch Continuity chart.

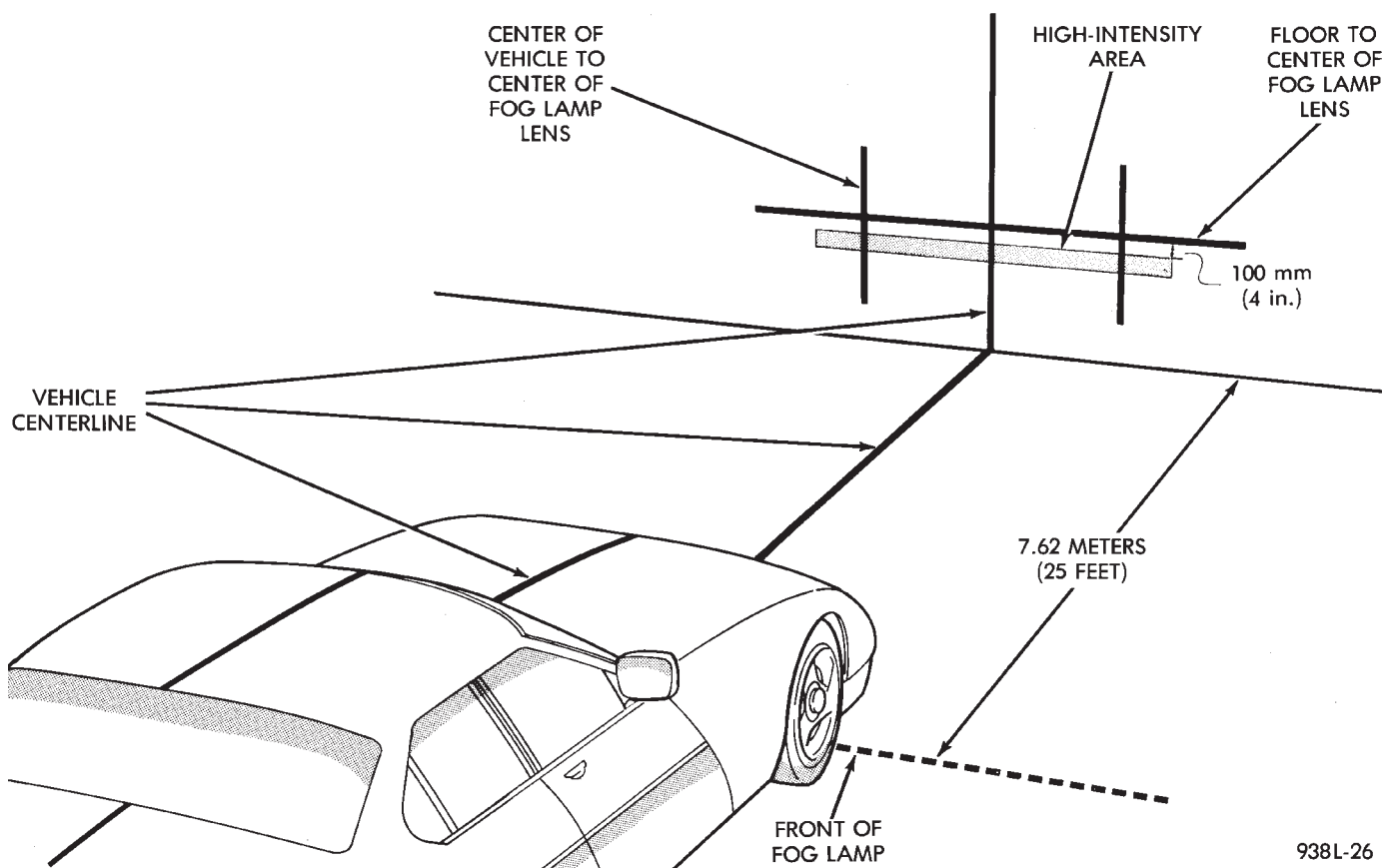
To test the switch:

- (1) Disconnect negative cable from the battery.
- (2) Remove tilt lever (tilt column only).
- (3) Remove both upper and lower steering column covers. Requires removal of 3 screws (Torx T-20).
- (4) Remove 4 screws holding steering column trim panel (Fig. 2).
- (5) Remove 6 screws holding knee blocker.
- (6) Remove steering column retaining nuts.
- (7) Lower steering column to gain access to rear of multi-function switch.
- (8) Remove switch connector (Figs. 3 and 4).

If the problem occurs only in the DELAY mode, see Intermittent Wiper Diagnosis.

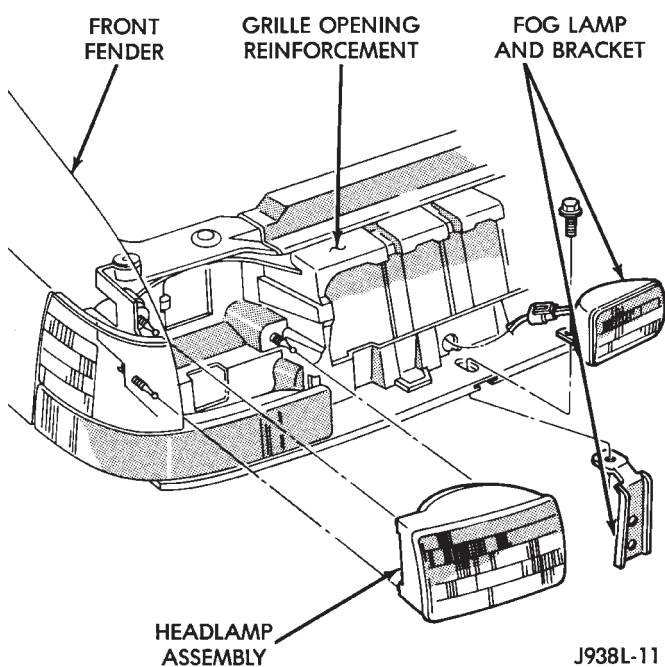
INTERMITTENT WIPER DIAGNOSIS

The following tests are to be performed if a problem with wiper system is only evident in the DELAY mode. These tests involve disconnecting the intermittent wiper module, which can be found on a bracket located on the left side kick panel.



938L-26

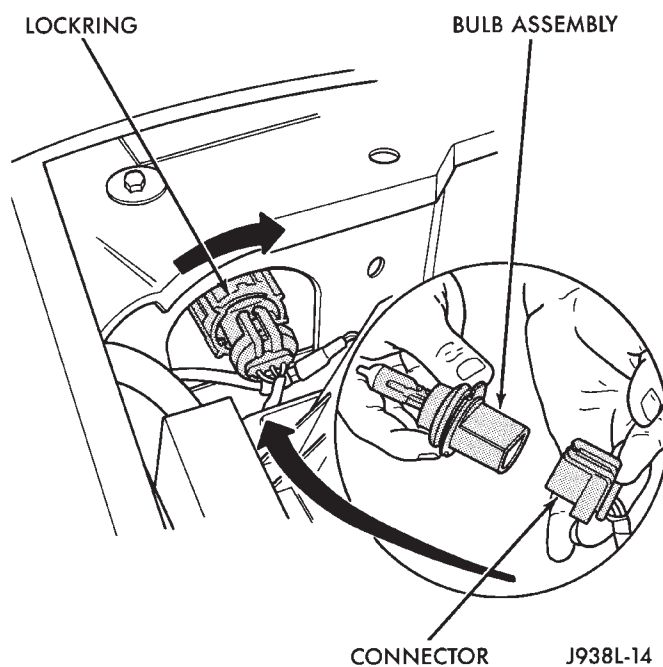
Fig. 3 Fog Lamp Alignment —Typical



J938L-11

Fig. 4 Headlamp Removal

(5) After replacing bulb, slide lamp into slot provided on inboard side of headlamp assembly. Replace two screws and replace parking lamp.



J938L-14

Fig. 5 Headlamp Bulb Removal

FOG LAMPS

Fog lamps are turned OFF by the circuit relay when high beam driving lamps are turned ON.

Fog lamps may be operated ONLY when low beam headlamps are ON. If the headlamps are switched to

RESTRAINT SYSTEMS

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AIRBAG SYSTEM	1	AIRBAG SYSTEM SERVICE	4
AIRBAG SYSTEM GENERAL INFORMATION	1		

AIRBAG SYSTEM

WARNING: THIS SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL THE AIRBAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. THEN WAIT 2 MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

To inspect system use Airbag System - Body Diagnostic Procedures manual.

If the airbag module assembly is defective and non-deployed, refer to Chrysler Corporation current return list for proper handling procedures.

WARNING: REPLACE AIRBAG SYSTEM COMPONENTS WITH CHRYSLER MOPAR® SPECIFIED REPLACEMENT PARTS ONLY. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION.

THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIRBAG COMPONENTS, HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANYTIME A NEW FASTENER IS NEEDED, REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS LISTED IN THE PARTS BOOK.

AIRBAG SYSTEM GENERAL INFORMATION

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Airbag Cleanup Procedure	2	Airbag Module Handling (Undeployed)	2
Airbag Clockspring	2	Airbag Module Storage	2
Airbag Control Module	2	Airbag Service (Deployed)	3
Airbag Impact Sensor	1	Airbag System Check	3
Airbag Module	1	Airbag System Schematic	3
Airbag Module Handling (Deployed)	2		

AIRBAG MODULE

The airbag module is the most visible part of the system. It contains the airbag cushion and its supporting components. The airbag module contains a housing to which the cushion and inflator are attached and sealed.

The inflator assembly is mounted to the back of the module. It seals the hole so it can discharge the gas it produces directly into the cushion when supplied with the proper electrical signal. A protective cover is fitted to the front of the airbag module and forms a

decorative cover in the center of the steering wheel. The airbag module is mounted directly to the steering wheel.

AIRBAG IMPACT SENSOR

The airbag system is a safety device designed to protect the driver from serious injury, caused by a frontal impact of the vehicle.

The impact sensors provide verification of the direction and severity of the impact. Three impact sensors are used. One is called a safing sensor. It is located inside the airbag control module (ACM),

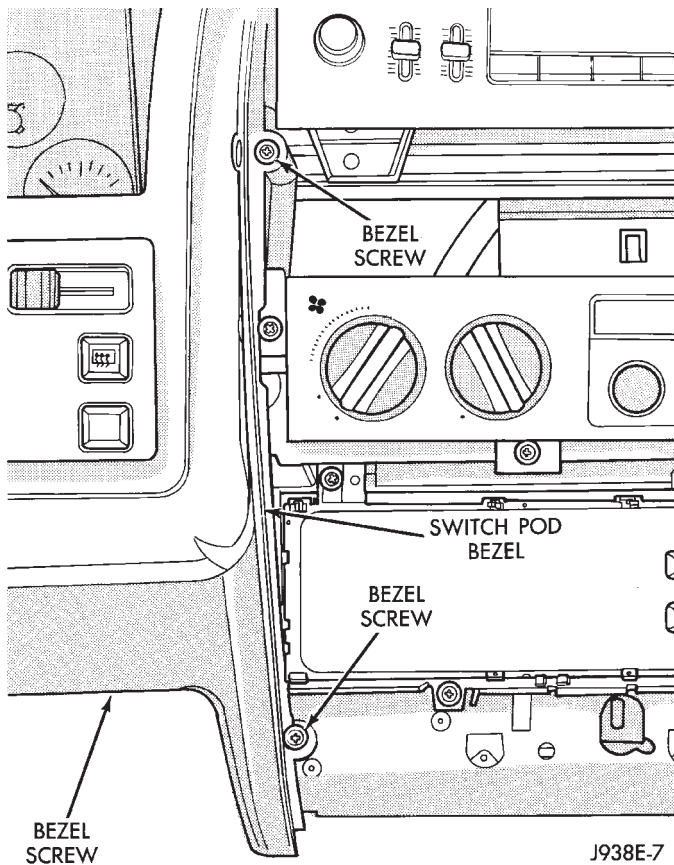


Fig. 10 Right Switch Pod Bezel Screws

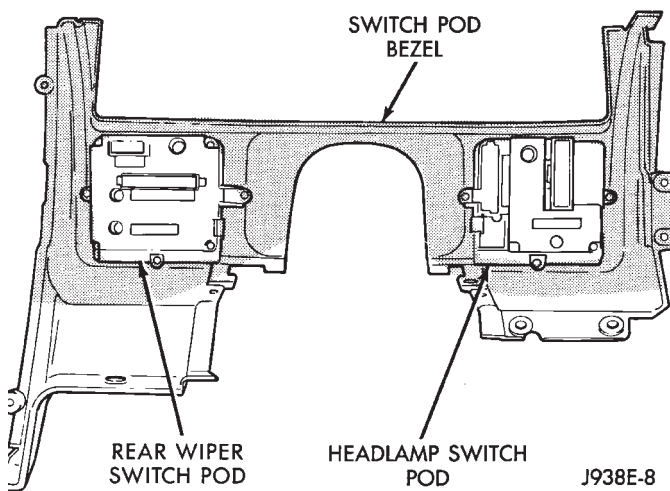


Fig. 11 Rear View Of Switch Pod Bezel

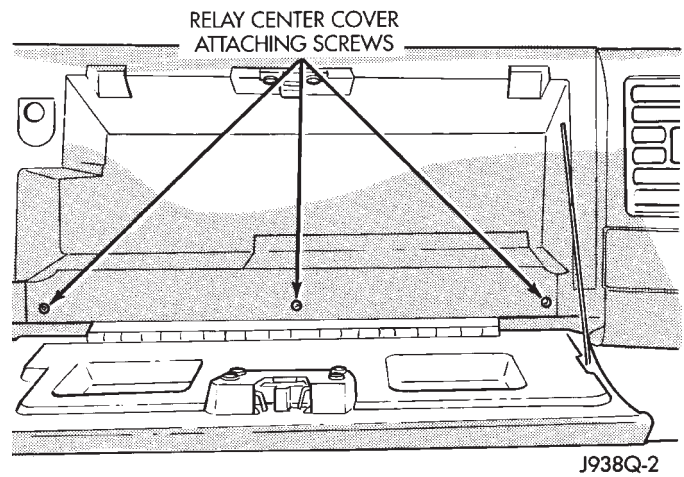


Fig. 12 Relay Center Cover

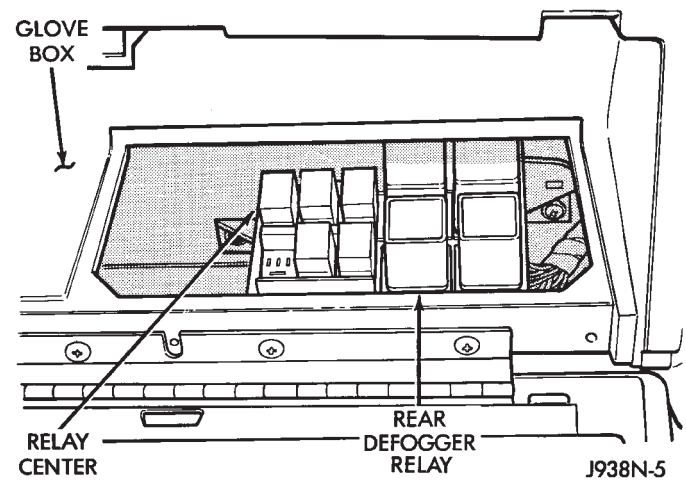
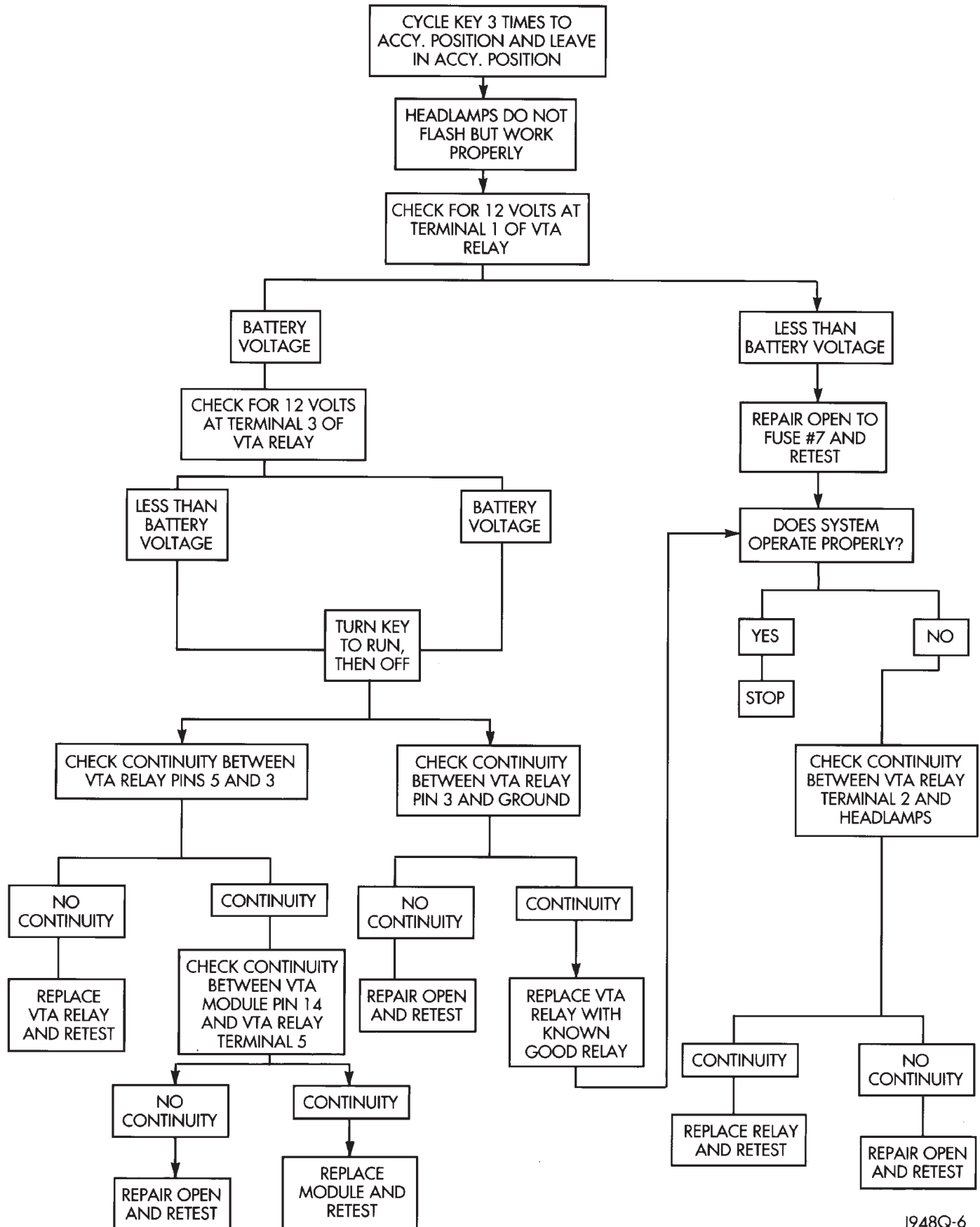


Fig. 13 Rear Window Defogger Relay

VEHICLE THEFT ALARM DIAGNOSIS



POWER WINDOWS

DESCRIPTION

A permanent magnet motor moves each power window. Each motor raises or lowers the glass when voltage is supplied to the motor. The direction the motor turns depends on the polarity of the supply voltage. The control switches control the supply voltage polarity.

With ignition switch in ON, voltage from the #13 fuse, 60 amp, in the PDC is applied to the #26 circuit breaker, 30 amp, in the fuse block. Power then goes to the master switch terminal 5 and to the right front or either rear window switch.

When the master window switch is moved UP, the contacts close a current path to:

- terminal 4
- the left front window motor
- terminal 3
- terminal 1 of the left front window switch to ground.

The motor then moves the glass up.

Current flows in a similar way when the UP contact in the right front or either rear window switch is closed. Current flow through the right front or either rear window motor must go through the master and the right front or either rear window switch before it reaches ground.

Each motor is protected by a built-in circuit breaker. If a window switch is held on too long with the window obstructed or after the window is fully up or down, the circuit breaker opens the circuit. The circuit breaker resets automatically as it cools. Do not allow frequent or consecutive resetting of the circuit breaker to continue.

POWER WINDOW DIAGNOSIS (Fig. 1)

For information concerning wiring or connectors, refer to Group 8W - Wiring Diagrams.

NO WINDOWS OPERATE

- Measure voltage at 30 amp circuit breaker #26 at fuse block. Meter should read battery voltage. If not, replace or repair open to 60 amp fuse #13 in PDC as required.
- Turn ignition switch to OFF and measure resistance from ground lug on left side kick panel to ground. Meter should read zero ohms. If not, repair open to ground.
- Remove master power window switch, left front door (refer to service procedures). Measure resistance at black wire (terminal 1 of green connector). Meter should read zero ohms. If not, repair open to ground.
- Turn ignition switch to ON and measure voltage at terminal 5 of black connector. Meter should read battery voltage. If not, repair open to circuit breaker #26 in fuse block.

- Close master window switch. Measure voltage at terminal 1 of black connector. Meter should read battery voltage. If not, replace switch.
- Operate window switch. All windows should operate. If there are still inoperative windows go to One Window Inoperative.

ONE WINDOW INOPERATIVE

Remove door trim panel of inoperative window, probe harness side of switch connector.

- Measure voltage at terminal 2 of connector while holding corresponding master switch in the DOWN position. Meter should read battery voltage. If OK, go to next step. If not, repair open back to master switch.
- With master switch still in DOWN position, measure voltage at terminal 6 of connector. Meter should read battery voltage. If not, check for battery voltage at motor terminals. Replace motor/regulator as required. If OK, repair open back to master switch.

POWER WINDOW REGULATOR SERVICE

FRONT DOOR TRIM PANEL REMOVAL

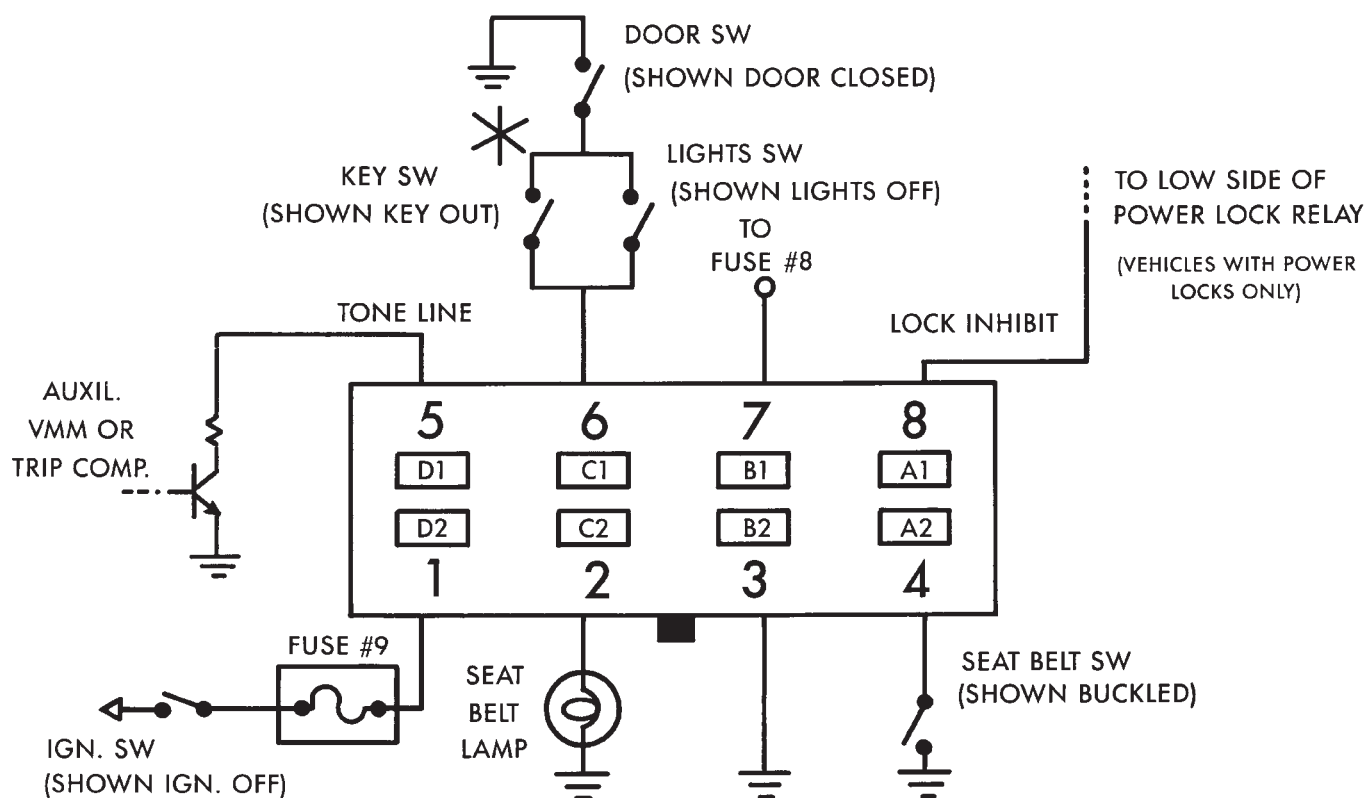
- (1) Lower window about half way.
- (2) Remove screw at top of trim panel near mirror (Fig. 2).
- (3) Remove screw from demister opening.
- (4) Remove screw and door handle cover.
- (5) Remove screw from under armrest.
- (6) Remove screw from bottom of hand hold in armrest.

CAUTION: The wiring harness to the door switches is just long enough to allow installation. If trim panel is pulled off by hand the switch may be pulled apart. Use a door clip tool to prevent damaging the switches.

- (7) Remove trim panel with a wide, flat bladed tool (Fig. 3).

To aid in removal of the trim panel, start at the bottom of the panel.

- (8) Unplug electrical connector from switches.
- (9) Loosen 2 nuts holding glass to window regulator (Fig. 4).
- (10) Slide glass rearward to remove from nuts.
- (11) Pull glass to the full up position and tape glass to the door.
- (12) Unplug wire harness connector from window regulator.
- (13) Remove 4 window regulator screws (Fig. 5).
- (14) Loosen last 2 window track screws (Fig. 5).
- (15) Remove window regulator.



PIN 8 (POWER LOCKS INHIBIT): LOW WHEN PIN 6 IS HI. AND OPEN WHEN PIN 6 IS LOW.

N/A = NOT APPLICABLE. X = DON'T CARE.

FUNCTION	DESCRIPTION	IGN.	SEAT BELT	TRIP COMP	DRIVER'S DOOR	KEY	HEAD LAMPS
SEAT BELT REMINDER	4 TO 8 SEC. CHIME AND LAMP OUTPUT	OFF → ON	NOT BCKLD	X	X	X	X
	4 TO 8 SEC. LAMP OUTPUT ONLY	OFF → ON	BCKLD	X	X	X	X
TRIP COMPUTER	CONTINUOUS. STEADY TONE	ON	X	LOW	X	X	X
KEY & HEAD LAMP REMINDER	PULSD. FAST-RATE CHIMES	OFF	X	X	OPEN	IN	X
						X	ON
DOOR LOCK INHIBIT	POWER LOCKS INHIBITED	OFF	X	X	OPEN	IN	X
						X	ON

J938U-2

Fig. 5 Buzzer Module Schematic

COMPONENT IDENTIFICATION

Caption	Fig.	Caption	Fig.
Battery and Starter Wiring 5.2L	.21	Instrument Panel to Body Wiring	.12
Body Wiring (Floor and Console)	.5	Instrument Panel Wiring	.11
Body Wiring (Left Side)	.3	Liftgate Wiring	.1
Body Wiring (Right Side)	.4	Overhead Lamps Wiring (w/o Power Sunroof)	.6
Door Wiring (Front)	.8	Overhead Lamps Wiring (w/ Power Sunroof)	.7
Door Wiring (Rear)	.9	Power Seat Wiring	.10
Engine Compartment Wiring (Left Side)	.16	Steering Column Wiring	.13
Engine Compartment Wiring (Right Side)	.15	Trailer Tow Wiring	.2
Engine Wiring 4.0L	.17	Transmission Wiring 4.0L	.19
Engine Wiring 5.2L	.18	Transmission Wiring 5.2L	.20
Front End Wiring	.22	Underhood Lamp Wiring	.14

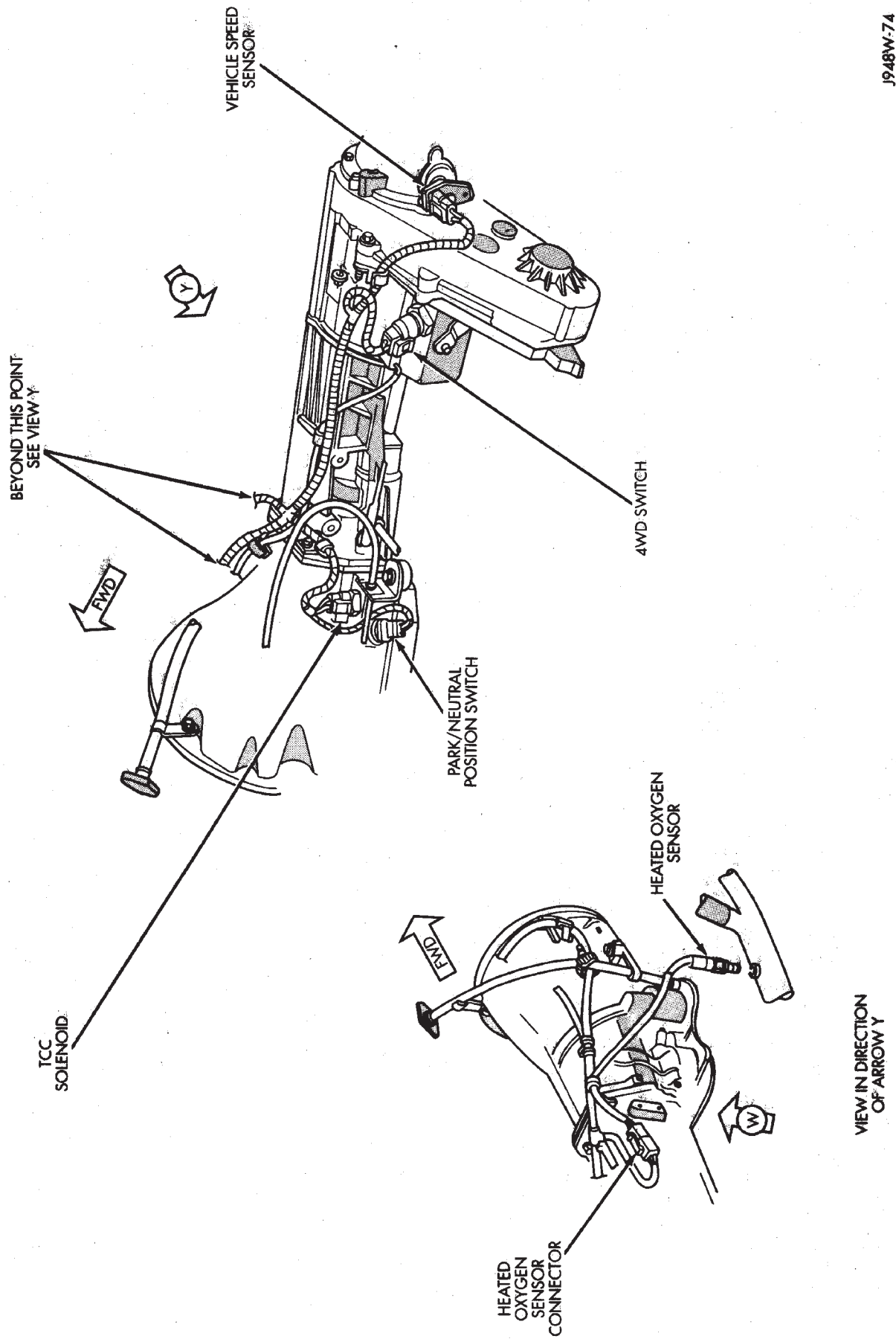
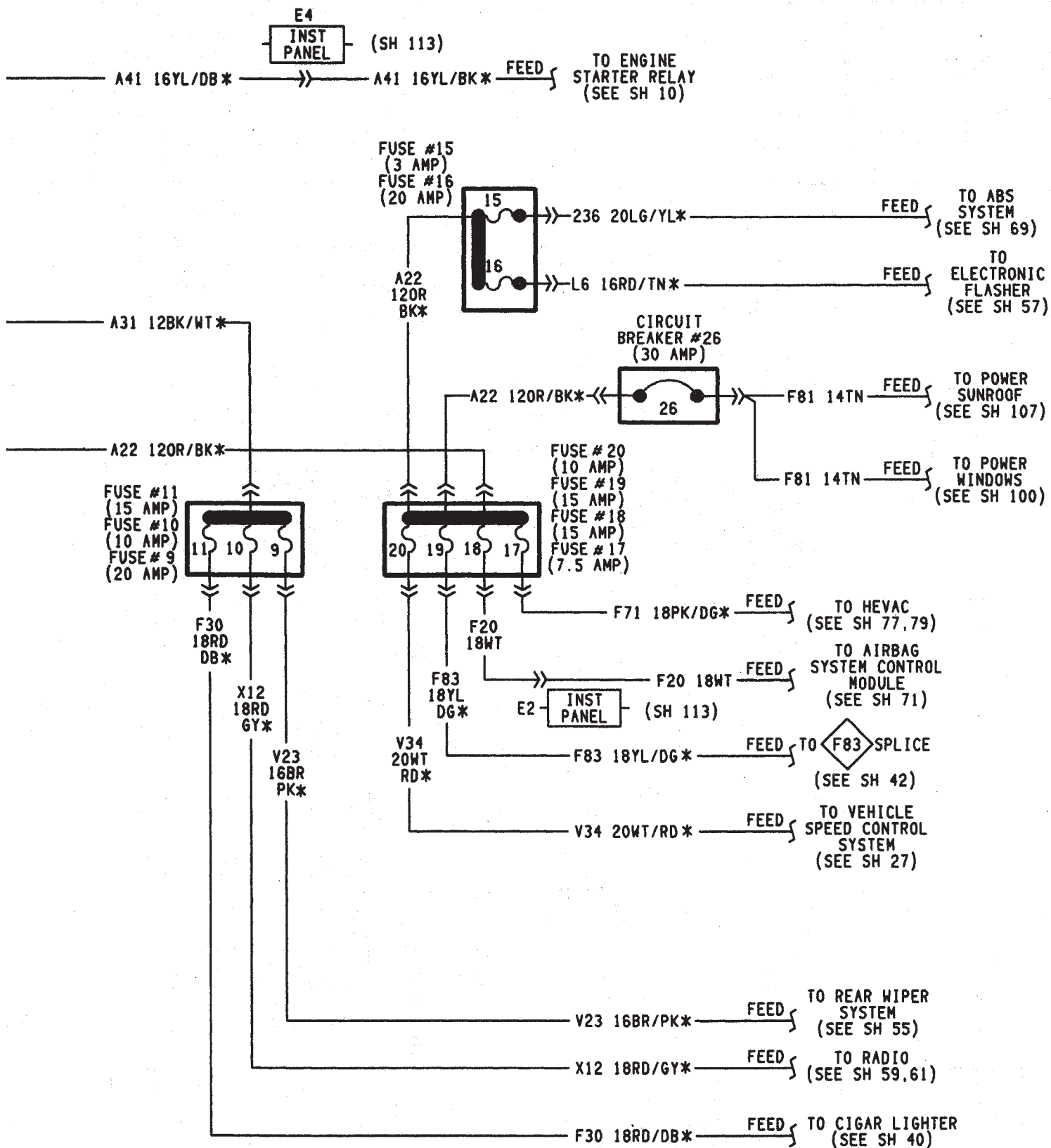
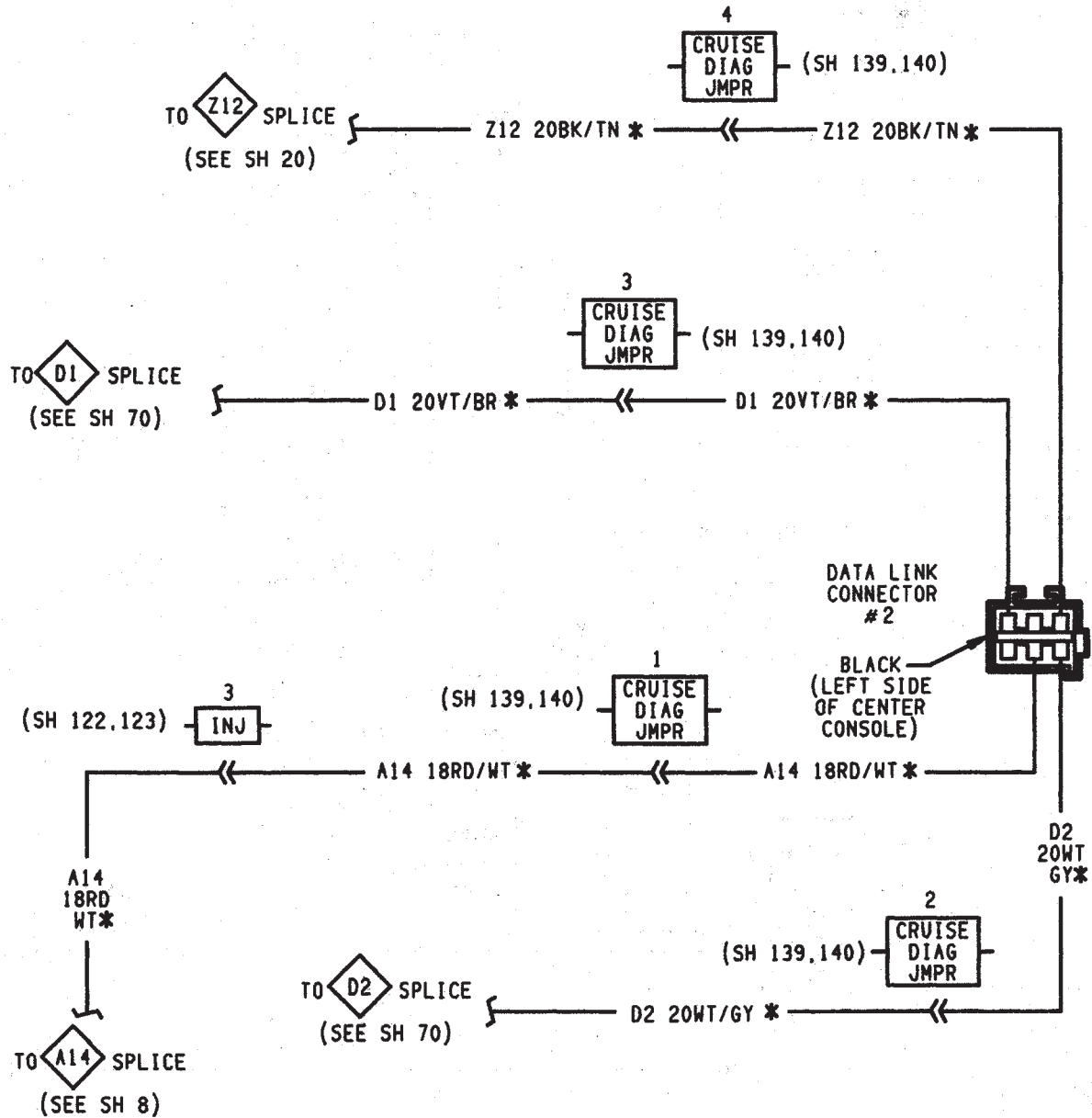


Fig. 20 Transmission Wiring 5.2L

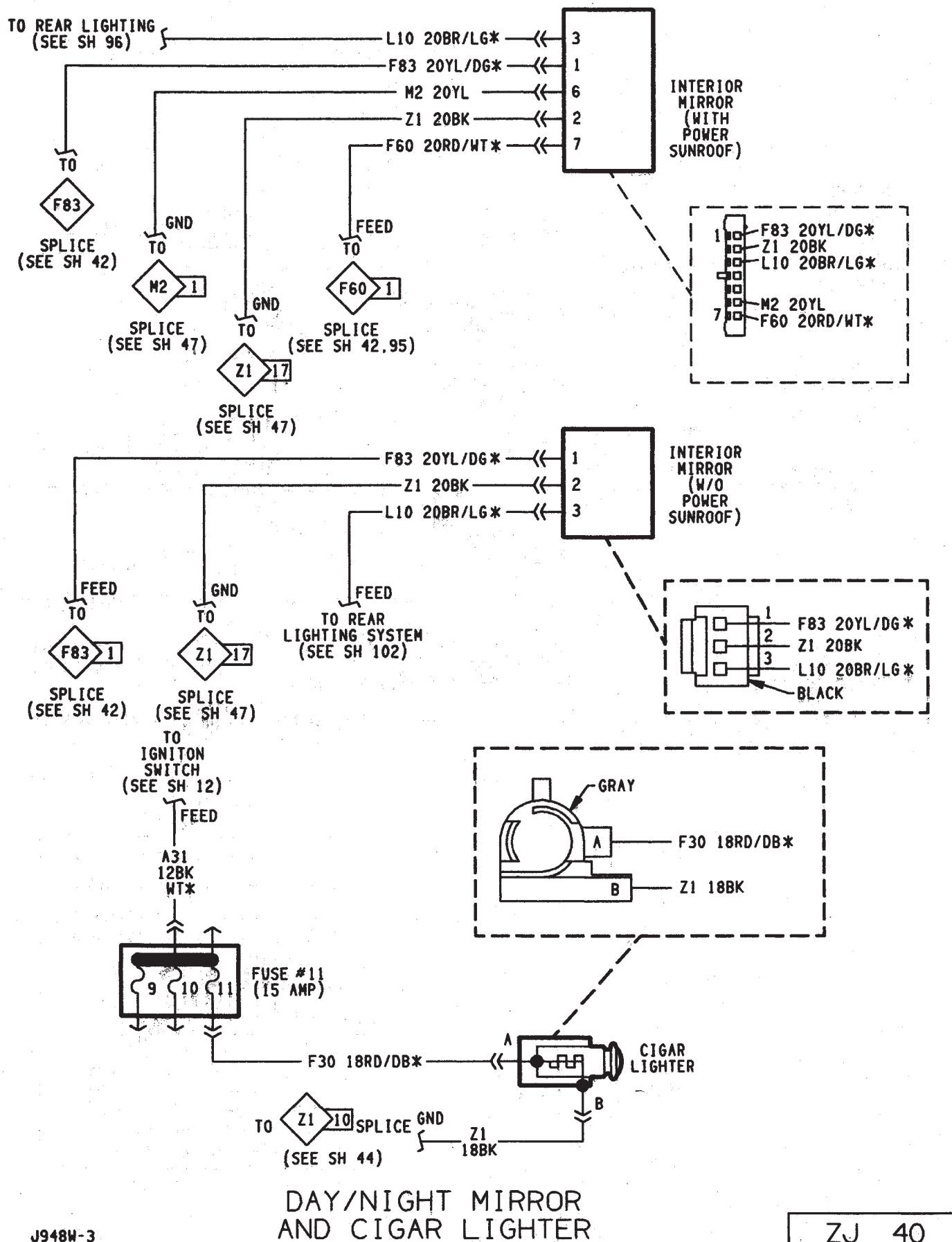
Wiring Diagram Name	Sheet Number
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Stop/Turn Relay	106
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Crankshaft Position Sensor	16, 22
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Splice C42	84
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Splice D2	70
Splice D41	80
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Splice F60-1	42, 95

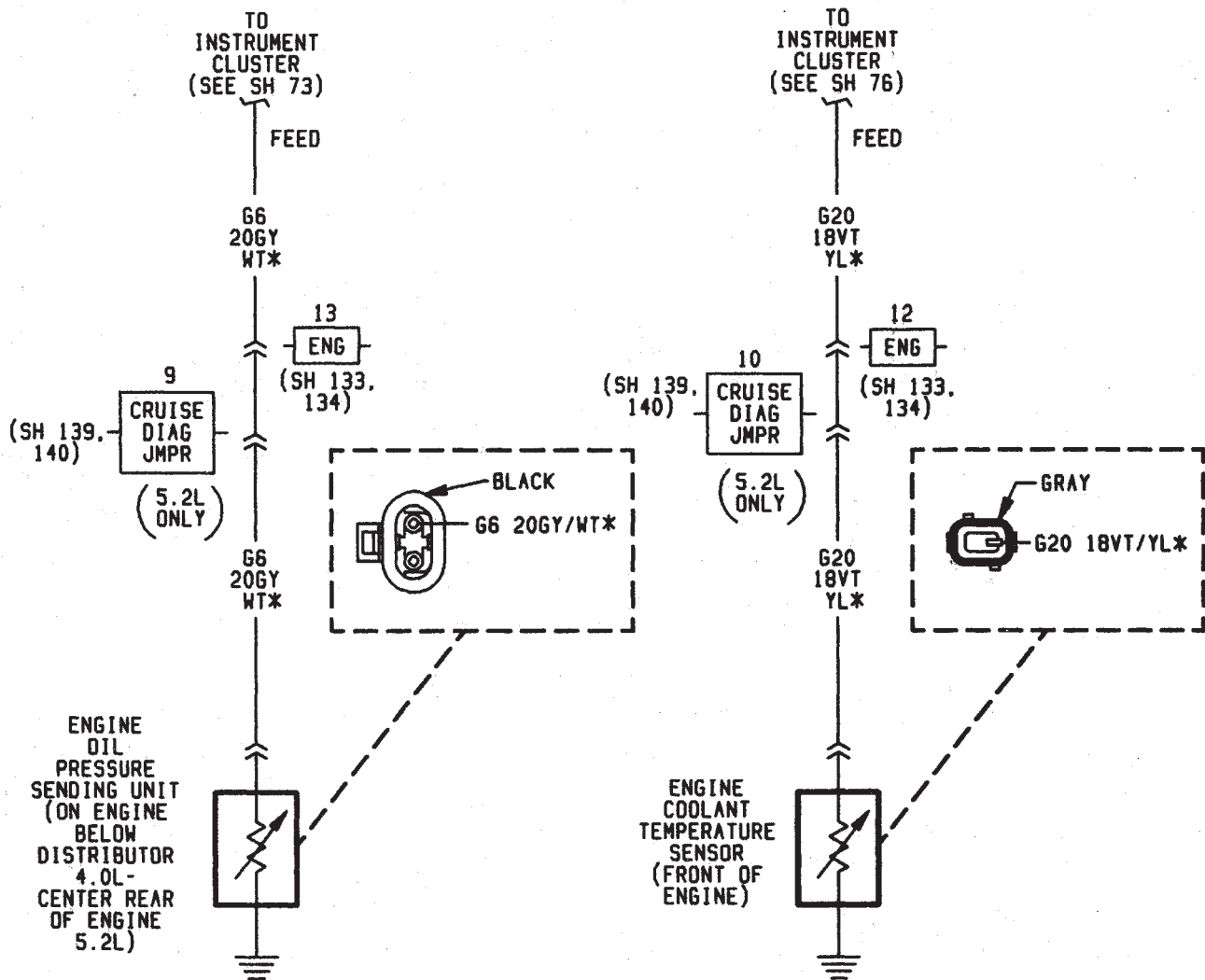
Wiring Diagram Name	Sheet Number
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Splice M2	45
Splice M2-1	47
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Splice Q1-1	100
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Splice X2	29
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Splice Z1-4	56
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Splice Z1-9	44
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Splice Z1-11	91
Splice Z1-12	29
Splice Z1-13	44
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Splice Z1-15	50
Splice Z1-17	47
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Splice Z1-25	91
Splice Z2	76
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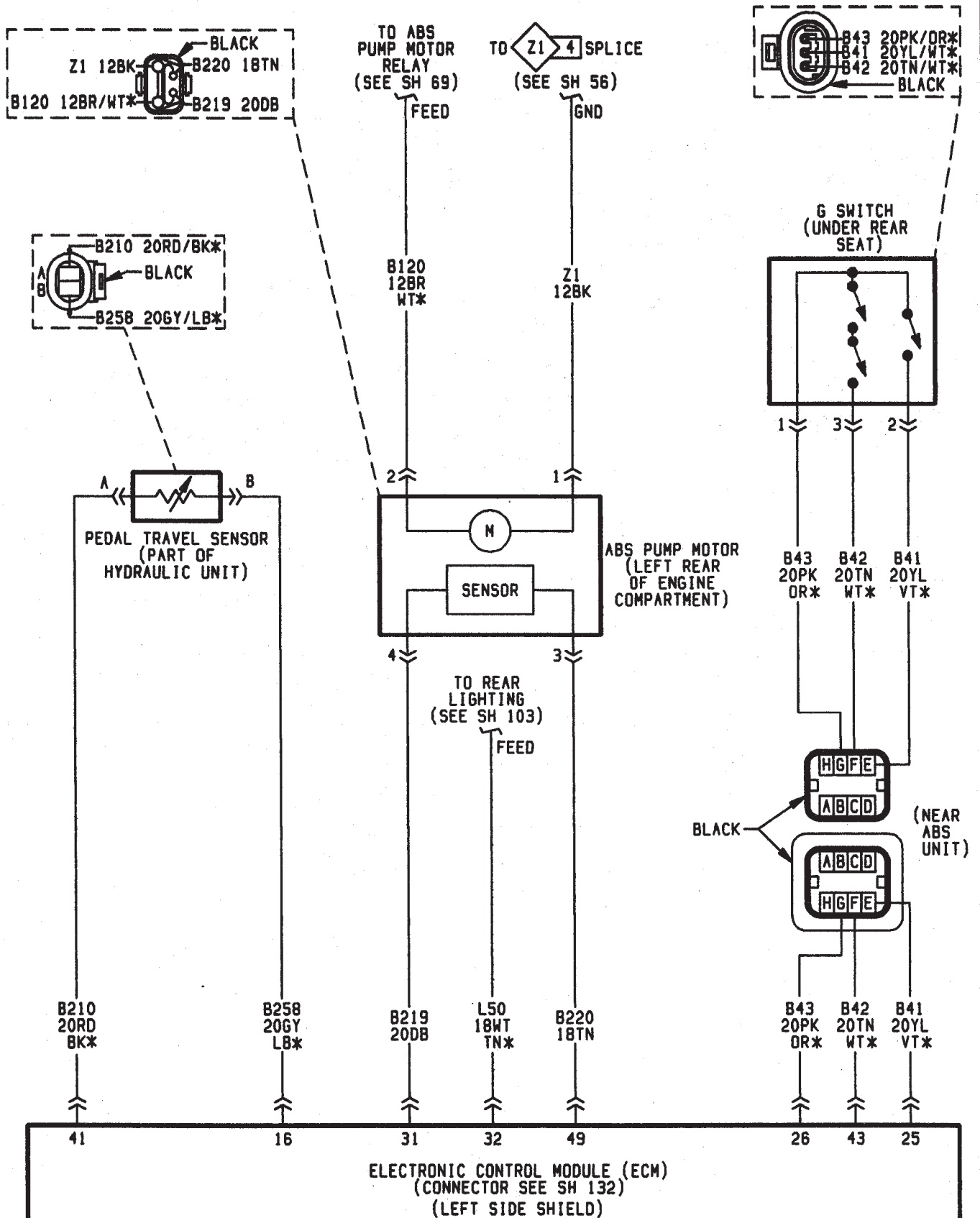


FUEL INJECTION
IGNITION SYSTEM (5.2L ENGINE)

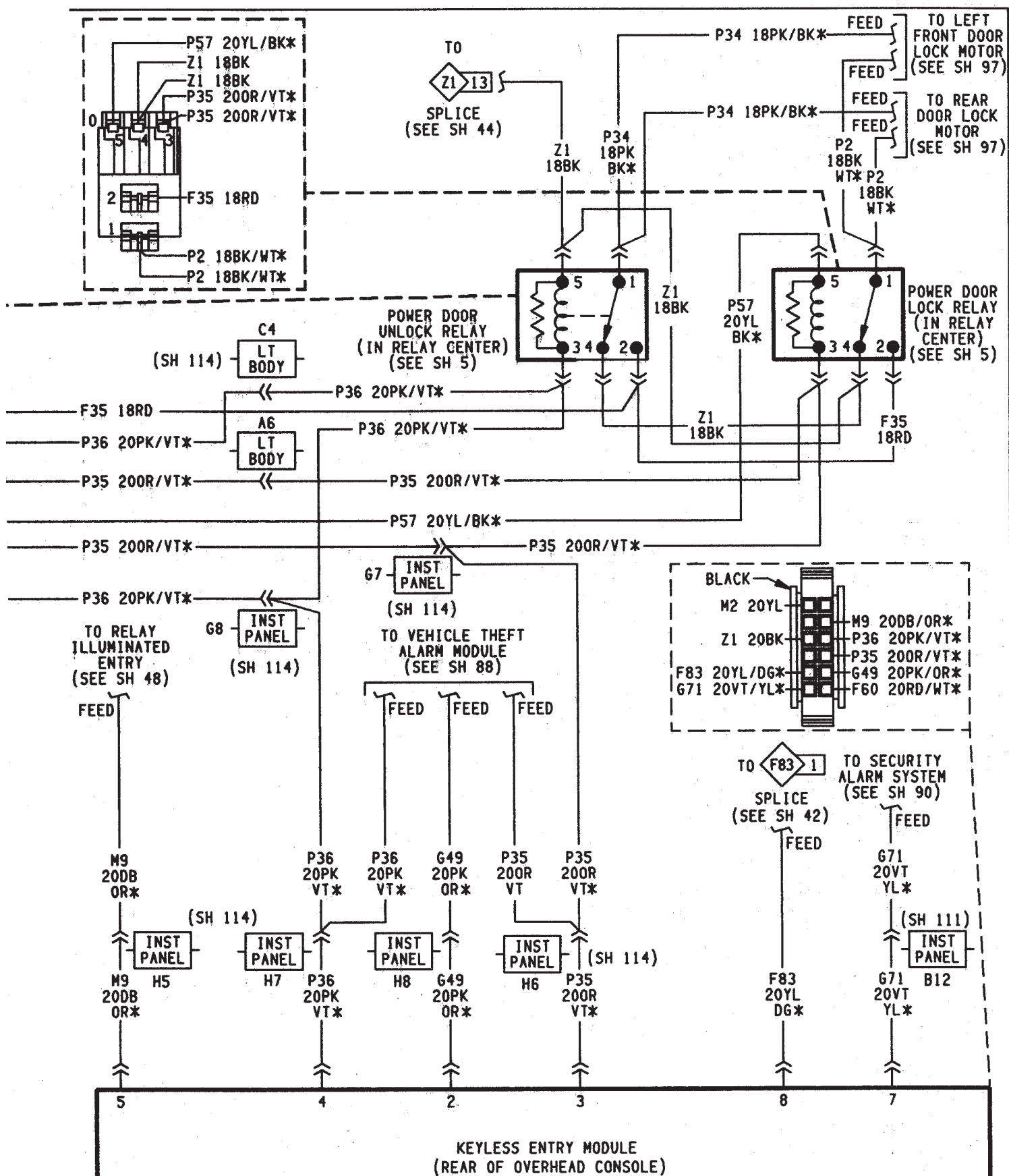


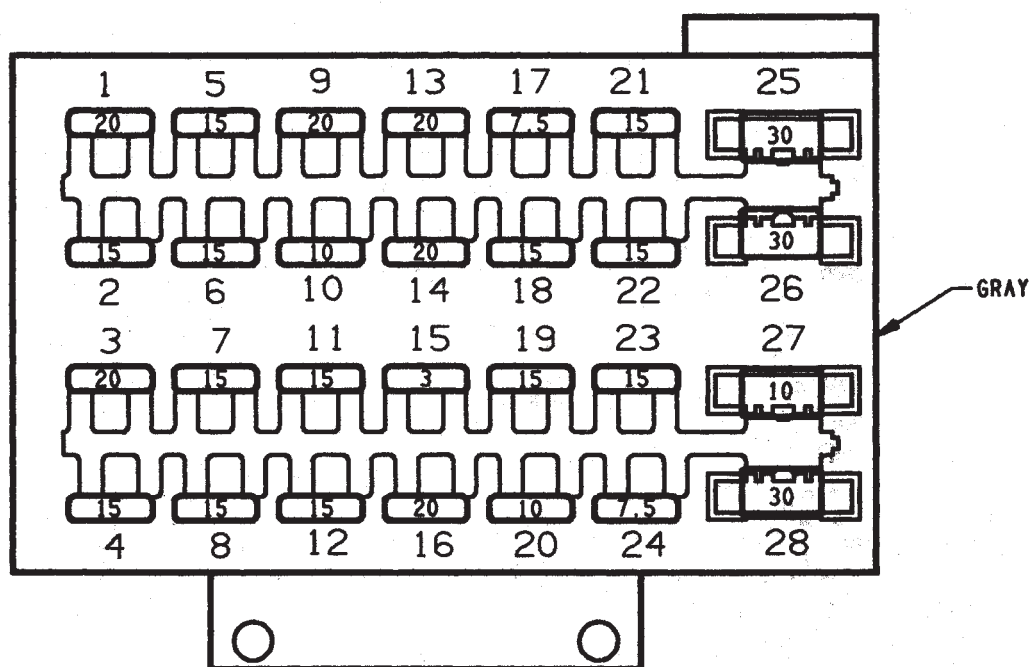


ENGINE OIL PRESSURE
AND TEMPERATURE SYSTEM



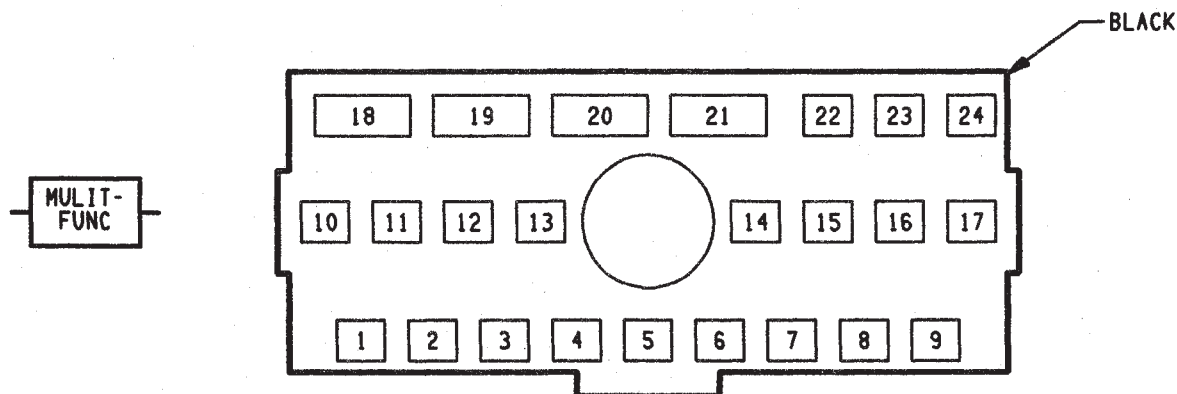






VIEWED FROM TERMINAL END

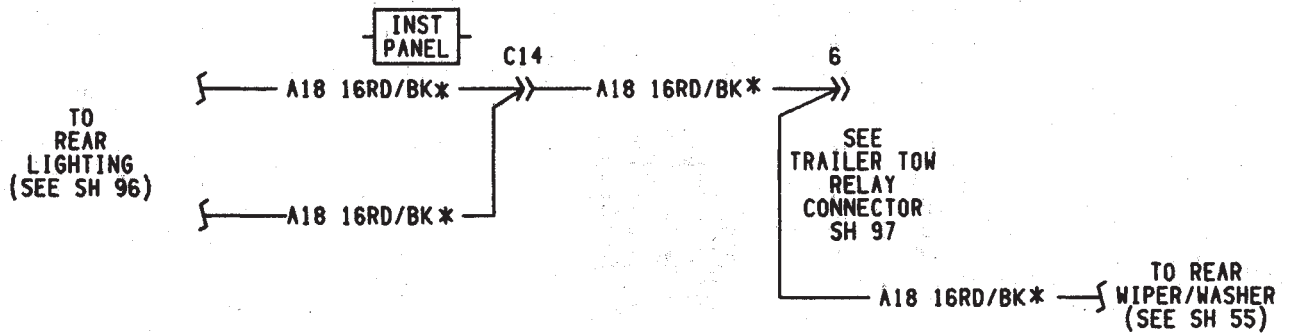
FUSE NUMBER	AMPS	COLOR	SHEET
1	20	YELLOW	1,65,102
2	15	LIGHT BLUE	1,7,27
3	20	YELLOW	1,58
4	15	LIGHT BLUE	1
5	15	LIGHT BLUE	1,7,45
6	15	LIGHT BLUE	1,7,87
7	15	LIGHT BLUE	1,34
8	15	LIGHT BLUE	1,7,95
9	20	YELLOW	2,12,56
10	10	RED	2,12,59,61
11	15	LIGHT BLUE	2,12,40
12	15	LIGHT BLUE	2,33
13	20	YELLOW	2,29
14	20	YELLOW	2,75,95
15	3	VIOLET	4,12,69
16	20	YELLOW	4,12,57
17	7.5	BROWN	3,12,77,79
18	15	LIGHT BLUE	3,12,71
19	15	LIGHT BLUE	3,12,42
20	10	RED	3,12,27
21	15	LIGHT BLUE	3,11,73
22	15	LIGHT BLUE	3,11,71,73
23	15	LIGHT BLUE	4,86
24	7.5	BROWN	4,36
25	30	C.B.	2,93
26	30	C.B.	4,12,100
27	10	C.B.	2,56,88
28	30	C.B.	1,86



VIEWED FROM TERMINAL END

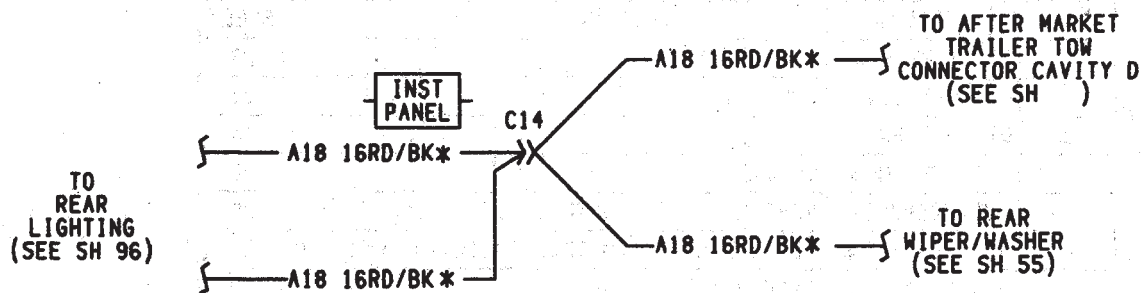
CAV	CIRCUIT	FUNCTION	SHEET
1	V50 18LG/WT*	INTERMITTENT WIPER SWITCH TO MODULE	56
2	V51 18WT	INTERMITTENT WIPER MODULE TO SWITCH	56
3	V11 18BK/TN*	WINDSHIELD WASH	56
4	F86 16LG/RD*	IGNITION ACCESSORY FEED	56
	F86 16LG/RD*	IGNITION ACCESSORY FEED	
5	V4 16RD/YL*	WIPER - HIGH SPEED	56
6	V3 16BR/WT*	WIPER - LOW SPEED	56
	V3 16BR/WT*	WIPER - LOW SPEED	
7	V6 16DB	WIPER - PARK FEED	56
8	V6 16DB	WIPER - PARK FEED	56
9	V3 16BR/WT*	WIPER - LOW SPEED	56
10	—	—	—
11	L64 18TN/DB*	RIGHT FRONT TURN SIGNAL	58
12	L60 18TN	RIGHT TURN TO TAIL LAMP	58
13	L12 16VT/TN*	HAZARD FLASHER TO SWITCH	58
14	—	—	—
15	L61 18LG	LEFT TURN TO TAIL LAMP	58
16	L65 18LG/DB*	LEFT FRONT TURN SIGNAL	58
17	L5 16BK/OR *	TURN SIGNAL FLASHER UNIT FEED	58
18	L4 16VT/OR *	LOW BEAM FEED	34
	L4 16VT/OR *	LOW BEAM FEED	
19	F34 14TN/BK*	HEADLAMP SWITCH BREAKER TO STRG COL	34
	F34 14TN/BK*	HEADLAMP SWITCH BREAKER TO STRG COL	
20	L3 16RD/OR *	HIGH BEAM FEED	34
	L3 16RD/OR *	HIGH BEAM FEED	
21	L11 16LG/BK*	FLASH TO PASS/VTA	34
	L11 16LG/BK*	FLASH TO PASS/VTA	
22	—	—	—
23	—	—	—
24	—	—	—

A



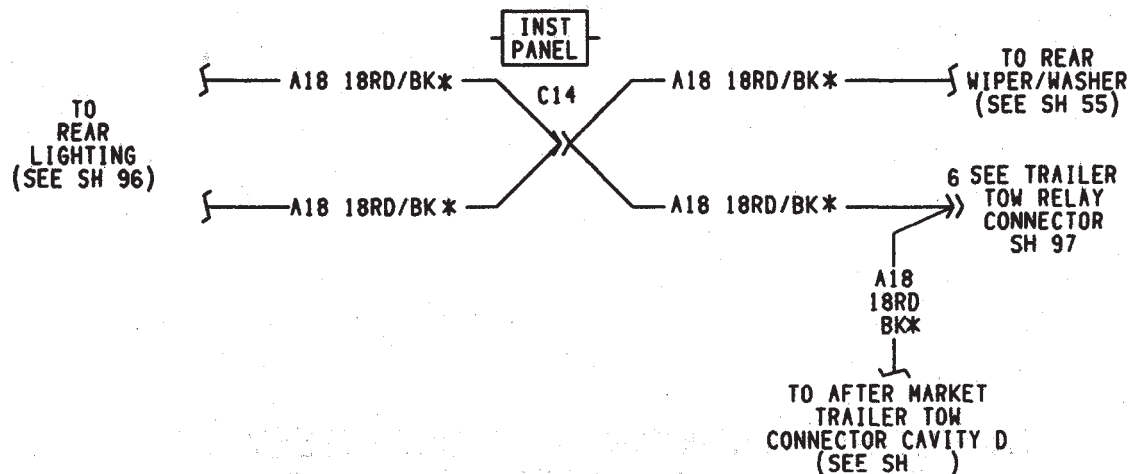
BASE TRAILER TOW

B



AFTERMARKET TRAILER TOW

C



FACTORY TRAILER TOW

The digits of the code identify:

- (1) 1st Digit—The year (4 = 1994).
- (2) 2nd & 3rd Digits—The month (01 - 12).
- (3) 4th & 5th Digits—The engine type/fuel system/compression ratio (MX = A 4.0 Liter (242 CID) 8.8:1 compression ratio engine with a multi-point fuel injection system).
- (4) 6th & 7th Digits—The day of engine build (01 - 31).

FOR EXAMPLE: Code * 401MX12 * Identifies a 4.0 Liter (242 CID) engine with a multi-point fuel injection system, 8.7:1 compression ratio and built on January 12, 1994.

OVERSIZE AND UNDERSIZE COMPONENT CODES

Some engines may be built with oversize or undersize components such as:

- Oversize cylinder bores.
- Oversize camshaft bearing bores.
- Undersize crankshaft main bearing journals.
- Undersize connecting rod journals.

These engines are identified by a letter code (Fig. 4) stamped on a boss between the ignition coil and the distributor (Fig. 5).

CODE	COMPONENT	UNDERSIZE
P	One or more connecting rod bearing journals	0.254 mm (0.010 in)
M	All crankshaft main bearing journals	0.254 mm (0.010 in)
PM	All crankshaft main bearing journals and one or more connecting rod journals	0.254 mm (0.010 in)
CODE	COMPONENT	OVERSIZE
B	All cylinder bores	0.254 mm (0.010 in)
C	All camshaft bearing bores	0.254 mm (0.010 in)

J8909-54

Fig. 4 Oversize and Undersize Component Codes

ENGINE MOUNTS—FRONT

The front mounts support the engine at each side. These insulators are made of resilient rubber.

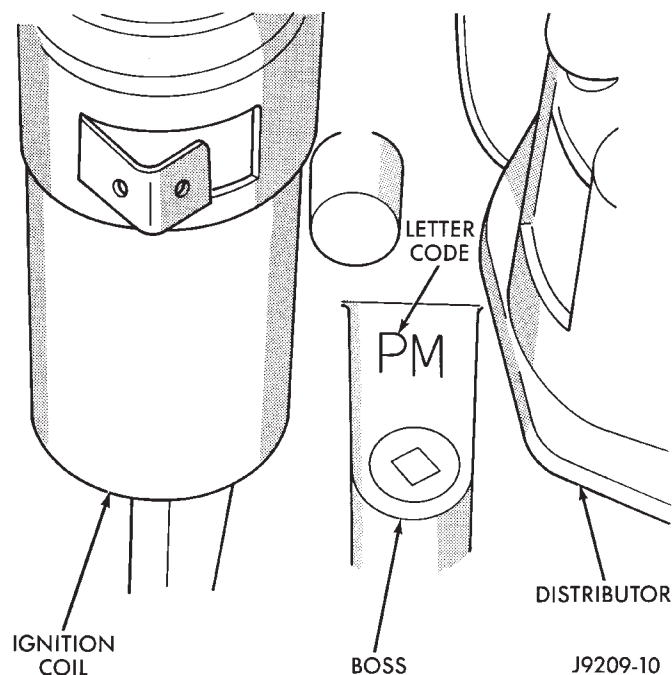


Fig. 5 Oversize and Undersize Component Code Location

REMOVAL

- (1) Disconnect the negative cable from the battery.
- (2) Support the engine.
- (3) Raise the vehicle.
- (4) Remove the insulator assembly-to-lower front sill bolts (Fig. 6 or 7).
- (5) Raise the engine slightly.
- (6) Remove the thru-bolt nut and thru-bolt (Fig. 6 or 7). Remove the insulator.

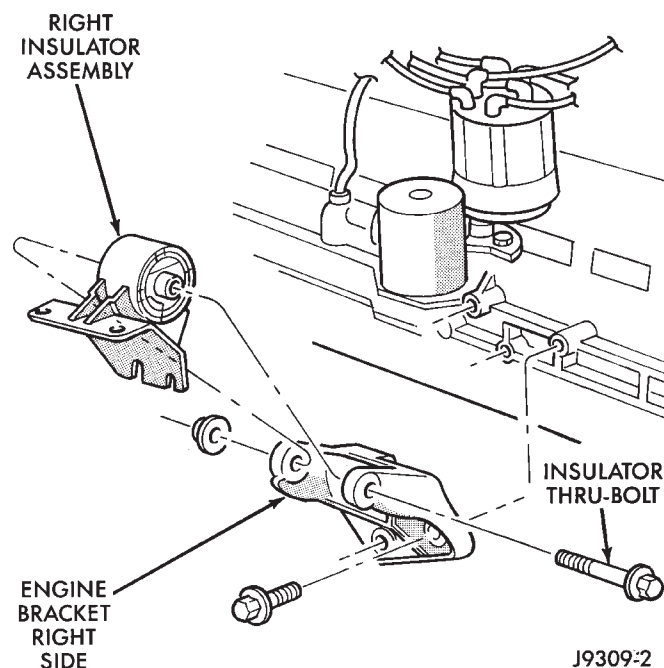


Fig. 6 Engine Mounts—Front (Right Side)

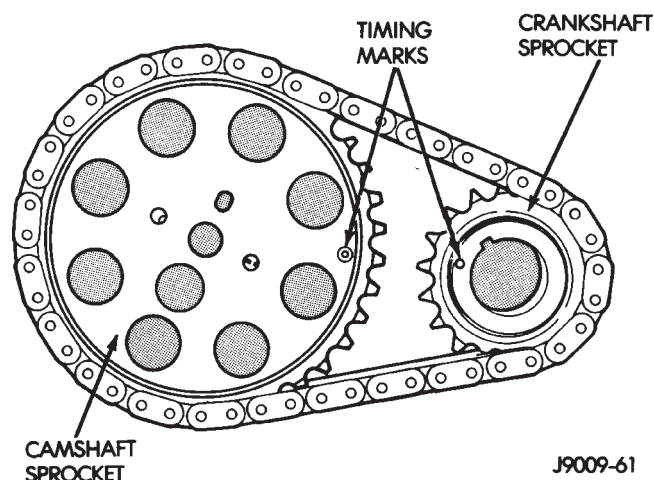


Fig. 6 Crankshaft/Camshaft Alignment—Typical

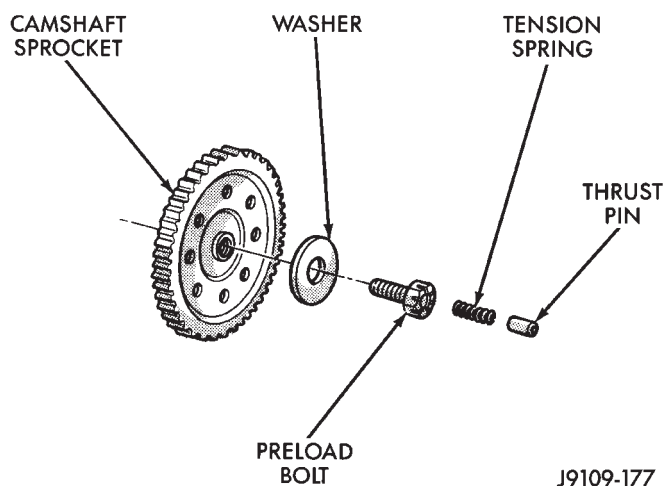


Fig. 7 Camshaft Sprocket Preload Bolt

mm (1/2 inch) replace it. The correct timing chain has 48 pins. A chain with more than 48 pins will cause excessive slack.

INSTALLATION

Assemble the timing chain, crankshaft sprocket and camshaft sprocket with the timing marks aligned (Fig. 6).

(1) Apply Mopar Silicone Rubber Adhesive Sealant to the keyway in the crankshaft and insert the key. With the key in the keyway on the crankshaft, install the assembly on the crankshaft and camshaft.

(2) Install the camshaft sprocket retaining preload bolt and washer (Fig. 7). Tighten the preload bolt to 108 N·m (80 ft. lbs.) torque.

(3) To verify correct installation of the timing chain, turn the crankshaft to position the camshaft sprocket timing mark as shown in Fig. 8. Count the number of chain pins between the timing marks of both sprockets. There must be 15 pins.

(4) Install the crankshaft oil slinger.

(5) Replace the oil seal in the timing case cover.

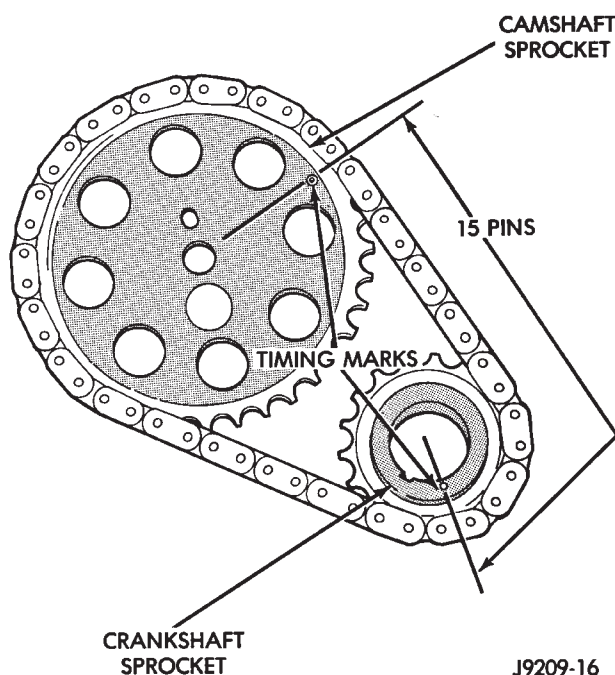


Fig. 8 Verify Sprocket/Chain Installation—Typical

(6) Lubricate the tension spring, thrust pin and pin bore in the preload bolt with Mopar Engine Oil Supplement, or equivalent. Install the spring and thrust pin in the preload bolt head (Fig. 6).

(7) Install the timing case cover and gasket.

(8) With the key installed in the crankshaft keyway, install the vibration damper, washer and bolt. Lubricate and tighten the bolt to 108 N·m (80 ft. lbs.) torque.

(9) Install the serpentine drive belt and tighten to the specified tension (refer to Group 7, Cooling System for the proper procedure).

(10) Install the fan and hub (or Tempatrol fan) assembly. Install the shroud.

(11) Connect negative cable to battery.

CAMSHAFT

REMOVAL

WARNING: THE COOLANT IN A RECENTLY OPERATED ENGINE IS HOT AND PRESSURIZED. RELEASE THE PRESSURE BEFORE REMOVING THE DRAIN COCK, CAP AND DRAIN PLUGS.

(1) Disconnect negative cable from battery.

(2) Drain the cooling system. DO NOT waste reusable coolant. If the solution is clean, drain it into a clean container for reuse.

(3) Remove the radiator or radiator/condenser, if equipped with A/C (refer to Group 7, Cooling System for the proper procedure).

(4) Remove the air conditioner condenser and receiver/drier assembly as a charged unit, if equipped (refer to Group 24, Heating and Air Conditioning).

MAIN BEARING FITTING CHART

Crankshaft Journals #1 - #6		Corresponding Crankshaft Bearing Insert	
Color Code	Diameter	Upper Insert Size	Lower Insert Size
Yellow	63.5025-63.4898 mm (2.5001-2.4996 in.)	Yellow - Standard	Yellow - Standard
Orange	63.4898-63.4771 mm (2.4996-2.4991 in.) 0.0127 mm (0.0005 in.) Undersize	Blue - Undersize 0.025 mm (0.001 in.)	Yellow - Standard
Blue	63.4771-63.4644 mm (2.4991-2.4986 in.) 0.0254 mm (0.001 in.) Undersize	Blue - Undersize 0.025 mm (0.001 in.)	Blue - Undersize 0.025 mm (0.001 in.)
Green	63.4644-63.4517 mm (2.4986-2.4981 in.) 0.0381 mm (0.0015 in.) Undersize	Blue - Undersize 0.025 mm (0.001 in.)	Green - Undersize 0.051 mm (0.002 in.)
Red	63.2485-63.2358 mm (2.4901-2.4896 in.) 0.254 mm (0.010 in.) Undersize	Red - Undersize 0.254 mm (0.010 in.)	Red - Undersize 0.254 mm (0.010 in.)

Crankshaft Journals #7 Only		Corresponding Crankshaft Bearing Insert	
Color Code	Diameter	Upper Insert Size	Lower Insert Size
Yellow	63.4873-63.4746 mm (2.4995-2.4990 in.)	Yellow - Standard	Yellow - Standard
Orange	63.4746-63.4619 mm (2.4990-2.4985 in.) 0.0127 mm (0.0005 in.) Undersize	Blue - Undersize 0.025 mm (0.001 in.)	Yellow - Standard
Blue	63.4619-63.4492 mm (2.4985-2.4980 in.) 0.0254 mm (0.001 in.) Undersize	Blue - Undersize 0.025 mm (0.001 in.)	Blue - Undersize 0.025 mm (0.001 in.)
Green	63.4492-63.4365 mm (2.4980-2.4975 in.) 0.0381 mm (0.0015 in.) Undersize	Blue - Undersize 0.025 mm (0.001 in.)	Green - Undersize 0.051 mm (0.002 in.)
Red	63.2333-63.2206 mm (2.4895-2.4890 in.) 0.254 mm (0.010 in.) Undersize	Red - Undersize 0.254 mm (0.010 in.)	Red - Undersize 0.254 mm (0.010 in.)

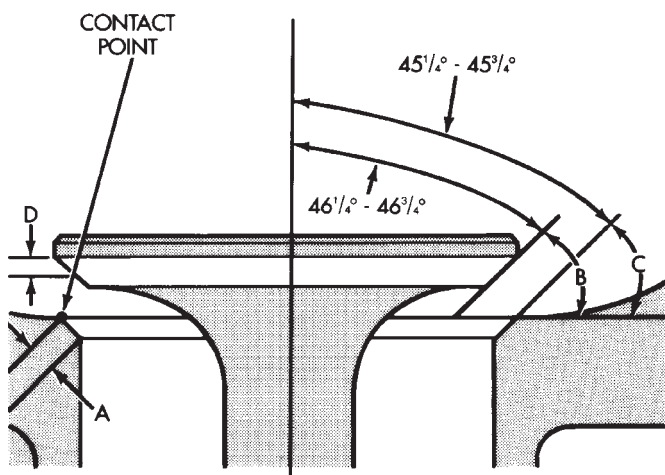
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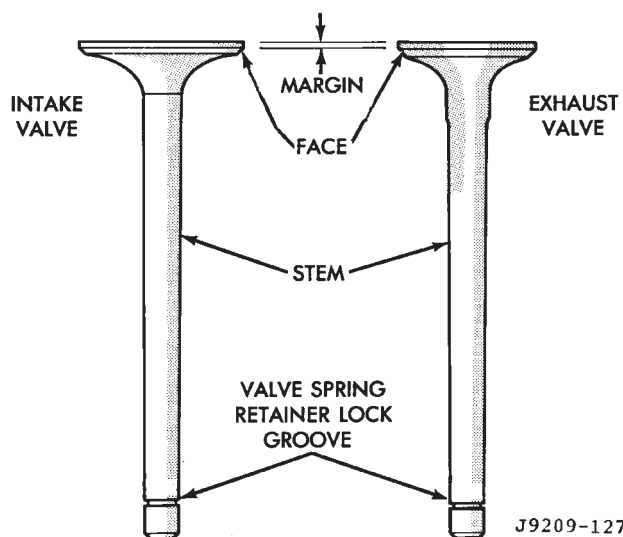
- A - SEAT WIDTH - INTAKE 1.016 - 1.524 mm (0.040 - 0.060 in.)
 EXHAUST 1.524 - 2.032 mm (0.060 - 0.080 in.)
 B - FACE ANGLE (INTAKE & EXHAUST) 43 1/4° - 43 3/4°
 C - SEAT ANGLE (INTAKE & EXHAUST) 44 1/4° - 44 3/4°
 D - CONTACT SURFACE

J9309-95

Fig. 12 Valve Face and Seat Angles

VALVES

Inspect the remaining margin after the valves are refaced (Fig. 13). Valves with less than 1.190 mm (0.047 inch) margin should be discarded.



J9209-127

Fig. 13 Intake and Exhaust Valves

VALVE SEATS

CAUTION: DO NOT un-shroud valves during valve seat refacing (Fig. 14).

(1) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(2) Measure the concentricity of valve seat using a dial indicator. Total runout should not exceed 0.051 mm (0.002 inch) total indicator reading.

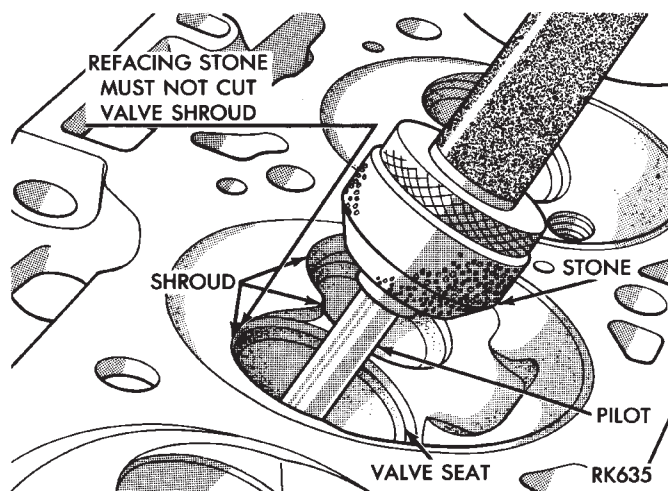


Fig. 14 Refacing Valve Seats

(3) Inspect the valve seat with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat **LIGHTLY** with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to the top edge of valve face, lower valve seat with a 15° stone. If the blue is transferred to bottom edge of valve face raise valve seat with a 60° stone.

(4) When seat is properly positioned the width of intake seats should be 1.016-1.524 mm (0.040-0.060 inch). The width of the exhaust seats should be 1.524-2.032 mm (0.060-0.080 inch).

VALVE SPRING INSPECTION

Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested. As an example the compression length of the spring to be tested is 1-5/16 inch. Turn table of Valve Spring Tester Tool C-647 (Fig. 15) until surface is in line with the 1-5/16 inch mark on the threaded stud. Be sure the zero mark is to the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by 2. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to specifications to obtain specified height and allowable tensions. Discard the springs that do not meet specifications.

INSTALLATION

(1) Coat valve stems with lubrication oil and insert them in cylinder head.

(2) If valves or seats are reground, check valve stem height. If valve is too long, replace cylinder head.

(3) Install new seals on all valve guides. Install valve springs and valve retainers.

(4) Compress valve springs with Valve Spring Compressor Tool MD-998772A, install locks and re-

(1) Remove oil pressure sending unit from back of block.

(2) Insert a 3.175 mm (1/8 inch) finish wire or equivalent into passage.

(3) Plug should be 190.0 to 195.2 mm (7-1/2 to 7-11/16 inches) from machined surface of block (Fig. 6). If plug is too high, use a suitable flat dowel drift to position properly.

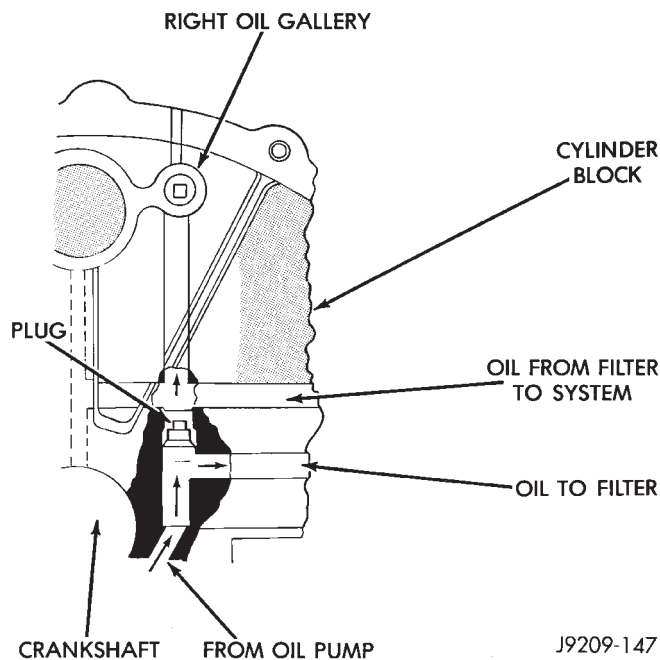


Fig. 6 Oil Line Plug

(4) If plug is off location, remove oil pan and rear main bearing cap. Use suitable flat dowel to remove plug. Coat outside diameter of new plug with Mopar (Stud and Bearing Mount Adhesive), or equivalent. Plug should be 54.0 to 57.7 mm (2-1/8 to 2-5/16 inches) from bottom of the block.

(5) Assemble engine and check oil pressure.

ENGINE CORE, OIL AND CAMSHAFT PLUGS

Engine core plugs have been pressed into the oil galleries behind the camshaft thrust plate (Fig. 7). This will reduce internal leakage and help maintain higher oil pressure at idle.

REMOVAL

(1) Using a blunt tool such as a drift or a screwdriver and a hammer, strike the bottom edge of the cup plug (Fig. 8).

(2) With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 8).

CLEANING

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer.

Make certain the new plug is cleaned of all oil or grease.

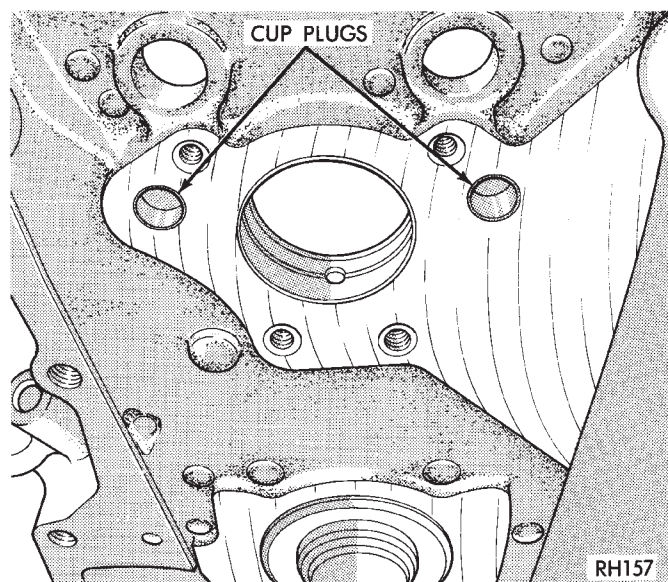


Fig. 7 Location of Cup Plugs in Oil Galleries

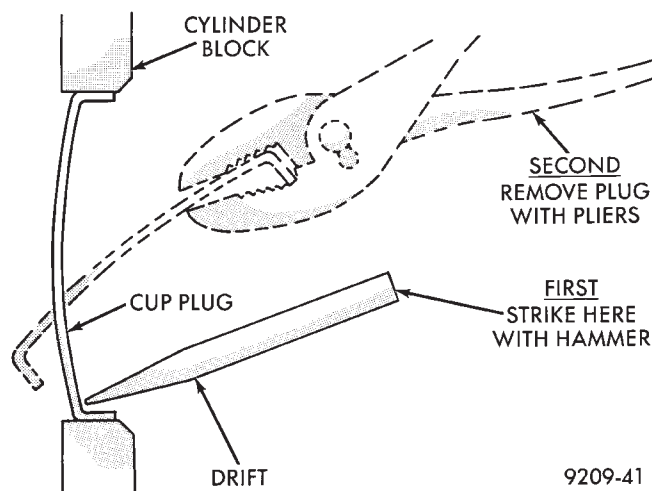


Fig. 8 Core Hole Plug Removal

INSTALLATION

(1) Coat edges of plug and core hole with Mopar Gasket Maker, or equivalent.

CAUTION: DO NOT drive cup plug into the casting as restricted coolant flow can result and cause serious engine problems.

(2) Using proper drive plug, drive plug into hole. The sharp edge of the plug should be at least 0.50 mm (0.020 inch) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be filled and the vehicle placed in service immediately.

ASSEMBLE

- (1) Install the piston/connecting rod assembly.
- (2) Install the oil pan.
- (3) Install the cylinder head.
- (4) Install the engine into the vehicle.

CLEANING

Clean mating surfaces on cylinder head and manifold, wash with solvent and blow dry with compressed air. Inspect manifold for cracks.

INSPECTION

Inspect mating surfaces of manifold for flatness with a straight edge. Seal surfaces must be flat within 0.1 mm (0.004 inch) overall.

INSTALLATION

CAUTION: If the studs came out with the nuts when removing the exhaust manifold, install new studs.

(1) Position the exhaust manifolds on the two studs located on the cylinder head. Install conical washers and nuts on these studs (Fig. 13).

(2) Install new bolt and washer assemblies in the remaining holes (Fig. 13). Start at the center arm and work outward. Tighten the bolts and nuts to 27 N·m (20 ft. lbs.) torque.

(3) Raise the vehicle.

(4) Assemble the exhaust pipe to the exhaust manifold and secure with bolts, nuts and washers. Tighten these nuts to 31 N·m (23 ft. lbs.) torque.

(5) Lower the vehicle.

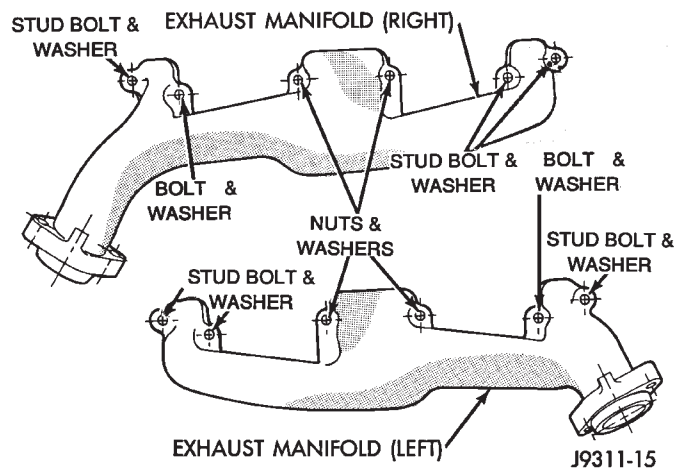


Fig. 13 Exhaust Manifold

(6) Install the EGR tube (refer to Group 25, Emission Control Systems).

CAUTION: The exhaust manifold heat shields **MUST** be installed to protect the underhood components.

(7) Install the exhaust manifold heat shields. Tighten the nuts to 27 N·m (20 ft. lbs.) torque.

(8) Connect the negative cable to the battery.

(3) Connect Fuel Line Pressure Test Adapter Tool number 6631 (3/8 in.) into the disconnected fuel supply line. Insert the other end of tool 6631 into an approved gasoline container.

(4) To activate the fuel pump and pressurize the system, obtain the DRB scan tool. Refer to the appropriate Powertrain Diagnostic Procedures service manual for DRB operation.

(5) A good fuel pump will deliver at least 1 liter of fuel per minute.

FUEL PRESSURE LEAK DOWN TEST

ENGINE OFF

Abnormally long periods of cranking to restart a hot engine that has been shut down for a short period of time may be caused by:

- Fuel pressure bleeding past the fuel pressure regulator.
- Fuel pressure bleeding past the check valve in the outlet end of the fuel tank mounted fuel pump.

(1) Remove protective cap at fuel rail test port (Figs. 14 or 15). With the engine off, connect an accurate 0-689 kPa (0-100 psi) fuel gauge to the pressure test port fitting on the fuel rail. The fitting on the pressure tester must be in good condition and free of any leaks before performing this test.

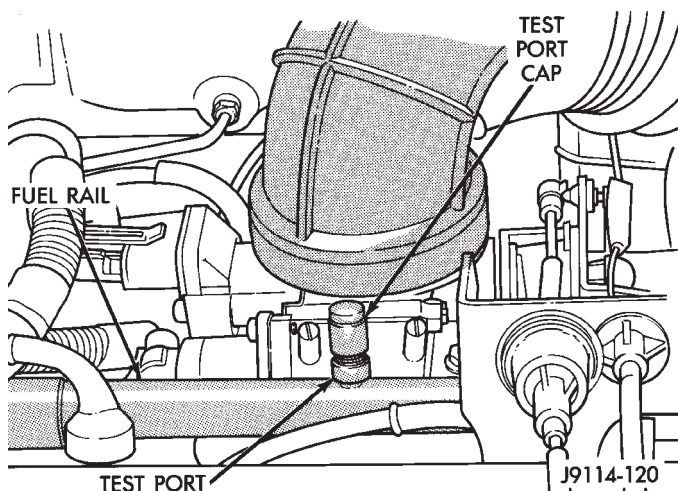


Fig. 11 Fuel Pressure Test Port—4.0L Engine

(2) Start the vehicle and let engine idle. Check fuel pressure reading on gauge. Fuel pressure should be within specifications. Refer to the previous Fuel System Pressure Tests.

(3) Shut engine off. Observe and record fuel pressure reading on gauge. Leave fuel pressure gauge connected. Allow engine to set for 30 minutes and then compare the fuel pressure reading on the gauge with the reading taken when engine was shut down. A pressure drop of up to 138 kPa (20 psi) within 30 minutes is within specifications.

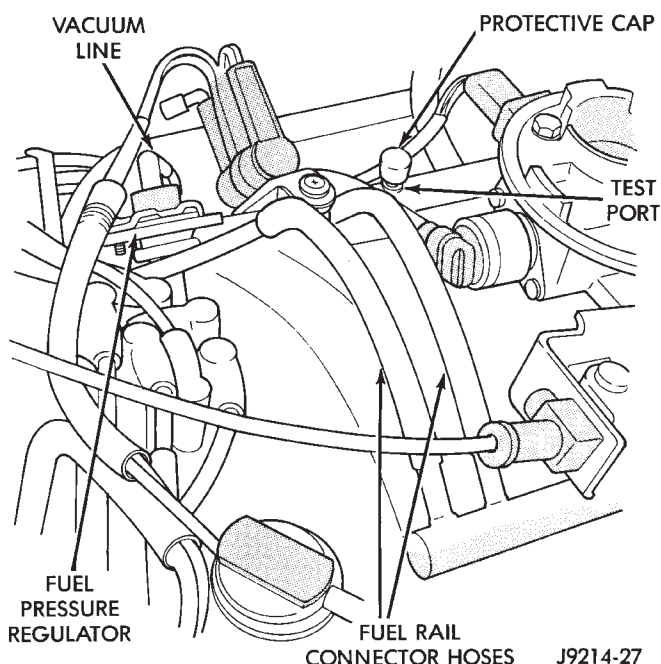


Fig. 12 Fuel Pressure Test Port—5.2L Engine

(4) If the fuel pressure drop is within specifications, the fuel pump outlet check valve and fuel pressure regulator are both operating normally.

(5) If fuel pressure drop is greater than 138 kPa (20 psi), it must be determined if this drop is being caused by (in-tank mounted) fuel pump outlet check valve or fuel pressure regulator. Proceed to next step.

(6) Release the fuel system pressure from fuel system. Refer to the previous Fuel Pressure Release Procedure in this group.

(7) 4.0L Engine: Disconnect both fuel lines at fuel rail near fuel pressure regulator. 5.2L Engine: Fuel rail connections are made below vehicle at fuel lines to the rear of vehicle. Raise the vehicle. Disconnect both fuel line quick-connect fittings at both fuel lines. Refer to Quick-Connect Fittings in this group for procedures.

(8) Connect Fuel Line Pressure Test Adapter Tool number 6631 (3/8 in.) between the disconnected fuel supply line and fuel rail (Fig. 16).

(9) Connect Fuel Line Pressure Test Adapter Tool number 6539 (5/16 in.) between the disconnected fuel return line and fuel rail (Fig. 16).

(10) Start engine. Observe and record fuel system pressure.

(11) Shut engine off.

(12) Clamp off the rubber hose portion of adapter tool number 6539 connected to the fuel return line. Allow engine to set for 30 minutes. If pressure has dropped more than 138 kPa (20 psi) in 30 minutes, pressure is bleeding past the (in-tank mounted) fuel pump outlet check valve. Replace Fuel Pump Module assembly. Refer to Fuel Pump Module removal and

ENGINE COOLANT TEMPERATURE SENSOR—PCM INPUT

The coolant temperature sensor is installed in the thermostat housing (Fig. 7) and protrudes into the water jacket. The sensor provides an input voltage to the powertrain control module (PCM) relating coolant temperature. The PCM uses this input along with inputs from other sensors to determine injector pulse width and ignition timing. As coolant temperature varies, the coolant temperature sensor's resistance changes. The change in resistance results in a different input voltage to the PCM.

When the engine is cold, the PCM will operate in Open Loop cycle. It will demand slightly richer air-fuel mixtures and higher idle speeds. This is done until normal operating temperatures are reached.

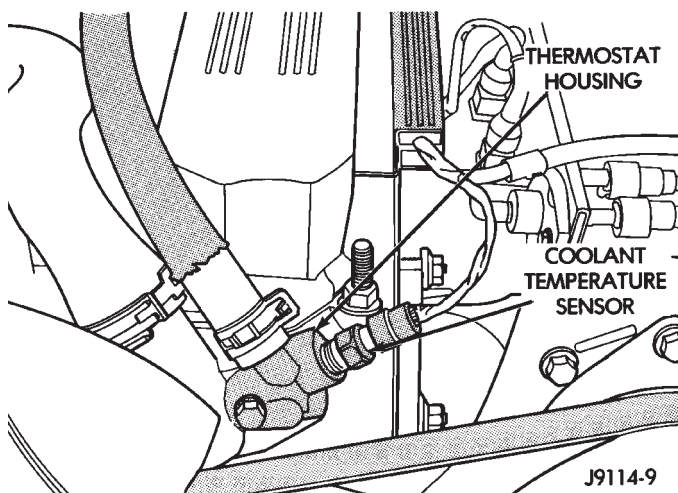


Fig. 7 Coolant Temperature Sensor

IGNITION CIRCUIT SENSE—PCM INPUT

The ignition circuit sense input tells the powertrain control module (PCM) the ignition switch has energized the ignition circuit. Refer to the wiring diagrams for circuit information.

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR—PCM INPUT

The MAP sensor reacts to absolute pressure in the intake manifold. It provides an input voltage to the powertrain control module (PCM). As engine load changes, manifold pressure varies. The change in manifold pressure causes MAP sensor voltage to change. The change in MAP sensor voltage results in a different input voltage to the PCM. The input voltage level supplies the PCM with information about ambient barometric pressure during engine start-up (cranking) and engine load while the engine is running. The PCM uses this input along with inputs from other sensors to adjust air-fuel mixture.

The MAP sensor is mounted on the dash panel (Fig. 8). The sensor is connected to the throttle body with a vacuum hose and to the PCM electrically.

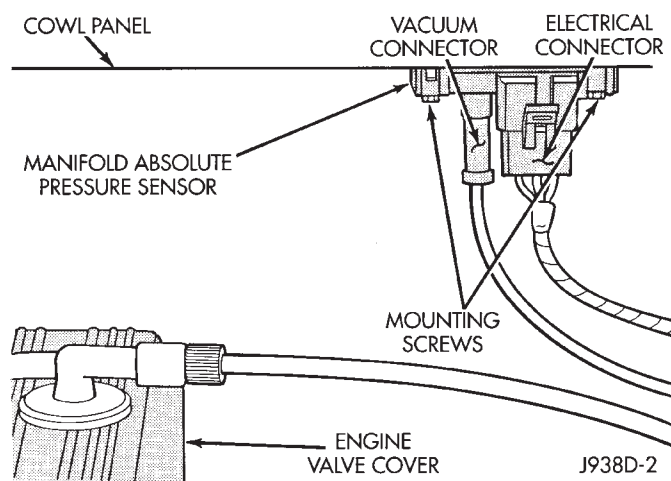


Fig. 8 Manifold Absolute Pressure (MAP) Sensor

OXYGEN (O2S) SENSOR—PCM INPUT

The O2S sensor is located in the exhaust down pipe (Fig. 9). It provides an input voltage to the powertrain control module (PCM) relating the oxygen content of the exhaust gas. The PCM uses this information to fine tune the air-fuel ratio by adjusting injector pulse width.

The O2S sensor produces voltages from 0 to 1 volt. This voltage will depend upon the oxygen content of the exhaust gas in the exhaust manifold. When a large amount of oxygen is present (caused by a lean air-fuel mixture), the sensor produces a low voltage. When there is a lesser amount present (rich air-fuel mixture) it produces a higher voltage. By monitoring the oxygen content and converting it to electrical voltage, the sensor acts as a rich-lean switch.

The oxygen sensor is equipped with a heating element that keeps the sensor at proper operating temperature during all operating modes. Maintaining correct sensor temperature at all times allows the system to enter into closed loop operation sooner.

In Closed Loop operation, the powertrain control module (PCM) monitors the O2S sensor input (along with other inputs). It then adjusts the injector pulse width accordingly. During Open Loop operation, the PCM ignores the O2S sensor input and adjusts injector pulse width to a preprogrammed value (based on other sensor inputs).

OVERDRIVE/OVERRIDE SWITCH

On vehicles equipped with overdrive, the powertrain control module (PCM) regulates the 3-4 overdrive up-shift and down-shift through the overdrive solenoid.

Refer to Group 21 for more information.

PARK/NEUTRAL SWITCH—PCM INPUT

The park/neutral switch is located on the transmission housing and provides an input to the powertrain control module (PCM). This will indicate that the au-

CAUTION: When testing, do not remove the electrical connector from MAP sensor (Fig. 19). Be sure that the MAP sensor harness wires are not damaged by the test meter probes.

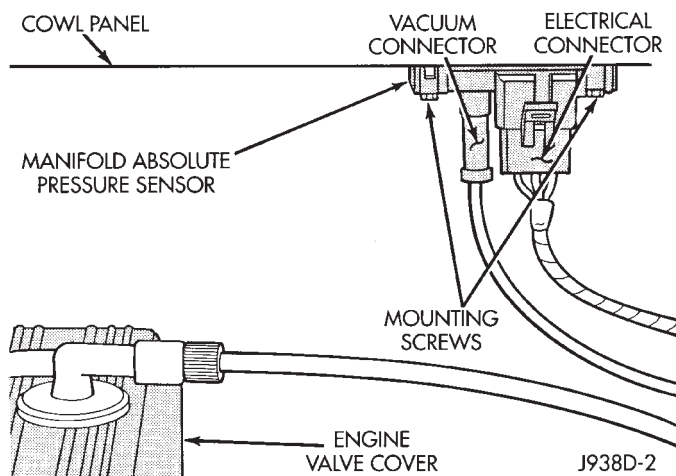
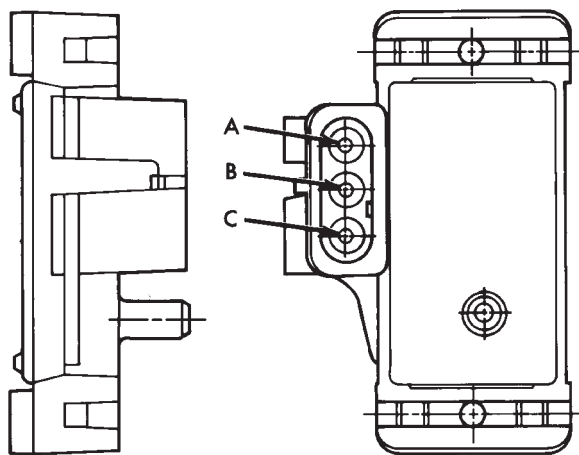


Fig. 19 MAP Sensor Location

Test the MAP sensor output voltage at the MAP sensor connector between terminals A and B (as marked on the sensor body) (Fig. 20). With the ignition switch ON and the engine OFF, output voltage should be 4-to-5 volts. The voltage should drop to 1.5-to-2.1 volts with a neutral-hot idle speed condition.



A. Ground
B. Output Voltage
C. 5 Volts

Fig. 20 MAP Sensor Connector Terminals—Typical

Test powertrain control module (PCM) (terminal 5) for the same voltage described above to verify the wire harness condition. Repair as necessary.

Test MAP sensor supply voltage at sensor connector between terminals A and C (Fig. 20) with the ignition ON and engine OFF. The voltage should be approximately 5 volts ($\pm 0.5V$). Five volts ($\pm 0.5V$)

should also be at terminal 6 of the PCM wire harness connector. Repair or replace the wire harness as necessary.

Test the MAP sensor ground circuit at sensor connector terminal A (Fig. 20) and PCM connector terminal 4. Repair the wire harness if necessary.

Test the MAP sensor ground circuit at the PCM connector between terminal 4 and terminal 11 with an ohmmeter. If the ohmmeter indicates an open circuit, inspect for a defective sensor ground connection. Refer to Group 8W, Wiring for location of engine grounds. If the ground connection is good, replace the PCM. If terminal 4 has a short circuit to 12 volts, correct this condition before replacing the PCM.

CRANKSHAFT POSITION SENSOR TEST

Refer to Group 8D, Ignition Systems for test procedures.

THROTTLE POSITION SENSOR (TPS) TEST

The throttle position sensor (TPS) can be tested with a digital voltmeter. The center terminal of the TPS is the output terminal (Fig. 21).

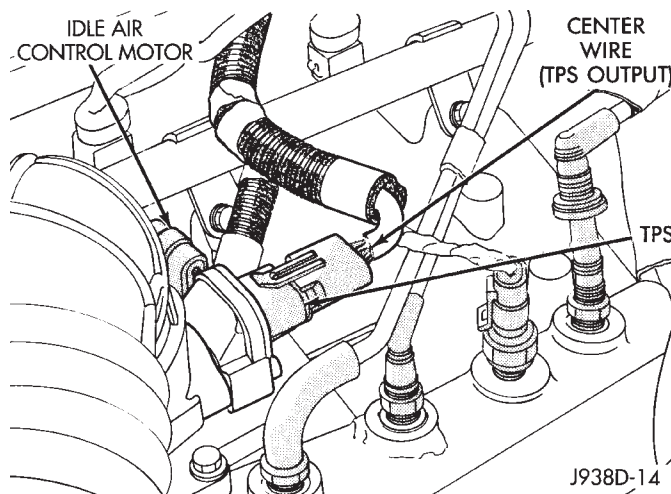


Fig. 21 Throttle Position Sensor (TPS) Testing—Typical

With the ignition key in the ON position, back-probe the TPS connector. Check the TPS output voltage at the center terminal wire of the connector. Check this at idle (throttle plate closed) and at wide open throttle (WOT). At idle, TPS output voltage should be greater than 200 millivolts. At wide open throttle, TPS output voltage must be less than 4.8 volts. The output voltage should increase gradually as the throttle plate is slowly opened from idle to WOT.

VEHICLE SPEED SENSOR TEST

To perform a complete test of the sensor and its circuitry, refer to DRB scan tool and appropriate Powertrain Diagnostics Procedures manual.

(4) Disconnect accelerator cable, throttle cable (automatic transmission) and speed control cable (if equipped) from throttle arm (Fig. 13).

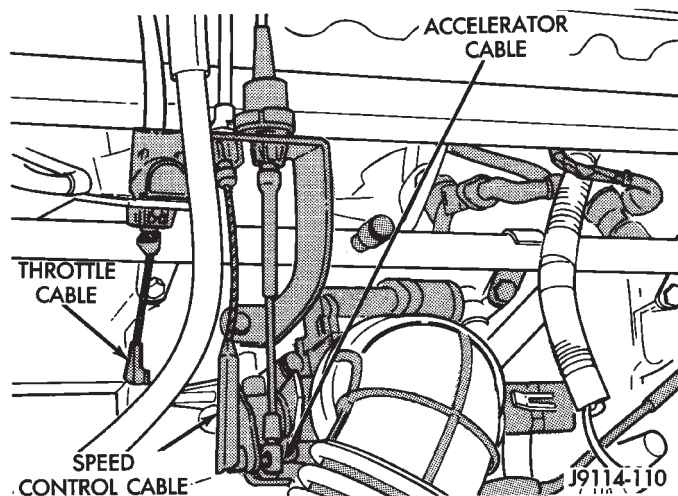


Fig. 13 Accelerator, Throttle and Speed Control Cables

(5) Remove throttle body mounting bolts, throttle body and gasket. Discard old gasket (Fig. 14).

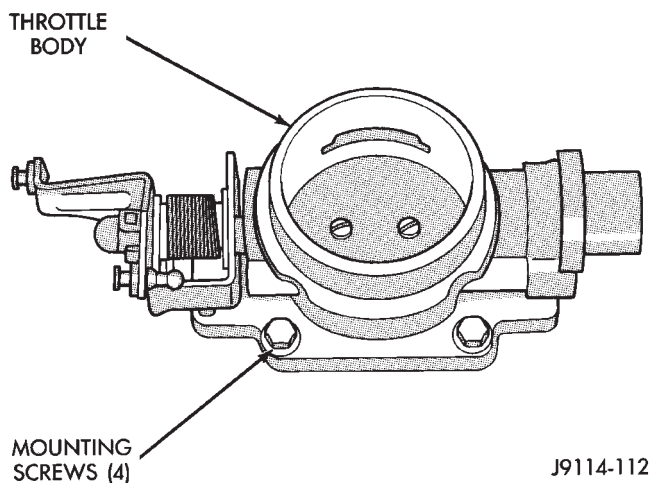


Fig. 14 Throttle Body—Removal/Installation

INSTALLATION

(1) Install throttle body and new gasket. Tighten throttle body mounting bolts to 12 N·m (9 ft. lbs.) torque.

(2) Connect idle air control motor and throttle position sensor wire connectors.

(3) Connect throttle linkage to throttle arm.

CAUTION: When the automatic transmission throttle cable is connected, it **MUST** be adjusted.

(4) If equipped with an automatic transmission, connect and adjust the transmission line pressure cable. Refer to Group 21, Transmissions for adjustment procedure.

(5) Install air cleaner hose to throttle body.

(6) Connect negative battery cable to battery.

THROTTLE POSITION SENSOR (TPS)

REMOVAL

- (1) Disconnect TPS electrical connector.
- (2) Remove TPS mounting bolts.
- (3) Remove TPS.

INSTALLATION

The throttle shaft end of the throttle body slides into a socket in the TPS (Fig. 15). The TPS must be installed so that it can be rotated a few degrees. (If the sensor will not rotate, install the sensor with the throttle shaft on the other side of the socket tangs). The TPS will be under slight tension when rotated.

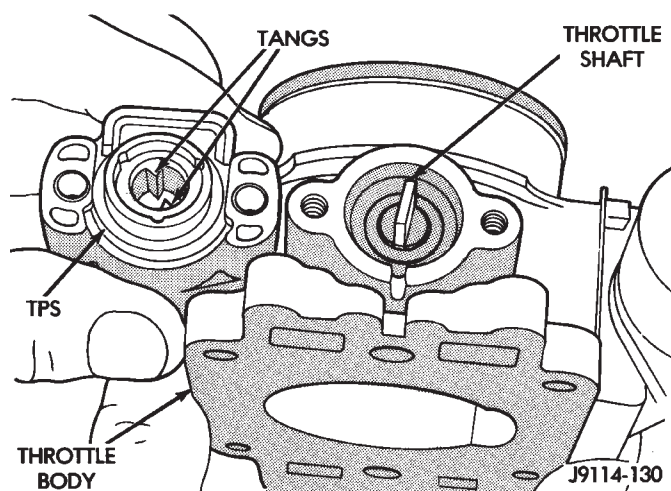


Fig. 15 Throttle Position Sensor—Installation

- (1) Install the TPS and retaining bolts.
- (2) Connect TPS electrical connector to TPS.
- (3) Manually operate the throttle (by hand) to check for any TPS binding before starting the engine.

The regulator is calibrated to maintain fuel system pressure at approximately 214 kPa (31 psi). This is with vacuum applied while the engine is at idle. Fuel pressure will be 55-69 kPa (8-10 psi) higher if vacuum is not applied to the regulator.

The pressure regulator contains a diaphragm, calibrated spring and a fuel return valve. Fuel pressure operates on one side of the regulator, while spring pressure and intake manifold vacuum operate on the other side. Spring pressure on one side of the diaphragm tries to force the return valve closed. Fuel pressure on other side of diaphragm, with assistance from manifold vacuum on spring side of diaphragm, act against spring pressure to open the return valve. System fuel pressure is the amount of fuel pressure required to force against spring pressure and unseat the return valve.

Without vacuum applied to the spring side of the regulator, the spring is calibrated to open the fuel re-

turn outlet. This happens when the pressure differential between the fuel injectors and the intake manifold reaches approximately 269 kPa (39 psi). Since manifold vacuum varies with engine operating conditions, the amount of vacuum applied to the spring side of the diaphragm varies. For this reason, fuel pressure varies, depending upon intake manifold vacuum. With low vacuum, such as during wide open throttle conditions, minimal vacuum assistance is available. Full spring pressure is exerted to seal the fuel outlet. This causes the system pressure to increase. With high vacuum, such as at engine idle or during vehicle deceleration, fuel pressure on one side of the diaphragm is balanced by intake manifold pressure. This is done on the spring side of the diaphragm and results in lower system fuel pressure.

It is possible that a DTC for a monitored circuit may not be entered into memory even though a malfunction has occurred. This may happen because one of the DTC criteria for the circuit has not been met. Example: assume that one of the criteria for the MAP sensor circuit is that the engine must be operating between 750 and 2000 rpm to be monitored for a DTC. If the MAP sensor output circuit shorts to ground when the engine rpm is above 2400 rpm, a 0 volt input will be seen by the PCM. A DTC will not be entered into memory because the condition does not occur within the specified rpm range.

A DTC indicates that the powertrain control module (PCM) has recognized an abnormal signal in a circuit or the system. A DTC may indicate the result of a failure, but never identify the failed component directly.

There are several operating conditions that the PCM does not monitor and set a DTC for. Refer to the following Monitored Circuits and Non-Monitored Circuits in this section.

MONITORED CIRCUITS

The powertrain control module (PCM) can detect certain problems in the fuel injection system.

Open or Shorted Circuit - The PCM can determine if sensor output (which is the input to PCM) is within proper range. It also determines if the circuit is open or shorted.

Output Device Current Flow - The PCM senses whether the output devices are hooked up.

If there is a problem with the circuit, the PCM senses whether the circuit is open, shorted to ground (-), or shorted to (+) voltage.

Oxygen Sensor - The PCM can determine if the oxygen sensor is switching between rich and lean. This is, once the system has entered Closed Loop. Refer to Open Loop/Closed Loop Modes Of Operation in the Component Description/System Operation section for an explanation of Closed (or Open) Loop operation.

NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems or conditions that could have malfunctions that result in driveability problems. A Diagnostic Trouble Code (DTC) may not be displayed for these conditions.

Fuel Pressure: Fuel pressure is controlled by the vacuum assisted fuel pressure regulator. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line fuel filter, or a pinched fuel supply or return line. However, these could result in a rich or lean condition causing an oxygen sensor DTC to be stored in the PCM.

Secondary Ignition Circuit: The PCM cannot detect an inoperative ignition coil, fouled or worn spark plugs, ignition cross firing, or open circuited spark plug cables.

Engine Timing: The PCM cannot detect an incorrectly indexed timing chain, camshaft sprocket or crankshaft sprocket. The PCM also cannot detect an incorrectly indexed distributor. However, these could result in a rich or lean condition causing an oxygen sensor DTC to be stored in the PCM.

Cylinder Compression: The PCM cannot detect uneven, low, or high engine cylinder compression.

Exhaust System: The PCM cannot detect a plugged, restricted or leaking exhaust system.

Fuel Injector Malfunctions: The PCM cannot determine if the fuel injector is clogged, or the wrong injector is installed. However, these could result in a rich or lean condition causing an oxygen sensor DTC to be stored in the PCM.

Excessive Oil Consumption: Although the PCM monitors exhaust stream oxygen content through oxygen sensor (closed loop), it cannot determine excessive oil consumption.

Throttle Body Air Flow: The PCM cannot detect a clogged or restricted air cleaner inlet or air filter element.

Evaporative System: The PCM will not detect a restricted, plugged or loaded EVAP canister.

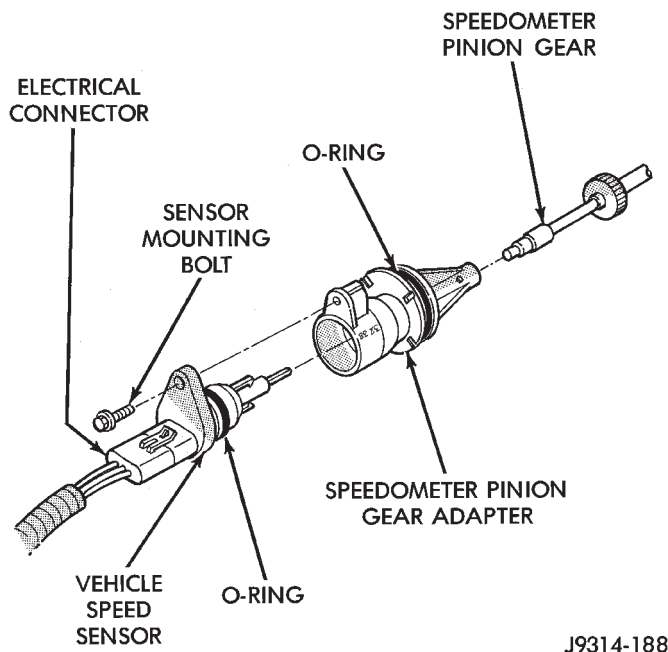
Vacuum Assist: Leaks or restrictions in the vacuum circuits of vacuum assisted engine control system devices are not monitored by the PCM. However, a vacuum leak at the MAP sensor will be monitored and a diagnostic trouble code (DTC) will be generated by the PCM.

Powertrain Control Module (PCM) System Ground: The PCM cannot determine a poor system ground. However, a DTC may be generated as a result of this condition.

Powertrain Control Module (PCM) Connector Engagement: The PCM cannot determine spread or damaged connector pins. However, a DTC may be generated as a result of this condition.

HIGH AND LOW LIMITS

The powertrain control module (PCM) compares input signal voltages from each input device. It will establish high and low limits that are programmed into it for that device. If the input voltage is not within specifications and other Diagnostic Trouble Code (DTC) criteria are met, a DTC will be stored in memory. Other DTC criteria might include engine rpm limits or input voltages from other sensors or switches. The other inputs might have to be sensed by the PCM when it senses a high or low input voltage from the control system device in question.



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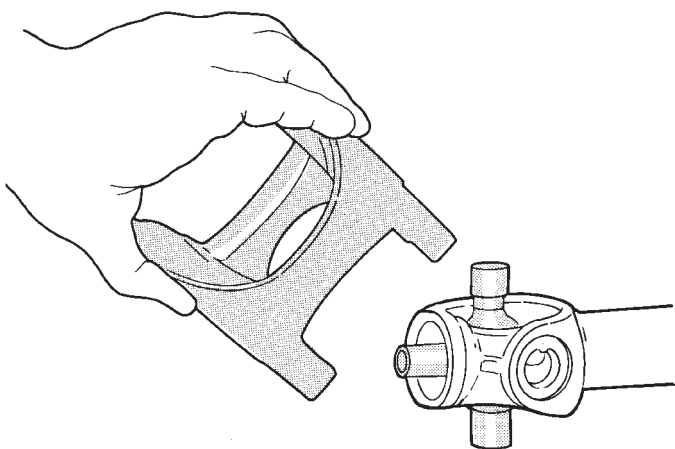
verify speed sensor is fully seated (mounted flush) to speedometer pinion gear adapter.

(3) Tighten sensor mounting bolt to 2.2 N·m (20 in. lbs.) torque.

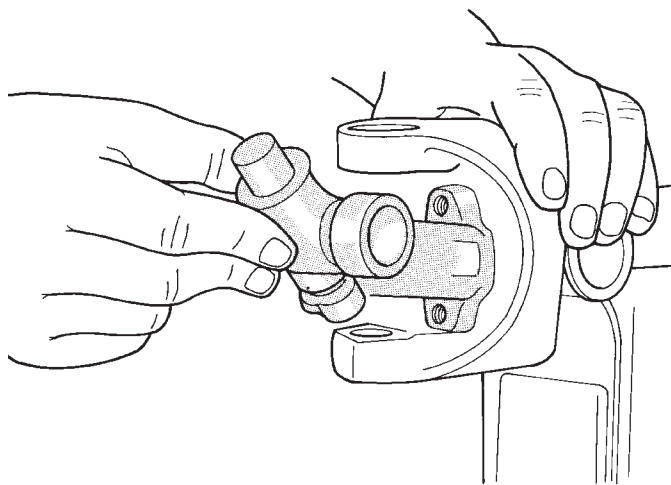
(4) Connect electrical connector to sensor.

Fig. 26 Sensor Removal/Installation—Typical

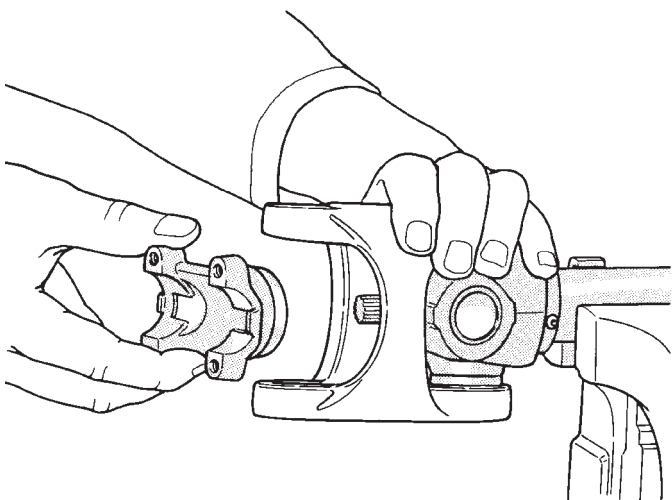
(2) Install sensor into speedometer gear adapter and install mounting bolt. **Before tightening bolt,**



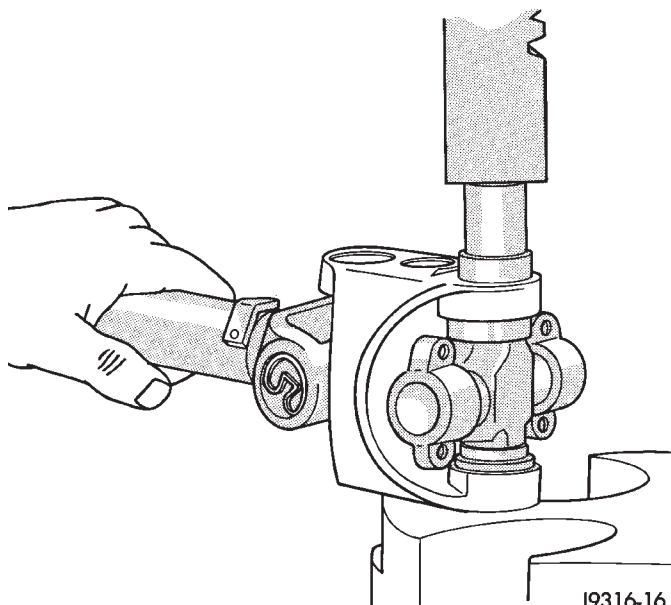
J9316-13

Fig. 15 Install Center Yoke

J9316-15

Fig. 17 Install Remaining Cross

J9316-14

Fig. 16 Install Centering Kit

J9316-16

Fig. 18 Press In Bearing Assembly

(7) Place two bearing assemblies on the remaining cross (opposite sides). Fit the open trunnions into the center yoke holes and the bearing assemblies into the centering kit (Fig. 17). Align the lube fitting on the cross with the other two lube fittings.

(8) Press the remaining two bearing assemblies into place and install snap rings (Fig. 18).

(9) Tap the snap rings to allow them to seat into the grooves (Fig. 19).

(10) Check for proper assembly. Flex the CV joint beyond center, it should snap over-center in both directions when correctly assembled (Fig. 20).

(11) Add grease to all three lube fittings.

(12) Install the propeller shaft. Refer to Propeller Shaft Replacement in this Group.

STEERING LINKAGE

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SERVICE INFORMATION

The steering linkage consists of a pitman arm, drag link, tie rod, and steering dampener. Adjustment sleeves are used on the tie rod and drag link for toe and steering wheel alignment.

Refer to Group 2, Front Suspension and Axle for additional information.

The tie rod end ball stud seals should be inspected during all oil changes.

A damaged ball stud seal requires removal of the seal. Inspect the tie rod end ball stud at the throat opening. Check for lubricant loss, contamination, ball stud wear or corrosion. If these conditions exist, replace the tie rod. A replacement seal can be installed if lubricant is in good condition. Otherwise, a complete replacement ball stud end should be installed. Lubricate the tie rod end with MOPAR® Multi-Mileage Lubricant, or equivalent product.

Use a Puller tool for tie rod removal. Failure to use this tool could damage the ball stud and seal (Fig. 1).

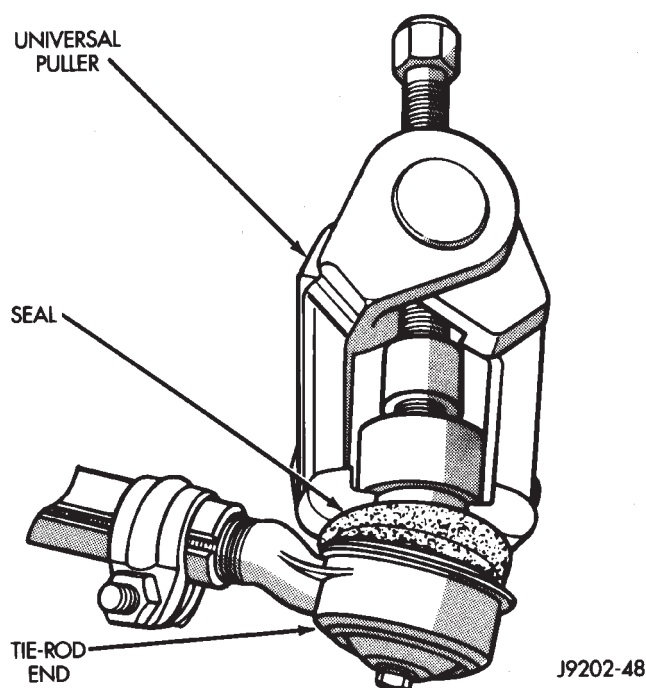


Fig. 1 Ball Stud Removal

TIE ROD

REMOVAL

(1) Remove the cotter pins and nuts at the steering knuckle and drag link (Fig. 2).

(2) Loosen the ball studs with a puller tool to remove the tie rod.

(3) If necessary, loosen the end clamp bolts and remove the tie rod ends from the tube.

INSTALLATION

(1) If necessary, install the tie rod ends in the tube (Fig. 2). Position the tie rod clamp as shown (Fig. 3). Tighten to 27 N·m (20 ft. lbs.) torque.

(2) Install the tie rod on the drag link and steering knuckle. Install the retaining nuts.

(3) Tighten the ball stud nut on the steering knuckle to 74 N·m (55 ft. lbs.) torque. Tighten the ball stud nut to drag link to 75 N·m (55 ft. lbs.) torque. Install new cotter pins.

DRAG LINK

REMOVAL

(1) Remove the cotter pins and nuts at the steering knuckle and drag link (Fig. 2).

(2) Remove the steering dampener ball stud from the drag link with a puller tool.

(3) Remove the drag link from the steering knuckle with a puller tool. Remove the same for tie rod and pitman arm.

(4) If necessary, loosen the end clamp bolts and remove the tie rod end from the link.

INSTALLATION

(1) Install the drag link adjustment sleeve and tie rod end. Position clamp bolts as shown (Fig. 3).

(2) Position the drag link at the steering linkage (Fig. 2).

Install the drag link to the steering knuckle nut. Do the same for the tie rod and pitman arm.

(3) Tighten the nut at the steering knuckle to 74 N·m (55 ft. lbs.) torque. Tighten the pitman and tie rod ball stud nuts to 74 N·m (55 ft. lbs.) torque. Install new cotter pins.

(4) Install the steering dampener onto the drag link. Tighten the nut to 74 N·m (55 ft. lbs.) torque. Install a new cotter pin.

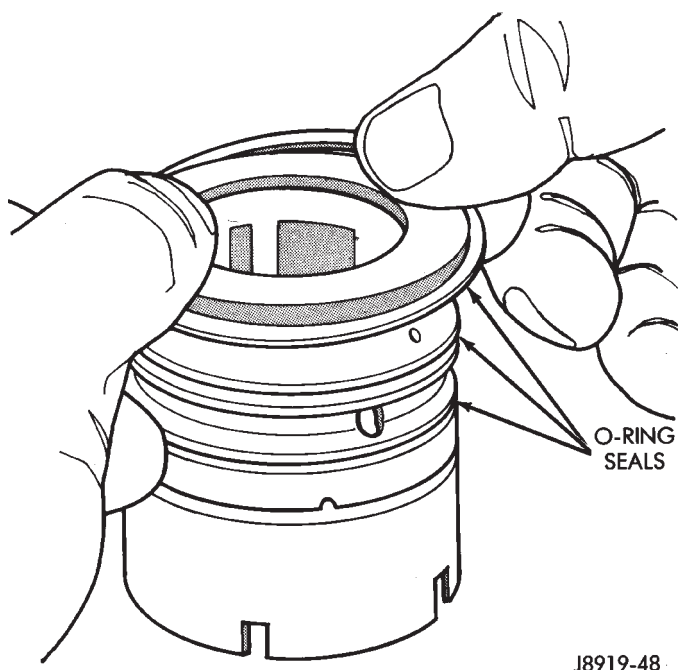


Fig. 27 Remove and Install Valve Seals

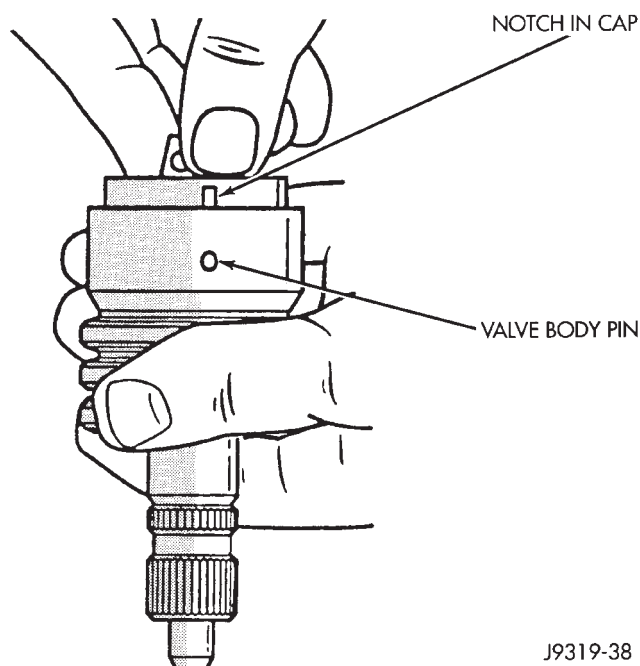


Fig. 28 Stub Shaft Installation

(7) Install stub shaft and valve assembly to worm shaft, fitting on worm shaft to slot in the valve assembly.

(8) Adjust Thrust Bearing Preload Adjustment and Over-Center Adjustment. Refer to Steering Gear Adjustments in this section.

INSTALL

(1) Install steering gear. Refer to Power Steering Gear Replacement in this section.

RACK PISTON AND WORM SHAFT REPLACEMENT

REMOVE

(1) Remove steering gear from vehicle. Refer to Power Steering Gear Replacement in this section.

DISASSEMBLE

(1) Remove pitman shaft and side cover. Refer to Side Cover and Pitman Shaft Replacement in this section.

(2) Remove housing plug end. Refer to Housing End Plug Replacement in this section.

(3) Turn stub shaft **COUNTERCLOCKWISE** until the rack piston begins to come out of the housing.

(4) Remove rack piston plug (Fig. 29).

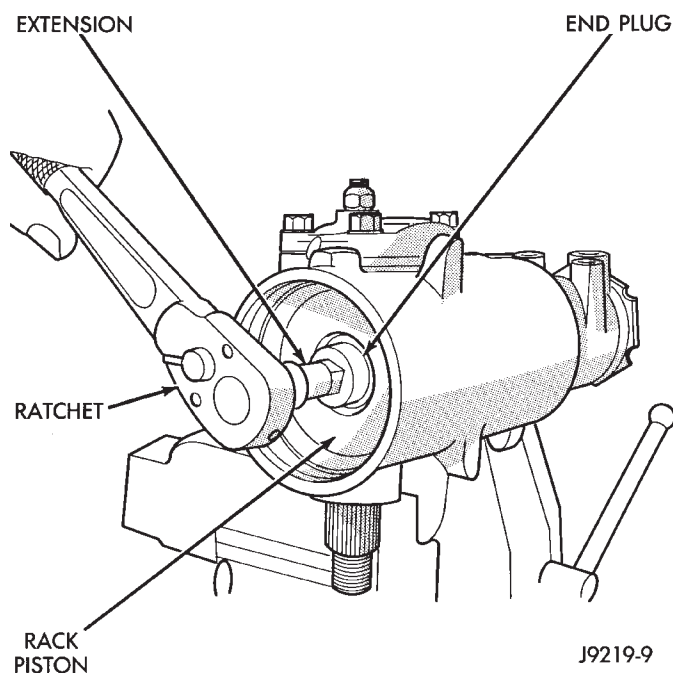


Fig. 29 Remove and Install Rack Piston End Plug

(5) Insert Arbor C-4175 (J-21552) into bore of rack piston (Fig. 30). Hold tool tightly against worm shaft while turning the stub shaft **COUNTERCLOCKWISE**.

• The rack piston will be forced onto the tool and hold the rack piston balls in place.

(6) Remove the rack piston, rack balls, and tool together from housing.

(7) Remove valve. Refer to Valve Replacement in this section.

(8) Remove worm shaft.

(9) Remove thrust bearing and races.

(10) Remove tool from rack piston.

(11) Remove rack piston balls.

(12) Remove screws, clamp and ball guide.

(13) Remove teflon ring and O-ring seal (Fig. 31).

TRANSMISSION AND TRANSFER CASE

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AX 15 MANUAL TRANSMISSION

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GENERAL INFORMATION

The AX 15 is a five speed, synchromesh, manual transmission. Fifth gear is an overdrive range with a ratio of 0.79:1. The shift mechanism is integral and mounted in the shift tower portion of the adapter housing (Fig. 1). The AX 15 is used with 3.9L (V6) and 4.0L (I6) engines.

TRANSMISSION IDENTIFICATION

The AX 15 identification code numbers are on the bottom surface of the transmission gear case (Fig. 2).

The first number represents year of manufacture. For example, 4 would represent 1994. The second and third numbers indicate month of manufacture. For example, 11 would represent November. The last series of numbers is the transmission serial number.

TRANSMISSION SHIFT PATTERN

The AX 15 shift pattern is shown in Figure 3. First and second and third and fourth gear ranges are in an H pattern. Fifth and reverse gear ranges are also in line at the right of the H pattern (Fig. 3).

The AX 15 is equipped with a reverse lockout mechanism. The shift lever must be moved through the Neutral detent before making a shift to reverse.

TRANSMISSION LUBRICANT

Recommended lubricant for AX 15 transmissions is Mopar SAE 75W-90, API Grade GL-5 gear lubricant.

Correct lubricant refill or top-off level is to the bottom edge of the fill plug hole.

Lubricant capacity is approximately 3.10 liters (3.27 qts.).

TRANSMISSION SWITCH AND PLUG LOCATIONS

The fill plug is at the driver side of the gear case (Fig. 4).

The drain plug and backup light switch are on the passenger side of the gear case (Fig. 5).

TRANSMISSION GEAR RATIOS

AX 15 transmission gear ratios are:

- First gear - 3.83:1
- Second gear - 2.33:1
- Third gear - 1.44:1
- Fourth gear - 1.00:1
- Fifth gear - 0.79:1
- Reverse - 4.22:1

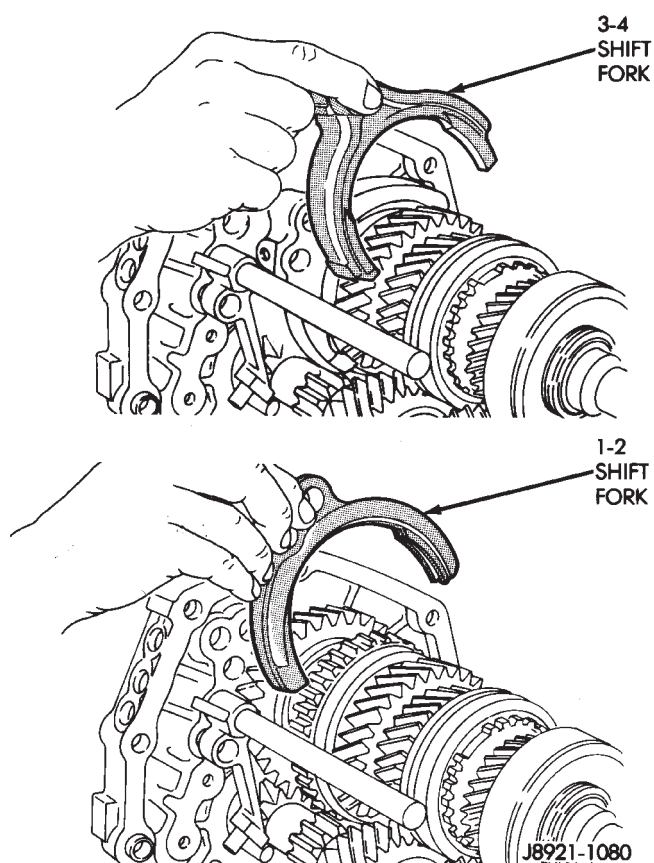


Fig. 50 Shift Fork Removal

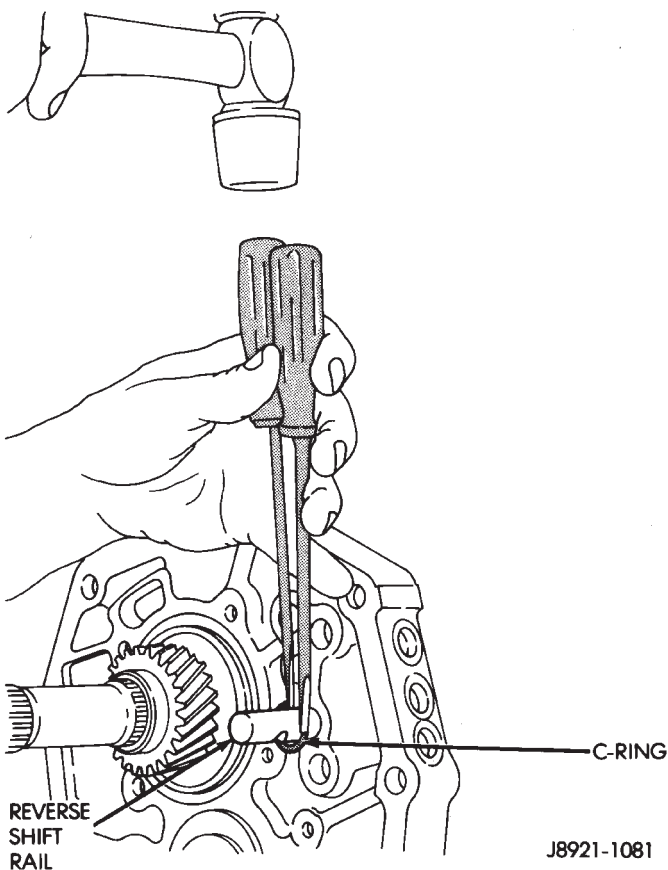


Fig. 51 Removing Reverse Shift Rail C-Ring

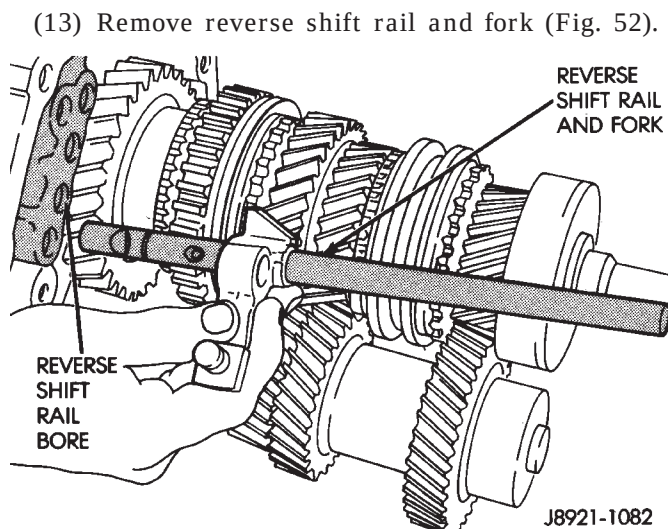


Fig. 52 Removing Reverse Shift Rail And Fork

(13) Remove reverse shift rail and fork (Fig. 52).
(14) Remove interlock pin from reverse shift rail (Fig. 53).

(15) Position shift rails, shift forks, lock balls, interlock plugs and interlock pins on the workbench in order of removal. This will help in identifying components during inspection and assembly.

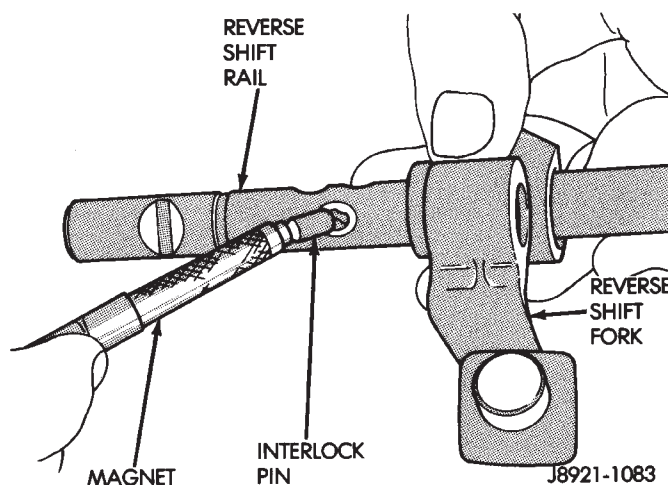


Fig. 53 Removing Reverse Shift Rail Interlock Pin

OUTPUT SHAFT AND CLUSTER GEAR REMOVAL

(1) Remove output shaft rear bearing snap ring (Fig. 54).

(2) Remove cluster gear rear bearing snap ring (Fig. 54).

(3) Tap end of output shaft with mallet to unseat and start rear bearing out of intermediate plate (Fig. 55).

(4) Remove output shaft by rocking it lightly until rear bearing comes out of intermediate plate (Fig. 56).

(5) Remove cluster gear by pulling it straight out of rear bearing (Fig. 57).

(12) Align screw holes in shift fork and rail and install set screw (Fig. 108). Tighten screw to 20 N·m (15 ft. lbs.) torque.

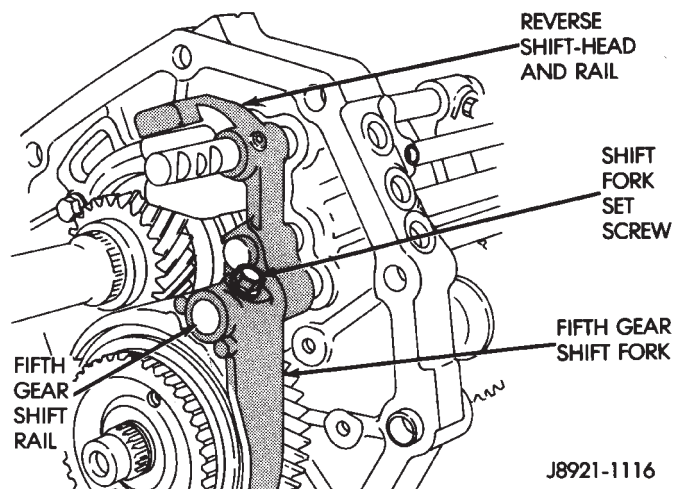


Fig. 108 Shift Fork Set Screw Installation

(13) Install lock balls and springs in intermediate plate (Fig. 109). Then install and tighten lock ball plugs to 19 N·m (14 ft. lbs.) torque.

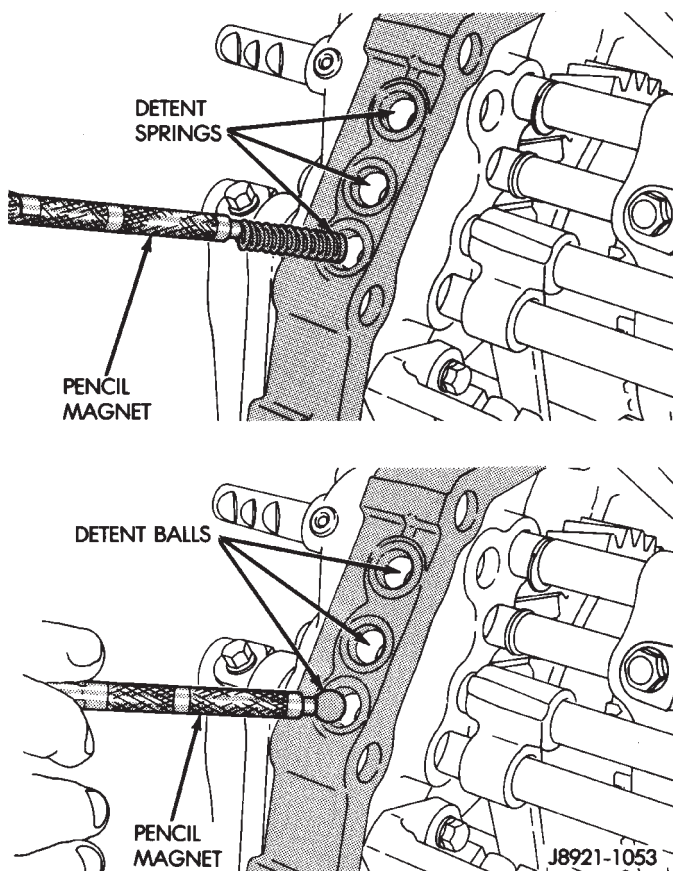


Fig. 109 Detent Ball And Spring Installation

(14) Install reverse shift arm bracket (Fig. 110). Tighten bracket bolts to 18 N·m (13 ft. lbs.) torque.

(15) Install reverse shift arm (Fig. 110). Position arm on reverse fork pin and engage it with pin on shift arm bracket.

(16) Verify that shift arm shoe is engaged in reverse idler gear. Then secure shift arm to pin on reverse fork with new E-clip.

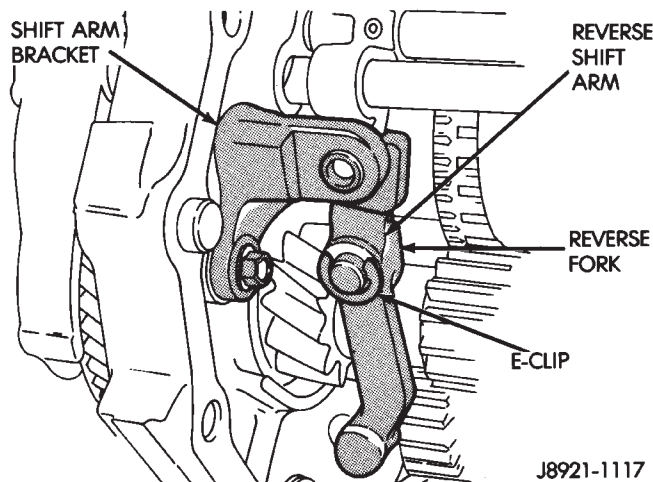


Fig. 110 Reverse Shift Arm And Bracket Installation

GEAR CASE AND ADAPTER INSTALLATION

(1) Dismount intermediate plate and gear assemblies from vise.

(2) Clean mating surfaces of intermediate plate and transmission gear case with wax and grease remover. Then wipe dry with a clean cloth.

(3) Apply 3 mm (1/8 in.) wide bead of Mopar Gasket Maker, or Loctite 518 to mating surface of gear case. Keep sealer bead inside bolt holes as shown (Fig. 111).

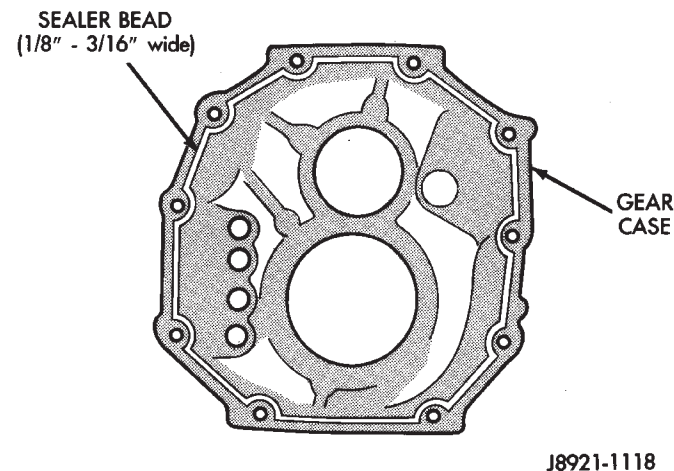


Fig. 111 Applying Sealer To Gear Case

(4) Install gear case (Fig. 112). Align shift rails and bearings in case and tap case into position.

(5) Verify that gear case is seated on intermediate plate dowel pins.

(6) Install front bearing snap rings (Fig. 113).

(4) Move transmission throttle lever from full forward to full rearward position and read pressure at both gauges.

(5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.

Test Three—Transmission In D Range

This test checks pressure regulation and condition of the clutch circuits. Use both pressure Test Gauges C-3292 and C-3293 for this test.

(1) Connect test gauges to accumulator and front servo ports (Fig. 3). Use either test gauge at the two ports.

(2) Start and run engine at 1600 rpm for this test.

(3) Move transmission gearshift lever two detents rearward from full forward position. This is D range.

(4) Read pressures on both gauges as transmission throttle lever is moved from full forward to full rearward position.

(5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase as lever is moved rearward.

(6) Front servo is pressurized only in D range and should be same as line pressure within 3 psi (21 kPa) up to downshift point.

Test Four—Transmission In Reverse

This test checks pump output, pressure regulation and the front clutch and rear servo circuits. Use 300 psi Test Gauge C-3293 for this test.

(1) Connect 300 psi gauge to rear servo port (Fig. 3).

(2) Start and run engine at 1600 rpm for test.

(3) Move transmission gearshift lever four detents rearward from full forward position. This is Reverse range.

(4) Move transmission throttle lever fully forward then fully rearward and note gauge readings.

(5) Pressure should be 145 - 175 psi (1000-1207 kPa) with lever forward and increase to 230 - 280 psi (1586-1931 kPa) as lever is moved rearward.

Test Five—Governor Pressure

This test checks governor operation by measuring governor pressure response to changes in vehicle speed. It is usually not necessary to check governor operation unless shift speeds are incorrect or if the transmission will not downshift. The test should be performed on a hoist that will allow the rear wheels to rotate freely.

(1) Connect 100 psi Test Gauge C-3292 to governor pressure port (Fig. 3).

(2) Move transmission gearshift lever to D range.

(3) Start and run engine at curb idle speed and

note pressure. At idle and with vehicle stopped, pressure should be zero to 1-1/2 psi maximum. If pressure exceeds this figure, a fault exists in the governor pressure control system.

(4) Slowly increase engine speed and observe speedometer and pressure test gauge. Governor pressure should increase in proportion to vehicle speed. Or approximately 1 psi for every 1 mph.

(5) Pressure rise should be smooth and drop back to 0 to 1-1/2 psi when wheels stop rotating.

(6) Compare results of pressure tests with analysis chart (Fig. 4).

Test Six—Transmission In Overdrive Fourth Gear

This test checks line pressure at the overdrive clutch in fourth gear range. Use 300 psi Test Gauge C-3292 for this test.

(1) Raise vehicle and connect test gauge to overdrive clutch pressure port (Fig. 4).

TEST CONDITION	INDICATION
Line pressure OK during any one test	Pump and regulator valve OK
Line Pressure OK in R but low in D, 2, 1	Leakage in rear clutch area (servo, clutch seals, governor support seal rings)
Pressure Low in D Fourth Gear Range	Overdrive clutch piston seal, or check ball problem
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area (servo, clutch seals, retainer bore, pump seal rings)
Pressure OK in 2 but low in R and 1	Leakage in rear servo
Front servo pressure low in 2	Leakage in servo; broken servo ring or cracked servo piston
Pressure low in all positions	Clogged filter, stuck regulator valve, worn or faulty pump, plugged fluid cooler
Governor pressure too high at idle speed	Governor pressure solenoid valve faulty
Governor pressure low at all mph figures	Faulty governor pressure solenoid, transmission control module, or governor pressure sensor
Lubrication/line pressure low at all throttle positions	Clogged fluid cooler or lines, seal rings leaking, output shaft plugged with debris, worn bushings in pump or clutch retainer

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Fig. 4 Pressure Test Analysis Chart

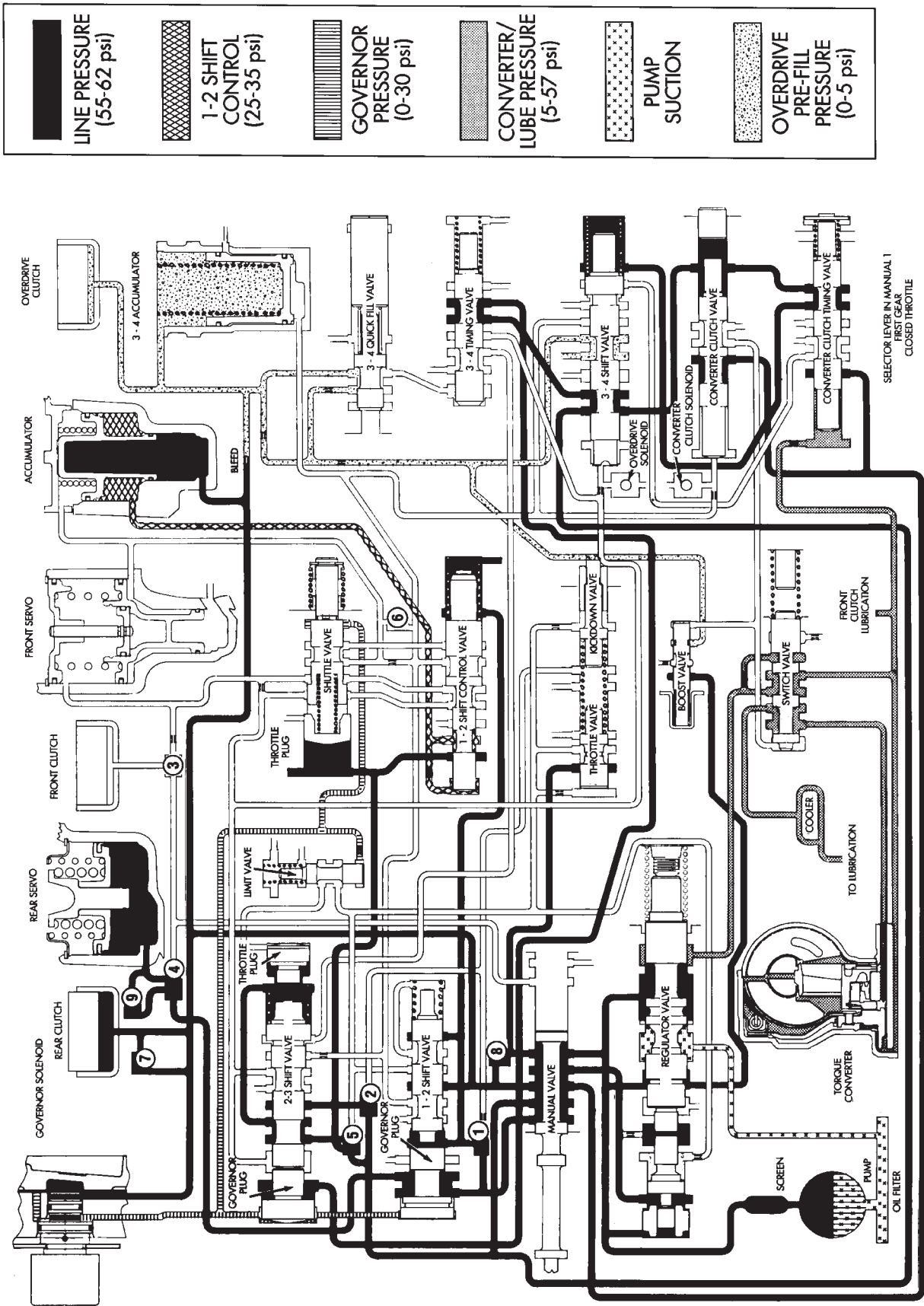
(2) Lower vehicle to enough to allow entry into drivers seat. Leave vehicle wheels approximately one foot off shop floor.

(3) Secure test gauge where it can be viewed from drivers seat.

OVERDRIVE DIAGNOSIS

Condition	Possible Cause	Correction
NO 3-4 UPSHIFT	1. Fourth gear overdrive switch (in dash) in OFF position 3. Fourth gear overdrive switch shorted, open, wires loose 4. Overdrive solenoid or circuit wire loose, shorted, open 5. Solenoid feed orifice in valve body is blocked or blown out 6. Fourth gear overdrive solenoid failure 7. Sensor or fluid temperature thermister fault 8. Overdrive piston seal failure 9. Wrong overdrive piston spacer 10. Low hydraulic pressure 11. Transmission fluid overheat (over 260 °F)	1. Turn control switch to ON position 3. Replace switch if shorted or open and repair loose or damaged wires 4. Check wires/connections with 12V test lamp and voltmeter; repair damaged or loose wires/connections as necessary 5. Remove, disassemble, clean valve body thoroughly 6. Verify solenoid failure with test lamp and replace solenoid 7. Test with DRB II scan tool or ohmmeter. Replace sensor or thermister as needed 8. Replace both seals 9. Remove unit, check end play, and install correct spacer 10. Pressure test transmission to determine cause 11. See overheat information in transmission diagnosis charts
SLIPS IN OVERDRIVE FOURTH GEAR	1. Low fluid level 2. Overdrive piston or seal malfunction 3. Overdrive clutch pack worn 4. 3-4 shift valve, timing valve, or accumulator malfunction 5. Overdrive piston retainer bleed orifice blown out 6. Overdrive unit thrust bearing failure	1. Add fluid and check for leaks 2. Remove overdrive unit; replace piston seals if worn; replace piston if damaged; if piston retainer is damaged, it will be necessary to remove and disassemble the transmission 3. Remove overdrive unit and rebuild clutch pack 4. Remove and overhaul valve body. Replace accumulator seals. Make sure all valves operate freely in bores and do not bind or stick. Make sure valve body screws are correctly tightened and separator plates are properly positioned. 5. Disassemble transmission, remove retainer, and replace orifice 6. Disassemble overdrive unit and replace thrust bearing (No. 1 thrust bearing is between overdrive piston and clutch hub; No. 2 thrust bearing is between the planetary gear and the direct clutch spring plate; No. 3 thrust bearing is between overrunning clutch hub and output shaft)

HYDRAULIC FLOW IN MANUAL LOW (1)



J9321-379

TRANSMISSION/OVERDRIVE REMOVAL AND INSTALLATION—42RE

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GENERAL INFORMATION

The overdrive unit can be removed for service without having to remove the entire transmission assembly. However if the transmission, torque converter, converter driveplate, or oil pump requires service, the complete transmission assembly must be removed for access to these components.

If only the overdrive unit must be removed, refer to the Overdrive Unit Removal/Installation procedures. If the complete transmission assembly must be removed, refer to the Transmission Removal/Installation procedures.

TRANSMISSION REMOVAL (2-WHEEL DRIVE)

- (1) Disconnect battery negative cable.
- (2) Raise vehicle on hoist.
- (3) Remove skid plate if equipped.
- (4) If transmission is being removed for repair, remove oil pan, drain fluid and reinstall pan on case.
- (5) Mark propeller shaft for installation reference. Then disconnect and remove propeller shaft.
- (6) Disconnect vehicle speed sensor wires, transmission solenoid wires and park/neutral position switch wires.
- (7) Disconnect wires from transmission speed sensor at rear of overdrive unit.
- (8) Remove exhaust system Y-pipe for working clearance.
- (9) Unclip wire harnesses from transmission clips.
- (10) Disconnect throttle valve and gearshift cables from levers on valve body manual shaft. Move cables aside and secure them to underbody.
- (11) Remove dust cover from transmission converter housing.
- (12) Disconnect and remove starter motor.
- (13) Remove bolts attaching converter to driveplate.
- (14) Disconnect cooler lines at transmission fittings. Refer to In-Vehicle Service section for procedures.
- (15) Support transmission with transmission jack.
- (16) Remove bolts/nuts attaching rear insulator to rear crossmember. Then remove rear crossmember.
- (17) Lower transmission for access to converter housing upper bolts and crankshaft position sensor.

- (18) Remove crankshaft position sensor. Retain sensor attaching screws.

CAUTION: The crankshaft position sensor can be damaged if the transmission is removed (or installed) with the sensor still bolted to the engine block. To avoid damage, remove the sensor before removing the transmission.

- (19) Remove transmission fill tube and tube O-ring seal.
- (20) Remove bolts attaching transmission to engine block.
- (21) Slide transmission away from engine and install C-clamp on converter housing to hold converter in place.
- (22) Lower transmission and move from under vehicle.
- (23) If transmission is to be serviced, remove it from jack and position it on bench.

TRANSMISSION REMOVAL (4-WHEEL DRIVE)

- (1) Raise vehicle on hoist.
- (2) Remove skid plate, if equipped.
- (3) Mark front and rear propeller shafts and U-joints for alignment reference (Fig. 1).
- (4) Disconnect and remove both propeller shafts.
- (5) Disconnect vehicle speed sensor and transmission output shaft speed sensor wires.
- (6) Disconnect electrical wires from clips on transmission and transfer case.
- (7) Disconnect transfer case shift linkage at transfer case range lever. Then remove linkage bracket bolts and remove linkage and bracket from transfer case. Move linkage aside for clearance.
- (8) Remove nuts attaching transfer case to overdrive unit gear case.
- (9) Remove transfer case. Support transfer case with transmission jack. Secure transfer case to jack with safety chains. Then move transfer case rearward and off transmission.
- (10) Remove transfer case from transmission jack and place transfer case on bench.
- (11) Support transmission with transmission jack.

(29) Lift front clutch off rear clutch (Fig. 19). Set clutch units aside for overhaul.

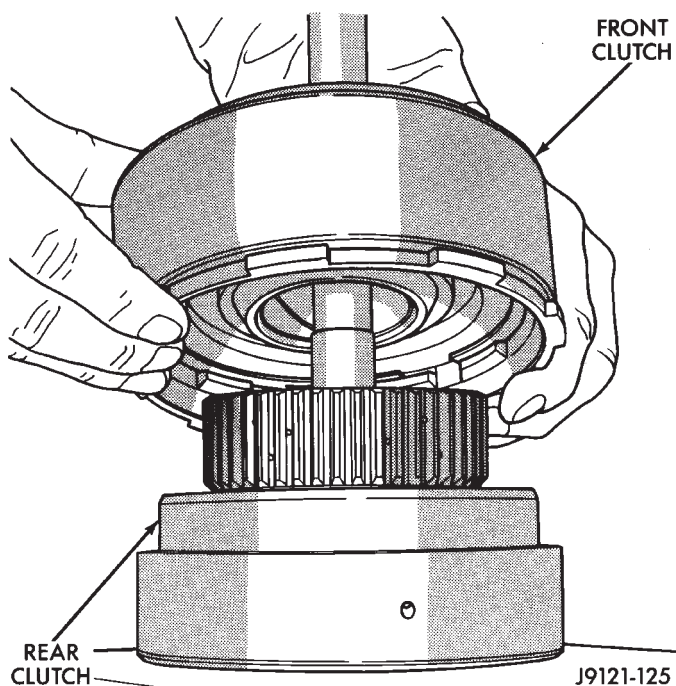


Fig. 19 Separating Front/Rear Clutch Assemblies

(30) Remove intermediate shaft thrust washer from front end of shaft or from rear clutch hub (Fig. 20).

(31) Remove output shaft thrust plate from intermediate shaft hub (Fig. 21).

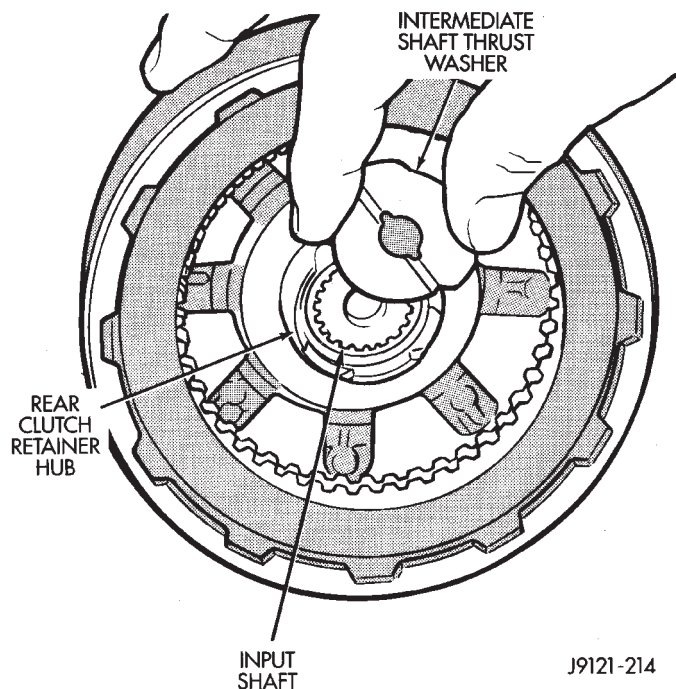


Fig. 20 Removing Intermediate Shaft Thrust Washer

(32) Slide front band off driving shell (Fig. 22) and remove band from case.

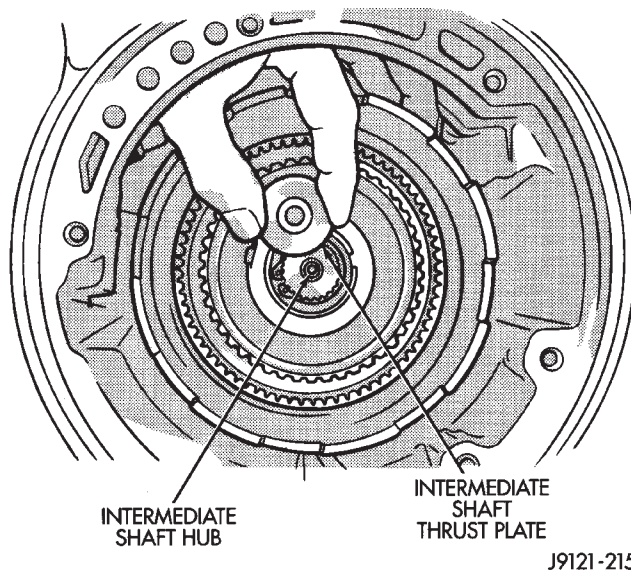


Fig. 21 Removing Intermediate Shaft Thrust Plate

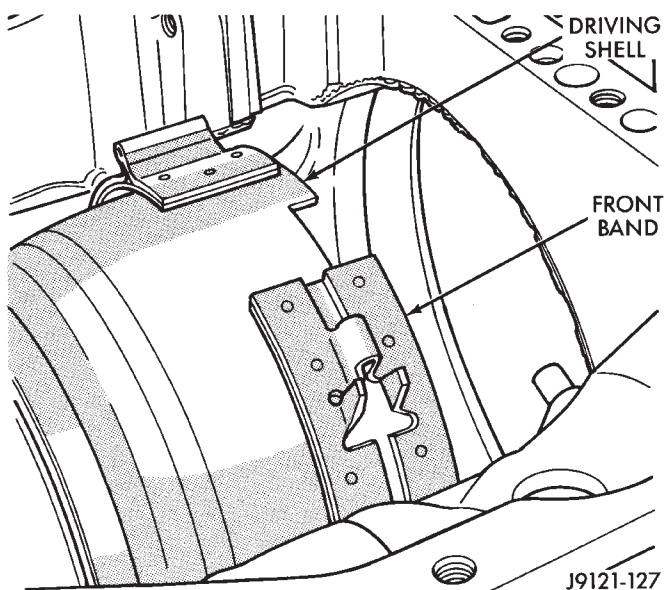


Fig. 22 Front Band Removal/Installation

(33) Remove planetary geartrain as assembly (Fig. 23). Support geartrain with both hands during removal. Do not allow machined surfaces on intermediate shaft or overdrive piston retainer to become nicked or scratched.

(34) Loosen rear band adjusting screw 4-5 turns.

(35) Remove low-reverse drum snap ring (Fig. 24).

(36) Remove bolts attaching overdrive piston retainer to rear of case (Fig. 25). Then remove piston retainer and gasket.

(37) Remove rear band pivot and reaction pins (Fig. 26). Use parallel jaw snap ring pliers to remove pins. Insert and spread plier jaws in pin bore to grip pin. Then twist and pull pins to remove them.

(38) Remove rear band lever.

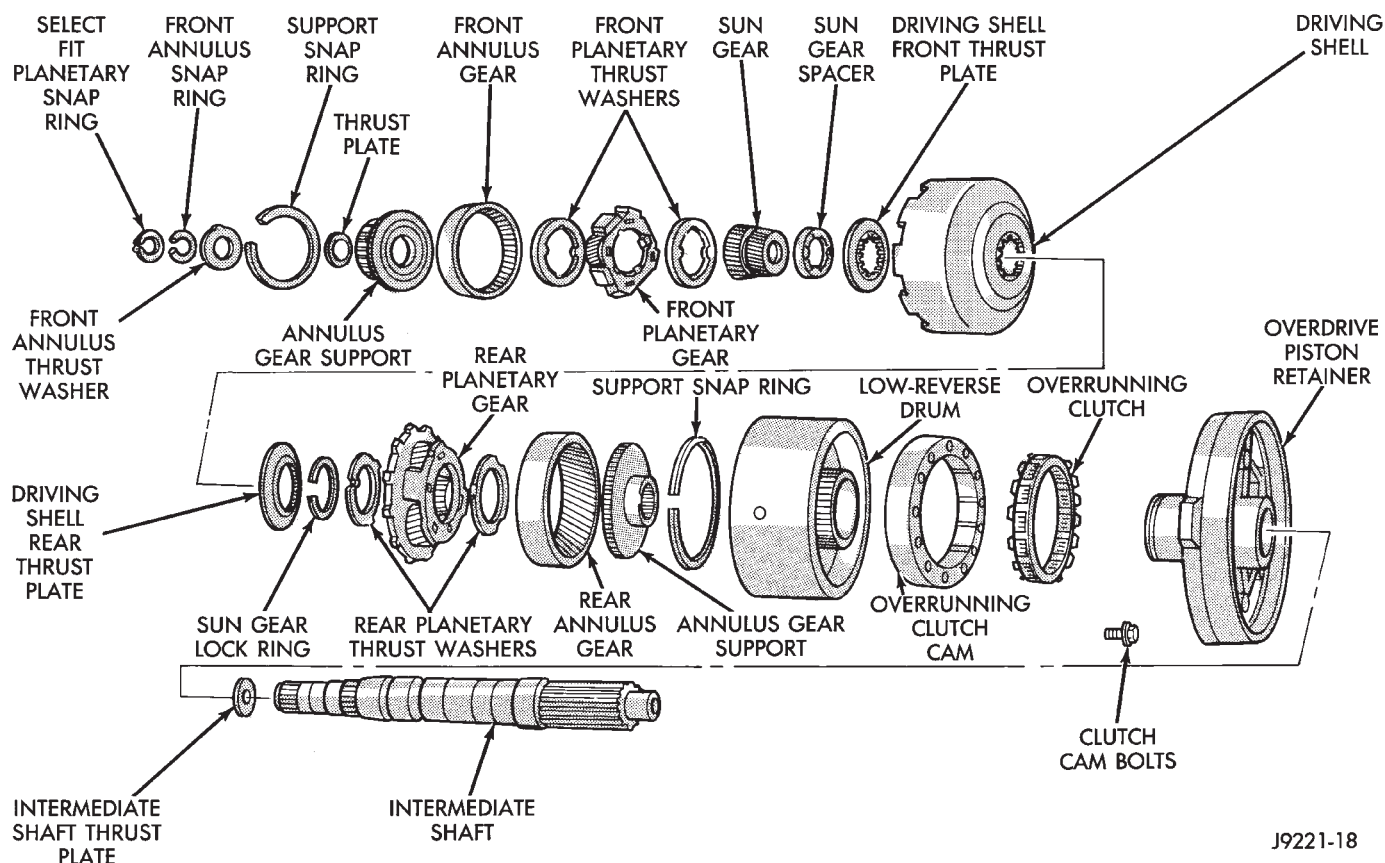


Fig. 69 Transmission Planetary Gear Train

Inspect the geartrain spacers, thrust plates, snap rings, and thrust washers. Replace any part that is worn or damaged. Do not attempt to reuse these parts.

Inspect the intermediate shaft carefully. Pay particular attention to the machined bushing/bearing surfaces on the shaft.

Replace the intermediate shaft if any machined surfaces are scored, pitted, or damaged in any way. Also replace the shaft if the splines are damaged, or exhibits cracks at any location. Be sure the select spacer groove on the shaft is in good condition. Trial fit the spacer if necessary.

PLANETARY GEARTRAIN ASSEMBLY

(1) Lubricate intermediate shaft and planetary components with transmission fluid. Use petroleum jelly to lubricate and hold thrust washers and plates in position.

(2) Assemble rear annulus gear and support if disassembled. Be sure support snap ring is seated and that shoulder side of support faces rearward.

(3) Install rear thrust washer on rear planetary gear (Fig. 70). Use enough petroleum jelly to hold washer in place. Also be sure washer tabs are properly engaged in gear slots.

(4) Install rear annulus over and onto rear planetary gear (Fig. 70).

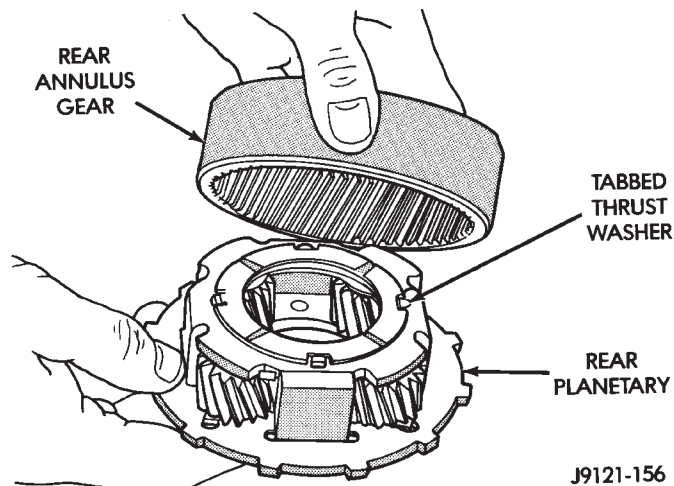


Fig. 70 Assembling Rear Annulus And Planetary Gear

(5) Install assembled rear planetary and annulus gear on intermediate shaft (Fig. 71). Verify that assembly is fully seated on shaft.

(6) Install front thrust washer on rear planetary gear (Fig. 72). Use enough petroleum jelly to hold washer on gear.

(7) Install spacer on sun gear (Fig. 73).

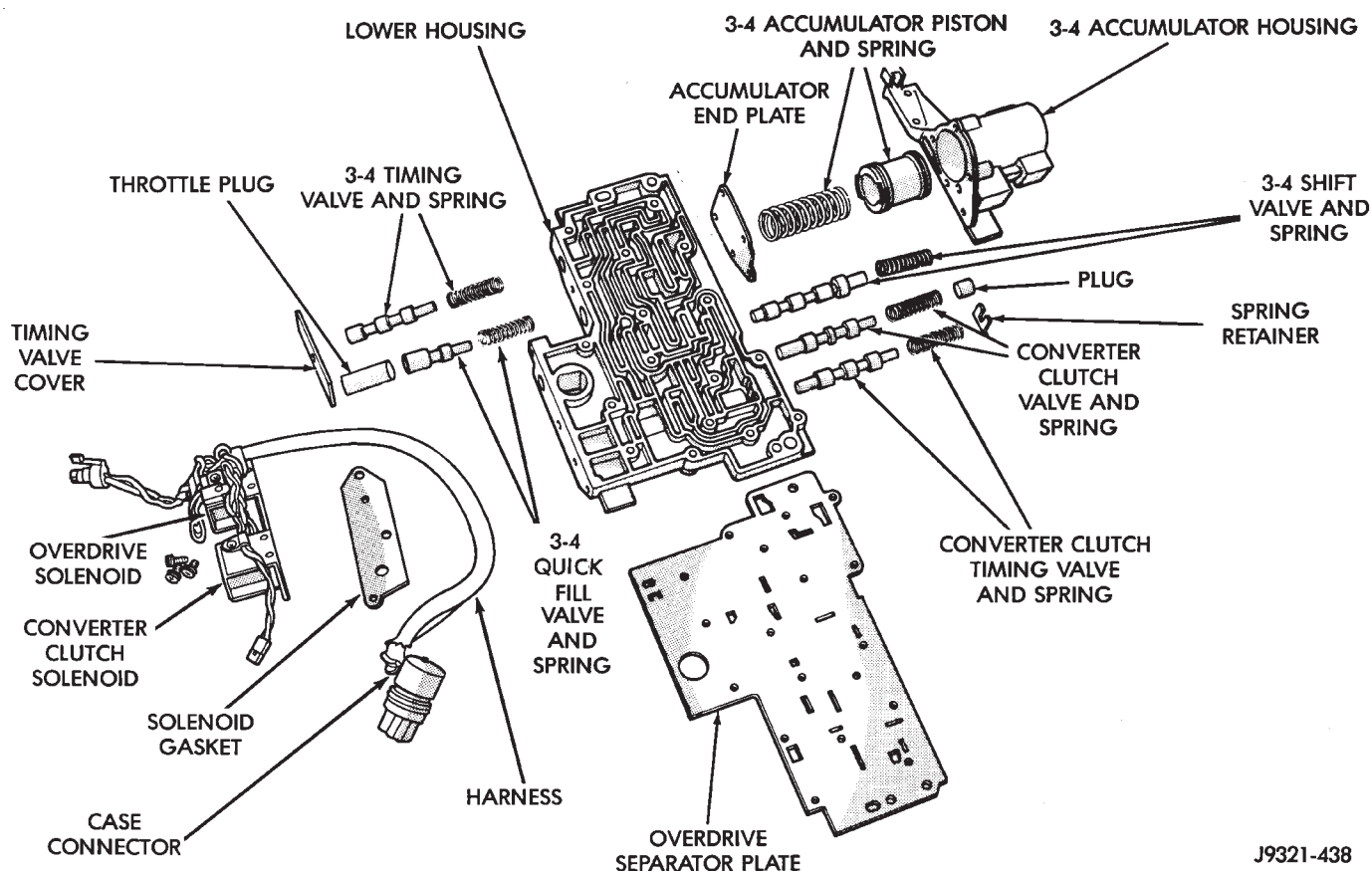


Fig. 124 Location Of 3-4 Shift Valves And Springs In Lower Housing

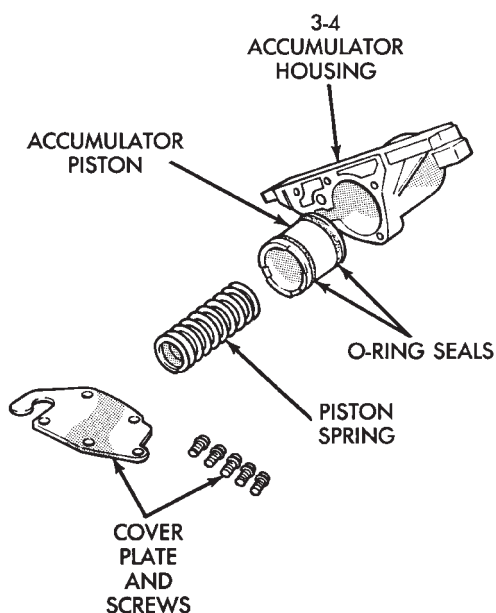


Fig. 125 3-4 Accumulator Housing Components

blocked by dirt or debris. Replace the valve and/or sensor only when DRB II scan tool diagnosis indi-

cates this is necessary. Or, if either part has sustained physical damage (dented, deformed, broken, etc.).

CAUTION: Do not turn the small screw at the end of the solenoid valve for any reason. Turning the screw in either direction will ruin solenoid calibration and result in solenoid failure. In addition, the filter on the solenoid valve is NOT serviceable. Do not try to remove the filter as this will damage the valve housing.

Inspect the throttle and manual valve levers and shafts. Do not attempt to straighten a bent shaft or correct a loose lever. Replace these components if worn, bent, loose or damaged in any way.

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straight-edge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

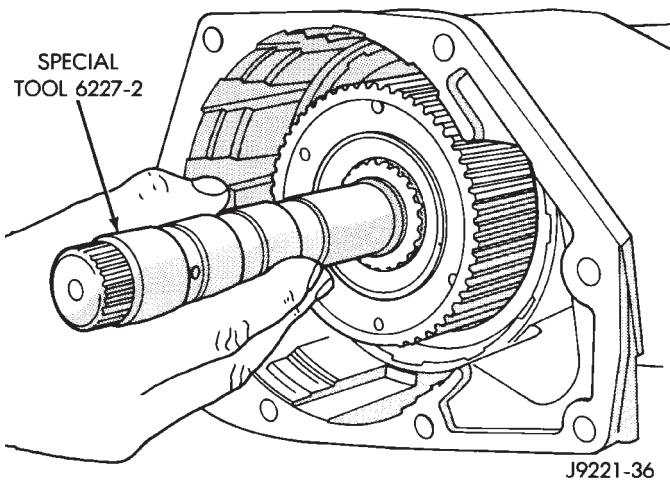


Fig. 168 Checking Alignment Of Overdrive Planetary Gear And Overrunning Clutch Splines

install and tighten bolts to 34 N·m (25 ft. lbs.) torque. **Be sure wire harness clips are placed on appropriate overdrive bolts beforehand.**

(49) Measure and if necessary, correct input shaft end play as follows (Fig. 169):

(a) Be sure overdrive unit is installed on transmission. **End play cannot be properly checked with overdrive unit off transmission.**

(b) Attach dial indicator to converter housing.

(c) Position indicator plunger against input shaft and zero indicator.

(d) Move input shaft in and out and record reading. End play should be 0.56 - 2.31 mm (0.022 - 0.091 in.). Proceed to step (e) if end play is not within specified limits.

(e) Intermediate shaft thrust washer (in hub of rear clutch retainer) controls end play. Washer is a select fit part and can be changed to adjust end play. If end play turns out to be incorrect, remove oil pump, and clutches. Then install thinner/thicker thrust washer as necessary.

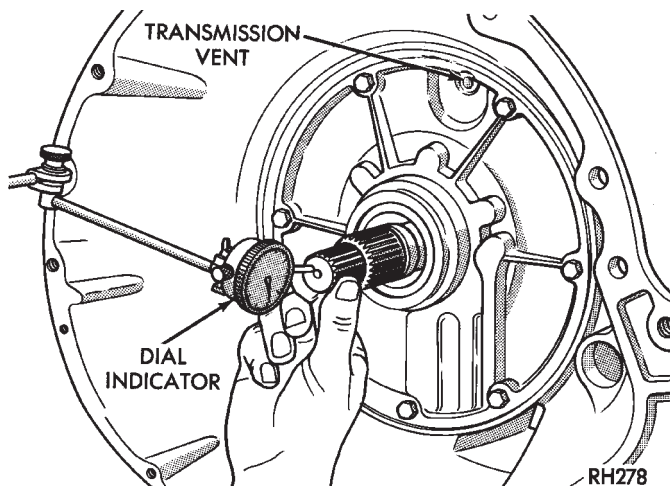


Fig. 169 Measuring Input Shaft End Play

(50) Install accumulator piston and inner and outer springs (Fig. 11).

(51) Verify that park/neutral position switch has **not** been installed in case. Valve body can not be installed if switch is in position.

(52) Verify that valve body solenoid harness is secured in 3-4 accumulator housing cover plate.

(53) Install valve body as follows:

(a) Align and carefully insert park rod into pawl. Rod will make click noise as it enters pawl. Move rod slightly to check engagement.

CAUTION: It is possible for the park rod to displace into a cavity just above the pawl sprag during installation. Make sure the rod is actually engaged in the pawl and has not displaced into the cavity. If the rod enters the cavity during installation, it will become bent when the overdrive bolts are tightened. If this occurs, the rod will have to be removed and replaced.

(b) Align and seat valve body on case. Be sure manual lever shaft and overdrive connector are fully seated in case. Also be sure valve body wiring is not pinched or kinked.

(c) Install and start all valve body attaching bolts by hand. Then tighten bolts evenly, in a diagonal pattern to 12 N·m (105 in. lbs.) torque. **Do not overtighten valve body bolts. This could result in distortion and cross leakage after installation..**

(54) Install new filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.).

(55) Adjust front and rear bands as follows:

(a) Loosen band adjusting screw locknuts.

(b) Tighten each band adjusting screw to 5 N·m (72 in. lbs.) with torque wrench.

(c) **Back off front band adjusting screw 3-5/8 turns.**

(d) Back off rear band screw 4 turns.

(e) Tighten each adjusting screw locknut. Hold adjusting screws with wrench to prevent turning when tightening locknut.

(56) Install seal on park/neutral position switch (Fig. 170). Then install and tighten switch to 34 N·m (25 ft. lbs.).

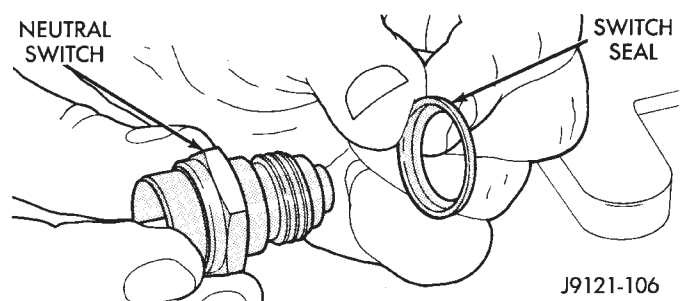


Fig. 170 Park/Neutral Position Switch Seal Position

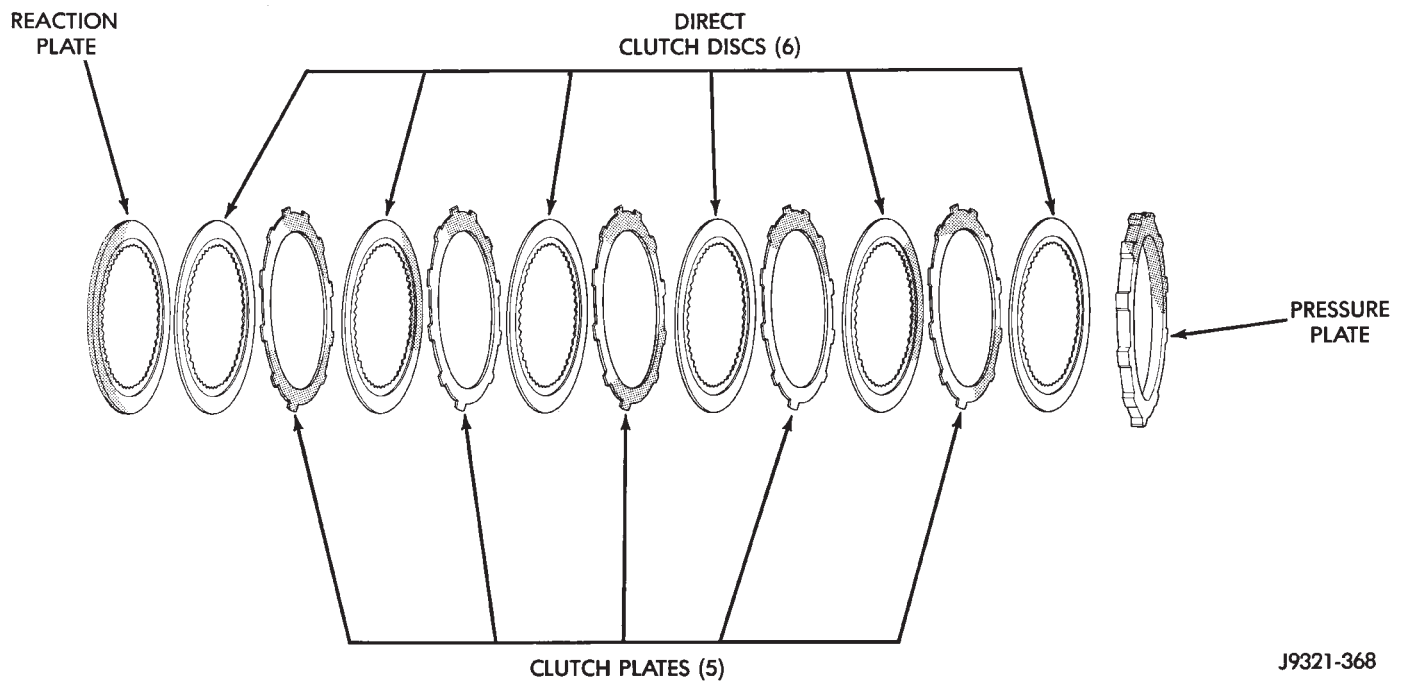


Fig. 49 Direct Clutch Pack Components

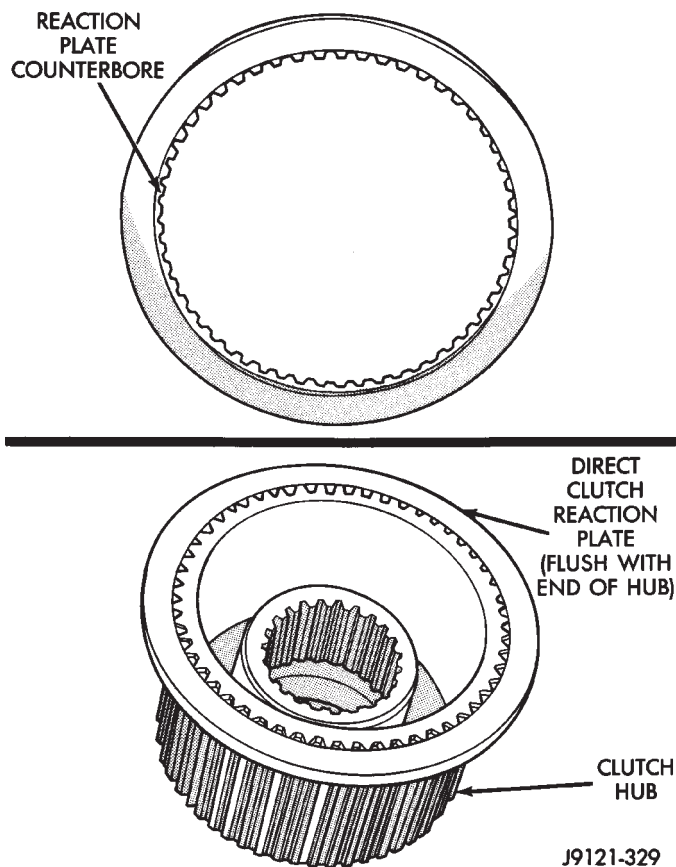


Fig. 50 Correct Position Of Direct Clutch Reaction Plate

(24) Compress clutch hub and spring just enough to place tension on hub and hold it in place.

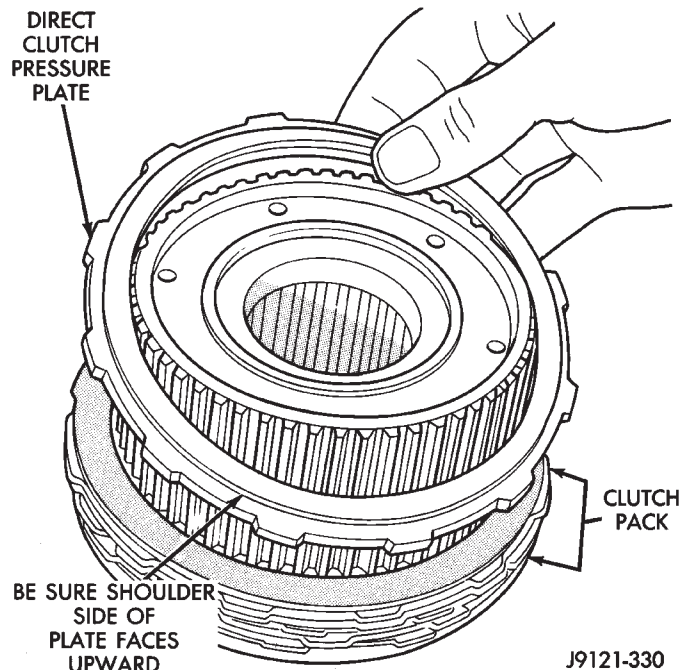


Fig. 51 Correct Position Of Direct Clutch Pressure Plate

(25) Slide direct clutch pack upwards on hub (Fig. 53). Then set clutch pack on edge of clutch hub and compressor tool as shown.

(26) Slowly compress clutch hub and spring (Fig. 53). Compress spring and hub only enough to expose ring grooves for clutch pack snap ring and clutch hub retaining ring.

(27) Realign clutch pack on hub and seat clutch discs and plates in clutch drum (Fig. 53).

Line pressure is checked at the accumulator port on the right side of the case. The front servo pressure port is at the right side of the case just behind the filler tube opening.

The rear servo and governor pressure ports are at the right rear of the transmission case. The overdrive clutch pressure port is at the left rear of the case (Fig. 6).

An accurate tachometer and two test gauges are required for the pressure test. Test Gauge C-3292 has a 100 psi range and is used at the accumulator, governor, and front servo pressure ports. Test Gauge C-3293 has a 300 psi range and is used at the rear servo port and overdrive test ports where pressures are higher. In cases where two test gauges are required, the 300 psi gauge can be used at any of the other test ports.

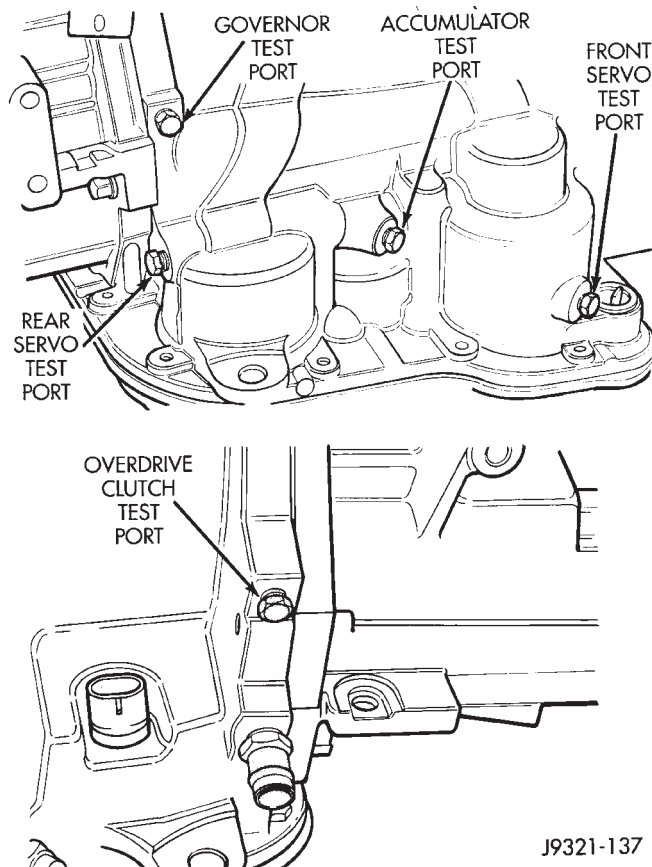


Fig. 6 Pressure Test Port Locations (42RH/46RH)

PRESSURE TEST PROCEDURE

Connect a tachometer to the engine. Position the tachometer so it can be observed from under the vehicle. Raise the vehicle on hoist that will allow the wheels to rotate freely.

Test One—Transmission In 1 Range

This test checks pump output, pressure regulation, and condition of the rear clutch and servo circuit. Test Gauges C-3292 and C-3293

are required for this test. Gauge C-3292 has a 100 psi range. Gauge C-3293 has a 300 psi range.

- (1) Connect 100 psi Gauge C-3292 to accumulator port.
- (2) Connect 300 psi Gauge C-3293 to rear servo port (Fig. 5).
- (3) Disconnect throttle and gearshift rods from manual and throttle levers.
- (4) Start and run engine at 1000 rpm.
- (5) Move shift lever (on manual lever shaft) all the way forward into 1 range.
- (6) Move transmission throttle lever from full forward to full rearward position and note pressures on both gauges.
- (7) Line pressure at accumulator port should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.
- (8) Rear servo pressure should be same as line pressure within 3 psi (20.68 kPa).

Test Two—Transmission In 2 Range

This test checks pump output and pressure regulation. Use 100 psi Test Gauge C-3292 for this test.

- (1) Connect test gauge to accumulator pressure port (Fig. 5).
- (2) Start and run engine at 1000 rpm.
- (3) Move shift lever on valve body manual lever shaft, one detent rearward from full forward position. This is 2 range.
- (4) Move transmission throttle lever from full forward to full rearward position and read pressure at both gauges.
- (5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.

Test Three—Transmission In D Range

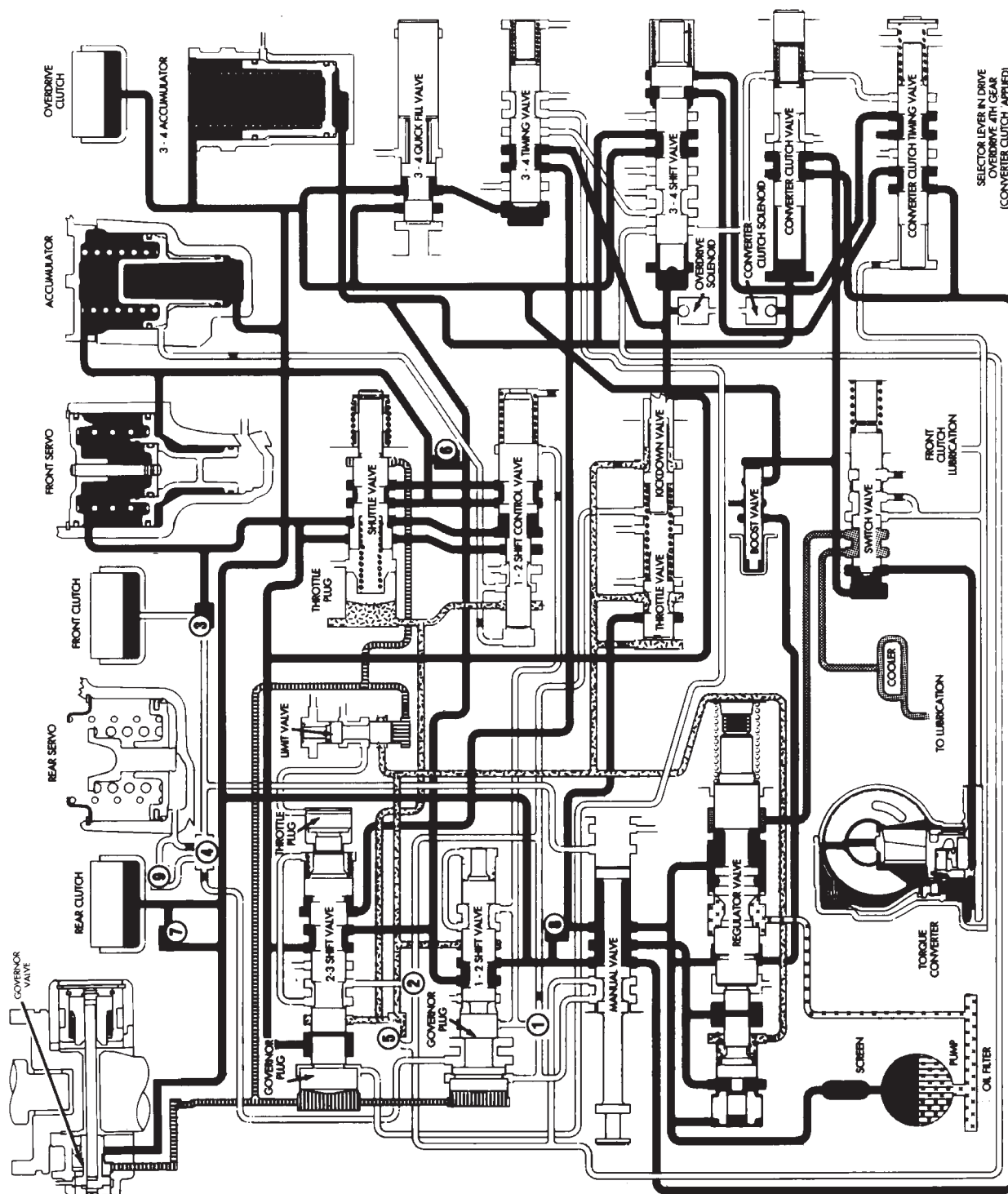
This test checks pressure regulation and condition of the clutch circuits. Use both pressure Test Gauges C-3292 and C-3293 for this test.

- (1) Connect test gauges to accumulator and front servo ports (Fig. 5). Use either test gauge at the two ports.
- (2) Start and run engine at 1600 rpm for this test.
- (3) Move selector lever two detents rearward from full forward position. This is D range.
- (4) Read pressures on both gauges as transmission throttle lever is moved from full forward to full rearward position.
- (5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase as lever is moved rearward.

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
NO START IN PARK OR NEUTRAL	1. Gearshift linkage out of adjustment 2. Neutral switch wire broken or open 3. Faulty neutral switch 4. Valve body manual lever assembly bent, worn, broken, or not aligned with switch	1. Adjust linkage 2. Check continuity with test lamp; repair as required 3. Refer to service section for test and replacement procedure 4. Inspect lever assembly and replace if damaged
SLUGGISH ACCELERATION AT LOW SPEEDS OR REQUIRES EXCESSIVE THROTTLE OPENING TO MAINTAIN HIGHWAY SPEEDS	1. Poor engine performance 2. Gearshift or throttle linkage out of adjustment 3. Transmission clutches slipping 4. Overrunning clutch in converter not holding 5. Converter overrunning clutch stuck	1. Check engine and repair as required 2. Adjust linkage 3. Perform stall test and repair as required 4. Perform stall test and replace converter if clutch has failed 5. Replace converter
FLUID CONTAMINATED (DISCOLORED, FULL OF SLUDGE AND/OR METAL AND FRICTION MATERIAL PARTICULAR)	1. If contamination occurred shortly after overhaul, fluid cooler and lines were not flushed and flow tested. This is especially true when original overhaul was to correct a problem that generated a large amount of debris, such as a gear failure or a clutch pack failure Note: Flushing the cooler and lines is mandatory after a failure of the converter lockup clutch 2. Incorrect fluid used in transmission 3. Main cooler in radiator is cracked, allowing engine coolant to enter transmission 4. Severe overload results in overheating, fluid breakdown, and accelerated wear, especially in high ambient temperatures. Most frequent causes are: • Vehicle is not properly equipped for heavy duty service • Tow vehicle and boat or trailer are both overloaded • Trailer or boat are too large for tow vehicle (load exceeds rated capacity of tow vehicle)	1. If contamination is severe, cooler flushing, converter replacement, and another overhaul may be necessary; particularly so if shift problems were also present 2. If transmission is operating properly, drain fluid, reverse flush cooler and lines, and change fluid and filter. However, if shift problem has developed, converter replacement and transmission overhaul may be required 3. Replace radiator (and cooler) and flush lines. If problem was diagnosed early enough, fluid and filter change may only be necessary. If contamination period was prolonged, overhaul and converter replacement may be required 4. Repair transmission, flush cooler, and lines. Replace converter if necessary. Install auxiliary cooler if needed. Also install HD cooling system if needed. If tow vehicle and unit being towed are both overloaded, the only repair is to reduce the load to rated limits. However, if trailer or boat is too large for tow vehicle, the only option is for the owner to move up to properly-equipped and load-rated tow vehicle

HYDRAULIC FLOW IN D FOURTH GEAR (CONVERTER CLUTCH APPLIED)



J9421-162

42RH/46RH TRANSMISSION/OVERDRIVE REMOVAL—INSTALLATION

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GENERAL INFORMATION

The overdrive unit can be removed for service without having to remove the entire transmission assembly. However if the transmission, torque converter, converter driveplate, or oil pump requires service, the complete transmission assembly must be removed for access to these components.

If only the overdrive unit must be removed, refer to the Overdrive Unit Removal/Installation procedures. If the complete transmission assembly must be removed, refer to the Transmission Removal/Installation procedures.

TRANSMISSION AND CONVERTER REMOVAL

- (1) Raise vehicle on hoist.
- (2) If transmission will be disassembled after removal, remove transmission oil pan, drain fluid and reinstall oil pan.
- (3) Remove skid plate, if equipped.
- (4) Mark front and rear propeller shafts and U-joints for alignment reference (Fig. 1).
- (5) Disconnect and remove both propeller shafts.

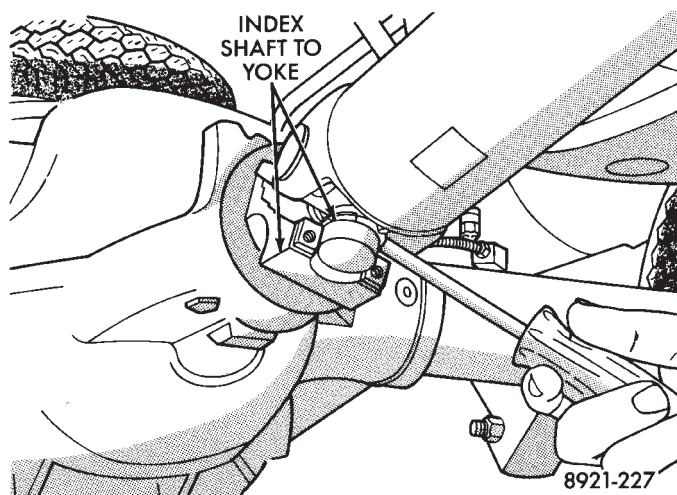


Fig. 1 Marking Propeller Shaft And Yoke For Alignment Reference

- (6) Disconnect vehicle speed sensor wires.
- (7) Disconnect vacuum vent hose at transfer case.

(8) Disconnect transfer case shift linkage at range lever. Then remove linkage bracket bolts and remove linkage and bracket from transfer case. Move linkage aside for clearance.

(9) Remove nuts attaching transfer case to overdrive unit gear case.

(10) Remove transfer case. Support transfer case with transmission jack. Secure transfer case to jack with safety chains. Then move transfer case rearward and off transmission.

(11) Remove transfer case from transmission jack and place transfer case on bench.

(12) Support transmission with transmission jack.

(13) Remove nuts and bolts attaching transmission mount to crossmember.

(14) Remove bolts and nuts attaching crossmember to frame rails.

(15) Rotate crossmember diagonally to clear frame rails and remove crossmember.

(16) Disconnect exhaust pipes at manifold and at converter and/or muffler connections as needed. Then remove Y-pipe from vehicle and move remaining pipes aside for working clearance.

(17) Disconnect and remove crankshaft position sensor. Retain sensor attaching bolts.

CAUTION: The crankshaft position sensor can be damaged if the transmission is removed (or installed) with the sensor still bolted to the engine block. To avoid damage, remove the sensor before removing the transmission.

(18) Disconnect transmission shift linkage at shift lever on transmission.

(19) Remove transmission shift linkage torque shaft assembly from retainers on transmission and frame rail. Move linkage aside for working clearance.

(20) Remove brackets that attach transmission to engine block, if equipped.

(21) Remove dust shield cover from front side of transmission converter housing.

(22) Remove starter motor bolts. Pull starter rearward until clear of housing and position it out of way on nearby component. Starter does not have to be removed from vehicle nor does cable have to be disconnected.

off sharp edges. Sharp edges are vital as they prevent foreign matter from getting between the valve and valve bore.

Do not reuse oil seals, gaskets, seal rings, or O-rings during overhaul. Replace these parts as a matter of course. Also do not reuse snap rings or E-clips that are bent or distorted. Replace these parts as well.

Lubricate transmission parts with Mopar ATF Plus, Type 7176 transmission fluid during assembly. Use Mopar Door Ease, or Ru-Glyde on clutch piston seals to ease installation. Use petroleum jelly to lubricate O-rings and hold thrust washers in place.

TRANSMISSION CASE CLEANING AND INSPECTION

Clean the case in a solvent tank. Flush the case bores and fluid passages thoroughly with solvent. Dry the case and all fluid passages with compressed air. Be sure all solvent is removed from the case and that all fluid passages are clear.

Do not use shop towels or rags to dry the case (or any other transmission component) unless they are made from lint-free materials. Lint will stick to case surfaces and transmission components and circulate throughout the transmission after assembly. A sufficient quantity of lint can block fluid passages and interfere with valve body operation.

Inspect the case for cracks, porous spots, worn bores, or damaged threads. Damaged threads can be repaired with Helicoil thread inserts. However, the case will have to be replaced if it exhibits any type of damage or wear.

Lubricate the front band adjusting screw threads with petroleum jelly and thread the screw part-way into the case. Be sure the screw turns freely.

OVERRUNNING CLUTCH—LOW-REVERSE DRUM—OVERDRIVE PISTON RETAINER INSPECTION AND OVERHAUL

If the overrunning clutch and cam came out with the low-reverse drum, remove the cam and clutch from the drum as follows: Thread two clutch cam bolts into the cam. Then lift the clutch and cam out of the drum with the bolts (Fig. 32). Rotate the cam back and forth to ease removal if necessary.

CLEANING AND INSPECTION

Clean the clutch rollers, springs and retainer, clutch cam, low-reverse drum and overdrive piston retainer in solvent. Dry them with light bursts of compressed air, or allow them to air dry after cleaning.

Inspect condition of each clutch part after cleaning. Replace the rollers and the retainer and spring as-

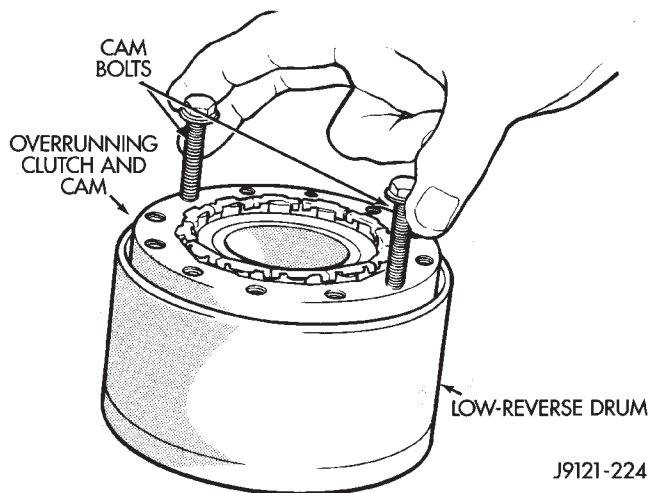


Fig. 32 Removing Overrunning Clutch From Low-Reverse Drum (42RH)

sembly if the rollers, springs or spring retainer are worn or damaged. Replace the clutch cam if worn, cracked or damaged.

Inspect the overrunning clutch race and low-reverse drum. Replace the drum and race as an assembly if either part is worn, scored or damaged.

Examine the overdrive piston retainer carefully for wear, cracks, scoring or other damage. Be sure the retainer hub is a snug fit in the case and low-reverse drum. Replace the retainer if worn or damaged.

OVERRUNNING CLUTCH ASSEMBLY

(1) Install clutch rollers in spring retainer (Fig. 33). Be sure springs are seated squarely against rollers.

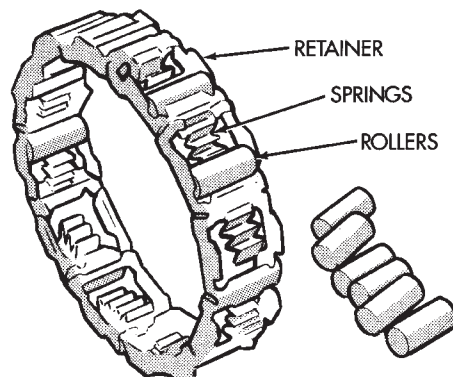


Fig. 33 Installing Overrunning Clutch Rollers In Retainer (42RH)

(2) Install roller and spring assembly in clutch cam (Fig. 34).

(3) Lubricate overrunning clutch rollers, springs cam and race with transmission fluid. Verify component installation before proceeding. Bolt holes in clutch cam are countersunk on one side. Be sure this side of cam will face rearward as shown (Fig. 34).

(20) Install front annulus thrust washer (Fig. 82). Align flat on washer with flat on planetary hub. Also be sure washer tab is facing forward.

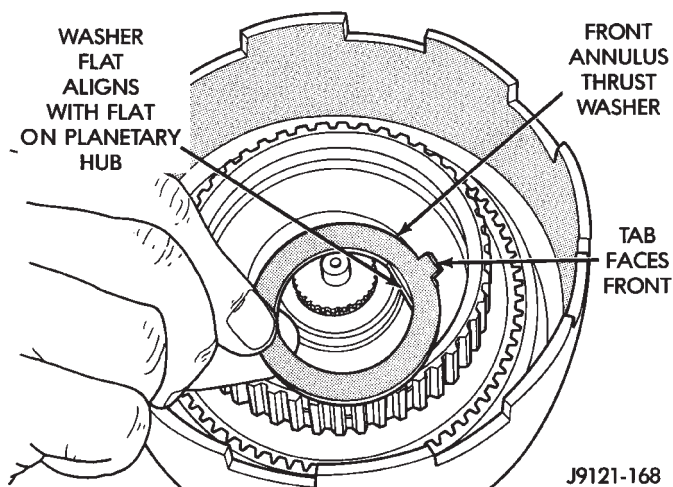


Fig. 82 Installing Front Annulus Thrust Washer (42RH)

(21) Install front annulus snap ring (Fig. 83). Use snap ring pliers to avoid distorting ring during installation. Also be sure ring is fully seated.

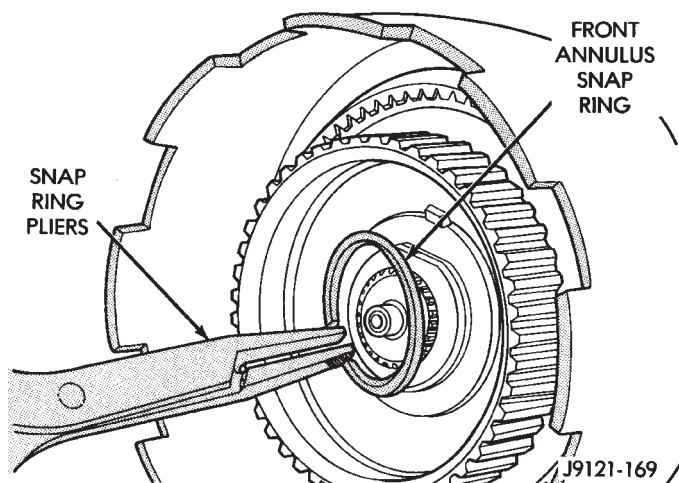


Fig. 83 Installing Front Annulus Snap Ring (42RH)

(22) Install planetary selective snap ring with snap ring pliers (Fig. 84). Be sure ring is fully seated.

(23) Turn planetary geartrain assembly over so driving shell is facing workbench. Then support geartrain on wood block positioned under forward end of intermediate shaft. This is necessary so geartrain components will move forward for accurate end play check.

(24) Check planetary geartrain end play with feeler gauge (Fig. 85). Gauge goes between shoulder on intermediate shaft and end of rear annulus support.

(25) Geartrain end play should be 0.12 to 1.22 mm (0.005 to 0.048 in.). If end play is incorrect, snap ring

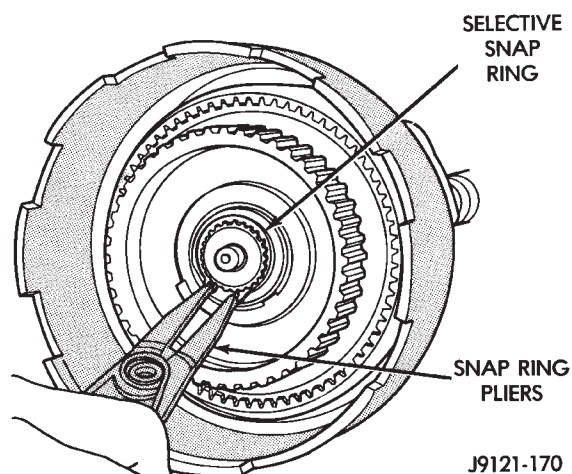


Fig. 84 Installing Planetary Selective Snap Ring (42RH)

(or thrust washers) may have to be replaced. Snap ring is available in three different thicknesses for adjustment purposes.

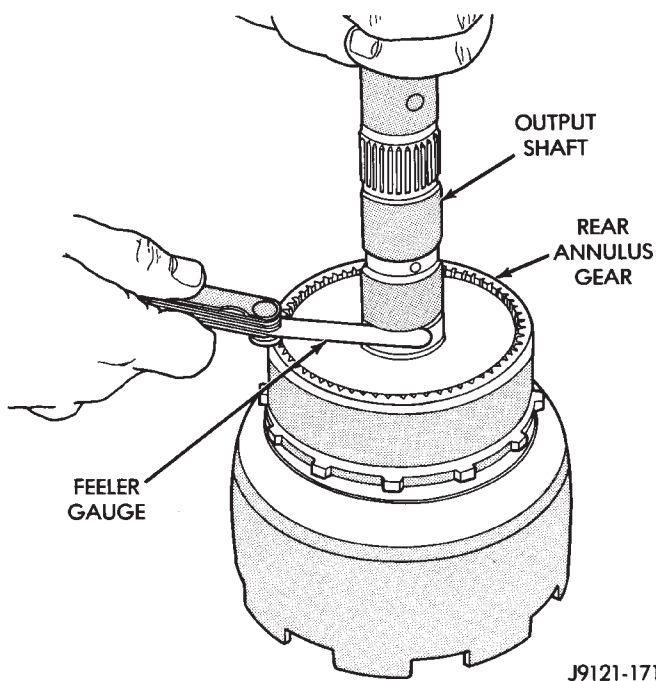


Fig. 85 Checking Planetary Geartrain End Play (42RH)

FRONT SERVO AND BAND OVERHAUL

FRONT SERVO DISASSEMBLY (FIG. 86)

- (1) Remove small snap ring from servo piston.
- (2) Remove piston, rod, springs and guide.
- (3) Remove and discard servo piston rings and O-ring.

FRONT BAND AND SERVO INSPECTION

Clean the servo components with solvent and dry them with compressed air.

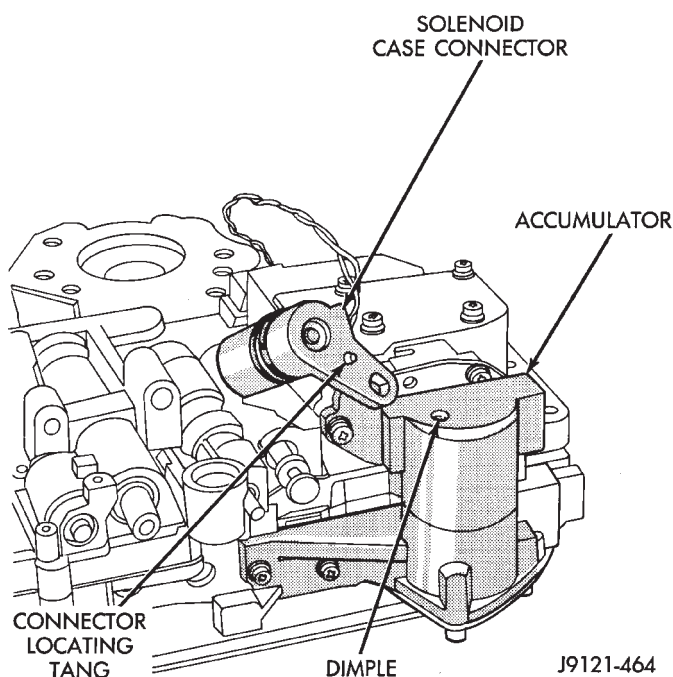


Fig. 125 Solenoid Connector Installation (42RH)

(8) Verify that solenoid wires are properly routed (Fig. 126). **Solenoid wires must be clear of rear band lever, manual lever and park rod.**

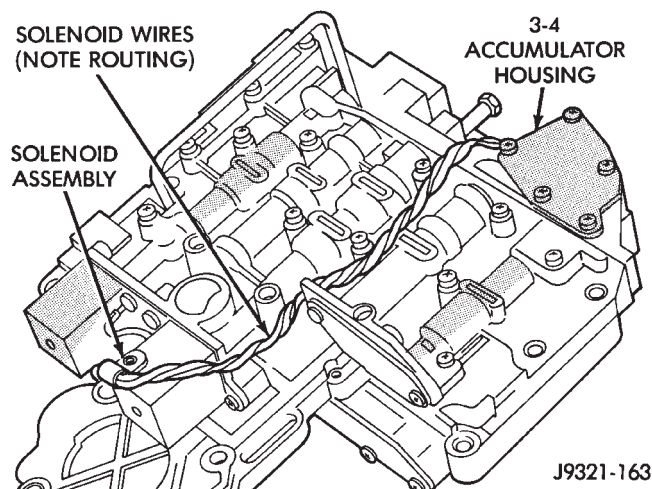


Fig. 126 Solenoid Wire Routing (42RH)

Valve Body Final Assembly And Adjustment

- (1) Insert manual lever detent spring in upper housing.
- (2) Position line pressure adjusting screw in adjusting screw bracket.
- (3) Install spring on end of line pressure regulator valve.
- (4) Install switch valve spring on tang at end of adjusting screw bracket.
- (5) Position adjusting screw bracket on valve body. Align valve springs and press bracket into place. Install short, upper bracket screws first and long bottom screw last. Verify that valve springs and bracket

are properly aligned. Then tighten all three bracket screws to 4 N·m (35 in. lbs.) torque.

(6) Install throttle lever in upper housing. Then install manual lever over throttle lever and start manual lever into housing.

(7) Position detent ball on end of spring. Then hold detent ball and spring in detent housing with Retainer Tool 6583 (Fig. 93).

(8) Align manual lever with detent ball and manual valve. Hold throttle lever upward. Then press down on manual lever until fully seated. Remove detent ball retainer tool after lever is seated.

(9) Then Install manual lever seal, washer and E-clip.

(10) Lubricate solenoid case connector O-rings and shaft of manual lever with light coat of petroleum jelly.

(11) Verify that throttle lever is aligned with end of kickdown valve stem and that manual lever arm is engaged in manual valve (Fig. 127).

(12) Install boost valve, valve spring, retainer and cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(13) Obtain new fluid filter for valve body but do not install filter at this time.

(14) If line pressure and/or throttle pressure adjustment screw settings were not disturbed, continue with overhaul or reassembly. However, if adjustment screw settings **were** moved or changed, readjust as described in Valve Body Control Pressure Adjustment procedure.

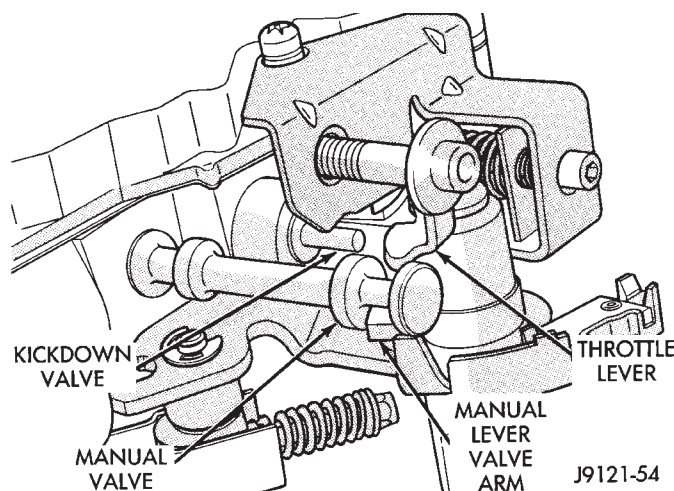


Fig. 127 Manual And Throttle Lever Alignment (42RH)

VALVE BODY CONTROL PRESSURE ADJUSTMENTS

There are two control pressure adjustments on the valve body which are, line pressure and throttle pressure.

Line and throttle pressure work together as each affects shift quality and timing. Both adjustments

(17) Remove accumulator outer spring, piston and inner spring (Fig. 16). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

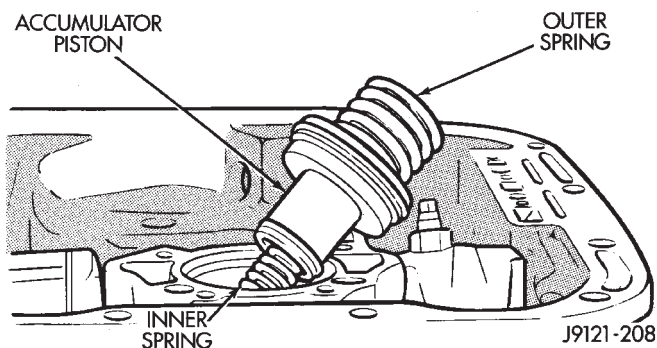


Fig. 16 Accumulator Component Removal (46RH)

(18) Remove front band lever pin access plug (Fig. 17). Use square end of 1/4 in. drive extension to remove plug as shown.

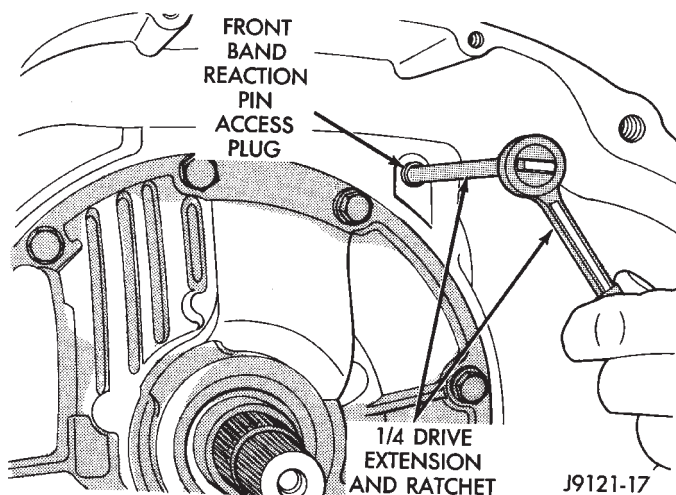


Fig. 17 Removing/Installing Front Band Lever Pin Access Plug (46RH)

(19) Remove oil pump and reaction shaft support assembly as follows:

(a) Tighten front band adjusting screw until band is tight around front clutch retainer (Fig. 18). This will prevent retainer from coming out with pump and possibly damaging clutch or pump components.

(b) Remove oil pump bolts.

(c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 19).

(d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 20).

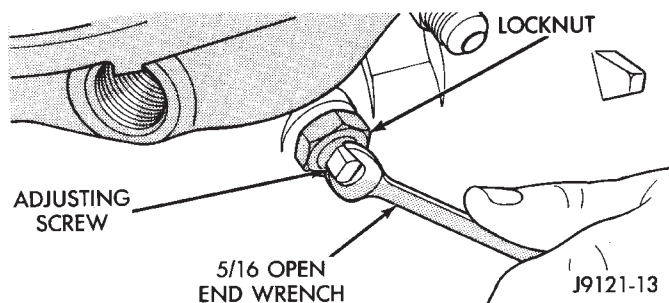


Fig. 18 Tightening Front Band To Hold Front Clutch In Place (46RH)

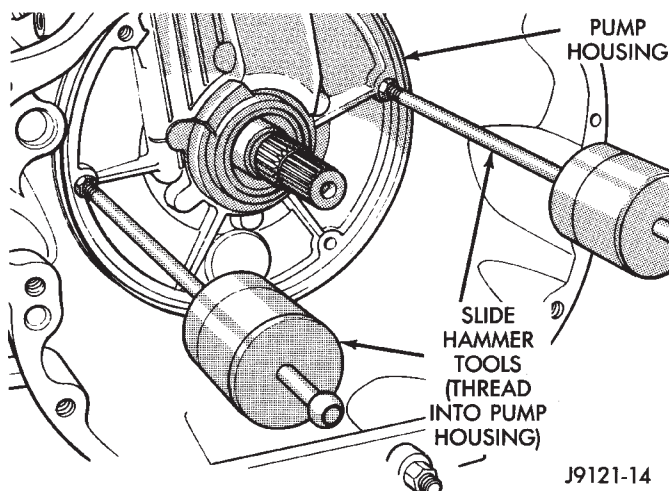


Fig. 19 Installing Oil Pump Remover Tools (46RH)

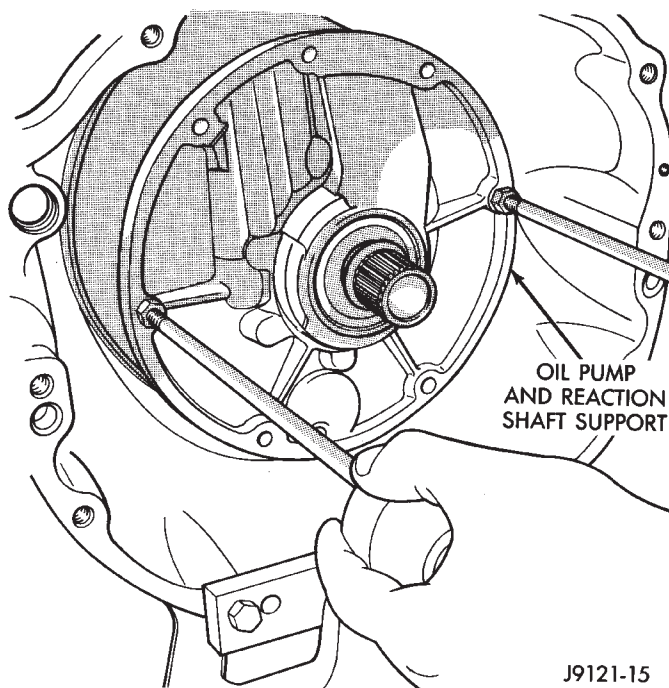


Fig. 20 Oil Pump Removal (46RH)

(6) Install spring retainer on top of piston springs.
 (7) Compress spring retainer and piston springs with Compressor Tool C-3863-A.

(8) Install spring retainer snap ring and remove compressor tool.

(9) Install clutch plates and discs. Install steel plate followed by clutch disc until all plates and discs are installed. **Install same number of discs and plates as removed during disassembly. Some models require 3 plates and discs. Others require 4 plates and discs.**

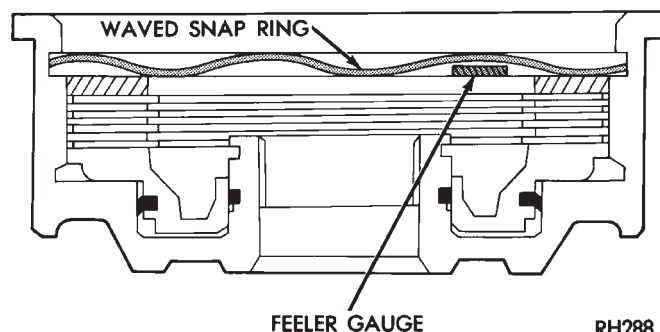
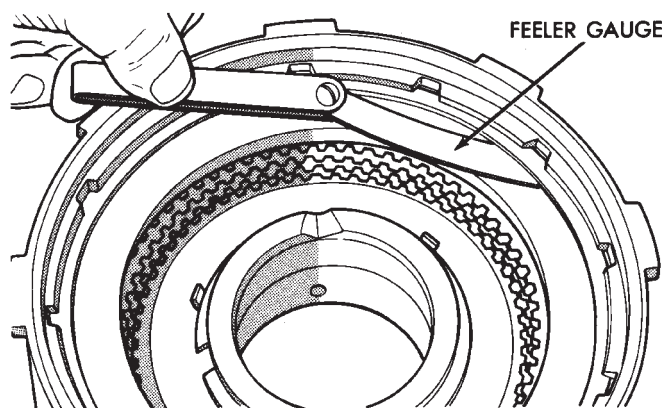
(10) Install reaction plate and waved snap ring.

(11) Check clutch pack clearance with feeler gauge as follows (Fig. 65):

- On 3 disc clutch, clearance between waved spring and pressure plate should be 1.78 - 3.28 mm (0.070 - 0.129 in.).

- On 4 disc clutch, clearance between waved spring and pressure plate should be 2.08 to 3.83 mm (0.082 to 0.151 in.).

- **If clearance is incorrect, clutch plates, clutch discs, snap ring and pressure plate will have to be changed. Clutch pack waved snap ring is not select fit.**



RH288

Fig. 65 Measuring Front Clutch Pack Clearance

(4) Remove clutch piston from piston retainer with a twisting motion.

(5) Remove input shaft thrust washer, if washer remained in piston retainer hub during removal.

(6) Remove seals from clutch piston. Discard seals after removal.

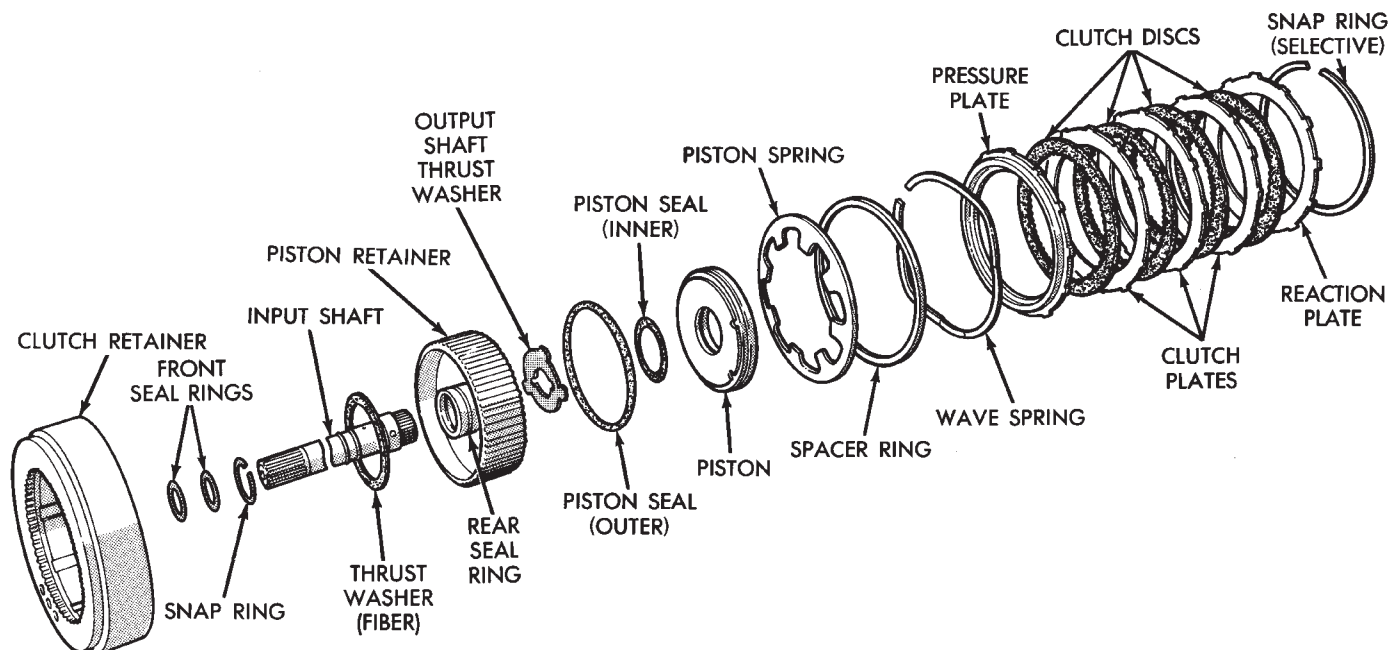
REAR CLUTCH OVERHAUL

REAR CLUTCH DISASSEMBLY (FIG. 66)

(1) Remove clutch pack select fit snap ring.

(2) Remove reaction plate and remove clutch plates and discs.

(3) Remove pressure plate, wave spring, spacer ring and piston spring from clutch retainer.



J9121-66

Fig. 66 Rear Clutch Components (46RH)

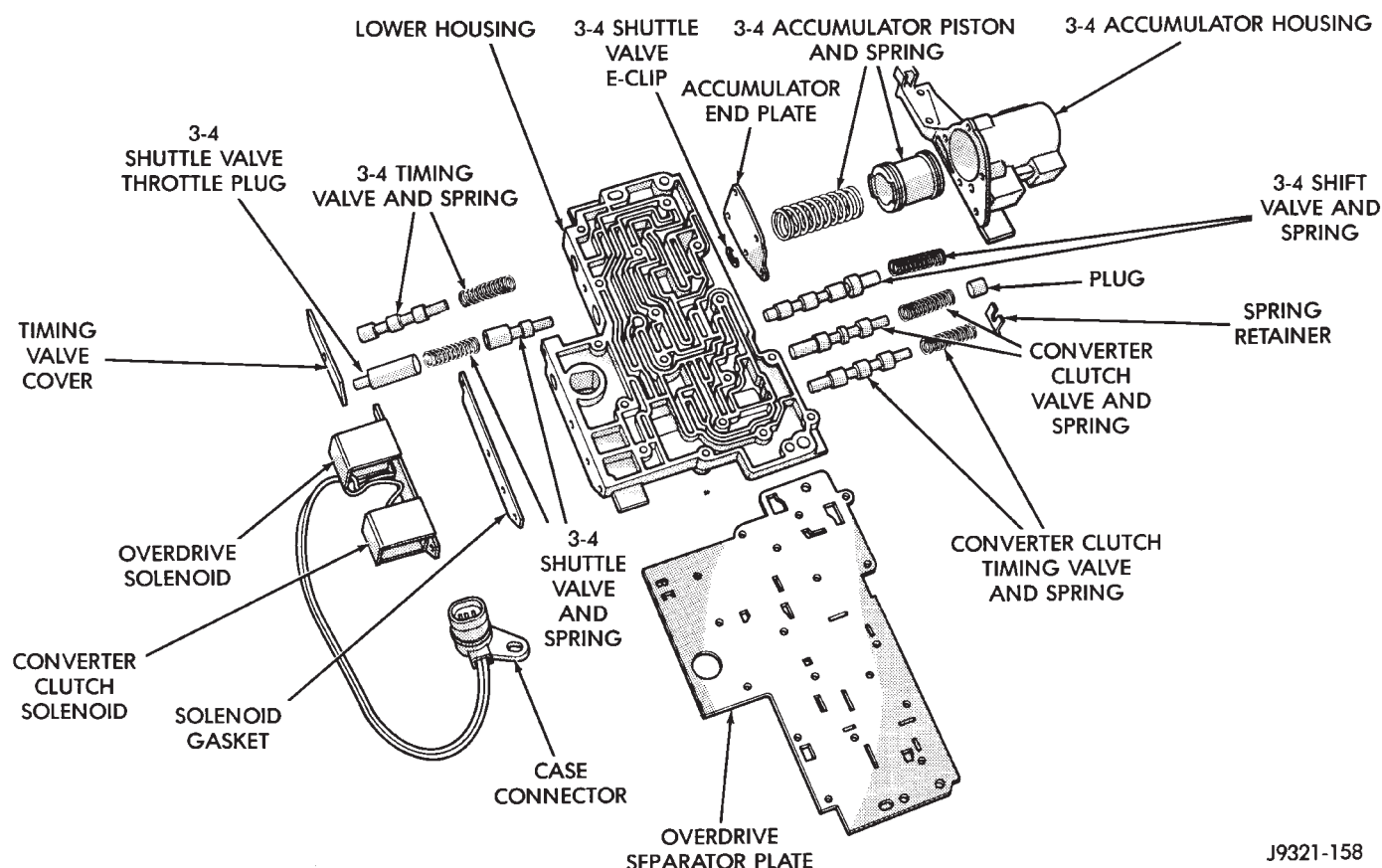


Fig. 116 Lower Housing Shift Valves And Springs

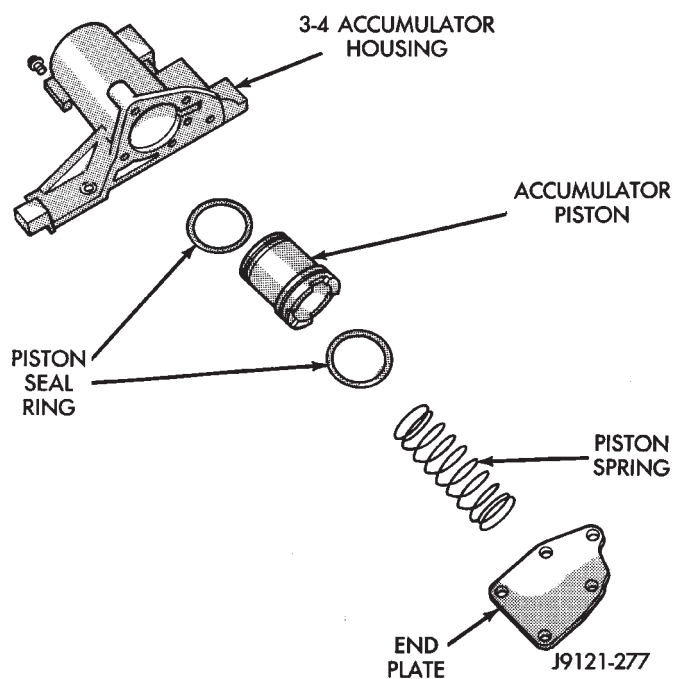


Fig. 117 3-4 Accumulator Housing Components (46RH)

als will stick to the valve body components. Lint will interfere with valve operation and may clog filters and fluid passages.

Inspect the throttle and manual valve levers and shafts. Do not attempt to straighten a bent shaft or correct a loose lever. Replace these components if worn, bent, loose or damaged in any way.

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straight-edge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valves and plugs, such as the throttle valve, shuttle valve plug, 1-2 shift valve and 1-2 governor plug, are made of coated aluminum (Fig. 118). Aluminum components are identified by the dark color of the special coating applied to the surface (or by testing with a magnet). Do not polish or sand aluminum valves or plugs with any type of material. This practice could damage the special coating and cause the valves and plugs to stick and bind.

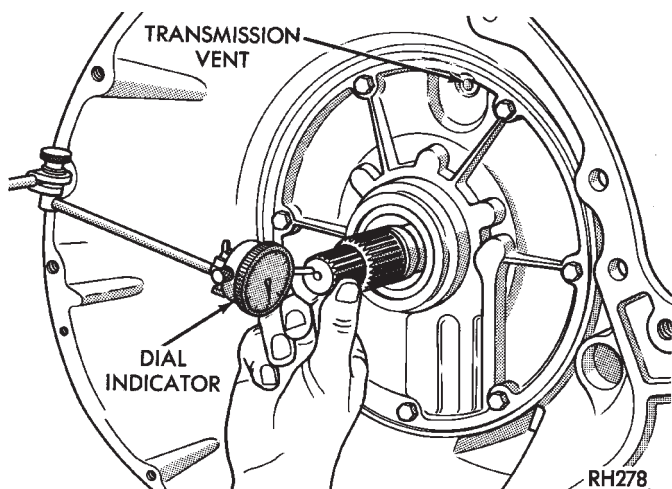


Fig. 156 Checking Input Shaft End Play

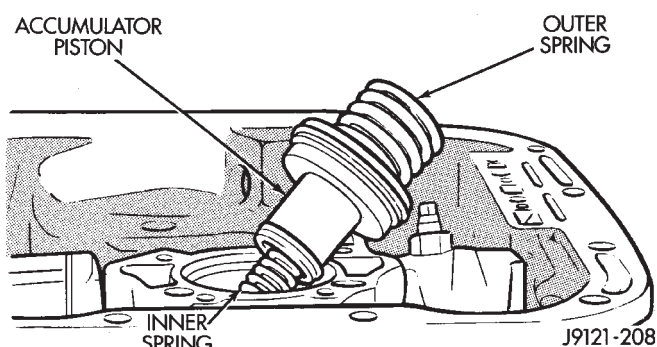


Fig. 157 Installing Accumulator Piston And Springs

(49) Verify that park/neutral position switch has **not** been installed in case. Valve body can not be installed if switch is in position.

(50) Install valve body as follows:

(a) Start park rod into park pawl. If rod will not slide past park pawl, pawl is engaged in park gear. Rotate overdrive output shaft with socket to free pawl and allow rod to engage.

(b) Align and seat valve body on case. Be sure manual lever shaft and overdrive connector are fully seated in case.

(c) Install and start all valve body attaching bolts by hand. Then tighten bolts evenly, in a diagonal pattern to 12 N·m (105 in. lbs.) torque. **Do not overtighten valve body bolts. This could result in distortion and cross leakage after installation..**

(51) Install new filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.).

(52) Install seal on park/neutral position switch (Fig. 158). Then install and tighten switch to 34 N·m (25 ft. lbs.).

(53) Adjust front and rear bands as follows:

(a) Loosen locknut on each band adjusting screw 4-5 turns.

(b) Tighten both adjusting screws to 8 N·m (72 in. lbs.).

(c) Back off front band adjusting screw 2-1/2 turns.

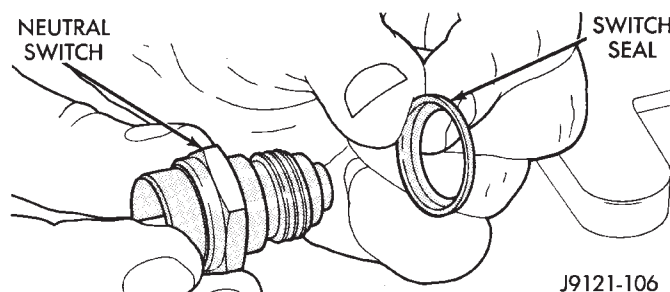


Fig. 158 Park/Neutral Position Switch Seal Position

(d) Back off rear band adjusting screw 2 turns.

(e) Hold each adjusting screw in position and tighten locknuts to 34 N·m (25 ft. lbs.) torque.

(54) Install magnet in oil pan. Magnet goes on small protrusion at corner of pan.

(55) Position new oil pan gasket on case and install oil pan. Tighten pan bolts to 17 N·m (13 ft. lbs.).

(56) Install new valve body manual shaft seal in case (Fig. 159). Lubricate seal lip and manual shaft with transmission fluid. Start seal over shaft and into case. Seat seal with 15/16 inch, deep well socket.

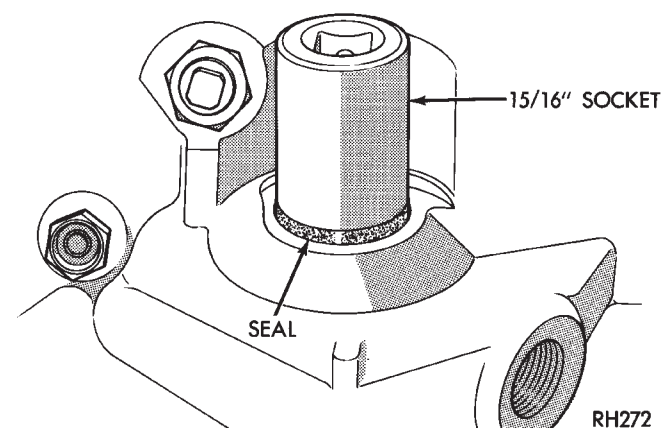


Fig. 159 Installing Manual Lever Shaft Seal

(57) Install throttle valve and shift selector levers on valve body manual lever shaft.

(58) Cap or cover transmission openings (cooler line fittings, filler tube bore, etc.) to prevent dirt entry.

(59) Install torque converter. Use C-clamp or metal strap to hold converter in place for installation.

(60) Mount transmission on jack for installation in vehicle.

(61) Apply dielectric grease to terminal pins of solenoid case connector and neutral switch.

CAUTION: The transmission cooler and lines must be reverse flushed if overhaul corrected a malfunction that generated sludge, metal particles, or clutch friction material. The torque converter should also be replaced if contaminated by the same malfunction. Debris and residue not flushed from the cooler and lines will flow back into the transmission and converter. The result could be a repeat failure and shop comeback.

WARNING: THE NEXT STEP IN GEARTRAIN ASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH HUB AND SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 800 POUNDS. USE SPRING COMPRESSOR TOOL C-6227-1 AND A HYDRAULIC-TYPE SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(25) Position Compressor Tool 6227-2 on clutch hub (Fig. 52).

(26) Position Tool MB990891 or similar size tool on top of compressor tool (Fig. 52). Similar size tool should have minimum outside diameter of 3-1/2 inch, minimum wall thickness of 1/4 inch and be approximately 4 inches long.

(27) Slide direct clutch pack upwards on hub (Fig. 52). Slide pack upward and set it partially on edge of hub and compressor tool as shown in Figure 52.

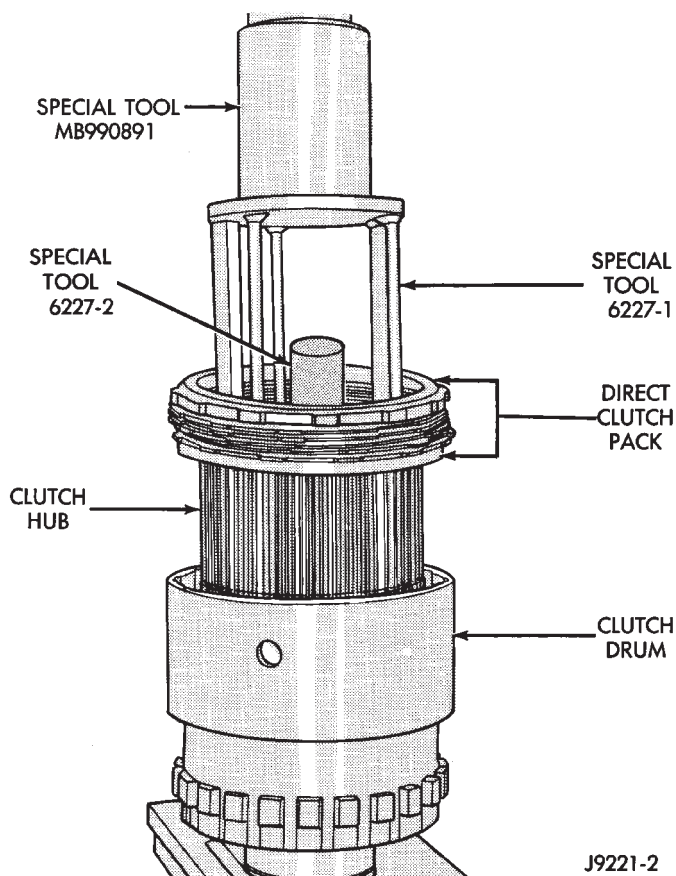


Fig. 52 Mounting Geartrain Assembly In Shop Press

(28) Slowly compress clutch hub and spring (Fig. 53). Compress spring and hub only enough to expose ring grooves for clutch pack snap ring and clutch hub retaining ring.

(29) Realign clutch pack on hub and seat clutch discs and plates in clutch drum (Fig. 53).

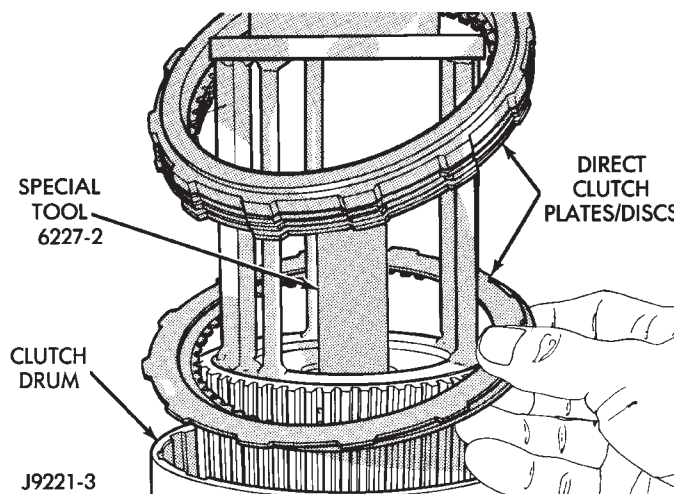


Fig. 53 Seating Clutch Pack In Drum

(30) Install direct clutch pack snap ring (Fig. 54). **Be very sure snap ring is fully seated in clutch drum ring groove.**

(31) Install clutch hub retaining ring (Fig. 55). **Be very sure retaining ring is fully seated in sun gear ring groove.**

(32) Slowly release press ram, remove compressor tools and remove geartrain assembly.

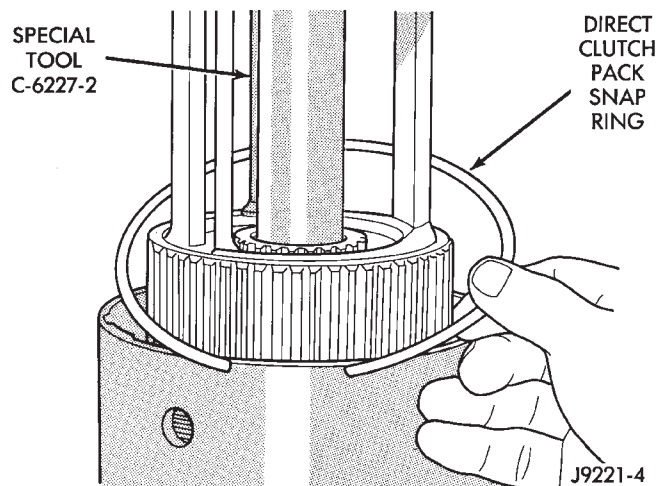


Fig. 54 Installing Direct Clutch Pack Snap Ring

OVERDRIVE UNIT ASSEMBLY AND ADJUSTMENT

(1) Install front bearing and snap ring on output shaft (Fig. 56). **Be sure locating ring groove in bearing is toward rear of shaft.**

(2) Install governor drive key in output shaft (Fig. 56).

(3) Install new seal rings on governor drive. Be sure ring ends are securely interlocked before proceeding (Fig. 57).

(4) Assemble governor drive and body. Be sure filter is properly seated and positioned in governor body before tightening attaching bolts.

(33) Remove shift detent plunger, spring and plug (Fig. 21). Remove O-ring from plug after removal.

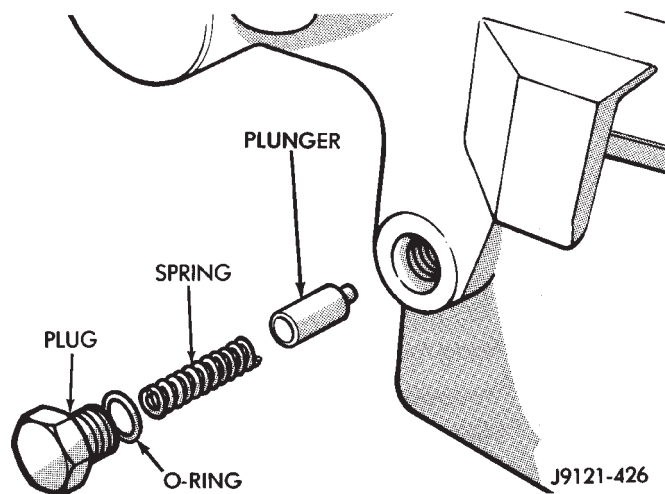


Fig. 21 Detent Component Removal

(34) Turn front case over and remove front bearing retainer bolts (Fig. 22).

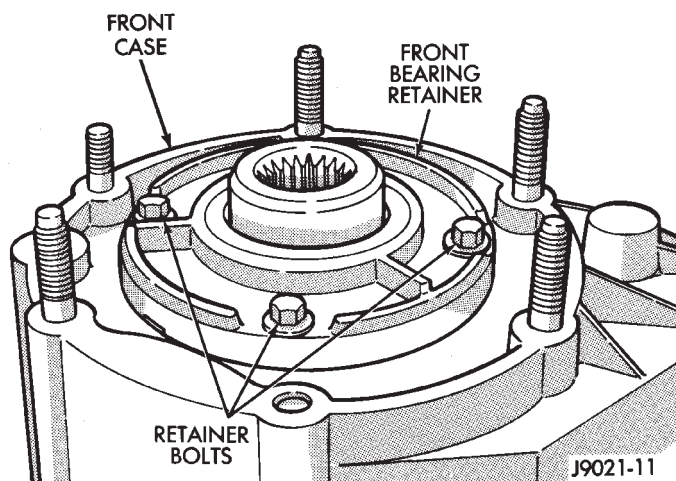


Fig. 22 Front Bearing Retainer Bolt Locations

(35) Remove front bearing retainer. Position screwdrivers in retainer slots and lift upward to loosen and remove retainer (Fig. 23).

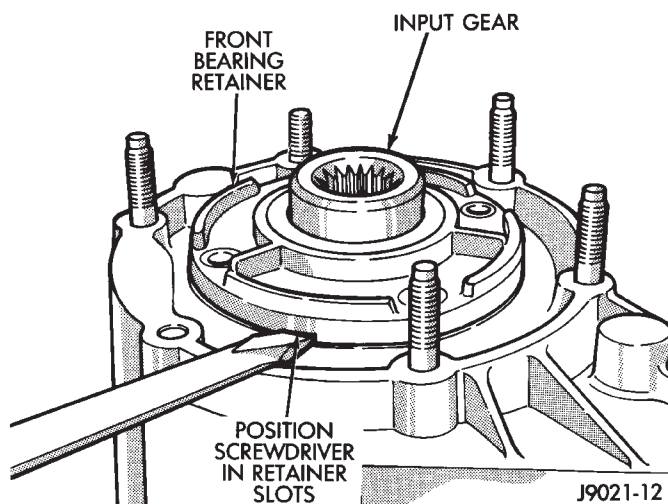


Fig. 23 Removing Front Bearing Retainer

(36) Remove input gear snap ring (Fig. 24).

(37) Press input and low range gear assembly out of input gear bearing with shop press (Fig. 25).

(38) Remove low range gear snap ring (Fig. 26).

(39) Remove retainer, thrust washers and input gear from low range gear (Fig. 27).

(40) Remove oil seals from rear retainer, rear extension housing, oil pump feed housing and case halves.

(41) Remove magnet from front case.

(42) Remove the speedometer driven gear, seals and adapter.

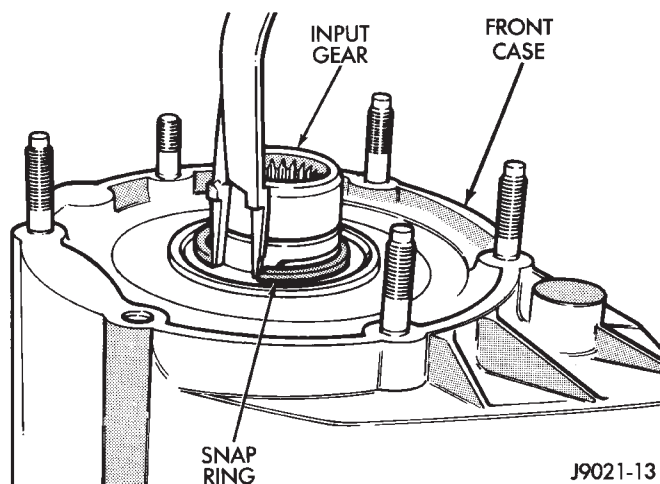


Fig. 24 Removing Input Gear Snap Ring

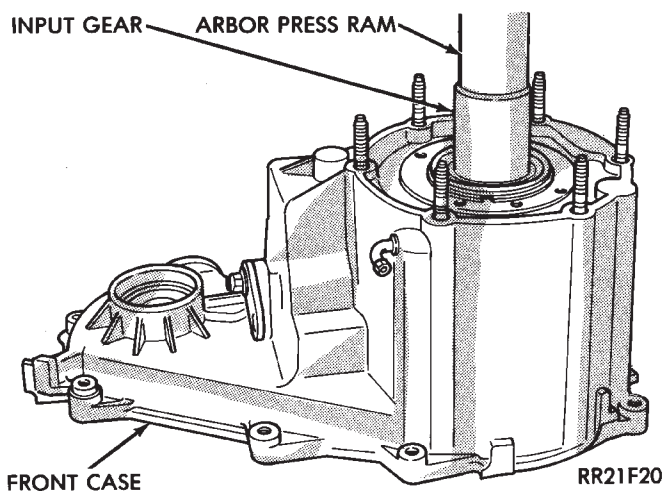


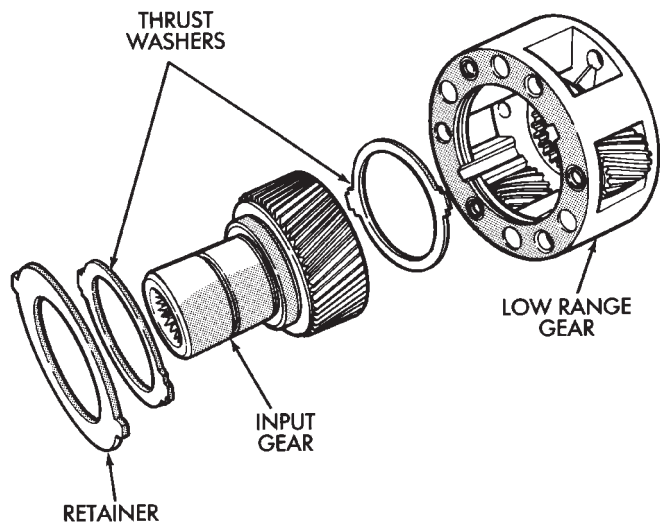
Fig. 25 Removing Input And Low Range Gear Assembly

NP242 SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
TRANSFER CASE DIFFICULT TO SHIFT OR WILL NOT SHIFT INTO DESIRED RANGE	(1) Transfer case external shift linkage binding. (2) Insufficient or incorrect lubricant. (3) Internal components binding, worn or damaged.	(1) Lubricate, repair or replace linkage, or tighten loose components as necessary. (2) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. (3) Disassemble unit and replace worn or damaged components as necessary.
TRANSFER CASE NOISY IN ALL DRIVE POSITIONS	(1) Insufficient or incorrect lubricant.	(1) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. Check for leaks and repair if necessary. Note: If unit is still noisy after drain and refill, disassembly and inspection may be required to locate source of noise.
LUBRICANT LEAKING FROM OUTPUT SHAFT SEALS OR FROM VENT	(1) Transfer case overfilled. (2) Vent closed or restricted. (3) Output shaft seals damaged or installed incorrectly.	(1) Drain to correct level. (2) Clear or replace vent if necessary. (3) Replace seals. Be sure seal lip faces interior of case when installed. Also be sure yoke seal surfaces are not scored or nicked. Remove scores and nicks with fine sandpaper or replace yoke(s) if necessary.
TRANSFER CASE WILL NOT SHIFT THROUGH 4 X 4 PART-TIME RANGE (Light Remains On).	(1) Incomplete shift due to drivetrain torque load. (2) Incorrect tire pressure(s). (3) Excessive tire wear. (4) Excessive vehicle loading.	(1) Driver must momentarily release the accelerator pedal to complete the shift. (2) Inflate all tires equally to correct pressure. (3) Switch tires — Install the two tires with the most wear (one on the front axle and one on the rear axle). (4) Check vehicle loading — Do not exceed the vehicle's GVW.

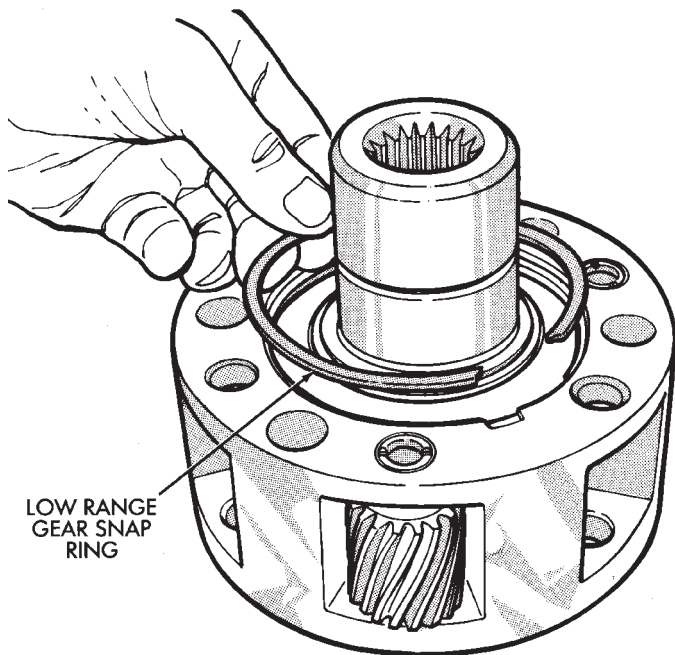
(11) Assemble low range gear, input gear thrust washers, input gear and input gear retainer (Fig. 44).

(12) Install low range gear snap ring (Fig. 45).



J8921-214

Fig. 44 Low Range And Input Gear Assembly



J8921-269

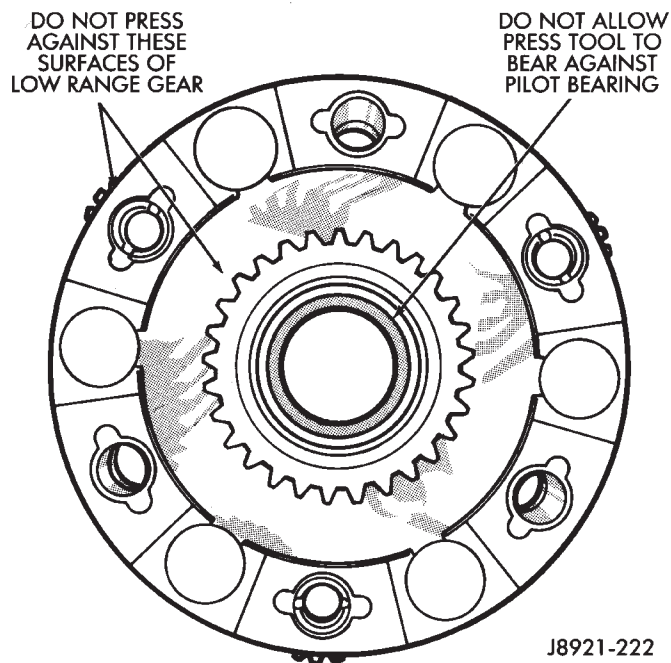
Fig. 45 Installing Low Range Gear Snap Ring

(13) Lubricate input gear and low range gears with automatic transmission fluid.

(14) Start the input gear shaft into the front case bearing.

(15) Press the input gear shaft into the front bearing.

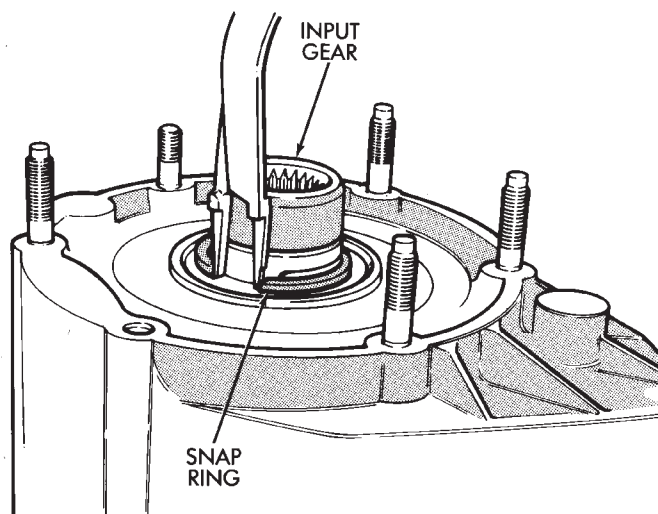
CAUTION: Be sure the input gear installer tool is the proper size. The wrong size tool could push the input gear pilot bearing too far into the gear bore (Fig. 46). Also, do not press against the end surfaces of the low range gear. The gear case and thrust washers could be damaged.



J8921-222

Fig. 46 Input Gear Installation

(16) Install new input gear snap ring (Fig. 47).



J8921-267

Fig. 47 Installing Input Gear Snap Ring

TORQUE	
A	3-4 N•m (27-35 in. lbs.)
B	11-14 N•m (97-123 in. lbs.)
C	8-14 N•m (72-120 in. lbs.)

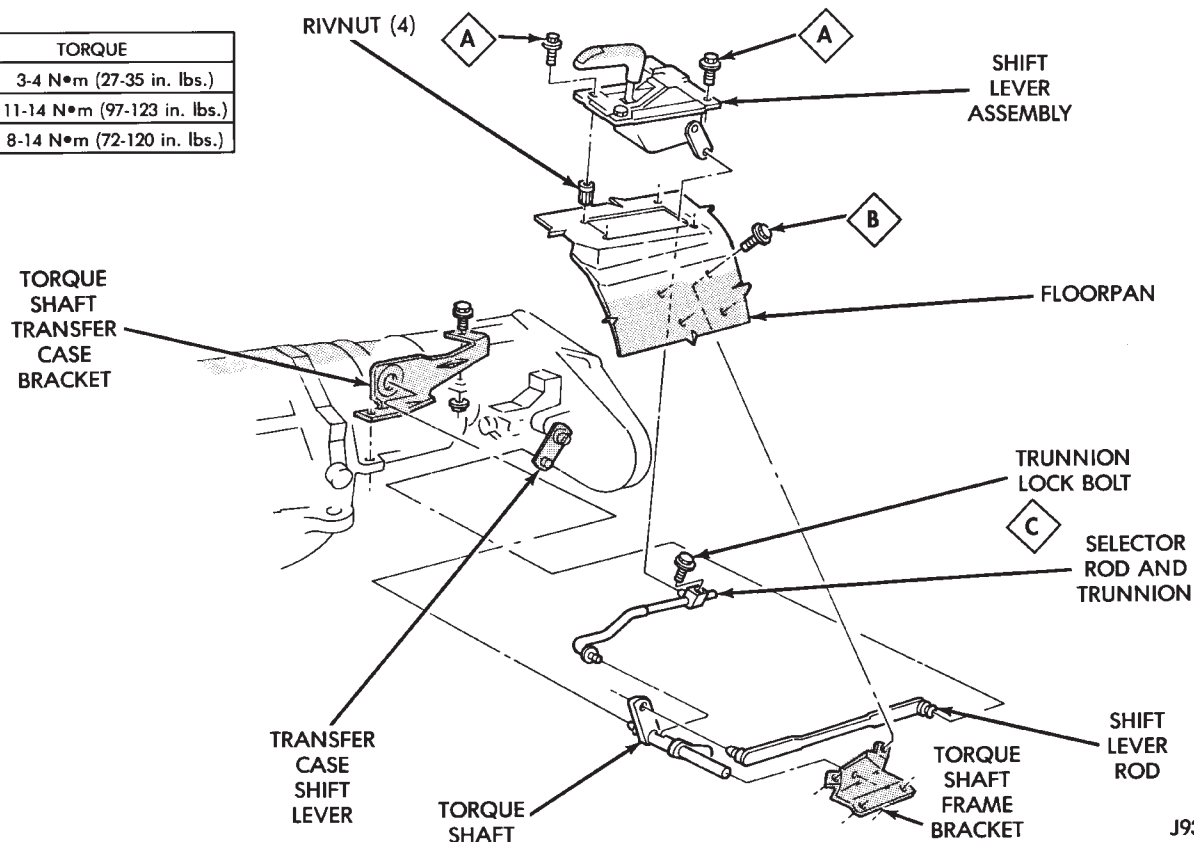


Fig. 3 Transfer Case Shift Linkage (Automatic Transmission)

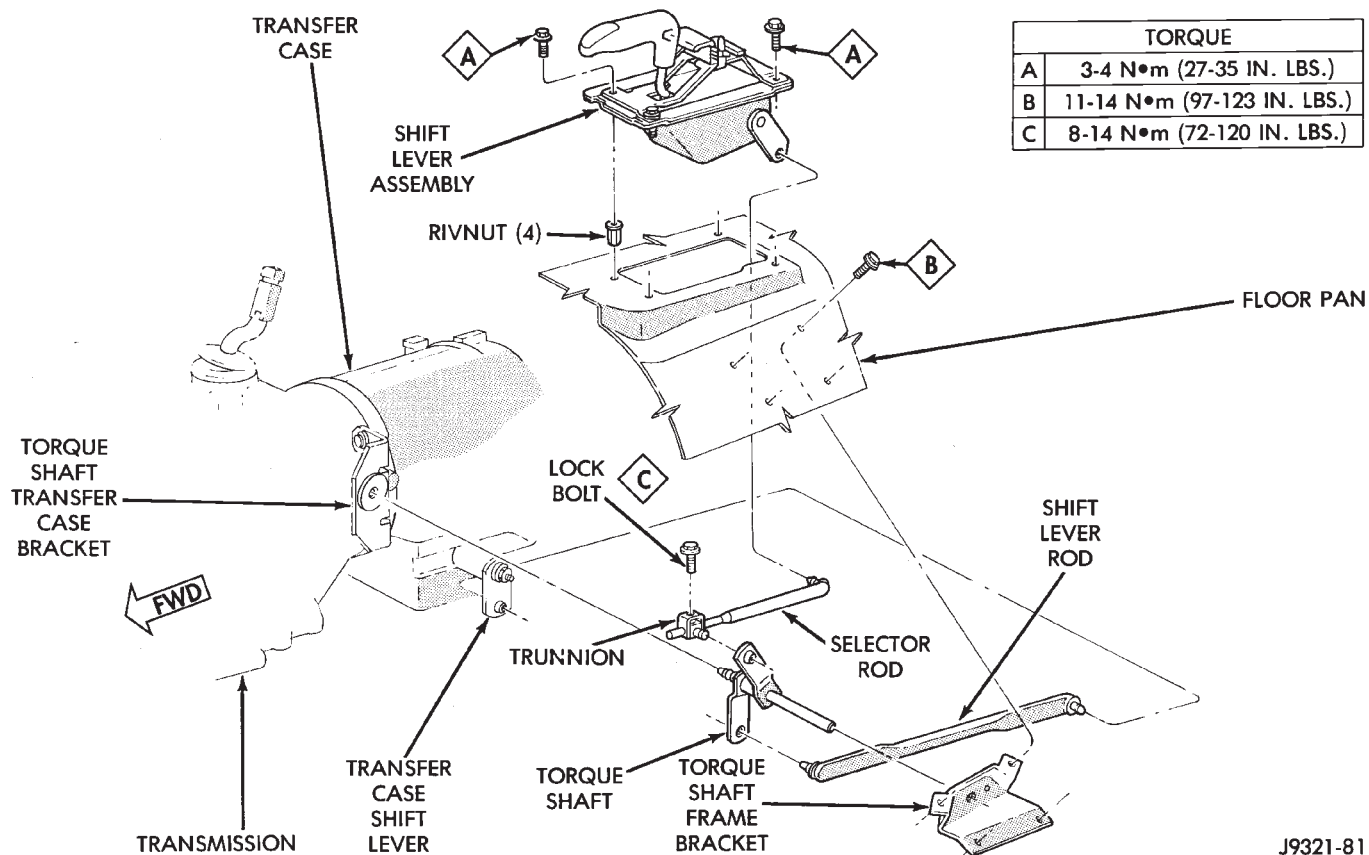


Fig. 4 Transfer Case Shift Linkage (Manual Transmission)

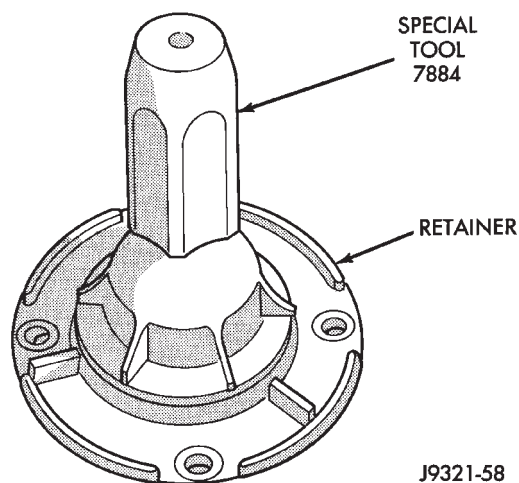


Fig. 58 Installing Seal In Front Bearing Retainer

the bearing can be removed with a two-jaw blind hole puller similar to the type used to remove a clutch pilot bushing.

The new bearing can be installed with tools similar to Driver Handle 8015 and Installer 7886 (Fig. 60).

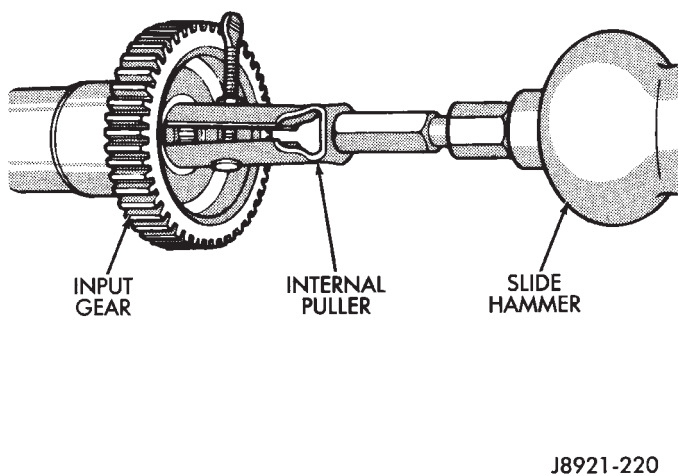


Fig. 59 Removing Input Gear Pilot Bearing

Replacing Rear Retainer Seal And Bushing

The rear retainer seal and bushing are serviceable parts. Both components are accessible once the retainer dust cap has been removed (Fig. 61).

Use a large pair of channel-lock pliers, or blunt punch to remove the dust cap. If a punch is used, work around the entire cap edge to remove it evenly from the retainer.

Remove the seal with a pry bar, drift, or punch. Then use a suitable size installer tool to position the seal in the retainer. The bushing can be replaced with a universal type bushing driver set once the seal has been removed from the retainer.

TRANSFER CASE ASSEMBLY AND ADJUSTMENT

Lubricate the transfer case components with the Mopar ATF Plus, Type 7176, Dexron II fluid during assembly operations.

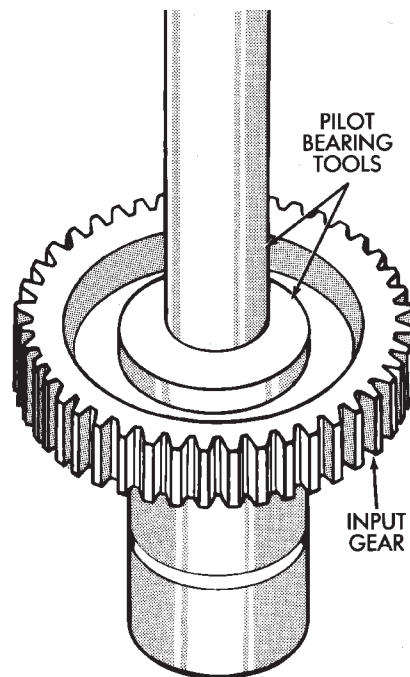


Fig. 60 Installing Input Gear Pilot Bearing

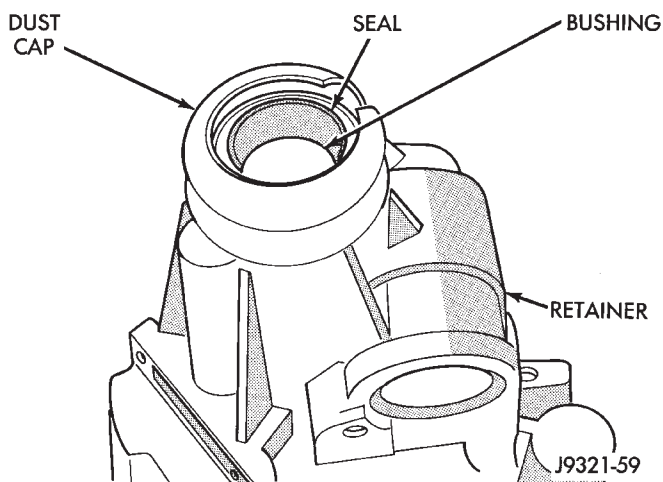


Fig. 61 Rear Retainer Cap, Bushing And Seal Position

Use petroleum jelly to prelubricate and hold mainshaft needle roller bearings and spacers in place. Petroleum jelly can also be used to lubricate seals, bushings and bearings during assembly.

Gaskets are **not** used in the NP249 transfer case. Instead, the mating surfaces of the case halves, retainer and extension are sealed with Mopar Gasket Maker, silicone adhesive/sealer, or Loctite 518.

PREPARING FRONT CASE FOR ASSEMBLY

(1) Support front case on wood blocks. Position case so sector shaft bore and input gear bearing are accessible.

(2) Lubricate sector shaft, shaft O-ring and shaft bore (in case) with petroleum jelly.

(3) Install sector in case (Fig. 62).

42RH/46RH GENERAL SPECIFICATIONS

TRANSMISSION MODEL	42RH	46RH
Oil Pump Clearances	0.089-0.190 mm (0.0035-0.0075 in.)	0.089-0.190 mm (0.0035-0.0075 in.)
Planetary End Play	0.127-1.22 mm (0.005-0.048 in.)	0.15-1.22 mm (0.006-0.048 in.)
Input Shaft End Play	0.56-2.31 mm (0.022-0.091 in.)	0.86-2.13 mm (0.034-0.084 in.)
Clutch Pack Clearance:		
Front Clutch - 3 Disc	1.88-3.17 mm (0.074-0.125 in.)	1.78-3.28 mm (0.070-0.129 in.)
Front Clutch - 4 Disc	1.70-3.40 mm (0.067-0.134 in.)	2.08-3.83 mm (0.082-0.151 in.)
Rear Clutch - 3 Disc	0.81-1.40 mm (0.032-0.055 in.)	
Rear Clutch - 4 Disc	0.81-1.40 mm (0.032-0.055 in.)	0.64-1.14 mm (0.025-0.045 in.)
Clutch Disc Usage:		
Front Clutch	4	3
Rear Clutch	4	4
Overdrive Clutch	4	4
Direct Clutch	6	8
Front Clutch Spring Usage	1	9
Band Adjustments: (backed off from 72 in. lbs.)		
Front Band	2½	2½
Rear Band	4	2
Recommended Fluid (all)	MOPAR ATF Plus, Type 7176 Automatic Transmission Fluid	

VIBRATION DIAGNOSIS

Vibration Sensitivity	Correction Codes For Mechanical Vibrations Within Specific MPH (km/h) Ranges								
	10 (16 km)	20 (32 km)	30 (48 km)	40 (64 km)	50 (80 km)	60 (96 km)	70 (112 km)	80 (128 km)	90 (144 km)
Vehicle Speed Sensitive		← W →	← WH →	← UJ and AN →	← WB →	← TRR and SSC →	← TB →	← TLR →	← DSY →
Torque Sensitive	← UJA →			← UJ and AN →			← UJA →		
Engine Speed Sensitive		← EA →			← ES →				
	← DEM →								
Vibration Sensitivity	Correction Codes For Audible Vibrations Within Specific MPH (km/h) Ranges								
	10 (16 km)	20 (32 km)	30 (48 km)	40 (64 km)	50 (80 km)	60 (96 km)	70 (112 km)	80 (128 km)	90 (144 km)
Vehicle Speed Sensitive			← UJA →	← JU and WH →	← TW →	← DSY →			
Torque Sensitive				← AN →	← UJ and TED →				
Engine Speed Sensitive	← DEM →	← ADB →			← EA and ES →				

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U-joint is worn it will cause vibration with almost any vehicle speed/engine torque condition.

DSY—Drive Shaft and Yokes: Vehicle speed sensitive, mechanical/audible vibration. The condition will not cause vibration below 35 mph (56 km/h). Excessive runout, unbalance or dents and bends in the shaft will cause the vibration. Identify the actual cause and repair/replace as necessary.

WB—Wheel Bearings: Vehicle speed sensitive, mechanical/audible vibration. Loose wheel bearings cause shimmy-like vibration at 35 mph (56 km/h) and above. Worn bearings will also produce a growl noise at low vehicle speed and a whine noise at high vehicle speed. The wheel bearings must be adjusted or replaced, as applicable.

AN—Axle Noise: Engine torque/vehicle speed sensitive, mechanical/audible vibration. The axle will not cause mechanical vibration unless the axle shaft is bent. Worn or damaged axle pinion shaft or differential gears and bearings will cause noise. Replace the defective component(s) as necessary.

SSC—Suspension and Steering Components: Vehicle speed sensitive, mechanical vibration. Worn suspension/steering components can cause mechanical vibration at speeds above 20 mph (32 km/h). Identify and repair or replace the defective component(s).

EA—Engine Driven Accessories: Engine speed sensitive, mechanical/audible vibration. Vibration can be caused by loose or broken A/C compressor, PS pump, water pump, generator or brackets, etc. Usually more noticeable when the transmission is shifted into the NEUTRAL position and the engine speed (rpm) increased. Inspect the engine driven accessories in the engine compartment. Repair/replace as necessary.

ADB—Accessory Drive Belts: Engine speed sensitive, audible vibration. Worn drive belts can cause a vibration that produces either a droning, fluttering or rumbling noise. Inspect the drive belt(s) and tighten/replace as necessary.

DEM—Damaged Engine or Transmission Support Mounts: Engine speed sensitive, mechanical/audible vibration. If a support mount is worn, noise or vibration will occur. Inspect the support mounts and repair/replace as necessary.

ES—Exhaust System: Engine speed sensitive, mechanical/audible vibration. If loose exhaust components contact the vehicle body they will cause noise and vibration. Inspect the exhaust system for loose, broken and mis-aligned components and repair/replace as necessary.

WIND DEFLECTOR ADJUSTMENT

- (1) Open sunroof.
- (2) Position wind deflector 1 mm (0.040 in.) rearward of roof panel forward edge (Fig. 2).
- (3) Secure wind deflector to sunroof unit.

GLASS PANEL

REMOVAL

- (1) Remove wind deflector mechanism covers (Fig. 1)
- (2) Position glass to vent position.
- (3) Position sunshade full rearward.
- (4) Loosen nuts holding glass panel to side adjustment brackets.
- (5) Slide glass panel rearward 12mm (0.5in.) and separate glass from sunroof unit.

INSTALLATION

- (1) Position glass panel in opening with logo rearward and slide panel forward 12 mm (0.5in.).
- (2) Verify that attaching nuts are below top surface of glass adjustment brackets.
- (3) Close sunroof to center glass panel in roof opening.
- (4) Tighten center screws to hold adjustment.
- (5) Open glass to vent position and tighten nuts to 8 N·m (70.8 in. lbs.).
- (6) Close glass and check alignment.
- (7) Install mechanism covers.
- (8) Adjust wind deflector, if necessary.

ADJUSTMENT BRACKET

REMOVAL AND INSTALLATION

- (1) Remove wind deflector, mechanism covers and glass panel.
- (2) Move glass carriage to vent position and remove rearward adjustment bolt from adjustment bracket.
- (3) Lift rear of adjustment bracket to highest vertical position and disengage front of bracket from unit (Fig. 3).
- (4) For installation reverse the preceding operation. Adjust glass, and wind deflector as necessary.

DRAIN CHANNEL

REMOVAL AND INSTALLATION

- (1) Remove wind deflector mechanism covers and glass panel.
- (2) Locate glass carriage to vent position and drain channel in full forward position.
- (3) Remove screws holding drain channel to support frame.
- (4) For installation reverse preceding operation.

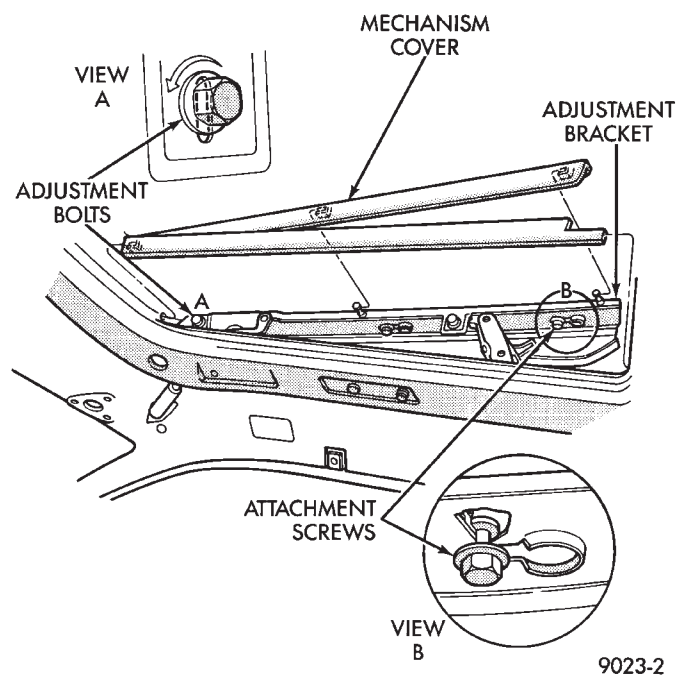


Fig. 3 Glass Height Vertical Adjustment

DRIVE CABLE LOCATORS

REMOVAL AND INSTALLATION

- (1) Position glass 19 mm (0.75 in.) until rearward cable locator is visible.
- (2) Remove screws holding drive cable locator to unit.
- (3) Remove travel limiting micro switch grommet and disconnect wire connector.
- (4) Insert a small screwdriver under rear edge of locator and pry locator from track Fig. 4.

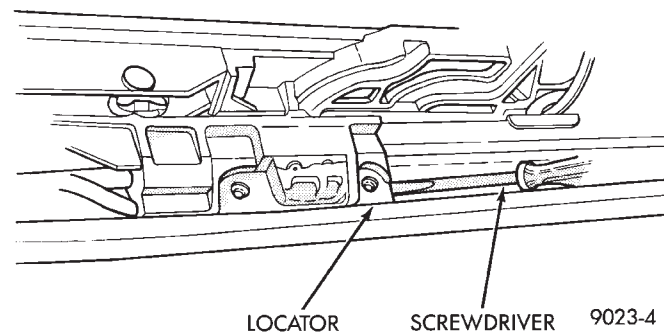


Fig. 4 Removing Cable Drive Locator

- (5) For installation reverse preceding operation. The small out-board lip underneath cable locator slips under bottom slot on guide track. After locator is seated install screws.

MOTOR AND DRIVE GEARS

REMOVAL

- (1) Open sunroof to vent position.
- (2) Remove headlining.

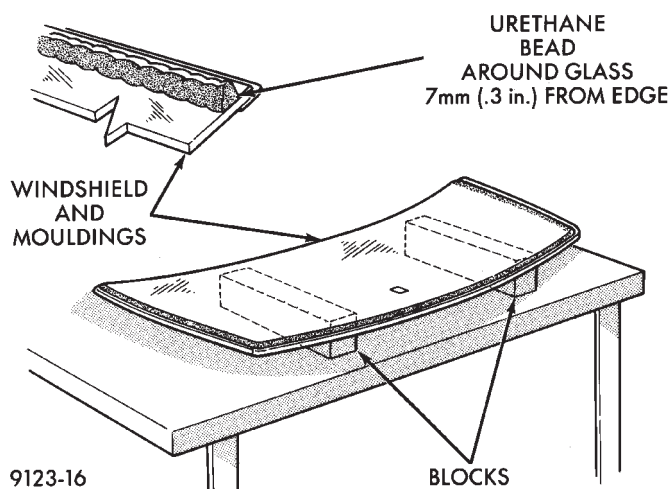


Fig. 6 Work Surface Set up and Molding Installation

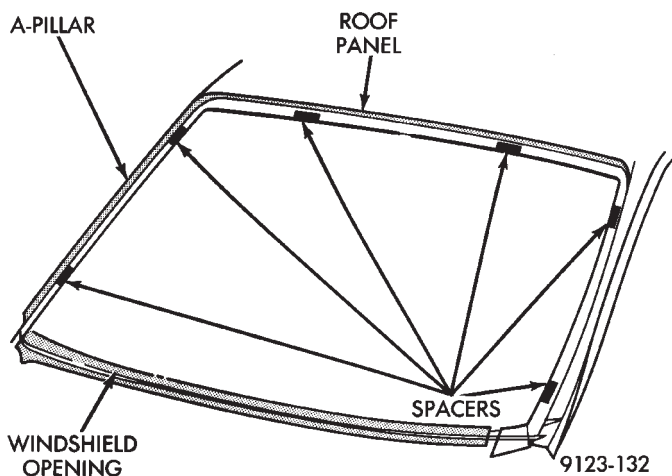


Fig. 7 Position Urethane Compression Spacers

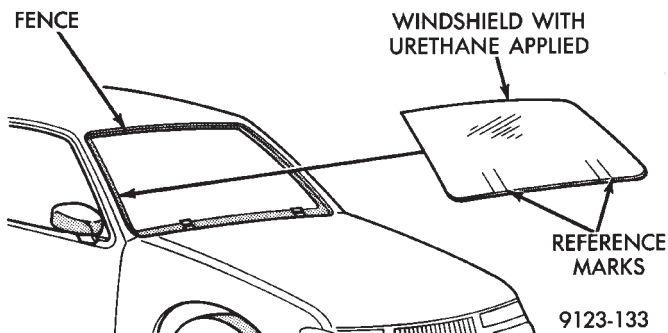


Fig. 8 Lower Windshield Into Position

LEAK TEST

Water test glass with a spray only. **Do not use hard streams of water.** Work from the bottom to the top of glass.

SEALING LEAK AREAS

- (1) Thoroughly clean and remove all foreign material from leak area. Dry area with compressed air.
- (2) Seal leak area with butyl sealant. Allow sealant to cure for at least 1/2 hour. Next, water test glass to ensure that leak area is sealed.

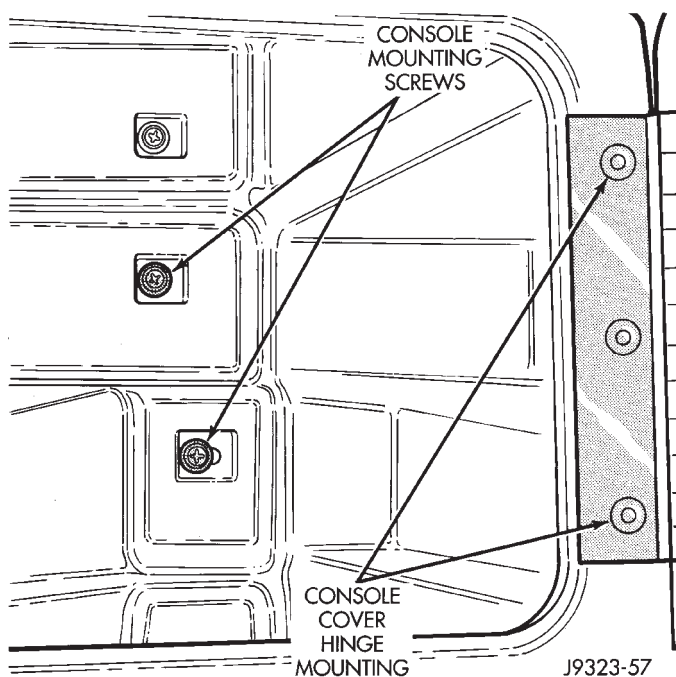


Fig. 35 Console Mounting/Rear

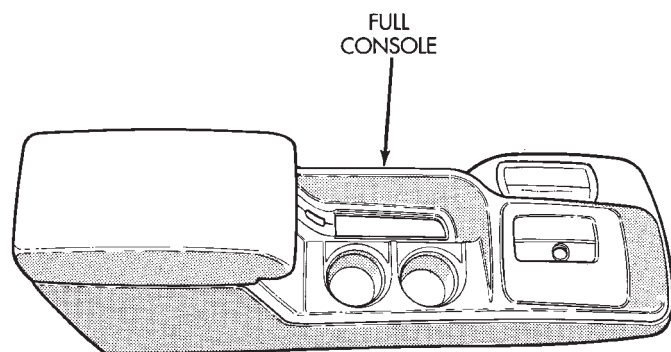


Fig. 36 Full Console

CARPETS AND FLOOR MATS

FRONT CARPET/MAT

REMOVAL

- (1) Remove lower B-pillar trim panels.
- (2) Remove front and rear seats (as applicable).
- (3) As necessary, remove trim panels and moldings.
- (4) Remove floor console.
- (5) Remove all other interfering components.
- (6) Remove carpet and mat from floor panel (Fig. 37).

For installation, reverse removal procedure.

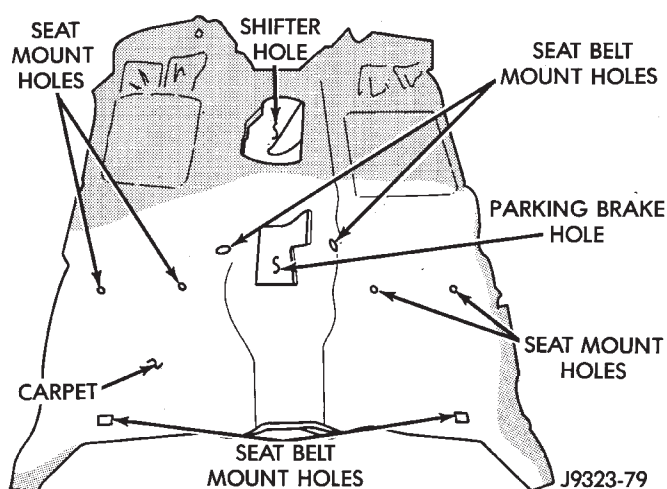


Fig. 37 Front Carpet & Mat

CARGO CARPET/MAT

REMOVAL

- (1) Remove quarter trim panels.
- (2) Remove retaining screws, and liftgate trim panel.
- (3) Drill-out retaining rivet heads and remove cargo tie-down footman loops from carpet (Fig. 38).

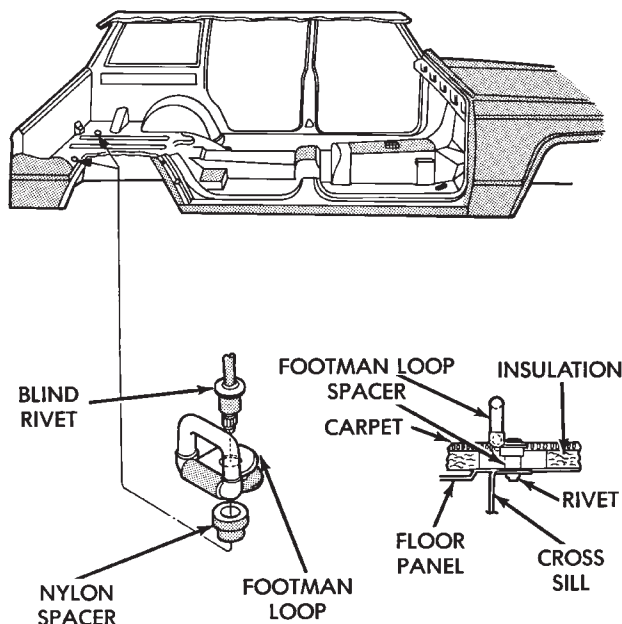


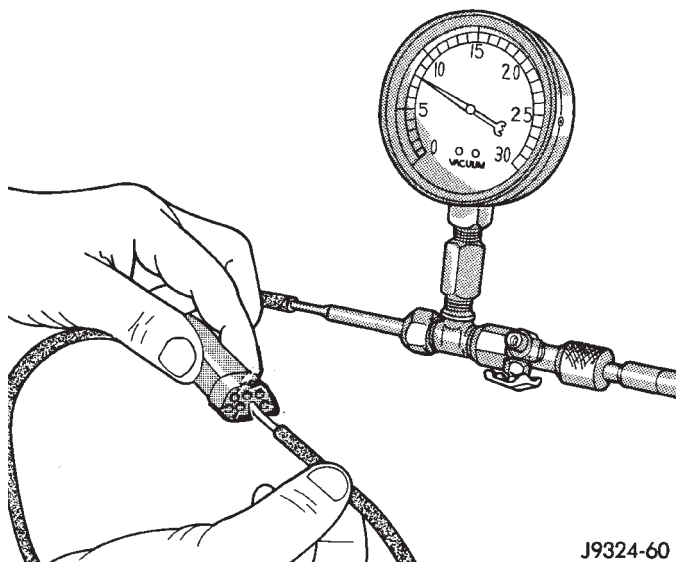
Fig. 38 Cargo Tie-Down Footman Loop

- (4) Remove rear seats and belts.
 - (5) As necessary, remove trim panels and moldings.
 - (6) Remove all other interfering components.
 - (7) Remove carpet and mat from floor panel (Fig. 39).
 - (8) If necessary, remove skid strips from carpet.
- For installation, reverse removal procedure.

gauge cannot achieve the calibrated setting, a vacuum circuit or component has a leak.

LOCATING VACUUM LEAKS

To locate a vacuum leak, disconnect 7-way vacuum connector behind the Heater-A/C control panel. Connect the calibrated vacuum hose probe to each port in the vacuum harness connector (Fig. 4). After each connection is made, the test gauge should return to calibrated setting. If all circuits function properly, replace Heater-A/C control. If not, determine the color of the vacuum circuit that is leaking. To determine vacuum line colors, refer to the Vacuum Circuits chart for the Heater-A/C (manual) units. Disconnect the vacuum actuator at the other end of the circuit. Instrument panel removal may be necessary to gain access to some components. Block the end of the disconnected vacuum line. The test gauge should return to calibrated setting. If not, that circuit has a leak and must be repaired or replaced. If test gauge returns to calibrated setting, the vacuum actuator must be replaced.



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Fig. 4 Vacuum Circuit Test

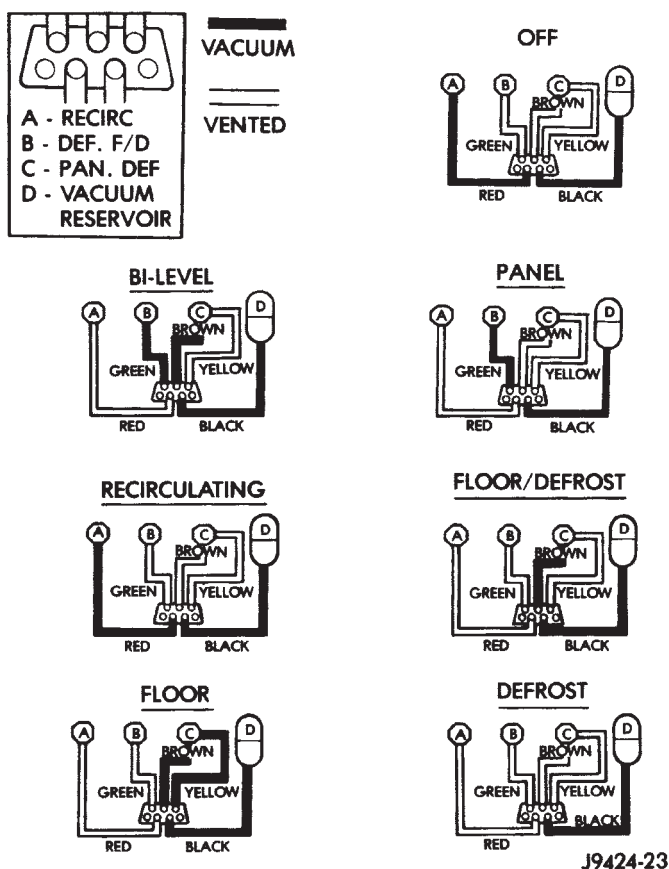
CONDENSATE WATER DRAINAGE

Condensate that accumulates in the bottom of the evaporator housing is drained from a drain hole in the Heater-A/C unit. When the Heater-A/C unit is installed in the vehicle, be sure that the drain hole is located properly in the dash panel. If the drain hole is out of position, water will drain into the passenger compartment. It is normal to see condensate drainage below the vehicle.

BLOWER MOTOR VIBRATION AND/OR NOISE DIAGNOSIS

The blower resistor supplies the blower motor with varied voltage (low and middle speeds) or battery voltage (high speed).

VACUUM CIRCUITS



J9424-23

CAUTION: Stay clear of the blower motor and resistor (Hot). Do not operate the blower motor with the resistor block removed from the Heater-A/C unit.

Refer to the Blower Motor Vibration/Noise chart in this section for diagnosis.

BLOWER MOTOR ELECTRICAL DIAGNOSIS

Refer to the Blower Motor Electrical System Diagnosis chart in this section. Also refer to Group 8W, Wiring Diagrams for more information.

COMPRESSOR NOISE

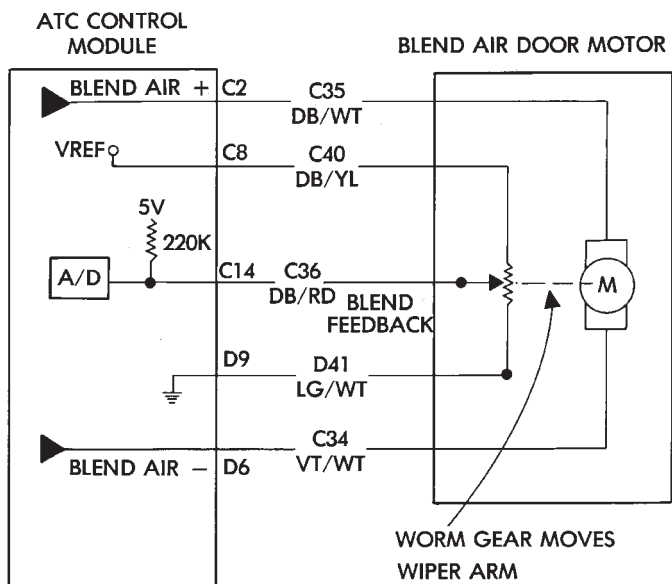
Excessive noise that occurs when the air conditioning is being used, can be caused by:

- Loose bolts
- Mounting brackets
- Loose clutch
- Excessive high refrigerant system operating pressure

Verify compressor drive belt condition, proper refrigerant charge and head pressure before compressor repair is performed.

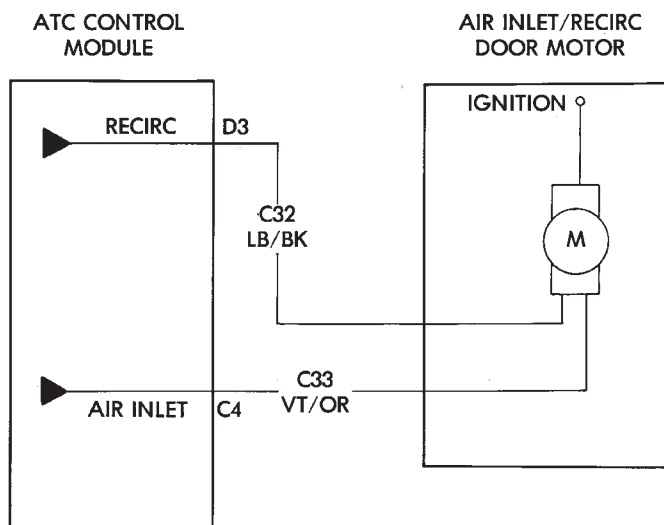
For noise diagnostic procedures, refer to the Compressor Noise and Compressor Clutch Diagnosis chart in this section.

BLEND AIR DOOR ACTUATOR DRIVE CIRCUIT



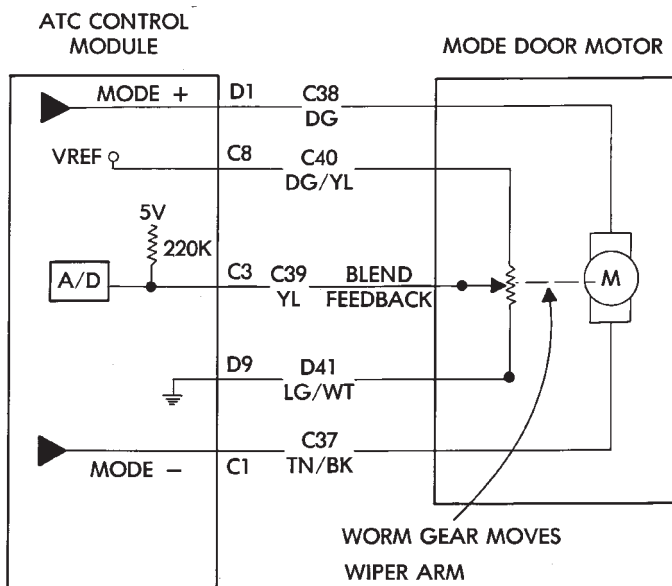
J9324-55

AIR INLET/RECIRC DOOR ACTUATOR DRIVE CIRCUIT



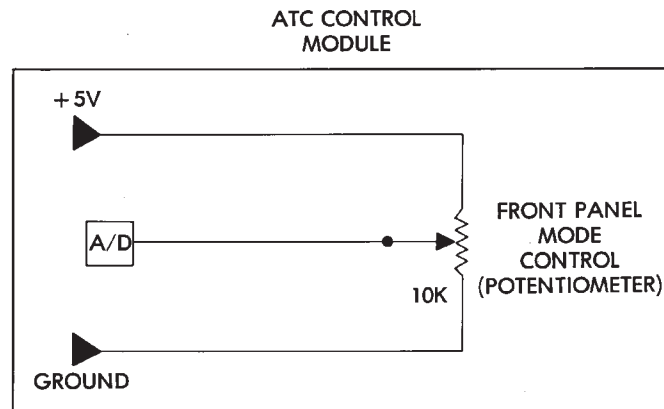
J9324-57

MODE DOOR ACTUATOR DRIVE CIRCUIT



J9324-56

FRONT PANEL MODE CONTROL



J9324-58

- (7) Connect the negative cable to the battery.

BLOWER MOTOR AND WHEEL

The blower motor and wheel are located under the glove box and can be removed from the passenger compartment.

REMOVAL

- (1) Disconnect the negative cable from the battery.
- (2) Disconnect the blower motor cooling tube (Fig. 4).
- (3) Remove the blower motor electrical connector from the retainer. Disconnect the electrical connector (Fig. 4).
- (4) Remove the blower motor and wheel assembly mounting screws (Fig. 4).
- (5) Remove the blower motor and wheel assembly.

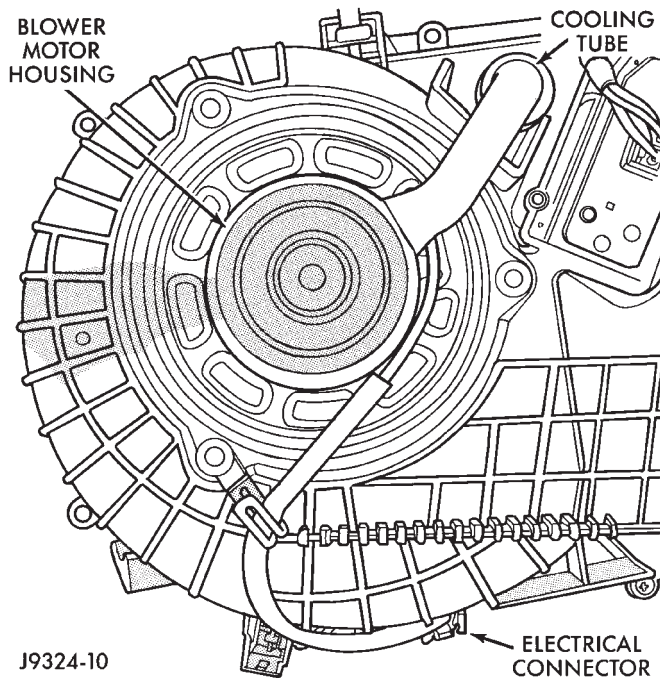


Fig. 4 Blower Motor

- (6) Remove the blower motor wheel retainer clip (Fig. 5).
- (7) Pull the blower motor wheel off of the blower motor shaft.

INSPECTION

Inspect the blower motor seal for damage.

INSTALLATION

- (1) Press the blower motor wheel onto the blower motor shaft. Be sure the flat on the blower motor shaft lines up with the flat inside the wheel.
- (2) Install the retainer clip. The ears of the retainer clip must be over the flat surface on the motor shaft.
- (3) Be sure the seal is installed on the blower motor housing (Fig. 6).

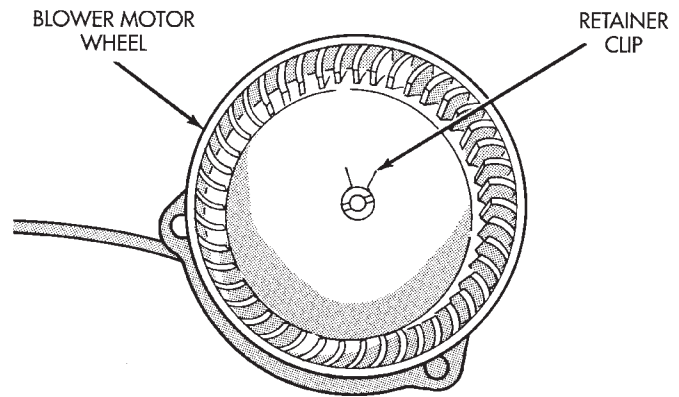


Fig. 5 Blower Motor Wheel

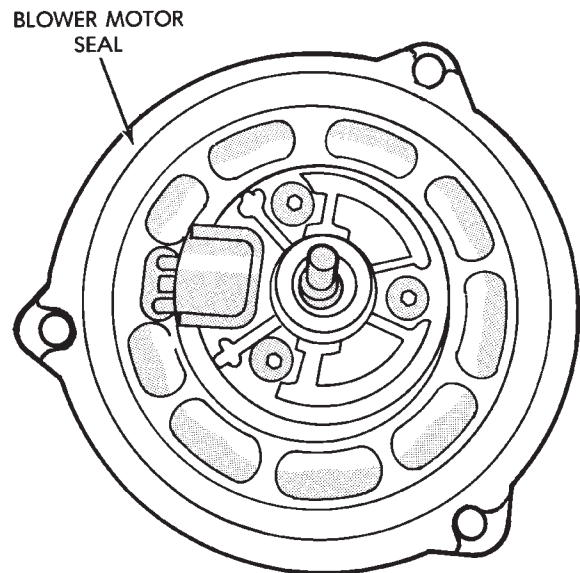


Fig. 6 Blower Motor Seal

- (4) Install the blower motor and wheel assembly.
- (5) Install and tighten blower motor and wheel assembly screws.
- (6) Connect the electrical connector and install into the retainer.
- (7) Connect the blower motor cooling tube.
- (8) Connect the negative cable to the battery.

BLOWER MOTOR RESISTOR

The blower motor resistor is located under the glove box and can be removed from the passenger compartment.

REMOVAL

- (1) Disconnect the negative cable from the battery.
- (2) Remove the blower motor resistor connector(s).
- (3) Remove the resistor retaining screws.
- (4) Remove the blower motor resistor (Fig. 7).

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