JEEP®

2002
LIBERTY

SERVICE MANUAL and
2.4L GAS SUPPLEMENT

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

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TOWING (Continued)

WARNING: WHEN TOWING A DISABLED VEHICLE AND THE DRIVE WHEELS ARE SECURED IN A WHEEL LIFT OR TOW DOLLIES, ENSURE THE TRANSMISSION IS IN THE PARK POSITION.

CAUTION: Many vehicles are equipped with air dams, spoilers, and/or ground effect panels. To avoid component damage, a wheel-lift towing vehicle or a flat-bed hauling vehicle is recommended.

FOUR WHEEL DRIVE TOWING—REAR END LIFTED

WARNING: ENSURE VEHICLE IS ON A LEVEL SURFACE OR THE WHEELS ARE BLOCKED TO PREVENT VEHICLE FROM ROLLING.

(1) Attach wheel lift device to front wheels.
(2) Place the transmission in neutral.
(3) Raise the front of the vehicle off the ground and install tow dollies under front wheels.
(4) Attach wheel lift device to rear wheels and raise vehicle to towing position.
(5) Attach safety chains. Route chains so not to interfere with tail pipe when vehicle is lifted.
(6) Turn the ignition switch to the OFF position to unlock the steering wheel.

CAUTION: Do not use steering column lock to secure steering wheel during towing operation.

(7) Secure steering wheel in straight ahead position with a clamp device designed for towing.
(8) Place transmission in park.

FOUR WHEEL DRIVE TOWING—FRONT END LIFTED

WARNING: ENSURE VEHICLE IS ON A LEVEL SURFACE OR THE WHEELS ARE BLOCKED TO PREVENT VEHICLE FROM ROLLING.

(1) Attach wheel lift device to rear wheels.
(2) Place the transmission in neutral.
(3) Raise the rear of the vehicle off the ground and install tow dollies under rear wheels.
(4) Attach wheel lift device to front wheels and raise vehicle to towing position.
(5) Attach the safety chains.

CAUTION: Do not use steering column lock to secure steering wheel during towing operation.

(6) Turn the ignition switch to the OFF position to unlock the steering wheel.
(7) Secure steering wheel in straight ahead position with a clamp device designed for towing.
(8) Place transmission in park.

UPPER BALL JOINT

REMOVAL

(1) Raise and support the vehicle.
(2) Support the rear axle with a hydraulic jack.
(3) Remove the ball joint pinch bolt from the top of the axle. (Fig. 7)
(4) Seperate the ball joint arm assembly from the differential housing by prying upwards.

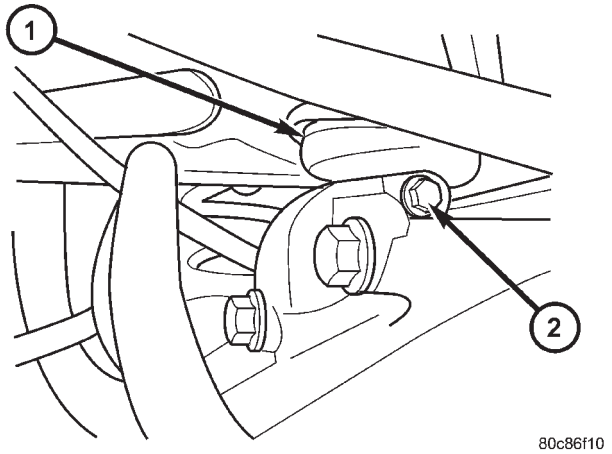

Fig. 7 BALL JOINT PINCH BOLT

1 - UPPER BALL JOINT
2 - PINCH BOLT

INSTALLATION

(1) Raise the rear axle with a hydraulic jack to align the ball joint with the differential housing bracket.
(2) Insert the ball joint into the differential housing bracket.
(3) Install the ball joint pinch bolt and tighten to 95 N·m (70 ft. lbs.). (Fig. 7).
(4) Remove the supports and lower the vehicle.

UPPER CONTROL ARM

DESCRIPTION - UPPER SUSPENSION ARM, BUSHINGS, AND BALL JOINT

The suspension arm uses vertical spool bushings to isolate road noise. The suspension arm is bolted through bushings to cage nuts in the body and a ball joint to the top of the differential housing.

OPERATION - UPPER SUSPENSION ARM, BUSHINGS, AND BALL JOINT

The upper suspension arm provides fore/aft and lateral location of the rear axle. The suspension arm travel is limited through the use of jounce bumpers in compression and shock absorbers in rebound.

REMOVAL

(1) Raise and support the vehicle.
(2) Support the rear axle with a hydraulic jack.
(3) Remove the ball joint pinch bolt from the top of the differential housing bracket (Fig. 7).
(4) Remove partial nuts from the heat shield in order to lower the shield down enough to get the proper clearence to remove the right side bolt from the body.
(5) Remove the upper suspension arm mounting bolts from the body and remove the arm (Fig. 8).

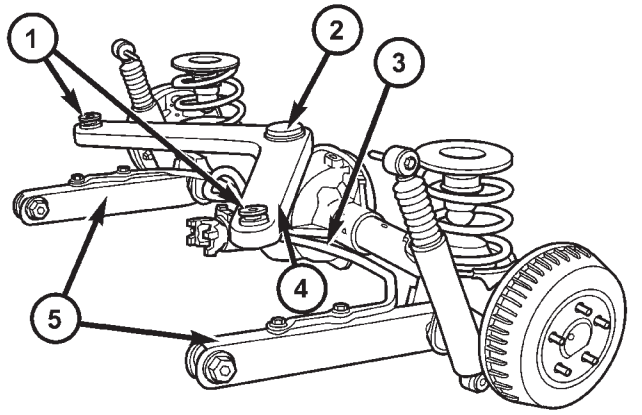

Fig. 8 UPPER CONTROL ARM

1 - BODY MOUNTS
2 - UPPER BALL JOINT
3 - STABILIZER BAR
4 - UPPER CONTROL ARM
5 - LOWER CONTROL ARM

(6) Remove the support bracket mounting bolts if needed. (Fig. 9)

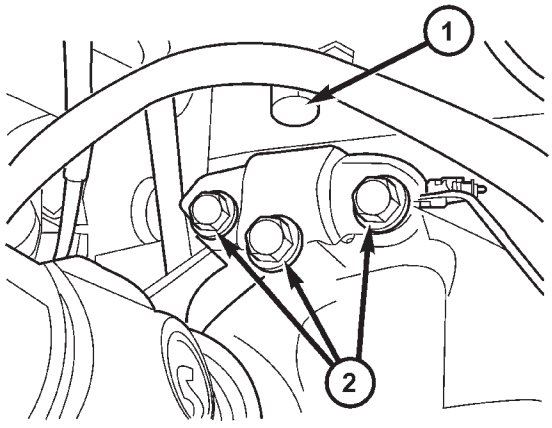

Fig. 9 BALL JOINT BRACKET

1 - UPPER BALL JOINT
2 - SUPPORT BRACKET BOLTS

HALF SHAFT

TABLE OF CONTENTS

HALF SHAFT

CAUTION

CAUTION:: Never grasp half shaft assembly by the boots. This may cause the boot to pucker or crease and reduce the service life of the boot.
Avoid over angulating or stroking the C/V joints when handling the half shaft.
Half shafts exposed to battery acid, transmission fluid, brake fluid, differential fluid or gasoline may cause the boots to deteriorate.

DIAGNOSIS AND TESTING - HALF SHAFT

Check for grease at the inboard and outboard C/V joint. This is a sign of boot or boot clamp damage.

NOISE AND/OR VIBRATION IN TURNS

A clicking noise or a vibration in turns could be caused by a damaged outer C/V or inner tripod joint seal boot or seal boot clamps. This will result in the loss/contamination of the joint grease, resulting in inadequate lubrication of the joint. Noise could also be caused by another component of the vehicle coming in contact with the half shafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a result of a damaged or worn C/V joint. A torn boot or loose/missing clamp on the inner/outer joint which has allowed the grease to be lost will damage the C/V joint.

SHUDDER OR VIBRATION DURING ACCELERATION

This problem could be a result of a worn/damaged inner tripod joint or a sticking tripod joint. Improper wheel alignment may also cause a shudder or vibration.

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of out of balance front tires or tire/wheel runout. Foreign material (mud, etc.) packed on the backside of the wheel(s) will also cause a vibration.

REMOVAL

(1) Raise and support vehicle.
(2) Remove wheel and tire assembly.
(3) Remove half shaft hub nut.
(4) Remove stabilizer link (Fig. 1).

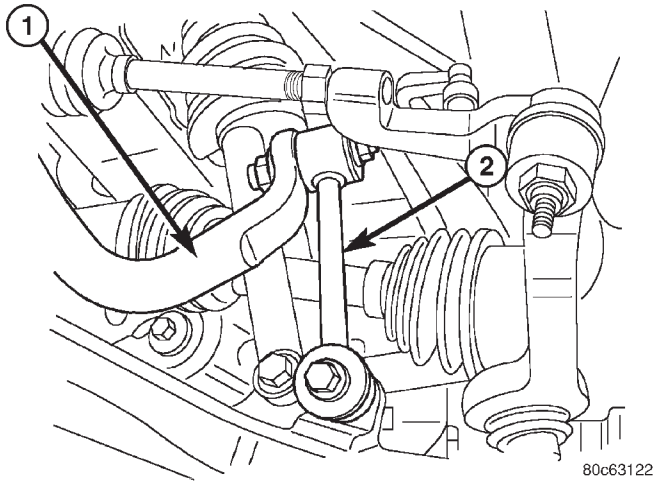

Fig. 1 STABILIZER BAR LINK

1 - STABILIZER BAR
2 - STABILIZER BAR LINK

FRONT AXLE - 186FIA (Continued)

(11) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 19).

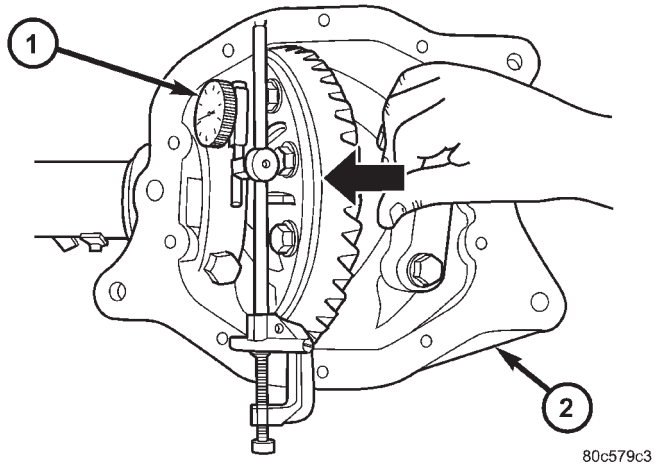

Fig. 19 DIFFERENTIAL RING GEAR SIDE

1 - DIAL INDICATOR
2 - DIFFERENTIAL HOUSING

(12) Add 0.152 mm (0.006 in.) to the zero end play total. This new total represents the thickness of shims to compress or preload the new bearings when the differential is installed.

(13) Rotate dial indicator out of the way on the pilot stud.

(14) Remove differential case and dummy bearings from the housing.

(15) Install the pinion gear in the housing. Install the pinion yoke and establish the correct pinion rotating torque.

(16) Install differential case and Dummy Bearings D-348 in the housing.

(17) Install a single dummy shim in the ring gear side. Install bearing caps and tighten bolts snug.

(18) Seat ring gear side dummy bearing (Fig. 17).

(19) Position the dial indicator plunger on a flat surface between the ring gear bolt heads.

(20) Push and hold differential case toward pinion gear and zero dial indicator (Fig. 20).

(21) Push and hold differential case to ring gear side of the housing and record dial indicator reading (Fig. 21). Add dummy shim thickness to this reading. This will be the total shim thickness to achieve zero backlash.

(22) Subtract 0.076 mm (0.003 in.) from the dial indicator reading to compensate for backlash between ring and pinion gears. This total is the thickness shim required to achieve proper backlash.

(23) Subtract the backlash shim thickness from the total preload shim thickness. The remainder is the shim thickness required on the pinion side of the axle housing.

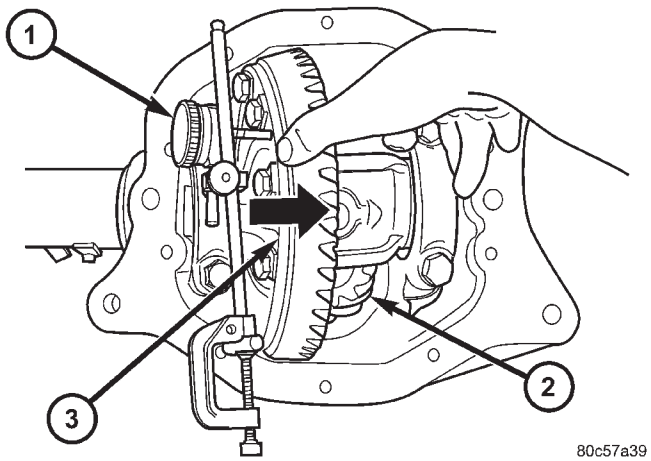

Fig. 20 DIFFERENTIAL PINION GEAR SIDE

1 - DIAL INDICATOR
2 - PINION GEAR
3 - RING GEAR

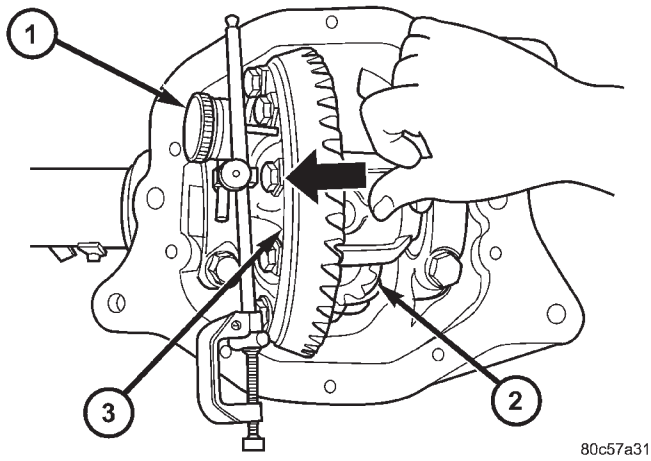

Fig. 21 DIFFERENTIAL RING GEAR SIDE

1 - DIAL INDICATOR
2 - PINION GEAR
3 - RING GEAR

(24) Rotate dial indicator out of the way on pilot stud.

(25) Remove differential case and dummy bearings from the housing.

(26) Install side bearings and cups on differential case.

(27) Install spreader W-129-B with Adapter Set 6987 on the housing and spread axle opening enough to receive differential case.

CAUTION: Never spread the differential housing over 0.34 mm (0.013 in.). If the housing is over-spread, it could be distorted or damaged.

rear propeller shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are splined to the axle shafts.

STANDARD DIFFERENTIAL

During straight-ahead driving, the differential pinion gears do not rotate on the pinion mate shaft. This occurs because input torque applied to the gears is divided and distributed equally between the two side gears. As a result, the pinion gears revolve with the pinion mate shaft but do not rotate around it (Fig. 2).

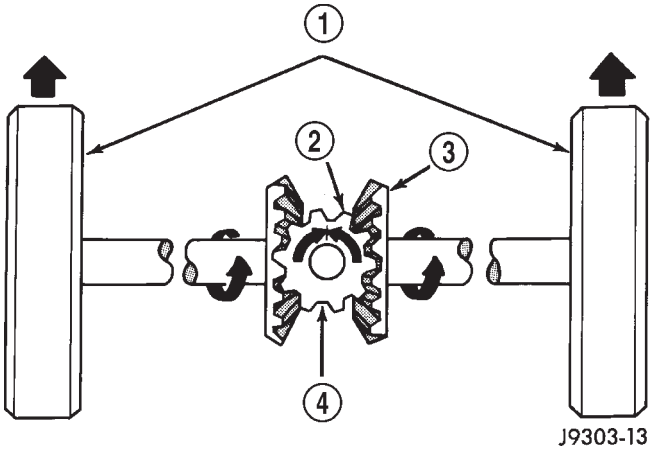

Fig. 2 DIFFERENTIAL-STRAIGHT AHEAD DRIVING

1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
2 - PINION GEAR
3 - SIDE GEAR
4 - PINION GEARS ROTATE WITH CASE

When turning corners, the outside wheel must travel a greater distance than the inside wheel to complete a turn. The difference must be compensated for to prevent the tires from scuffing and skidding through turns. To accomplish this, the differential allows the axle shafts to turn at unequal speeds (Fig. 3). In this instance, the input torque applied to the pinion gears is not divided equally. The pinion gears now rotate around the pinion mate shaft in opposite directions. This allows the side gear and axle shaft attached to the outside wheel to rotate at a faster speed.

TRAC-LOK™ DIFFERENTIAL

The Trac-lok™ clutches are engaged by two concurrent forces. The first being the preload force exerted through Belleville spring washers within the clutch packs. The second is the separating forces generated by the side gears as torque is applied through the ring gear (Fig. 4).

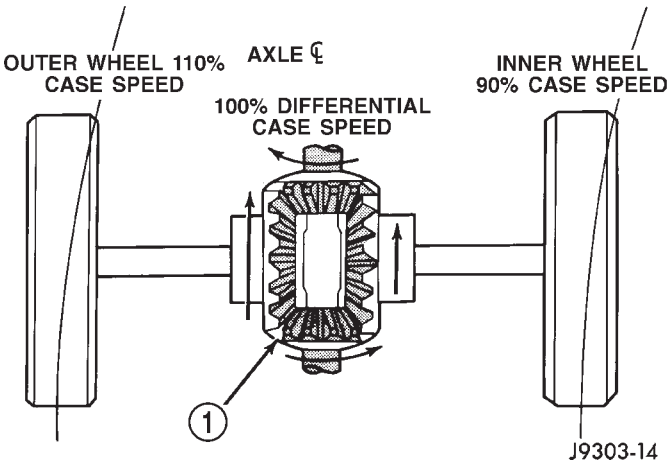

Fig. 3 DIFFERENTIAL-ON TURNS

1 - PINION GEARS ROTATE ON PINION SHAFT

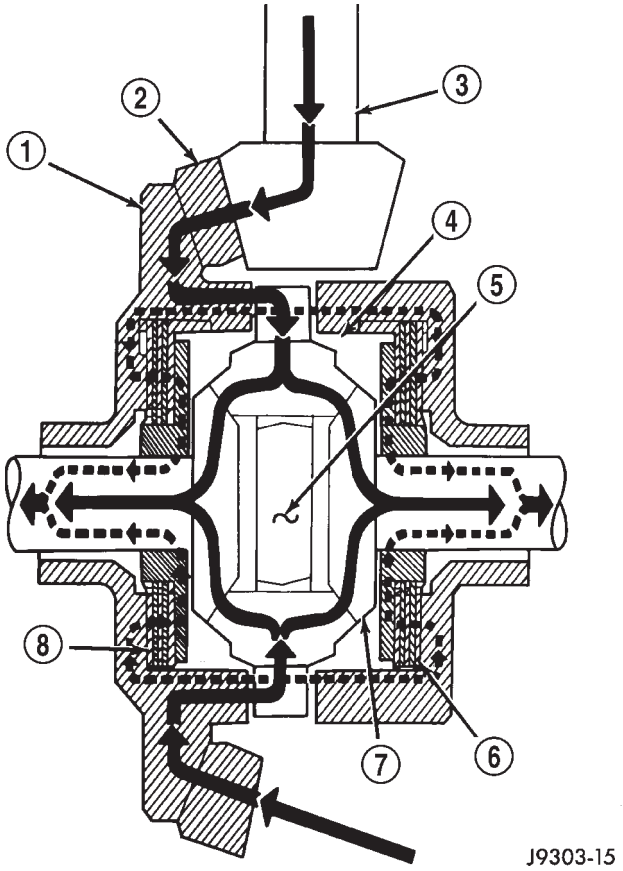

Fig. 4 TRAC-LOK DIFFERENTIAL

1 - CASE
2 - RING GEAR
3 - DRIVE PINION
4 - PINION GEAR
5 - MATE SHAFT
6 - CLUTCH PACK
7 - SIDE GEAR
8 - CLUTCH PACK

PINION SEAL (Continued)

(8) Fill differential with gear lubricant.
(9) Install the brake drums
(10) Install wheel and tire assemblies.
(11) Lower the vehicle.

COLLAPSIBLE SPACER

REMOVAL

(1) Raise and support the vehicle.
(2) Remove wheel and tire assemblies.
(3) Remove rear brake drums.
(4) Mark the propeller shaft and pinion yoke for installation reference.
(5) Remove the propeller shaft from the yoke.
(6) Rotate the pinion gear three or four times.
(7) Measure and record torque to rotate the pinion gear with an inch pound dial-type torque wrench.
(8) Hold pinion yoke with Spanner Wrench 6958 and remove pinion nut and washer.
(9) Remove the pinion yoke with Remover C-452 and Flange Wrench C-3281 (Fig. 38).

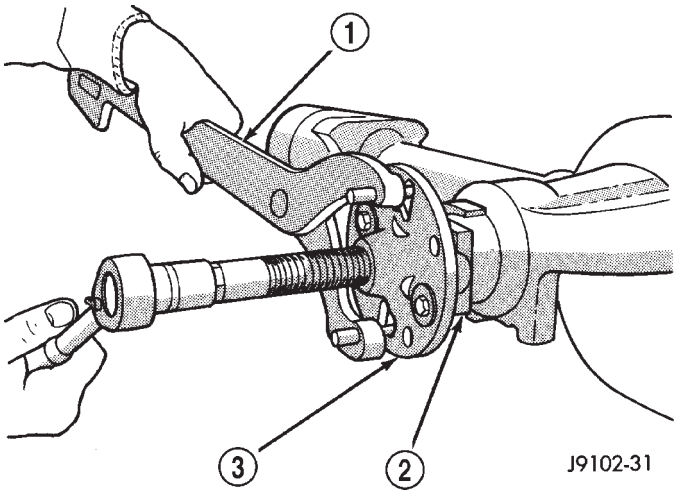

Fig. 38 PINION YOKE

1 - FLANGE WRENCH
2 - YOKE
3 - REMOVER

(10) Remove pinion shaft seal with a pry tool or a slide hammer mounted screw.
(11) Remove front pinion bearing using a pair of pick tools. Pull the bearing straight off the pinion gear shaft. If the bearing becomes bound on the pinion shaft, lightly tap the end of the pinion gear with a rawhide/rubber hammer.
(12) Remove the collapsible spacer.

INSTALLATION

(1) Install a **new** collapsible preload spacer on pinion shaft.
(2) Install pinion front bearing.
(3) Apply a light coating of gear lubricant on the lip of pinion seal and install a **new** seal with an appropriate installer (Fig. 39).

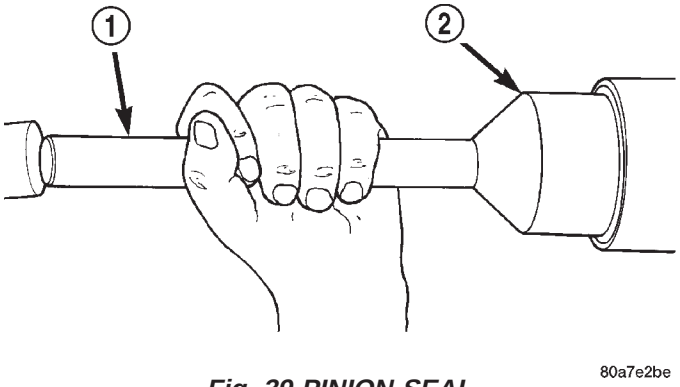

Fig. 39 PINION SEAL

1 - HANDLE
2 - INSTALLER

(4) Install yoke with Screw 8112, Cup 8109 and Spanner Wrench 6958 (Fig. 40).

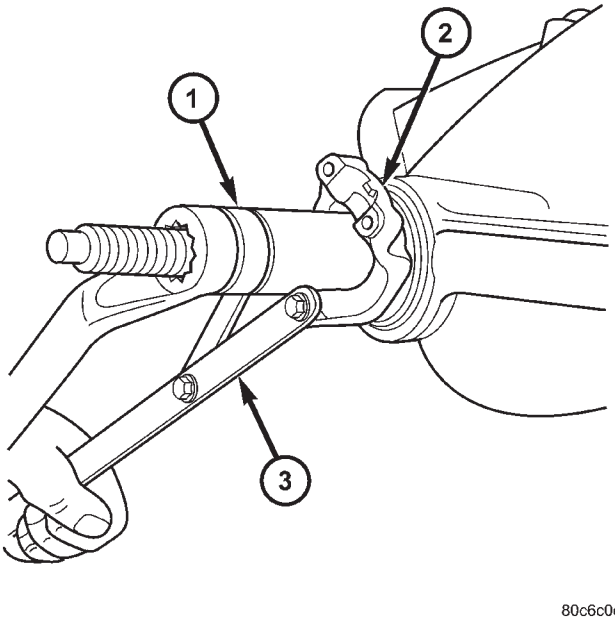

Fig. 40 PINION YOKE INSTALLER

1 - INSTALLER
2 - PINION YOKE
3 - WRENCH

(5) Install yoke washer and **new** nut on the pinion gear. Tighten the nut to 271 N·m (200 ft. lbs.).

CAUTION: Never loosen pinion gear nut to decrease pinion gear bearing rotating torque and never exceed specified preload torque. If preload torque or rotating torque is exceeded a new collapsible spacer must be installed.

REAR AXLE - 8 1/4 (Continued)

Condition	Possible Causes	Correction
Loss Of Lubricant	1. Lubricant level too high.	1. Drain lubricant to the correct level.
	2. Worn axle shaft seals.	2. Replace seals.
	3. Cracked differential housing.	3. Repair as necessary.
	4. Worn pinion seal.	4. Replace seal.
	5. Worn/scored yoke.	5. Replace yoke and seal.
	6. Axle cover not properly sealed.	6. Remove, clean, and re-seal cover.
Axle Overheating	1. Lubricant level low.	1. Fill differential to correct level.
	2. Improper grade of lubricant.	2. Fill differential with the correct fluid type and quantity.
	3. Bearing pre-loads too high.	3. Re-adjust bearing pre-loads.
	4. Insufficient ring gear backlash.	4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading.	1. Replace gears. Examine other gears and bearings for possible damage.
	2. Erratic clutch operation.	2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation.
	3. Ice-spotted pavement.	3. Replace gears and examine remaining parts for damage.
	4. Improper adjustments.	4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant.	1. Fill differential with the correct fluid type and quantity.
	2. Improper ring gear and pinion adjustment.	2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth.
	3. Unmatched ring gear and pinion.	3. Replace gears with a matched ring gear and pinion.
	4. Worn teeth on ring gear and/or pinion.	4. Replace ring gear and pinion.
	5. Loose pinion bearings.	5. Adjust pinion bearing pre-load.
	6. Loose differential bearings.	6. Adjust differential bearing pre-load.
	7. Mis-aligned or sprung ring gear.	7. Measure ring gear run-out. Replace components as necessary.
	8. Loose differential bearing cap bolts.	8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued tot he proper specification.
	9. Housing not machined properly.	9. Replace housing.

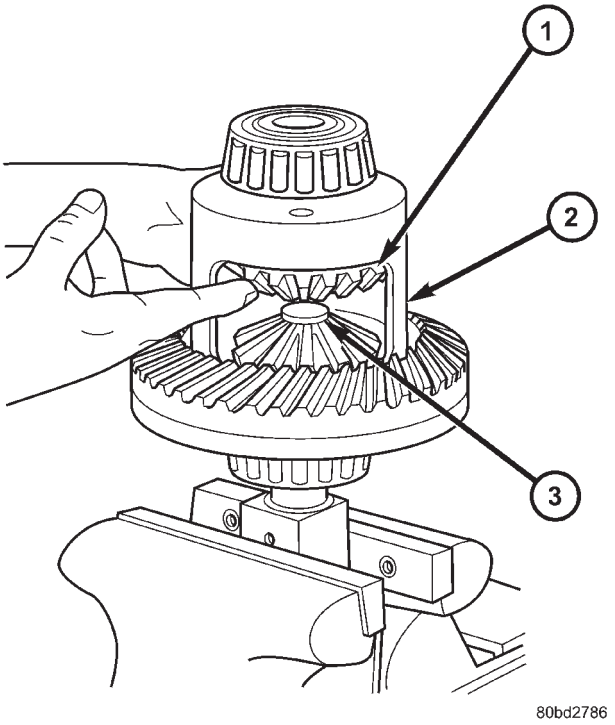

Fig. 44 CLUTCH PACK AND UPPER SIDE GEAR

1 - SIDE GEAR AND CLUTCH PACK
2 - DIFFERENTIAL CASE
3 - LOWER DISC

(14) Install pinion gear mate shaft and align holes in shaft and case.

(15) Install pinion mate shaft lock screw finger tight to hold shaft during differential installation.

(16) Lubricate all differential components with hypoid gear lubricant.

DIFFERENTIAL CASE BEARINGS

REMOVAL

(1) Remove differential case from axle.

(2) Remove differential bearings from the case with Puller/Press C-293-PA and Adapters C-293-48 and Plug SP-3289 (Fig. 45).

INSTALLATION

(1) Install differential side bearings with Installer C-4340 and Handle C-4171 (Fig. 46).

(2) Install differential case in axle.

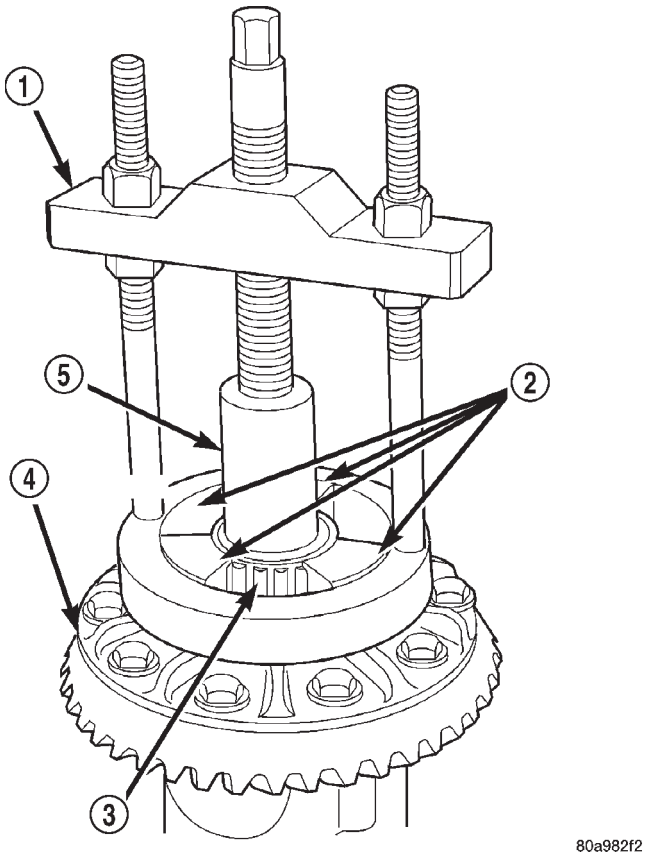

Fig. 45 Differential Bearing Puller

1 - PULLER
2 - ADAPTERS
3 - BEARING
4 - DIFFERENTIAL
5 - PLUG

PINION GEAR/RING GEAR/ TONE RING

REMOVAL

CAUTION: The ring and pinion gears are serviced in a matched set. Never replace one gear without replacing the other matched gear.

(1) Mark pinion yoke and propeller shaft for installation reference.

(2) Remove propeller shaft from pinion yoke and tie propeller shaft to underbody.

(3) Remove differential from axle housing.

(4) Place differential case in a vise with soft metal jaw (Fig. 47).

(5) Remove bolts holding ring gear to differential case.

(6) Drive ring gear from the differential case with a rawhide hammer.

DISC BRAKE CALIPERS (Continued)

OPERATION

When the brakes are applied fluid pressure is exerted against the caliper piston. The fluid pressure is exerted equally and in all directions. This means pressure exerted against the caliper piston and within the caliper bore will be equal (Fig. 14).

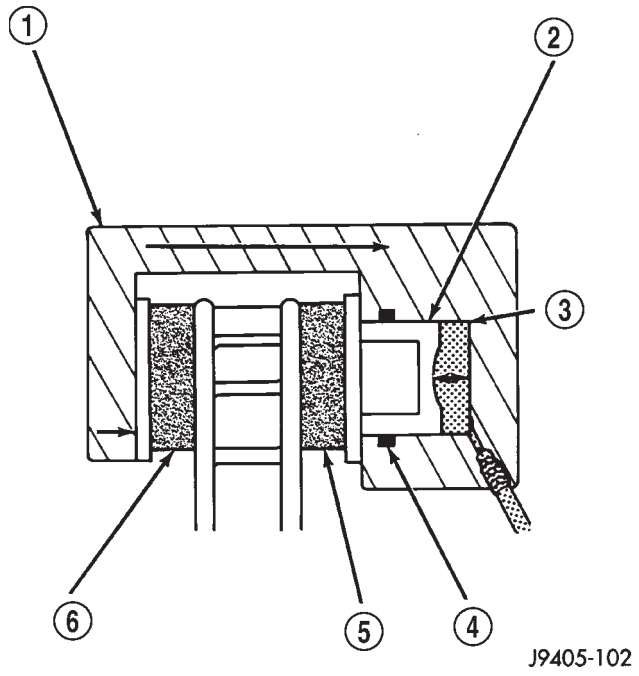

Fig. 14 Brake Caliper Operation

1 - CALIPER
2 - PISTON
3 - PISTON BORE
4 - SEAL
5 - INBOARD SHOE
6 - OUTBOARD SHOE

Fluid pressure applied to the piston is transmitted directly to the inboard brake shoe. This forces the shoe lining against the inner surface of the disc brake rotor. At the same time, fluid pressure within the piston bore forces the caliper to slide inward on the mounting bolts. This action brings the outboard brake shoe lining into contact with the outer surface of the disc brake rotor.

In summary, fluid pressure acting simultaneously on both piston and caliper, produces a strong clamping action. When sufficient force is applied, friction will attempt to stop the rotors from turning and bring the vehicle to a stop.

Application and release of the brake pedal generates only a very slight movement of the caliper and piston. Upon release of the pedal, the caliper and piston return to a rest position. The brake shoes do not retract an appreciable distance from the rotor. In fact, clearance is usually at, or close to zero. The reasons for this are to keep road debris from getting between the rotor and lining and in wiping the rotor surface clear each revolution.

The caliper piston seal controls the amount of piston extension needed to compensate for normal lining wear.

During brake application, the seal is deflected outward by fluid pressure and piston movement (Fig. 15). When the brakes (and fluid pressure) are released, the seal relaxes and retracts the piston.

The amount of piston retraction is determined by the amount of seal deflection. Generally the amount is just enough to maintain contact between the piston and inboard brake shoe.

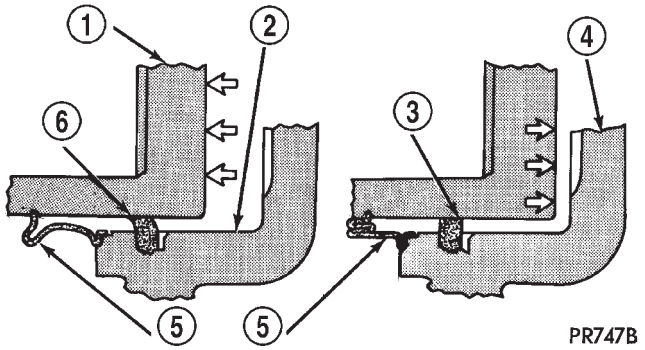

Fig. 15 Lining Wear Compensation By Piston Seal

1 - PISTON
2 - CYLINDER BORE
3 - PISTON SEAL BRAKE PRESSURE OFF
4 - CALIPER HOUSING
5 - DUST BOOT
6 - PISTON SEAL BRAKE PRESSURE ON

REMOVAL

(1) Install prop rod on the brake pedal to keep pressure on the brake system.
(2) Raise and support vehicle.
(3) Remove front wheel and tire assembly.
(4) Drain small amount of fluid from master cylinder brake reservoir with suction gun.
(5) Remove the brake hose banjo bolt if replacing caliper (Fig. 16).
(6) Remove the caliper mounting slide pin bolts (Fig. 16).
(7) Remove the caliper from vehicle.

DISASSEMBLY

(1) Remove brake shoes from caliper.
(2) Drain brake fluid out of caliper.
(3) Take a piece of wood and pad it with one-inch thickness of shop towels. Place this piece in the outboard shoe side of the caliper in front of the piston. This will cushion and protect caliper piston during removal (Fig. 17).

ELECTRICAL

DESCRIPTION

Three wheel speed sensors are used. The front sensors are mounted to the steering knuckles. The rear sensor is mounted at the top of the rear axle differential carrier. Tone wheels are mounted to the outboard ends of the front axle shafts. The gear type tone wheel serves as the trigger mechanism for each sensor.

OPERATION

The sensors convert wheel speed into a small digital signal. The CAB sends 12 volts to the sensors. The sensor has an internal magneto resistance bridge that alters the voltage and amperage of the signal circuit. This voltage and amperage is changed by magnetic induction when the toothed tone wheel passes the wheel speed sensor. This digital signal is sent to the CAB. The CAB measures the voltage and amperage of the digital signal for each wheel.

FRONT WHEEL SPEED SENSOR

REMOVAL

(1) Disconnect the front wheel speed sensor wire connector that is located on the inboard side of the respective wheel house.

(2) Raise and support the vehicle.

(3) Remove the tire and wheel assembly.

(4) Remove the caliper adapter. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER ADAPTER - REMOVAL).

CAUTION: Never allow the disc brake caliper to hang from the brake hose. Damage to the brake hose with result. Provide a suitable support to hang the caliper securely.

(5) Remove the disc brake rotor. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).

(6) Remove the wheel speed sensor mounting bolt to the hub (Fig. 1).

(7) Remove the wheel speed sensor wire from the hub/bearing (Fig. 1).

(8) Remove the wheel speed sensor wire hold down from the knuckle (Fig. 1).

(9) Remove the wheel speed sensor wire thru the wheel well.

(10) Remove the wheel speed sensor from the vehicle.

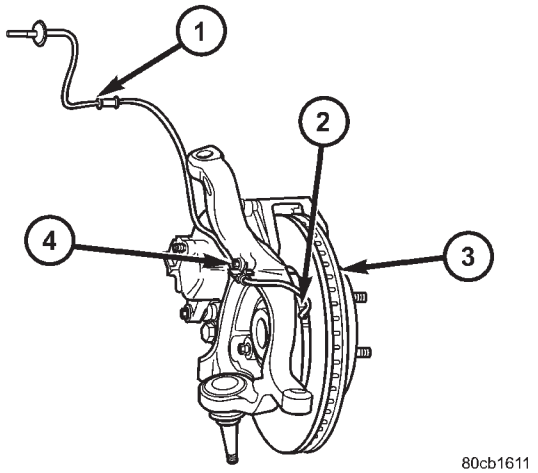

Fig. 1 FRONT WHEEL SPEED SENSOR

1 - WHEEL SPEED SENSOR WIRE
2 - WHEEL SPEED SENSOR
3 - ROTOR
4 - WHEEL SPEED SENSOR WIRE HOLD DOWN

INSTALLATION

(1) Install the wheel speed sensor to the vehicle.

(2) Install the wheel speed sensor wire thru the wheel well.

(3) Install the wheel speed sensor wire to the hub/bearing.

(4) Install the wheel speed sensor wire hold down to the knuckle.

(5) Install the wheel speed sensor mounting bolt to the hub. Tighten the mounting bolt to 14 N·m (10 ft.lbs.).

(6) Install the disc brake rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).

(7) Install the disc brake caliper adapter. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER ADAPTER - INSTALLATION).

(8) Install the tire and wheel assembly (Refer to 22 - TIRES/WHEELS/WHEELS - STANDARD PROCEDURE).

(9) Reconnect the front wheel speed sensor wire connector to the inboard side of the wheel house being worked on.

COOLING (Continued)

DIAGNOSIS AND TESTING - COOLING SYSTEM LEAKS

ULTRAVIOLET LIGHT METHOD

A leak detection additive is available through the parts department that can be added to cooling system. The additive is highly visible under ultraviolet light (black light). Pour one ounce of additive into cooling system. Place heater control unit in HEAT position. Start and operate engine until radiator upper hose is warm to touch. Aim the commercially available black light tool at components to be checked. If leaks are present, black light will cause additive to glow a bright green color.

The black light can be used in conjunction with a pressure tester to determine if any external leaks exist (Fig. 3).

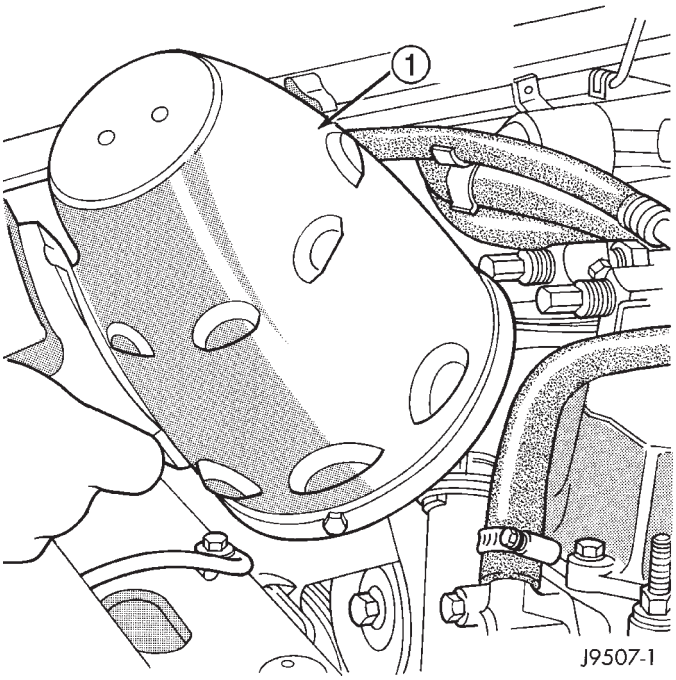

Fig. 3 Leak Detection Using Black Light - Typical

1 - TYPICAL BLACK LIGHT TOOL

PRESSURE TESTER METHOD

The engine should be at normal operating temperature. Recheck the system cold if cause of coolant loss is not located during the warm engine examination.

WARNING: HOT, PRESSURIZED COOLANT CAN CAUSE INJURY BY SCALDING.

Carefully remove radiator pressure cap from pressure bottle and check coolant level. Push down on cap to disengage it from stop tabs. Wipe inside of filler neck and examine lower inside sealing seat for nicks, cracks, paint, and dirt. Inspect radiator-to-reserve/overflow tank hose for internal obstructions. Insert a wire through the hose to be sure it is not obstructed.

Inspect cams on outside of filler neck. If cams are damaged, seating of pressure cap valve and tester seal will be affected.

Attach pressure tester (7700 or an equivalent) to radiator filler neck (Fig. 4).

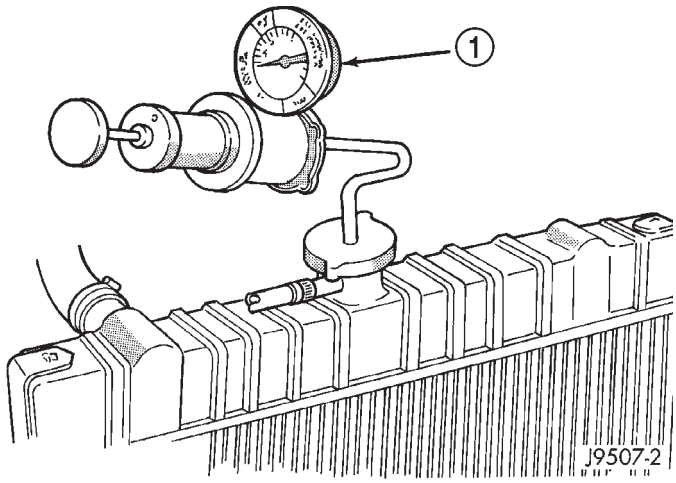

Fig. 4 Pressure Testing Cooling System - Typical

1 - TYPICAL COOLING SYSTEM PRESSURE TESTER

Operate tester pump to apply 110 kPa (16 psi) pressure to system. If hoses enlarge excessively or bulges while testing, replace as necessary. Observe gauge pointer and determine condition of cooling system according to following criteria:

Holds Steady: If pointer remains steady for two minutes, serious coolant leaks are not present in system. However, there could be an internal leak that does not appear with normal system test pressure. If it is certain that coolant is being lost and leaks cannot be detected, inspect for interior leakage or perform Internal Leakage Test.

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

Drops Quickly: Indicates that serious leakage is occurring. Examine system for external leakage. If leaks are not visible, inspect for internal leakage. Large radiator leak holes should be repaired by a reputable radiator repair shop.

INTERNAL LEAKAGE INSPECTION

Remove engine oil pan drain plug and drain a small amount of engine oil. If coolant is present in

RADIATOR (Continued)

(3) Remove the front grill (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
(4) Remove the cooling fan from the engine, if equipped.
(5) Remove the two radiator mounting bolts.
(6) Disconnect both transmission cooler lines from radiator.
(7) Disconnect the connector for the electric fan.
(8) Disconnect the power steering cooler line from cooler.
(9) Disconnect the radiator upper and lower hoses.
(10) Disconnect the overflow hose from radiator.
(11) The lower part of radiator is equipped with two alignment dowel pins (Fig. 9). They are located on the bottom of radiator tank and fit into rubber grommets. These rubber grommets are pressed into the radiator lower crossmember.

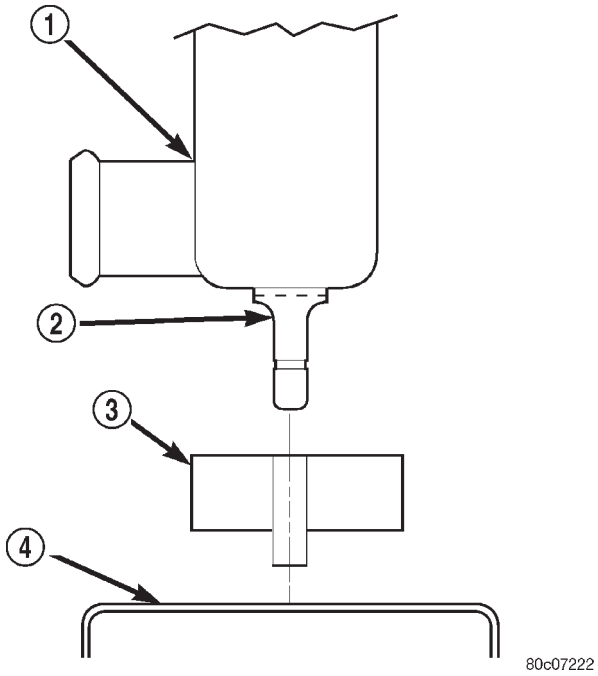

Fig. 9 Radiator Alignment Dowels - Typical

1 - RADIATOR
2 - ALIGNMENT DOWEL
3 - RADIATOR LOWER ISOLATOR
4 - RADIATOR LOWER CROSSMEMBER

WARNING: THE AIR CONDITIONING SYSTEM (IF EQUIPPED) IS UNDER A CONSTANT PRESSURE EVEN WITH THE ENGINE OFF. REFER TO REFRIGERANT WARNINGS IN, HEATING AND AIR CONDITIONING BEFORE HANDLING ANY AIR CONDITIONING COMPONENT.

NOTE: The radiator and radiator cooling fan can be removed as an assembly. It is not necessary to remove the cooling fan before removing or installing the radiator.

(12) Gently lift up and remove radiator from vehicle. Be careful not to scrape the radiator fins against any other component. Also be careful not to disturb the air conditioning condenser (if equipped).

CLEANING

Clean radiator fins With the engine cold, apply cold water and compressed air to the back (engine side) of the radiator to flush the radiator and/or A/C condenser of debris.

INSPECTION

The radiator cooling fins should be checked for damage or deterioration. Inspect cooling fins to make sure they are not bent or crushed, these areas result in reduced heat exchange causing the cooling system to operate at higher temperatures. Inspect the plastic end tanks for cracks, damage or leaks.

Inspect the radiator neck for damage or distortion.

INSTALLATION

CAUTION: Before installing the radiator or A/C condenser, be sure the radiator-to-body and radiator-to-A/C condenser rubber air seals are properly fastened to their original positions. These are used at the top, bottom and sides of the radiator and A/C condenser. To prevent overheating, these seals must be installed to their original positions.

(1) Gently lower the radiator and fan shroud into the vehicle. Guide the two radiator alignment dowels into the rubber grommets located in lower radiator crossmember.
(2) Connect the radiator upper and lower hoses and hose clamps to radiator.

CAUTION: The tangs on the hose clamps must be positioned straight down.

(3) Install coolant reserve/overflow tank hose at radiator.
(4) Connect both transmission cooler lines at the radiator.
(5) Install both radiator mounting bolts.
(6) Reconnect the electric cooling fan.
(7) Install the grill (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
(8) Reinstall the cooling fan to the engine.
(9) Rotate the fan blades (by hand) and check for interference at fan shroud.
(10) Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
(11) Connect battery cable at battery.
(12) Start and warm engine. Check for leaks.

NOTE: The engine cooling system will push any remaining air into the coolant bottle within about an hour of normal driving. As a result, a drop in coolant level in the pressure bottle may occur. If the engine cooling system overheats and pushes coolant into the overflow side of the coolant bottle, this coolant will be sucked back into the cooling system ONLY IF THE PRESSURE CAP IS LEFT ON THE BOTTLE. Removing the pressure cap breaks the vacuum path between the two bottle sections and the coolant will not return to cooling system.

(3) With heater control unit in the HEAT position, operate engine with pressure bottle cap in place.

(4) Add coolant to pressure bottle as necessary. **Only add coolant to the pressure bottle when the engine is cold. Coolant level in a warm engine will be higher due to thermal expansion.**

NOTE: The coolant bottle has two chambers. Coolant will normally only be in the outboard (larger) of the two. The inboard chamber is only to recover coolant in the event of an overheat or after a recent service fill. The inboard chamber should normally be empty. If there is coolant in the overflow side of the coolant bottle (after several warm/cold cycles of the engine) and coolant level is above cold full when cold, disconnect the end of the overflow hose at the fill neck and lower it into a clean container. Allow coolant to drain into the container until emptied. Reconnect overflow hose to fill neck.

STANDARD PROCEDURE - COOLING SYSTEM - REVERSE FLUSHING

CAUTION: The cooling system normally operates at 97-to-110 kPa (14-to -16 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

Reverse flushing of the cooling system is the forcing of water through the cooling system. This is done using air pressure in the opposite direction of normal coolant flow. It is usually only necessary with very dirty systems with evidence of partial plugging.

CHEMICAL CLEANING

If visual inspection indicates the formation of sludge or scaly deposits, use a radiator cleaner (Mopar Radiator Kleen or equivalent) before flushing. This will soften scale and other deposits and aid the flushing operation.

CAUTION: Be sure instructions on the container are followed.

REVERSE FLUSHING RADIATOR

Disconnect the radiator hoses from the radiator fittings. Attach a section of radiator hose to the radiator bottom outlet fitting and insert the flushing gun. Connect a water supply hose and air supply hose to the flushing gun.

CAUTION: The cooling system normally operates at 97-to-110 kPa (14- to-16 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

Allow the radiator to fill with water. When radiator is filled, apply air in short blasts allowing radiator to refill between blasts. Continue this reverse flushing until clean water flows out through rear of radiator cooling tube passages. For more information, refer to operating instructions supplied with flushing equipment. Have radiator cleaned more extensively by a radiator repair shop.

REVERSE FLUSHING ENGINE

Drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE). Remove the thermostat housing and thermostat. Install the thermostat housing. Disconnect the radiator upper hose from the radiator and attach the flushing gun to the hose. Disconnect the radiator lower hose from the water pump. Attach a lead away hose to the water pump inlet fitting.

CAUTION: Be sure that the heater control valve is closed (heat off). This is done to prevent coolant flow with scale and other deposits from entering the heater core.

Connect the water supply hose and air supply hose to the flushing gun. Allow the engine to fill with water. When the engine is filled, apply air in short blasts, allowing the system to fill between air blasts. Continue until clean water flows through the lead away hose. For more information, refer to operating instructions supplied with flushing equipment.

Remove the lead away hose, flushing gun, water supply hose and air supply hose. Remove the thermostat housing (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - REMOVAL). Install the thermostat and housing with a replacement gasket (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - INSTALLATION). Connect the radiator hoses. Refill the cooling system with the correct antifreeze/water mixture (Refer to 7 - COOLING - STANDARD PROCEDURE).

lating (AM) and Frequency Modulating (FM) commercial frequency ranges.

The audio system components operate on battery current received through a fuse in the Junction Block (JB) on a fused ignition switch output (run-acc) circuit so that the system will only operate when the ignition switch is in the Run or Accessory positions.

On vehicles that are equipped with the optional remote radio switches, the Body Control Module (BCM) receives hard wired resistor multiplexed inputs from the remote radio switches. The programming in the BCM allows it to process those inputs and send the proper messages to the radio receiver over the Programmable Communication Interface (PCI) bus network to control the radio volume up or down, station seek up or down, preset station advance, and mode advance functions.

Refer to the owner's manual for more information on the features, use and operation of each of the available audio systems.

DIAGNOSIS AND TESTING - AUDIO

Any diagnosis of the Audio system should begin with the use of the DRB diagnostic tool. For information on the use of the DRB, refer to the appropriate Diagnostic Service Manual.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

AUDIO SYSTEM DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSES	CORRECTION
NO AUDIO	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for shorted or open wires. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
	6. Speakers faulty.	6. Replace speaker as necessary.
NO RADIO DISPLAY	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.

DIAGNOSIS AND TESTING - CHIME WARNING SYSTEM

The hard wired chime warning system inputs to the EMIC, as well as other hard wired circuits for this system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the PCI data bus network, or the electronic message inputs used by the EMIC to provide chime warning system service. The most reliable, efficient, and accurate means to diagnose the EMIC, the PCI data bus network, and the electronic message inputs for the chime warning system requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

The hard wired chime warning system inputs to the ElectroMechanical Instrument Cluster (EMIC), as well as other hard wired circuits for this system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the Programmable Communications Interface (PCI) data bus network, or the electronic message inputs used by the EMIC to provide chime warning system service. The most reliable, efficient, and accurate means to diagnose the EMIC, the PCI data bus network, and the electronic message inputs for the chime warning system requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

TRANSMISSION CONTROL MODULE (Continued)

Certain mechanical problems within the input clutch assembly (broken return springs, out of position snap rings, excessive clutch pack clearance, improper assembly, etc.) can cause inadequate or out-of-range element volumes. Also, defective Input/Output Speed Sensors and wiring can cause these conditions. The following chart identifies the appropriate clutch volumes and when they are monitored/updated:

CLUTCH VOLUMES		
Clutch	**When Updated**	**Proper Clutch Volume**
L/R	2-1 or 3-1 downshift	45 to 134
2C	3-2 kickdown shift	25 to 85
OD	2-3 upshift	30 to 100
4C	3-4 upshift	30 to 85
UD	4-3 kickdown shift	30 to 100

SHIFT SCHEDULES

As mentioned earlier, the TCM has programming that allows it to select a variety of shift schedules. Shift schedule selection is dependent on the following:

- Shift lever position
- Throttle position
- Engine load
- Fluid temperature
- Software level

As driving conditions change, the TCM appropriately adjusts the shift schedule. Refer to the following chart to determine the appropriate operation expected, depending on driving conditions.

Schedule	Condition	Expected Operation
Extreme Cold	Oil temperature below -16° F	-Park, Reverse, Neutral and 1st and 3rd gear only in D position, 2nd gear only in Manual 2 or L -No EMCC
Super Cold	Oil temperature between -12° F and 10° F	- Delayed 2-3 upshift - Delayed 3-4 upshift - Early 4-3 coastdown shift - High speed 4-2, 3-2, 2-1 kickdown shifts are prevented -Shifts at high throttle openings willl be early. - No EMCC
Cold	Oil temperature between 10° F and 36° F	-Shift schedule is the same as Super Cold except that the 2-3 upshifts are not delayed.
Warm	Oil temperature between 40° F and 80° F	- Normal operation (upshift, kickdowns, and coastdowns) - No EMCC
Hot	Oil temperature between 80° F and 240° F	- Normal operation (upshift, kickdowns, and coastdowns) - Normal EMCC operation

BATTERY (Continued)

negative jumper posts. Select TESTING AT JUMPER POST when connecting to that location.

(3) Connect the tester to the battery or jumper posts, the red clamp to positive (+) and the black clamp to negative (–).

NOTE: Multiple batteries connected in parallel must have the ground cable disconnected to perform a battery test. Failure to disconnect may result in false battery test readings.

NOTE: When testing the battery in a PT Cruiser, always test at the battery terminals

(4) Using the ARROW key select **in** or **out** of vehicle testing and press ENTER to make a selection.

(5) If not selected, choose the Cold Cranking Amp (CCA) battery rating. Or select the appropriate battery rating for your area (see menu). The tester will then run its self programmed test of the battery and display the results. Refer to the test result table noted below.

CAUTION: If REPLACE BATTERY is the result of the test, this may mean a poor connection between the vehicle's cables and battery exists. After disconnecting the vehicle's battery cables from the battery, retest the battery using the OUT-OF-VEHICLE test before replacing.

(6) While viewing the battery test result, press the CODE button and the tester will prompt you for the last 4 digits of the VIN. Use the UP/DOWN arrow buttons to scroll to the correct character; then press ENTER to select and move to the next digit. Then press the ENTER button to view the SERVICE CODE. Pressing the CODE button a second time will return you to the test results.

BATTERY TEST RESULTS	
GOOD BATTERY	Return to service
GOOD - RECHARGE	Fully charge battery and return to service
CHARGE & RETEST	Fully charge battery and retest battery
REPLACE BATTERY	Replace the battery and retest complete system
BAD-CELL REPLACE	Replace the battery and retest complete system

NOTE: The SERVICE CODE is required on every warranty claim submitted for battery replacement.

REMOVAL

(1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.

(2) Loosen the battery negative cable terminal clamp pinch-bolt hex nut.

(3) Disconnect the battery negative cable terminal clamp from the battery negative terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post (Fig. 16).

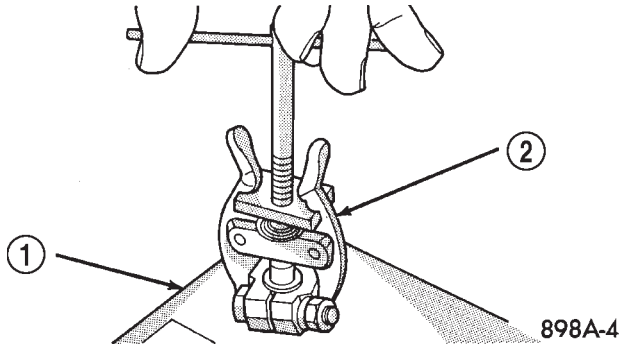

Fig. 16 Remove Battery Cable Terminal Clamp - Typical

1 - BATTERY
2 - BATTERY TERMINAL PULLER

(4) Loosen the battery positive cable terminal clamp pinch-bolt hex nut.

(5) Disconnect the battery positive cable terminal clamp from the battery positive terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.

(6) Remove the battery holddowns from the battery. Refer to Battery Holddown for the proper battery holddown removal procedures.

WARNING: WEAR A SUITABLE PAIR OF RUBBER GLOVES (NOT THE HOUSEHOLD TYPE) WHEN REMOVING A BATTERY BY HAND. SAFETY GLASSES SHOULD ALSO BE WORN. IF THE BATTERY IS CRACKED OR LEAKING, THE ELECTROLYTE CAN BURN THE SKIN AND EYES.

(7) Remove the battery and the battery thermal guard from the battery tray as a unit.

(8) Remove the battery thermal guard from the battery case. Refer to Thermal Guard for the proper battery thermal guard removal procedures.

INSTALLATION

(1) Clean and inspect all of the battery system components. Refer to Battery System Cleaning for the proper cleaning procedures, and refer to Battery System Inspection for the proper inspection procedures.

STARTING SYSTEM (Continued)

Center (PDC). Refer to label on PDC cover for relay location.

(1) Connect positive lead of voltmeter to negative battery cable terminal post. Connect negative lead of voltmeter to negative battery cable clamp (Fig. 2). Rotate and hold ignition switch in Start position. Observe voltmeter. If voltage is detected, correct poor contact between cable clamp and terminal post. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, procedure must be performed twice, once for each battery.**

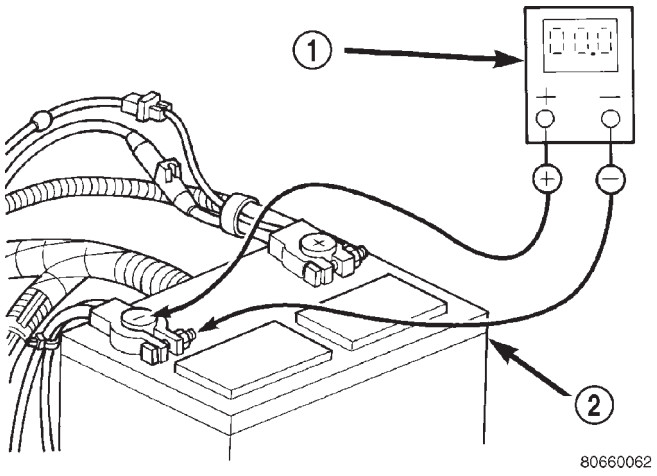

Fig. 2 Test Negative Battery Cable Connection Resistance - Typical

1 - VOLTMETER
2 - BATTERY

(2) Connect positive lead of voltmeter to positive battery terminal post. Connect negative lead of voltmeter to battery positive cable clamp (Fig. 3). Rotate and hold ignition switch in Start position. Observe voltmeter. If voltage is detected, correct poor contact between cable clamp and terminal post. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed twice, once for each battery.**

(3) Connect voltmeter to measure between battery positive terminal post and starter solenoid battery terminal stud (Fig. 4). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cable connection at solenoid. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed on driver side battery only.**

(4) Connect voltmeter to measure between negative battery terminal post and a good clean ground

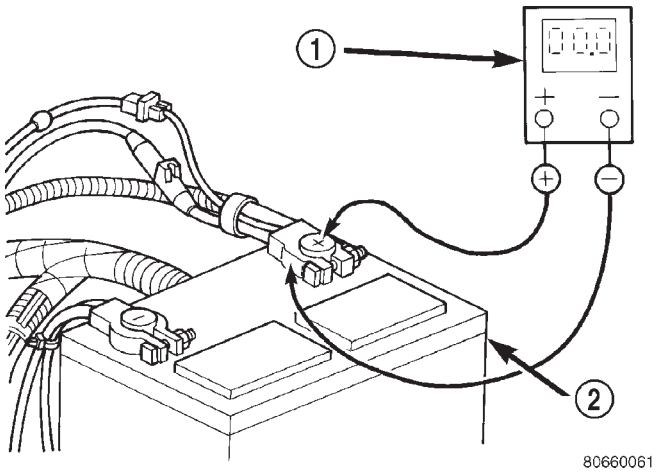

Fig. 3 Test Positive Battery Cable Connection Resistance - Typical

1 - VOLTMETER
2 - BATTERY

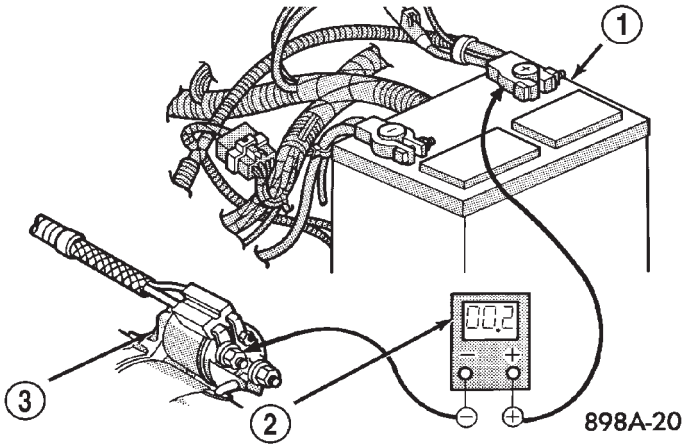

Fig. 4 Test Positive Battery Cable

1 - BATTERY
2 - VOLTMETER
3 - STARTER MOTOR

on engine block (Fig. 5). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten negative battery cable attachment on engine block. Repeat test. If reading is still above 0.2 volt, replace faulty negative battery cable. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed twice, once for each battery.**

(5) Connect positive lead of voltmeter to starter housing. Connect negative lead of voltmeter to negative battery terminal post (Fig. 6). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, correct poor starter to engine block ground contact. **Note: Certain diesel**

DRIVER SEAT HEATER SWITCH (Continued)

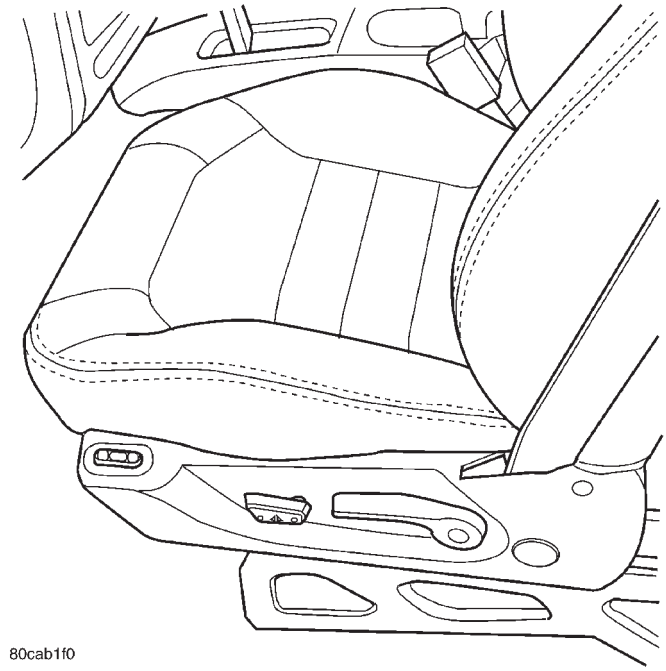

Fig. 1 KJ POWER / HEATED SEAT

OPERATION

There are three positions that can be selected with each of the heated seat switches: Off, Low, and High. When the front of the switch rocker is fully depressed, the High position is selected and the high position LED indicator illuminates. When the rear of the switch rocker is fully depressed, the Low position is selected and the low position LED indicator illuminates. When the switch rocker is depressed a second time in either direction, Off is selected and both LED indicators are extinguished.

Both switches provide separate resistor multiplexed hard wire inputs to the Heated Seat Module to indicate the selected switch position. The heated seat module monitors the switch inputs and responds to the heated seat switch status messages by controlling the output to the seat heater elements of the selected seat. The Low heat position set point is about 36° C (97° F), and the High heat position set point is about 41° C (105° F).

DIAGNOSIS AND TESTING - HEATED SEAT SWITCH

If a heated seat fails to heat and one or both of the indicator lamps on a heated seat switch flash, refer to **Heated Seat System Diagnosis and Testing** in this section for flashing LED failure identification. Refer to **Wiring Diagrams** for complete heated seat system wiring diagrams.

(1) If the problem being diagnosed involves a heated seat switch indicator lamp that remains illuminated after the heated seat has been turned Off, refer to **Diagnosis and Testing the Heated Seat Module** in the Electronic Control Modules section for heated seat module diagnosis and testing procedures. If not, go to Step 2

(2) Remove the heated seat switch (Refer to 8 - ELECTRICAL/HEATED SEATS/DRIVER HEATED SEAT SWITCH - REMOVAL). Check for continuity between the ground circuit cavity #5 of the heated seat switch connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit as required.

(3) Turn the ignition switch to the ON position. Check for battery voltage at the fused ignition switch output circuit cavity #1 of the heated seat switch connector. If OK, go to Step 4. If not OK, repair the open fused ignition switch output circuit as required.

(4) Check the continuity between pin #1 and pin #3 of the heated seat switch (Fig. 2). If the readings do not correspond to those in the Heated Seat Switch Continuity table below, replace the heated seat switch. If OK, and the heated seat system is still not operating properly refer to **Diagnosis and Testing the Heated Seat Module**.

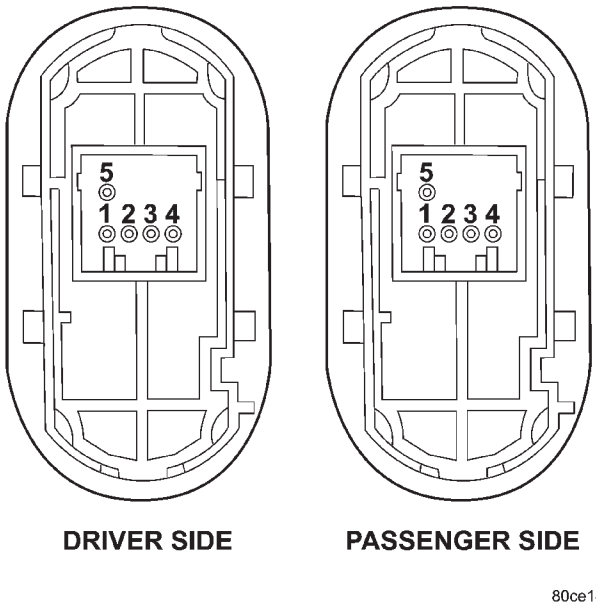

Fig. 2 Heated Seat Switches

NOTE: ANY RESISTANCE VALUES (OHMS Ω) GIVEN IN THE FOLLOWING TEXT ARE SUPPLIED USING THE AUTOMATIC RANGE GENERATED BY A FLUKE® AUTOMOTIVE METER. IF ANOTHER TYPE OF MEASURING DEVICE IS USED, THE VALUES GENERATED MAY NOT BE THE SAME AS THE RESULTS SHOWN HERE, OR MAY HAVE TO BE CONVERTED TO THE RANGE USED HERE.

KNOCK SENSOR (Continued)

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors.

REMOVAL

The 2 knock sensors are bolted into the cylinder block under the intake manifold (Fig. 20).

NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

(1) Disconnect knock sensor dual pigtail harness from engine wiring harness. this connection is made near rear of left valve cover (Fig. 20).
(2) Remove intake manifold. Refer to Engine section.
(3) Remove sensor mounting bolts (Fig. 20). Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.
(4) Remove sensors from engine.

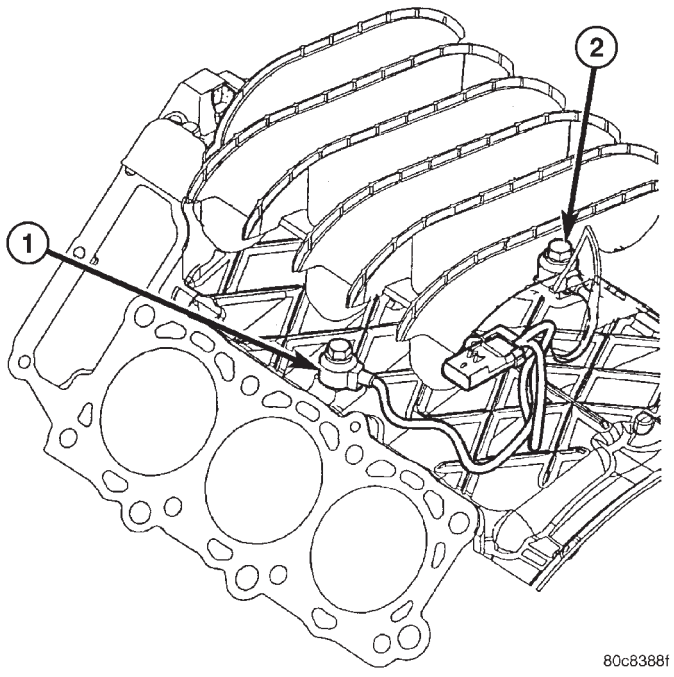

Fig. 20 KNOCK SENSOR LOCATION

1 - KNOCK SENSORS (2)
2 - MOUNTING BOLTS

INSTALLATION

NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

(1) Thoroughly clean knock sensor mounting holes.
(2) Install sensors into cylinder block.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors. The torque for the knock senor bolt is relatively light for an 8mm bolt.

NOTE: Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

(3) Install and tighten mounting bolts. Refer to torque specification.
(4) Install intake manifold. Refer to Engine section.
(5) Connect knock sensor wiring harness to engine harness at rear of intake manifold.

SPARK PLUG

DESCRIPTION

Resistor type spark plugs are used.

Spark plug resistance values range from 6,000 to 20,000 ohms (when checked with at least a 1000 volt spark plug tester). **Do not use an ohmmeter to check the resistance values of the spark plugs. Inaccurate readings will result.**

OPERATION

To prevent possible pre-ignition and/or mechanical engine damage, the correct type/heat range/number spark plug must be used.

Always use the recommended torque when tightening spark plugs. This is especially true when plugs are equipped with tapered seats. Incorrect torque can distort the spark plug and change plug gap. It can also pull the plug threads and do possible damage to both the spark plug and the cylinder head.

Remove the spark plugs and examine them for burned electrodes and fouled, cracked or broken porcelain insulators. Keep plugs arranged in the order in which they were removed from the engine. A sin-

COOLANT LOW INDICATOR (Continued)

above the fuel gauge and to the left of the tachometer in the instrument cluster. The coolant low indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Low Engine Coolant" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The coolant low indicator is serviced as a unit with the instrument cluster.

OPERATION

The coolant low indicator gives an indication to the vehicle operator when the diesel engine coolant level is low. This indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and a hard wired input received by the cluster from the engine coolant level switch. The coolant low indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the coolant low indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the coolant low indicator is illuminated for about three seconds as a bulb test.
- **Engine Coolant Level Switch Input** - Each time the cluster detects ground on the low coolant fluid level sense circuit (engine coolant level switch closed = engine coolant level low) the cluster applies an algorithm to confirm that the input is correct and not the result of coolant sloshing in the coolant bottle. The cluster tests the status of the circuit about seven milliseconds after ignition On, and about once every second thereafter, then uses an internal counter to count up or down. When the counter accumulates thirty ground inputs on the circuit, the coolant low indicator will be illuminated. The indicator remains illuminated until the low coolant fluid level sense input to the cluster is an open circuit (engine coolant level switch open = engine coolant level full), or until the ignition switch is turned to the Off position, whichever occurs first.
- **Engine Coolant Level Switch Input Fault** - The engine coolant level switch also features a 3.3 kilohm diagnostic resistor connected in parallel between the switch input and output to provide the cluster with verification that the low coolant fluid level sense circuit is not open or shorted. If the cluster does not see a proper input on the low coolant fluid level sense circuit, it will suspend coolant low indicator operation. The indicator operation remains suspended until the low coolant fluid level sense circuit fault is resolved.
- **Actuator Test** - Each time the cluster is put through the actuator test, the coolant low indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The engine coolant level switch on the coolant bottle provides a hard wired ground input to the instrument cluster circuitry through the low coolant fluid level sense circuit whenever the level of the coolant in the bottle is low. For further diagnosis of the coolant low indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/ INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the engine coolant level switch input to the instrument cluster that control the coolant low indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

CRUISE INDICATOR

DESCRIPTION

A cruise indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional speed control system. The cruise indicator is located near the lower edge of the instrument cluster, between the tachometer and the speedometer. The cruise indicator consists of a stencil-like cutout of the word "CRUISE" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A green Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "CRUISE" text to appear in green through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the cruise indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The cruise indicator is serviced as a unit with the instrument cluster.

WASHER FLUID INDICATOR (Continued)

OPERATION

The washer fluid indicator gives an indication to the vehicle operator that the fluid level in the washer reservoir is low. This indicator is controlled by the instrument cluster electronic circuit board based upon cluster programming and a hard wired input received by the cluster from the washer fluid level switch mounted on the washer reservoir. The washer fluid indicator function of the Vacuum Fluorescent Display (VFD) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The instrument cluster will turn on the washer fluid indicator for the following reasons:

- **Washer Fluid Level Switch Input** - Each time the cluster detects ground on the low washer fluid sense circuit (washer fluid level switch closed = washer fluid level low) the cluster applies an algorithm to confirm that the input is correct and not the result of fluid sloshing in the washer reservoir. The cluster tests the status of the circuit about seven milliseconds after ignition On, and about once every second thereafter, then uses an internal counter to count up or down. When the counter accumulates thirty ground inputs on the circuit, the washer fluid indicator will be illuminated. If the vehicle is not moving when the washer fluid level switch input counter reaches thirty, the VFD will repeatedly and sequentially cycle its indication in two second intervals with the odometer/trip odometer information, the low washer fluid warning, and any other active warnings including: door ajar, gate ajar, and glass ajar. If the vehicle is moving, or once the cluster of a non-moving vehicle receives an electronic vehicle speed message from the Powertrain Control Module (PCM) indicating a speed greater than zero, the warning sequence will consist of three complete display cycles, then revert to only the odometer/trip odometer display. Once the washer fluid indicator warning has completed, the washer fluid indicator is extinguished and will not repeat until the ignition switch is cycled.

The instrument cluster continually monitors the washer fluid level switch in the washer reservoir to determine the status of the washer fluid level. For further diagnosis of the washer fluid indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). The washer fluid level switch and circuits can be diagnosed using conventional diagnostic tools and methods. The washer fluid level switch also features a 3.3 kilohm diagnostic resistor connected in parallel between the switch input and output to provide the cluster with verification that the low washer fluid sense circuit is not open or shorted. This input can be monitored using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - WASHER FLUID INDICATOR

The diagnosis found here addresses an inoperative washer fluid indicator condition. If the problem being diagnosed is related to indicator accuracy, be certain to confirm that the problem is with the indicator or washer fluid level switch input and not with a damaged or empty washer fluid reservoir, or inoperative instrument cluster indicator control circuitry. Inspect the washer fluid reservoir for proper fluid level and signs of damage or distortion that could affect washer fluid level switch performance and perform the instrument cluster actuator test before you proceed with the following diagnosis. If no washer fluid reservoir or instrument cluster control circuitry problem is found, the following procedure will help to locate a short or open in the washer fluid switch sense circuit. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INDICATOR DOES NOT ILLUMINATE WITH WASHER RESERVOIR EMPTY

(1) Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the washer fluid level switch connector receptacle. Check for continuity between the ground circuit cav-

BRAKE LAMP SWITCH (Continued)

(5) Discard the removed brake lamp switch.

CAUTION: Always replace a removed brake lamp switch with a new unit. This is a one time component and is not intended for reinstallation.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: Always replace a removed brake lamp switch with a new unit. This is a one time component and is not intended for reinstallation.

(1) While holding the brake pedal depressed, align the tabs on the brake lamp switch locking collar with the keyed mounting hole in the steering column support bracket (Fig. 5).

(2) Still holding the brake pedal depressed, insert the tabs on the brake lamp switch housing through the keyed mounting hole in the steering column support bracket until the switch is firmly seated against the bracket.

(3) Still holding the brake pedal depressed, rotate the switch clockwise about 30 degrees to lock the tabs on the brake lamp switch locking collar to the keyed mounting hole in the steering column support bracket.

(4) Release the brake pedal.

CAUTION: Do not pull up on the brake pedal before the switch plunger adjustment has been completed.

(5) Rotate the plunger adjustment release lever clockwise until it locks into place parallel to the brake lamp switch connector receptacle. This action will set the switch plunger length to a final adjustment position and cannot be undone. If not performed properly the first time, a new brake lamp switch **must** be installed.

(6) Reconnect the instrument panel wire harness connector for the brake lamp switch to the switch connector receptacle.

(7) Reconnect the battery negative cable.

CENTER HIGH MOUNTED STOP LAMP BULB

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the Center High Mounted Stop Lamp (CHMSL) unit from the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ CENTER HIGH MOUNTED STOP LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the back of the CHMSL unit housing.

(4) Rotate the socket on the back of the CHMSL unit housing counterclockwise about 30 degrees (Fig. 6).

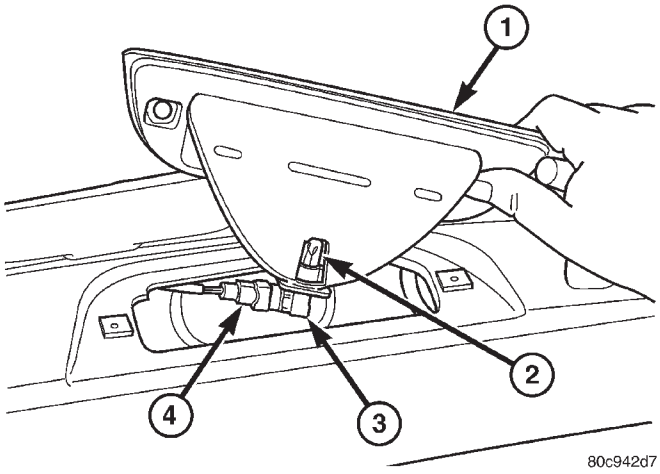

Fig. 6 Center High Mounted Stop Lamp Bulb Remove/Install

1 - CHMSL UNIT
2 - BULB
3 - SOCKET
4 - BODY WIRE HARNESS CONNECTOR

(5) Pull the socket and bulb straight out of the back of CHMSL unit housing.

(6) Pull the bulb straight out of the CHMSL unit socket.

HEADLAMP LEVELING SWITCH (Continued)

(1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the headlamp leveling switch from the switch connector receptacle.

(2) Using an ohmmeter, perform the resistance tests at the terminal pins in the headlamp leveling switch connector receptacle (Fig. 35) as shown in the Headlamp Leveling Switch Tests table.

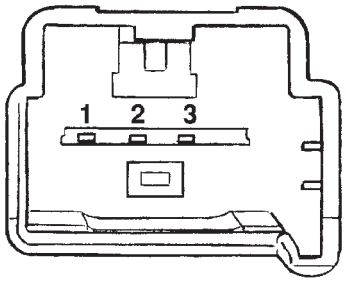

Fig. 35 Headlamp Leveling Switch Connector Receptacle

HEADLAMP LEVELING SWITCH TESTS	
SWITCH POSITION	RESISTANCE (OHMS) BETWEEN PINS 1 & 3
0	0.5 ± 0.5
1	301 ± 1
2	595 ± 1
3	739 ± 1

(3) If the switch fails any of the resistance tests, replace the faulty headlamp leveling switch as required.

REMOVAL

The headlamp leveling switch is used only on vehicles manufactured for certain markets where headlamp leveling is required.

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(1) Disconnect and isolate the battery negative cable.

(2) Remove the driver side inboard bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL DRIVER SIDE BEZEL - REMOVAL).

(3) Disconnect the instrument panel wire harness connector for the headlamp leveling switch from the switch connector receptacle (Fig. 36).

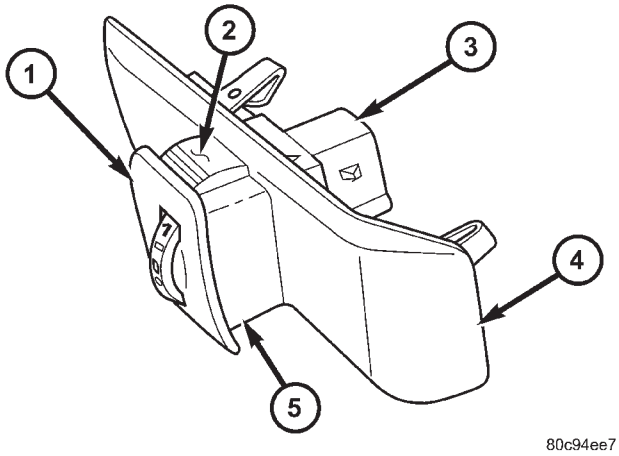


Fig. 36 Headlamp Leveling Switch Remove/Install

1 - HEADLAMP LEVELING SWITCH
2 - UPPER LATCH TAB
3 - RECEPTACLE
4 - DRIVER SIDE INBOARD BEZEL
5 - LOWER LATCH TAB (2)

(4) From the back of the trim bezel, depress the two lower latch features on the headlamp leveling switch housing and rock the bottom of the switch out through the face of the bezel.

(5) From the back of the trim bezel, depress the upper latch feature on the headlamp leveling switch housing and push the switch out through the face of the bezel.

INSTALLATION

The headlamp leveling switch is used only on vehicles manufactured for certain markets where headlamp leveling is required.

REAR FOG LAMP RELAY (Continued)

and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the rear fog lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 58).

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the rear fog lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 58).

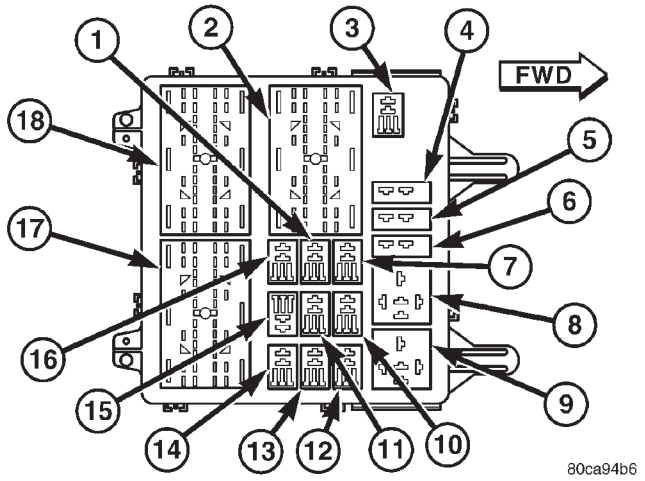


Fig. 58 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

1 - PASSENGER DOOR UNLOCK RELAY
2 - JB C3 CONNECTOR RECEPTACLE
3 - LOW BEAM RELAY
4 - CIRCUIT BREAKER #1
5 - CIRCUIT BREAKER #2
6 - CIRCUIT BREAKER #3
7 - DOOR LOCK RELAY
8 - DEFOGGER RELAY
9 - SPARE
10 - FRONT FOG LAMP RELAY
11 - HORN RELAY
12 - SPARE
13 - SPARE
14 - REAR FOG LAMP RELAY
15 - PARK LAMP RELAY
16 - DRIVER DOOR UNLOCK RELAY
17 - JB C1 CONNECTOR RECEPTACLE
18 - JB C2 CONNECTOR RECEPTACLE

(2) Align the rear fog lamp relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the rear fog lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

REAR LAMP BULB

REMOVAL

The rear lamp unit may contain up to four bulbs, depending upon the market for which the vehicle was manufactured. The service procedures for each bulb is the same, only the bulb sizes and types may differ.

FLIP-UP GLASS AJAR SWITCH (Continued)

tions and features of the vehicle. The rear wiper motor uses this input to restrict rear wiper operation when the flip-up glass is ajar. The flip-up glass ajar switch can be diagnosed using conventional diagnostic tools and methods; however, for proper diagnosis of the BCM, and both the hard wired and electronic BCM outputs affected by the flip-up glass ajar switch input, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

HEATER-A/C CONTROL ILLUMINATION BULB

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the center bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/ INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) From the back of the center bezel, use a small thin-bladed screwdriver to rotate the heater-A/C control illumination bulb holder counterclockwise about 30 degrees on the circuit board (Fig. 11).

(4) Pull the heater-A/C illumination bulb holder and bulb unit straight out of the circuit board bulb mounting hole.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

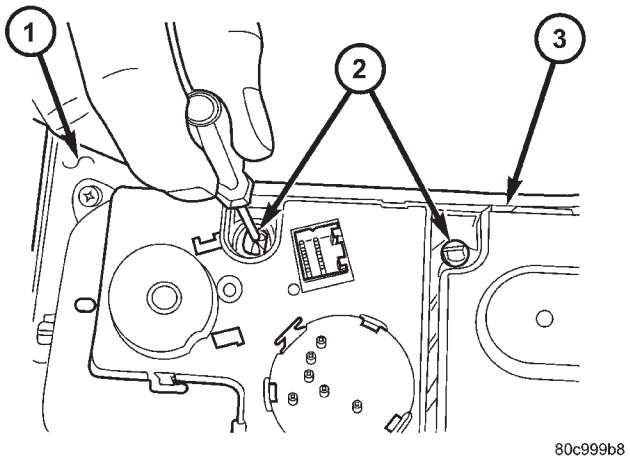


Fig. 11 Heater-A/C Control Illumination Bulb Remove/Install

1 - CENTER BEZEL
2 - BULB HOLDER & BULB (2)
3 - HEATER-A/C CONTROL

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket and/or the lamp wiring.

(1) Align the heater-A/C control illumination bulb holder and bulb unit with the circuit board bulb mounting hole.

(2) Insert the heater-A/C control illumination bulb holder and bulb unit straight into the circuit board bulb mounting hole until it is firmly seated (Fig. 11).

(3) Using a small thin-bladed screwdriver, rotate the heater-A/C control illumination bulb holder clockwise about 30 degrees on the circuit board.

(4) Reinstall the center bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/ INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(5) Reconnect the battery negative cable.

LAMPS/LIGHTING - EXTERIOR (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
REAR FOG LAMP DOES NOT EXTINGUISH	1. Faulty relay.	1. Test and replace rear fog lamp relay as required.
	2. Faulty switch.	2. Test and replace multi-function switch as required.
	3. Faulty feed circuit.	3. Test and repair shorted rear fog lamp relay output circuit as required.
	4. Faulty BCM inputs or outputs.	4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

TURN SIGNAL LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE TURN SIGNAL LAMP DOES NOT ILLUMINATE	1. Faulty or missing bulb.	1. Test and replace turn signal bulb as required.
	2. Faulty ground circuit.	2. Test and repair open ground circuit as required.
	3. Faulty feed circuit.	3. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE AND/OR ALL LEFT SIDE TURN SIGNAL LAMPS DO NOT FLASH	1. Faulty sense circuit.	1. Test and repair open right or left turn switch sense circuit as required.
	2. Faulty switch.	2. Test and replace multi-function switch as required.
	3. Faulty flasher.	3. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/ combination flasher unit as required.
	4. Faulty signal circuit.	4. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE OR ALL LEFT SIDE TURN SIGNALS FLASH TOO RAPIDLY (MORE THAN 100 FLASHES PER MINUTE)	1. Faulty or missing bulb.	1. Test and replace faulty bulb as required.
	2. Faulty ground circuit.	2. Test and repair open ground circuit as required.
	3. Faulty signal circuit	3. Test and repair open right or left turn signal circuit as required.
	4. Faulty flasher.	4. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/ combination flasher unit as required.

HEADLAMP HIGH BEAM RELAY (Continued)

- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

The headlamp high beam relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HEADLAMP HIGH BEAM RELAY

The headlamp high beam relay (Fig. 29) is located in the Junction Block (JB) on the driver side outboard end of the instrument panel. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the headlamp high beam relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP HIGH BEAM RELAY - REMOVAL).

(2) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

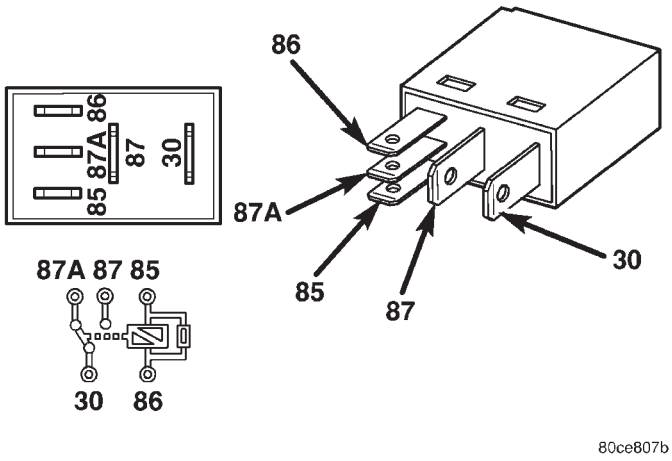


Fig. 29 ISO Micro Relay

30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the end cap from the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(3) Remove the headlamp high beam relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 30).

MULTI-FUNCTION SWITCH (Continued)

(3) Position the multi-function switch onto the steering column lock housing. Be certain that the switch alignment posts and locator tabs are fully seated on the lock housing.

(4) Position the upper and lower shrouds onto the steering column.

(5) Align the snap features on the lower shroud with the receptacles on the upper shroud and apply hand pressure to snap them together.

(6) From below the steering column, install and tighten the two screws that secure the lower shroud to the upper shroud. Tighten the screws to 2 N·m (20 in. lbs.).

(7) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column back to the fully raised position and move the tilt release lever into the locked (up) position.

(8) Reconnect the battery negative cable.

PARK LAMP RELAY

DESCRIPTION

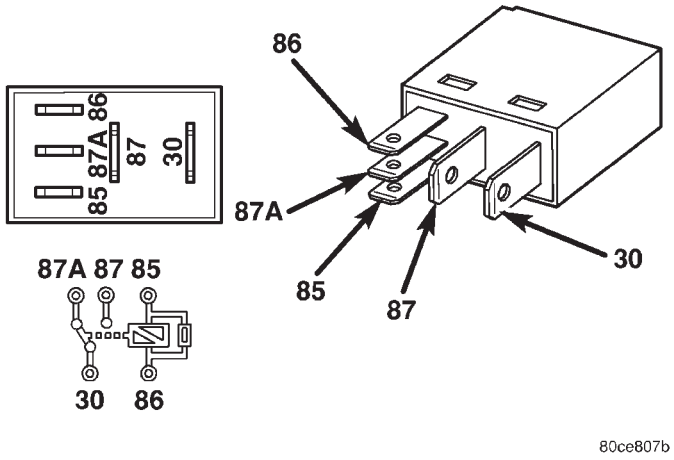


Fig. 53 ISO Micro Relay

30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

The park lamp relay is located in the Junction Block (JB) below the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The park lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 53). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The park lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The park lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the park lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The park lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the park lamp relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the park lamps through the park lamp relay output circuit and provides ground to the park lamps when the relay is de-energized, and battery current to the park lamps whenever the relay is energized.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the Body Control Module (BCM) through a park lamp relay control circuit. The BCM controls park lamp operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the PDC through a fused B(+) circuit.
- **Normally Open Terminal** - The normally open terminal (87) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.
- **Normally Closed Terminal** - The normally closed terminal (87A) is connected to ground at all times through a ground circuit that receives ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB).

COMPASS/MINI-TRIP COMPUTER (Continued)

- STEP
- C/T - Compass/Temperature
- US/M - English/Metric
- RESET

1. STEP BUTTON

Pressing the STEP button selects one of the following 6 displays:

- Average fuel economy
- Distance to empty
- Instantaneous fuel economy
- Trip odometer
- Elapsed time
- Blank Screen

2. C/T (COMPASS/TEMPERATURE) BUTTON

Pressing the C/T button selects the Compass/Temperature display.

3. US/M (ENGLISH/METRIC MEASUREMENT) BUTTON

Pressing the US/M button switches the display units between English and Metric readings.

4. RESET BUTTON

Pressing the RESET button resets the function on the display, provided that function can be reset. The functions which can be reset are Average fuel economy, Trip odometer and Elapsed time.

Global Reset This feature allows all three displays (Average fuel economy, Trip odometer and Elapsed time) to be reset easily, by pressing the RESET button twice within three seconds with any of the screens in display. This eliminates the need to reset each display individually.

The RESET button is also used to set the variance and/or calibrate the compass. Refer to the Variance Procedure and Calibration Procedure in this section.

For more information on the features, control functions and setting procedures for the CMTC module, see the owner's manual in the vehicle glove box.

DIAGNOSIS AND TESTING - COMPASS MINI-TRIP COMPUTER

The following diagnostic procedure can be used if the compass mini-trip computer is not operational in any way. If the problem is specific to a individual CMTC display, go to the appropriate display title noted below and diagnose using the information provided on how these displays are generated.

(1) Remove the overhead console from the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(2) Using a ohmmeter, check the ground circuit cavity of the compass mini-trip computer electrical connector for proper continuity to ground. Continuity should be present, If OK go to Step 3, If not OK repair the open or shorted ground circuit as required.

NOTE: Connect the negative battery cable before proceeding.

(3) Using a voltmeter, check the fused (B+) circuit cavity of the compass mini-trip computer electrical connector for 12v. Voltage should be present, If OK go to Step 4, If not OK repair the open or shorted fused (B+) circuit as required.

(4) Using a voltmeter, check the fused ignition switch output circuit cavity of the compass mini-trip computer electrical connector for 12v with Key ON. Voltage should be present, If OK, replace the inoperative CMTC module, If not OK repair the open or shorted fused ignition switch output circuit as required.

TEMPERATURE

The compass mini-trip computer receives Programmable Communications Interface bus (PCI bus) messages from the Body Control Module (BCM) for all displayed information except the compass display. If a dash (-) is displayed, the compass mini-trip computer is not receiving a PCI bus message from the BCM. To check out the PCI bus line and the BCM, use the DRB lll® scan tool and proper Body Diagnostic Procedure Manual.

If the compass mini-trip computer displays a temperature more than 54° C (130° F), check for a short circuit between the temperature sensor and the BCM.

If the compass mini-trip computer displays a temperature less than -40° C (-67° F), check for an open circuit between the temperature sensor and the BCM.

AVERAGE FUEL ECONOMY

The compass mini-trip computer receives average fuel economy information from the BCM over the PCI bus line. If the compass mini-trip computer displays -.- instead of an average fuel economy value, it is not receiving a PCI bus message for the average fuel economy from the BCM. To check out the PCI bus line and the BCM use the DRB lll® scan tool and proper Body Diagnostic Procedure Manual.

DISTANCE TO EMPTY

The compass mini-trip computer receives distance to empty information from the BCM over the PCI bus line. If compass mini-trip computer displays a dash (-) instead of a distance to empty value, it is not receiving a PCI bus message for the distance to empty from the BCM. To check out the PCI bus line

SEAT TRACK (Continued)

DIAGNOSIS AND TESTING - SEAT TRACK

(1) Remove the power seat switch from the seat (Refer to 8 - ELECTRICAL/POWER SEATS/DRIVER SEAT SWITCH - REMOVAL).

(2) Checking the body harness side of the power seat switch electrical connector (Fig. 3), check Pin 1 for ground and Pin 5 for battery voltage. If either of these two are not present repair the body harness as required.

(3) To test the seat motors and verify proper seat responses, refer to the Seat Motor Test table below. Using two jumper wires, connect one to a battery supply and the second to a ground. Connect the other ends to the seat wire harness connector as described in the Seat Motor Test table.

SEAT MOTOR TEST

SEAT SWITCH CONNECTOR			
CONNECT JUMPER		SEAT ACTION	
B(+)	B(–)	LEFT SIDE	RIGHT SIDE
PIN 9	PIN 8	FRONT RISER UP	FRONT RISER DOWN
PIN 8	PIN 9	FRONT RISER DOWN	FRONT RISER UP
PIN 3	PIN 6	FORWARD	FORWARD
PIN 6	PIN 3	REARWARD	REARWARD
PIN 10	PIN 7	REAR RISER UP	REAR RISER DOWN
PIN 7	PIN 10	REAR RISER DOWN	REAR RISER UP

REMOVAL

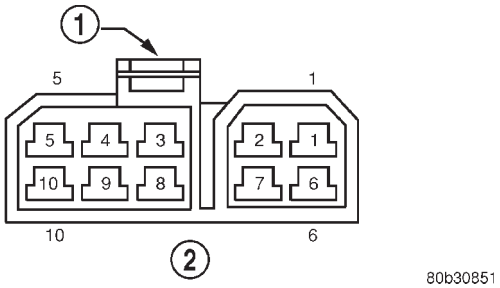


Fig. 3 POWER SEAT SWITCH HARNESS PIN IDENTIFICATION

1 - CONNECTOR RETAINING TAB
2 - VIEWED FROM BODY HARNESS END

(1) Remove the appropriate seat from the vehicle. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(2) Remove the seat cushion side shield from the seat (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - REMOVAL).

(3) Remove four seat track mounting bolts from cushion pan.

(4) Disconnect the power seat electrical and remove the seat track from the seat cushion.

INSTALLATION

(1) Position the seat track and install the retaining bolts in the seat cushion pan. Torque the bolts to 45-60 N·m.

(2) Route and connect the power seat electrical on the seat track and cushion pan.

(3) Install the seat cushion side shield on the seat. Refer to the Body section for the procedure.

(4) Install the seat in the vehicle (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

(5) Connect the negative battery cable.

LEFT POWER SEAT SWITCH

DESCRIPTION

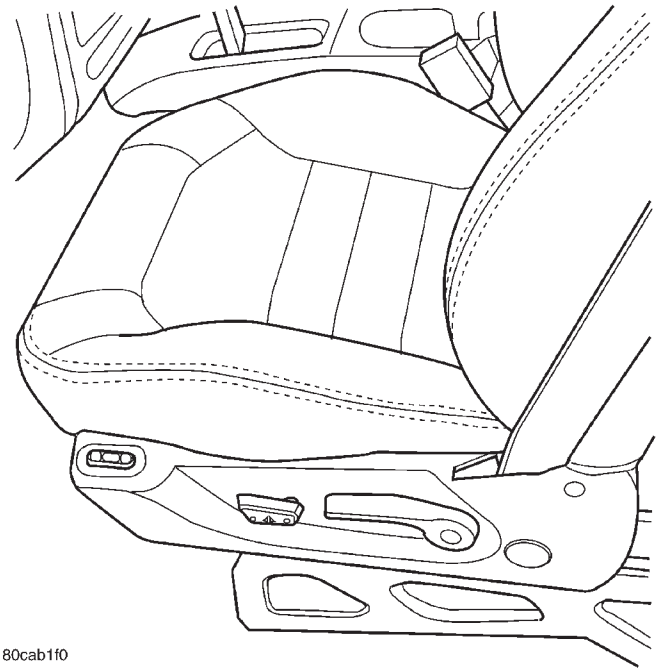


Fig. 4 KJ Heated/Power Seat

Vehicles equipped with the power seat option utilize a six-way power seat switch. This six-way power seat switch features one seat cushion shaped knob, visible on the outboard seat cushion side shield (Fig. 4).

The switch is secured to the back of the seat cushion side shield with two screws. However, the control knob must be removed before the seat switch can be removed from the side shield.

AIRBAG CONTROL MODULE (Continued)

(5) Remove the two screws that secure the ACM to the ACM bracket that is welded onto the top of the floor panel transmission tunnel (Fig. 8).

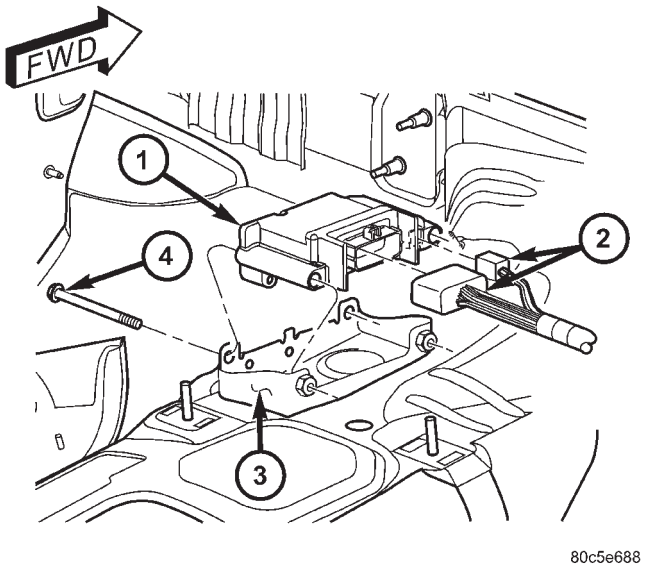


Fig. 8 Airbag Control Module Remove/Install

1 - AIRBAG CONTROL MODULE
2 - WIRE HARNESS CONNECTOR (2)
3 - BRACKET
4 - SCREW (2)

(6) Lift the ACM from the ACM bracket on the top of the floor panel transmission tunnel and move the unit to the left far enough to access the ACM wire harness connectors.

(7) Disconnect the two instrument panel wire harness connectors for the ACM from the ACM connector receptacles on the right side of the module. To disconnect the large instrument panel wire harness connector from the ACM:

(a) Slide the red Connector Position Assurance (CPA) lock on the top of the connector toward the side of the connector.

(b) Depress the connector latch tab and pull the connector straight away from the ACM connector receptacle.

(8) Remove the ACM from the left side of the floor panel transmission tunnel.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE AIRBAG CONTROL MODULE CONTAINS THE IMPACT SENSOR, WHICH ENABLES THE SYSTEM TO DEPLOY THE FRONT SUPPLEMENTAL RESTRAINTS. NEVER STRIKE OR DROP THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE IS ACCIDENTALLY DROPPED DURING SERVICE, THE MODULE MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN ACCIDENTAL, INCOMPLETE, OR IMPROPER FRONT SUPPLEMENTAL RESTRAINT DEPLOYMENT AND POSSIBLE OCCUPANT INJURIES.

(1) Position the Airbag Control Module (ACM) to the left side of the floor panel transmission tunnel near the ACM bracket (Fig. 8).

(2) Reconnect the instrument panel wire harness connectors for the ACM to the ACM connector receptacles on the right side of the module. Be certain that the latches on both connectors and the red Connector Position Assurance (CPA) lock on the large connector are each fully engaged.

(3) Carefully position the ACM into the ACM bracket on the top of the floor panel transmission tunnel. When the ACM is correctly positioned, the arrow on the ACM housing will be pointed forward in the vehicle.

(4) Install and tighten the two screws that secure the ACM to the ACM bracket that is welded onto the floor panel transmission tunnel. Tighten the screws to 36 N·m (26 ft. lbs.).

(5) Install and tighten the ground screw that secures the ground lug on the left rear corner of the ACM housing to the ACM bracket on the floor panel transmission tunnel (Fig. 7). Tighten the screw to 12 N·m (105 in. lbs.).

(6) From the left side of the floor panel transmission tunnel, carefully position the ACM cover back over the top of the ACM.

REAR CENTER SEAT BELT & RETRACTOR

REMOVAL

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS FOR PROPER INSTALLATION, OPERATION, OR DAMAGE. REPLACE ANY BELT THAT IS CUT, FRAYED, OR TORN. STRAIGHTEN ANY BELT THAT IS TWISTED. TIGHTEN ANY LOOSE FASTENERS. REPLACE ANY BELT THAT HAS A DAMAGED OR INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Remove the right center seat belt buckle unit from the floor panel. (Refer to 8 - ELECTRICAL/RESTRAINTS/REAR SEAT BELT BUCKLE - REMOVAL).

(2) Unlatch and fold the right rear seat back forward and separate the cargo area carpet from the base of the seat back panel.

(3) Reach between the base of the right rear seat back and the forward edge of the rear cargo floor to access and remove the screw that secures the rear center seat belt lower anchor to the floor panel (Fig. 28).

(4) Lift the rear center seat belt lower anchor off of the stud on the rear floor panel.

(5) Remove the two screws that secure the belt web guide to the top of the right rear seat back panel.

(6) Remove the right rear seat back panel from the vehicle. (Refer to 23 - BODY/SEATS/SEAT BACK - REAR - REMOVAL).

(7) Remove the two screws that secure the belt web guide to the top of the right rear seat back panel.

(8) Remove the trim from the right rear seat back. (Refer to 23 - BODY/SEATS/SEAT BACK COVER - REAR - REMOVAL).

(9) Route the rear seat belt lower anchor and belt web guide through the top of the seat back panel.

(10) Disengage the seat back latch cable fitting from the cable support on the retractor, which is a light snap fit (Fig. 29).

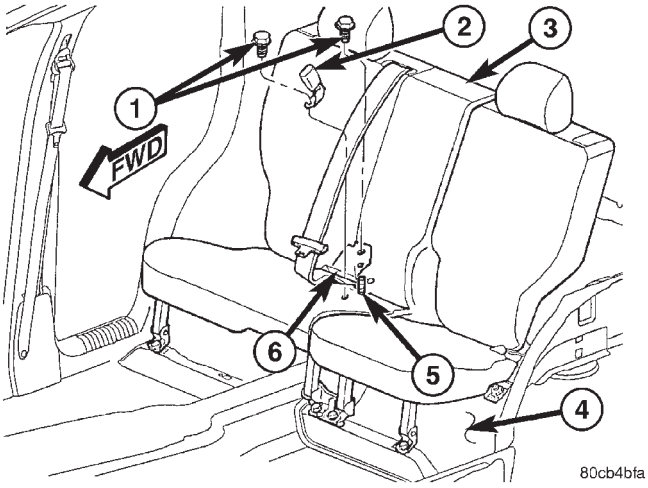


Fig. 28 Rear Center Seat Belt Anchor Plate Remove/Install

1 - SCREW (2)
2 - BUCKLE UNIT
3 - REAR SEAT BACK
4 - REAR FLOOR PANEL
5 - STUD (1)
6 - ANCHOR PLATE

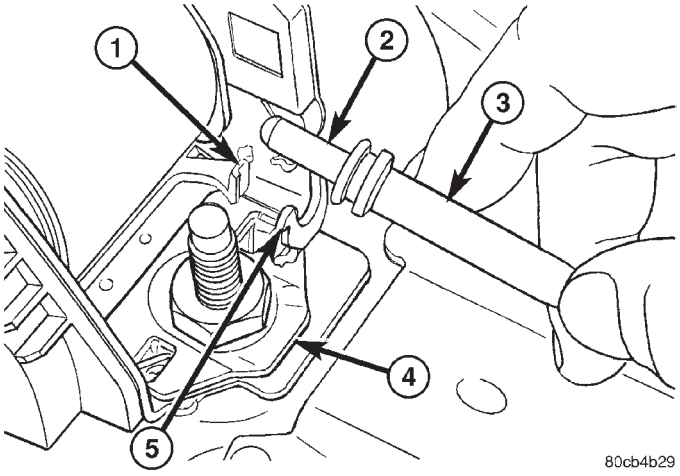


Fig. 29 Seat Back Latch Cable Disengage/Engage

1 - LEVER
2 - PLUNGER
3 - LATCH CABLE FITTING
4 - REAR CENTER RETRACTOR
5 - SUPPORT

SWITCH (Continued)

- The VSS signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)
- If the actual speed is not within 20 mph of the set speed

The previous disengagement conditions are programmed for added safety.

Once the speed control has been disengaged, depressing the ACCEL switch restores the vehicle to the target speed that was stored in the PCM's RAM.

NOTE: Depressing the OFF switch will erase the set speed stored in the PCM's RAM.

If, while the speed control is engaged, the driver wishes to increase vehicle speed, the PCM is programmed for an acceleration feature. With the ACCEL switch held closed, the vehicle accelerates slowly to the desired speed. The new target speed is stored in the PCM's RAM when the ACCEL switch is released. The PCM also has a ″tap-up″ feature in which vehicle speed increases at a rate of approximately 2 mph for each momentary switch activation of the ACCEL switch.

The PCM also provides a means to decelerate without disengaging speed control. To decelerate from an existing recorded target speed, depress and hold the COAST switch until the desired speed is reached. Then release the switch. The ON, OFF switch operates two components: the PCM's ON, OFF input, and the battery voltage to the brake switch, which powers the speed control servo.

Multiplexing

The PCM sends out 5 volts through a fixed resistor and monitors the voltage change between the fixed resistor and the switches. If none of the switches are depressed, the PCM will measure 5 volts at the sensor point (open circuit). If a switch with no resistor is closed, the PCM will measure 0 volts (grounded circuit). Now, if a resistor is added to a switch, then the PCM will measure some voltage proportional to the size of the resistor. By adding a different resistor to each switch, the PCM will see a different voltage depending on which switch is pushed.

Another resistor has been added to the 'at rest circuit' causing the PCM to never see 5 volts. This was done for diagnostic purposes. If the switch circuit should open (bad connection), then the PCM will see the 5 volts and know the circuit is bad. The PCM will then set an open circuit fault.

REMOVAL

WARNING: BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL AND STEERING COLUMN COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE NEGATIVE (GROUND) BATTERY CABLE. 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.

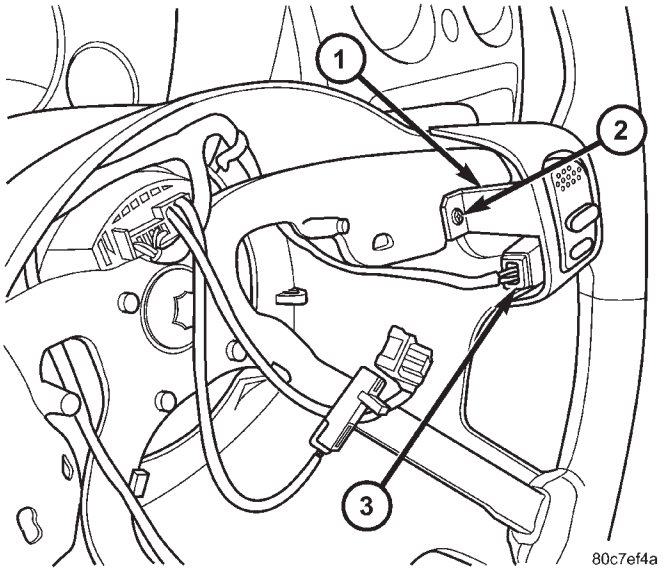


Fig. 7 SPEED CONTROL SWITCH

1 - SWITCH
2 - SCREW
3 - ELECTRICAL CONNECTOR

(1) Disconnect and isolate negative battery cable from battery.

(2) Remove airbag module. Refer to Restraint Systems.

(3) Unplug electrical connector (Fig. 7).

(4) Remove speed control switch mounting screw (Fig. 7) and remove switch from steering wheel.

INSTALLATION

(1) Position switch to steering wheel.

(2) Install switch mounting screw and tighten. Refer to torque specifications.

(3) Plug electrical connector into switch.

(4) Install airbag module. Refer to Restraint Systems.

(5) Connect negative battery cable to battery.

SIREN (Continued)

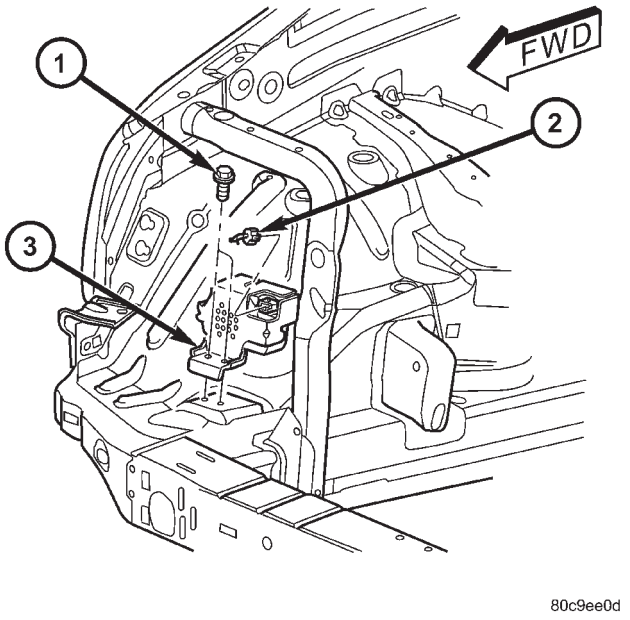


Fig. 14 Siren Remove/Install

1 - SCREW (2)
2 - WIRE HARNESS CONNECTOR
3 - SIREN

(2) Install and tighten the two screws that secure the alarm siren module to the front extension of the right front wheel house panel. Tighten the screws to 6 N·m (50 in. lbs.).

(3) Reconnect the headlamp and dash wire harness connector for the alarm siren module to the module connector receptacle.

(4) Reconnect the battery negative cable.

NOTE: If the alarm siren module has been replaced with a new unit, the new unit MUST be configured in the Intrusion Transceiver Module (ITM) before the Vehicle Theft Security System can operate as designed. The use of a DRBIII® scan tool is required to configure the alarm siren module settings in the ITM. Refer to the appropriate diagnostic information.

TRANSPONDER KEY

DESCRIPTION

Each ignition key used in the Sentry Key Immobilizer System (SKIS) has an integral transponder chip (Fig. 15). Ignition keys with this feature can be readily identified by a gray rubber cap molded onto the head of the key, while conventional ignition keys have a black molded rubber cap. The transponder

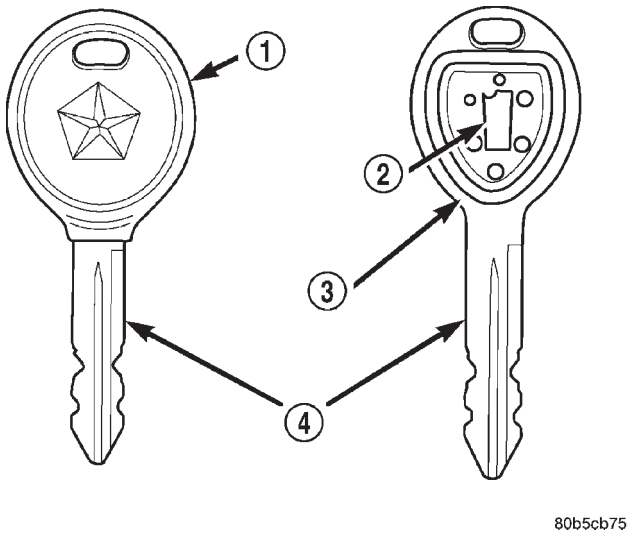


Fig. 15 Sentry Key Immobilizer Transponder

1 - MOLDED CAP
2 - TRANSPONDER CHIP
3 - MOLDED CAP REMOVED
4 - TRANSPONDER KEY

chip is concealed beneath the molded rubber cap, where it is molded within a plastic mount into the head of the metal key. In addition to being cut to match the mechanical coding of the ignition lock cylinder, each new Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. The Sentry Key transponder cannot be adjusted or repaired. If faulty or damaged, the entire key must be replaced.

OPERATION

When the ignition switch is turned to the On position, the Sentry Key Immobilizer Module (SKIM) communicates through its antenna with the Sentry Key transponder using a Radio Frequency (RF) signal. The SKIM then listens for a RF response from the transponder through the same antenna. The Sentry Key transponder chip is within the range of the SKIM transceiver antenna ring when it is inserted into the ignition lock cylinder. The SKIM determines whether a valid key is present in the ignition lock cylinder based upon the response from the transponder. If a valid key is detected, that fact is communicated by the SKIM to the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus, and the PCM allows the engine to continue running. If the PCM receives an invalid key message, or receives no message from the SKIM over the PCI data bus, the engine will be disabled after about two seconds of operation. The ElectroMechanical Instrument Cluster (EMIC) will also respond to the invalid key message on the PCI data bus by flashing the SKIS indicator on and off.

WASHER FLUID LEVEL SWITCH (Continued)

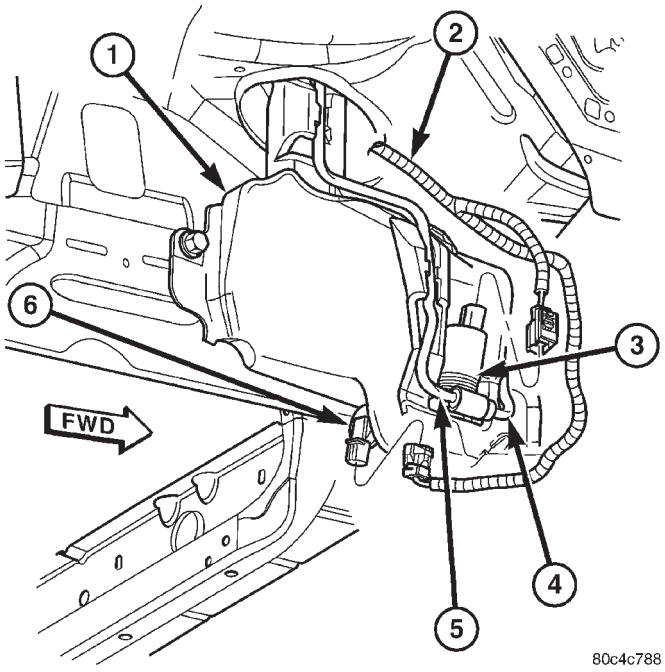


Fig. 17 Washer Fluid Level Switch Remove/Install

1 - WASHER RESERVOIR
2 - WIRE HARNESS
3 - WASHER PUMP/MOTOR
4 - FRONT WASHER HOSE
5 - REAR WASHER HOSE
6 - WASHER FLUID LEVEL SWITCH

NOTE: The pivoting float of the washer fluid level switch must be in a horizontal position within the reservoir in order to be removed. With the reservoir empty and in an upright position, the pivoting float will orient itself to the horizontal position when the switch connector receptacle is pointed straight downwards.

(6) Using a trim stick or another suitable wide flat-bladed tool, gently pry the barbed nipple of the washer fluid level switch out of the rubber grommet seal on the back of the reservoir sump. Care must be taken not to damage the reservoir.

(7) Remove the washer fluid level switch from the washer reservoir.

(8) Remove the rubber grommet seal from the washer fluid level switch mounting hole in the washer reservoir and discard.

INSTALLATION

(1) Install a new rubber grommet seal into the washer fluid level switch mounting hole in the washer reservoir. Always use a new rubber grommet seal on the reservoir.

(2) Insert the float of the washer fluid level switch through the rubber grommet seal and into the washer reservoir. The connector receptacle of the washer fluid level switch should be pointed downward.

(3) Using hand pressure, press firmly and evenly on the washer fluid level switch mounting flange until the barbed nipple is fully seated in the rubber grommet seal in the washer reservoir mounting hole.

(4) Reconnect the headlamp and dash wire harness connector for the washer fluid level switch to the switch connector receptacle (Fig. 17).

(5) Reconnect the removed washer hose to the barbed outlet nipple of the washer pump/motor unit.

(6) Reinstall the splash shield into the right front fender wheel house. (Refer to 23 - BODY/EXTERIOR/ FRONT WHEELHOUSE SPLASH SHIELD - INSTALLATION).

(7) Lower the vehicle.

(8) Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

(9) Reconnect the battery negative cable.

WASHER PUMP/MOTOR

DESCRIPTION

The washer pump/motor unit (Fig. 18) is located on the outboard side of the washer reservoir, on the outboard side of the right front frame rail behind the right front wheel house splash shield. A small permanently lubricated and sealed reversible electric motor is coupled to the rotor-type washer pump. The use of an integral shuttle valve allows the washer pump/ motor unit to provide washer fluid to either the front or the rear washer systems, depending upon the direction of the motor/pump impeller rotation. A seal flange with a barbed inlet nipple on the pump housing passes through a rubber grommet seal installed in a dedicated mounting hole of the washer reservoir. When the pump is installed in the reservoir the front barbed outlet nipple on the pump shuttle valve housing connects the unit to the front washer hose and the rear barbed outlet nipple connects the unit to the rear washer hose. The letters “F” and “R” molded into the shuttle valve housing adjacent to each nipple provide further clarification of the nipple assignments.

The washer pump/motor unit is retained on the reservoir by the interference fit between the barbed pump inlet nipple and the grommet seal, which is a light press fit. The top of the washer pump is also secured to the washer reservoir by the use of a snap post on the motor and a snap post receptacle molded into the reservoir that allows for mounting of the washer pump without the use of fasteners. An integral connector receptacle on the top of the motor

REAR WIPER ARM (Continued)

A wiper arm cannot be adjusted or repaired. If damaged or faulty, the entire wiper arm unit must be replaced.

OPERATION

The rear wiper arm is designed to mechanically transmit the motion from the rear wiper motor output shaft to the rear wiper blade. The wiper arm must be properly indexed to the motor output shaft in order to maintain the proper wiper blade travel on the glass. The wiper arm support is designed to lift and support the rear wiper arm and blade off of the glass when the rear wiper blade is parked. This support and the park ramp on the tailgate outer panel below the glass also provide an alignment reference to ensure accurate rear wiper arm and blade installation. The tapered hole in the wiper arm pivot end is interlocks with the serrations on the outer circumference of the tapered motor output shaft, allowing positive engagement and finite adjustment of this connection. A hex nut secures the wiper arm pivot end to the threads on the rear wiper motor output shaft and the pivot cover hinges and snaps over this connection for a neat appearance. The spring-loaded wiper arm hinge controls the down-force applied through the tip of the wiper arm to the wiper blade on the glass. The hook formation on the tip of the wiper arm provides a cradle for securing and latching the wiper blade pivot block to the wiper arm.

REMOVAL

(1) Lift the rear wiper arm pivot cover by lifting it at the rear wiper motor output shaft end of the arm (Fig. 9).

(2) Remove the nut that secures the rear wiper arm to the rear wiper motor output shaft.

(3) If necessary, use a battery terminal puller to disengage the wiper arm from the rear wiper motor output shaft splines (Fig. 10).

NOTE: Depending upon the size and type of puller used, it may be necessary to remove the spare tire from the tailgate. Refer to the owner's manual in the vehicle glove box for information on removing the spare tire from the tailgate.

(4) Remove the rear wiper arm pivot end from the motor output shaft.

INSTALLATION

NOTE: Always install the wiper arm and blade with the wiper motor in the Park position.

(1) The rear wiper arm must be indexed to the motor output shaft with the rear wiper motor in the park position to be properly installed. Place the wiper arm onto the tailgate with the wiper arm support positioned on the park ramp and the tapered mounting hole on the pivot end of the arm positioned over the rear wiper motor output shaft.

(2) Position the tab on the back of the rear wiper arm support on the tailgate park ramp in the Installation Position (Fig. 11).

(3) With the wiper arm in the Installation Position, push the tapered mounting hole on the pivot end of the wiper arm down over the rear wiper motor output shaft.

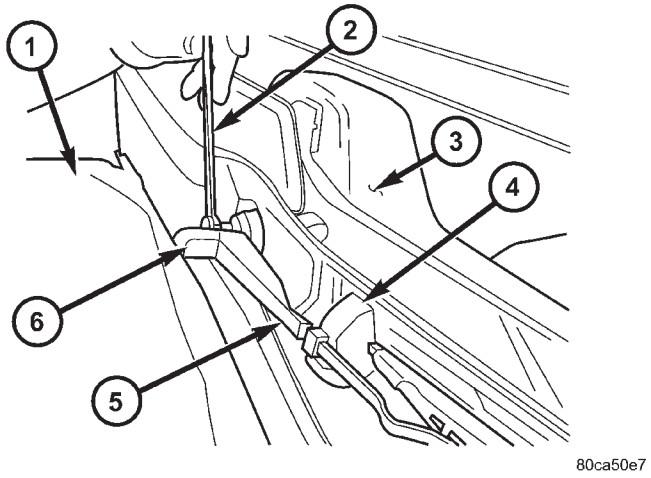


Fig. 9 Rear Wiper Arm Remove/Install

1 - SPARE TIRE
2 - WRENCH
3 - FLIP-UP GLASS
4 - PARK RAMP
5 - REAR WIPER ARM
6 - PIVOT COVER

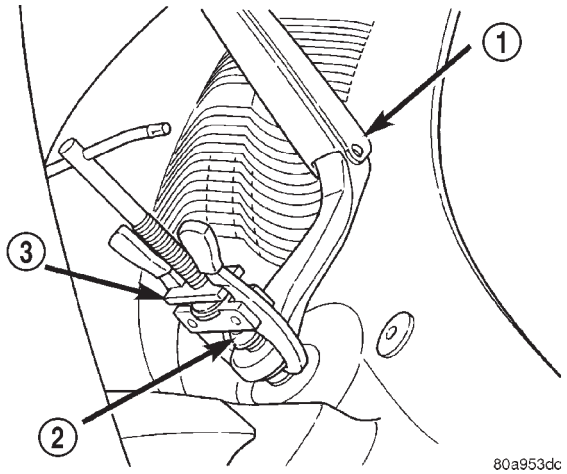


Fig. 10 Wiper Arm Puller - Typical

1 - WIPER ARM
2 - WIPER PIVOT
3 - BATTERY TERMINAL PULLER

CONNECTOR (Continued)

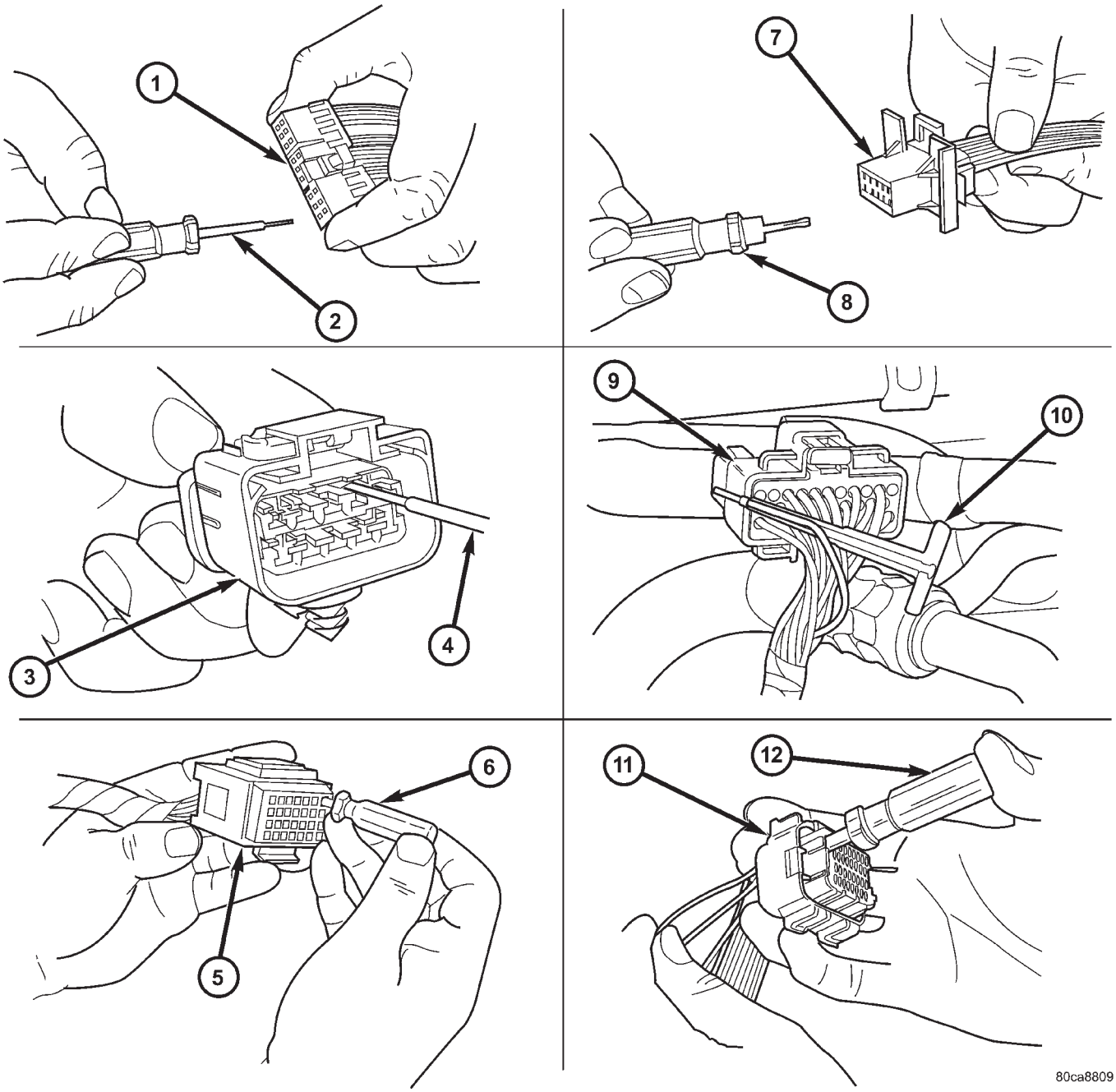
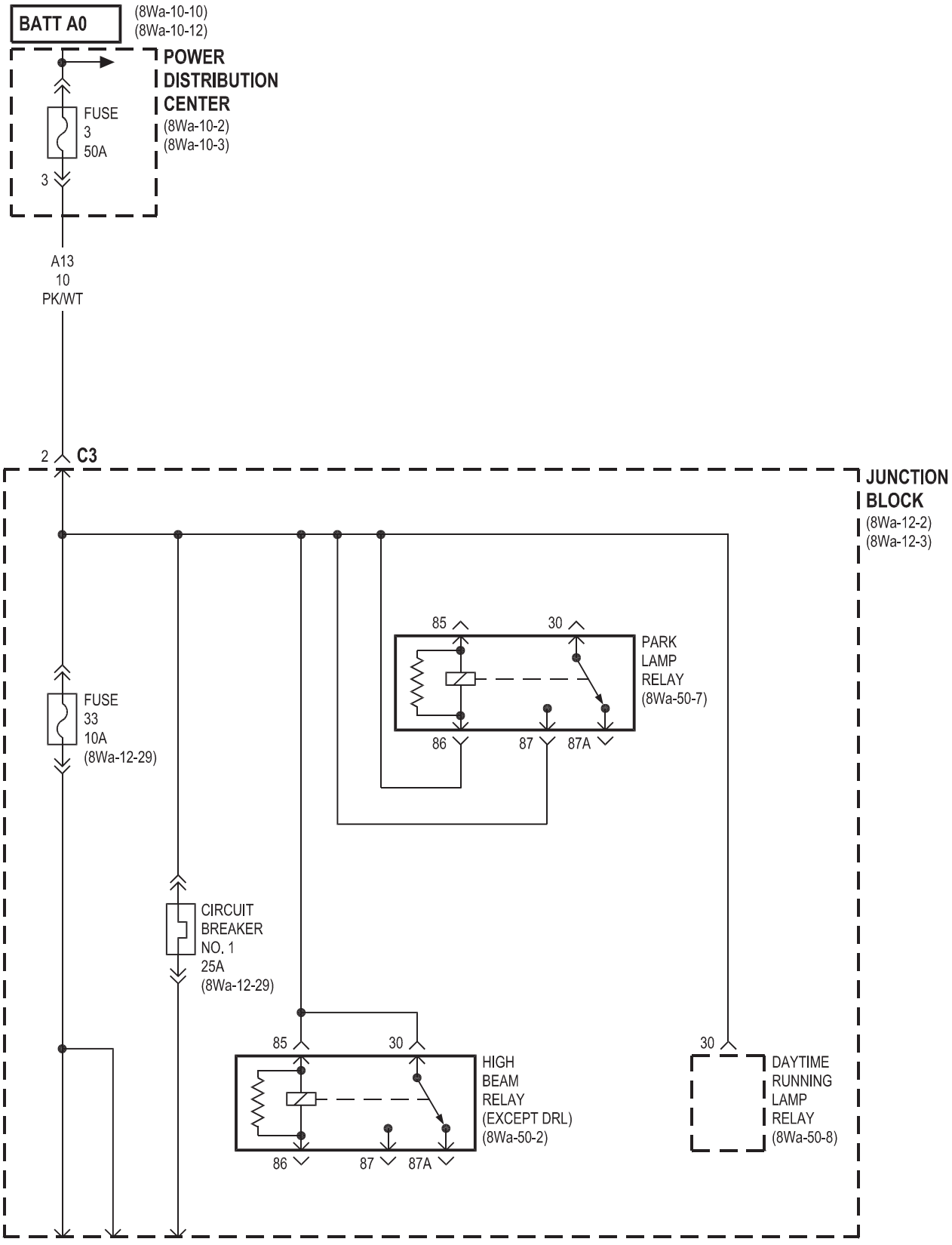


Fig. 12 TERMINAL REMOVAL

1 - TYPICAL CONNECTOR
2 - PICK FROM SPECIAL TOOL KIT 6680
3 - APEX CONNECTOR
4 - PICK FROM SPECIAL TOOL KIT 6680
5 - AUGAT CONNECTOR
6 - SPECIAL TOOL 6932
7 - MOLEX CONNECTOR
8 - SPECIAL TOOL 6742
9 - THOMAS AND BETTS CONNECTOR
10 - SPECIAL TOOL 6934
11 - TYCO CONNECTOR
12 - SPECIAL TOOL 8638


BATT A0
(8Wa-10-10)
(8Wa-10-12)
POWER
DISTRIBUTION
CENTER
(8Wa-10-2)
(8Wa-10-3)
FUSE
3
50A
3
A13
10
PK/WT
2
C3
JUNCTION
BLOCK
(8Wa-12-2)
(8Wa-12-3)
85
30
PARK
LAMP
RELAY
(8Wa-50-7)
86
87
87A
FUSE
33
10A
(8Wa-12-29)
CIRCUIT
BREAKER
NO. 1
25A
(8Wa-12-29)
85
30
HIGH
BEAM
RELAY
(EXCEPT DRL)
(8Wa-50-2)
86
87
87A
30
DAYTIME
RUNNING
LAMP
RELAY
(8Wa-50-8)

DAYTIME RUNNING LAMP RELAY

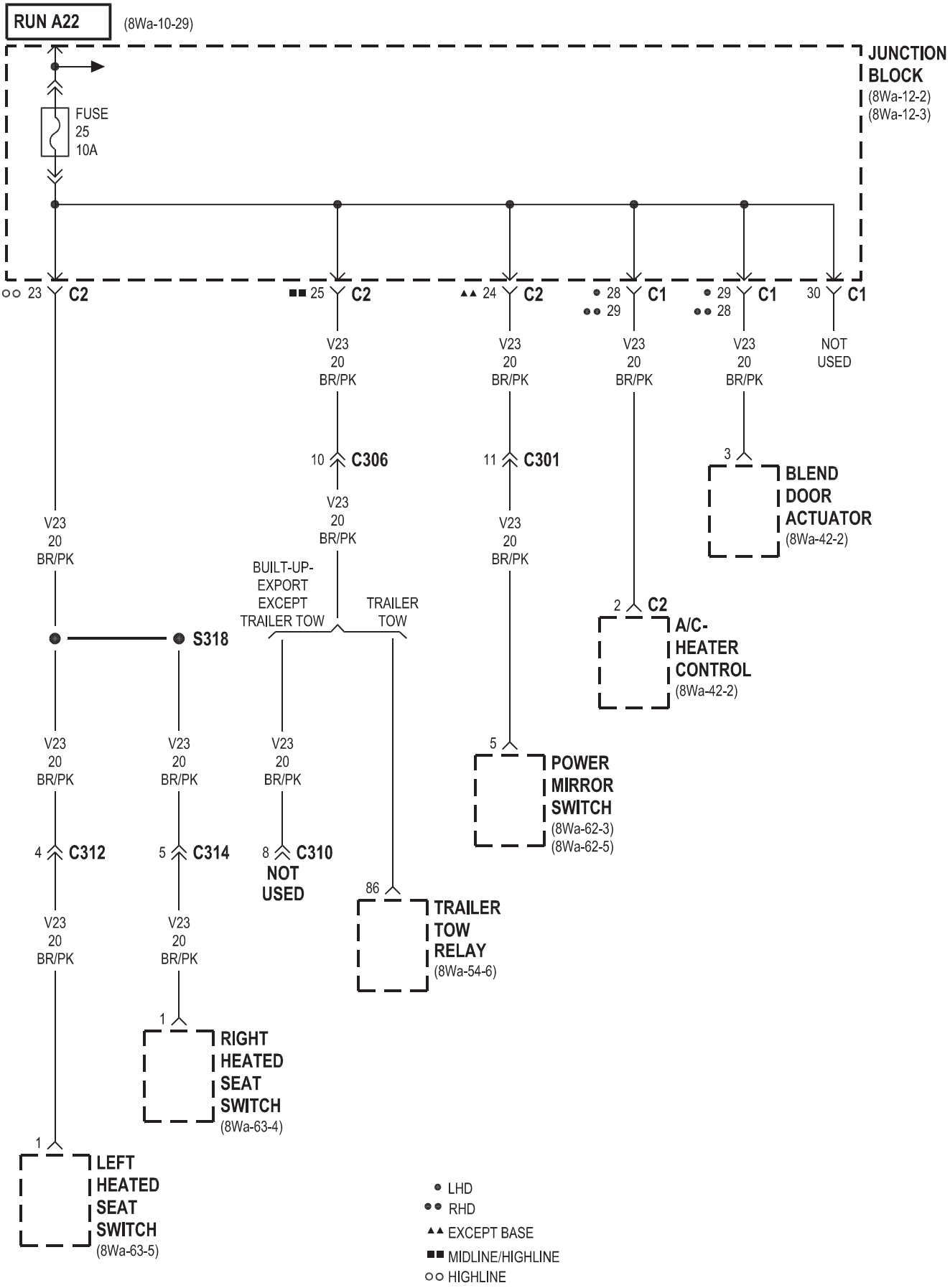
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	GROUND
86	INTERNAL	HIGH BEAM RELAY CONTROL
87	INTERNAL	DAYTIME RUNNING LAMP RELAY OUTPUT
87A	-	-

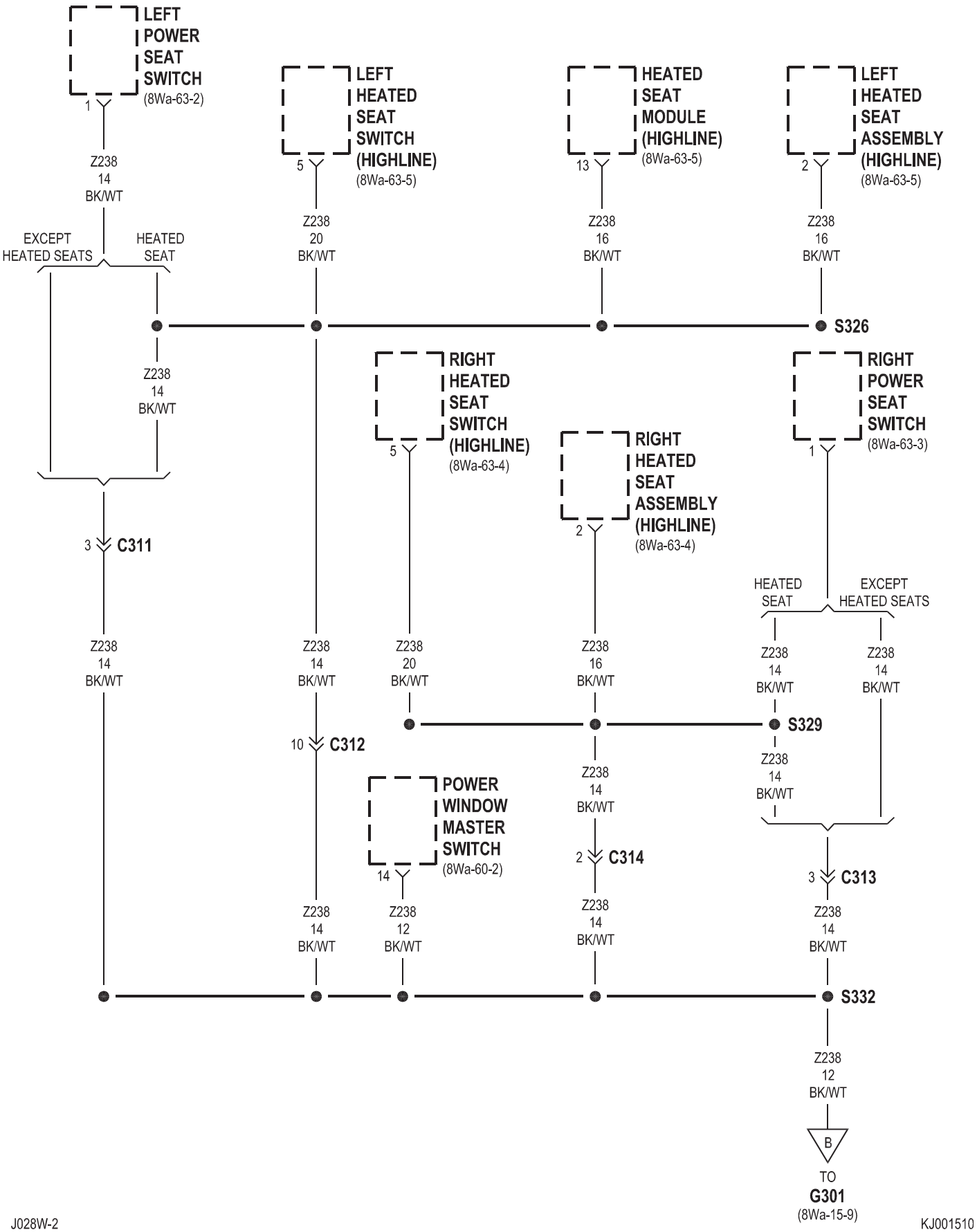
DEFOGGER RELAY

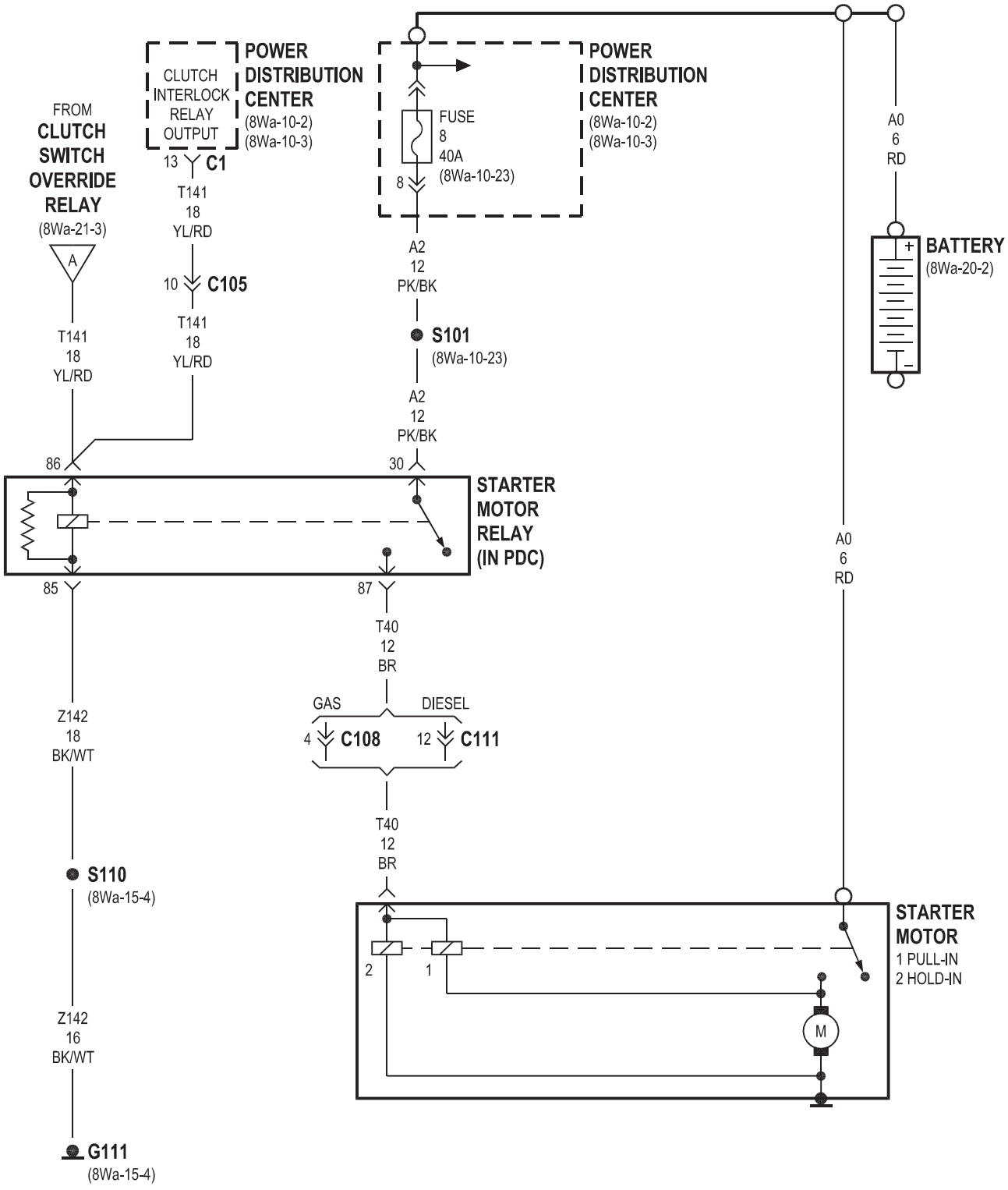
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
86	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
87	INTERNAL	REAR WINDOW DEFOGGER RELAY OUTPUT
87A	-	-

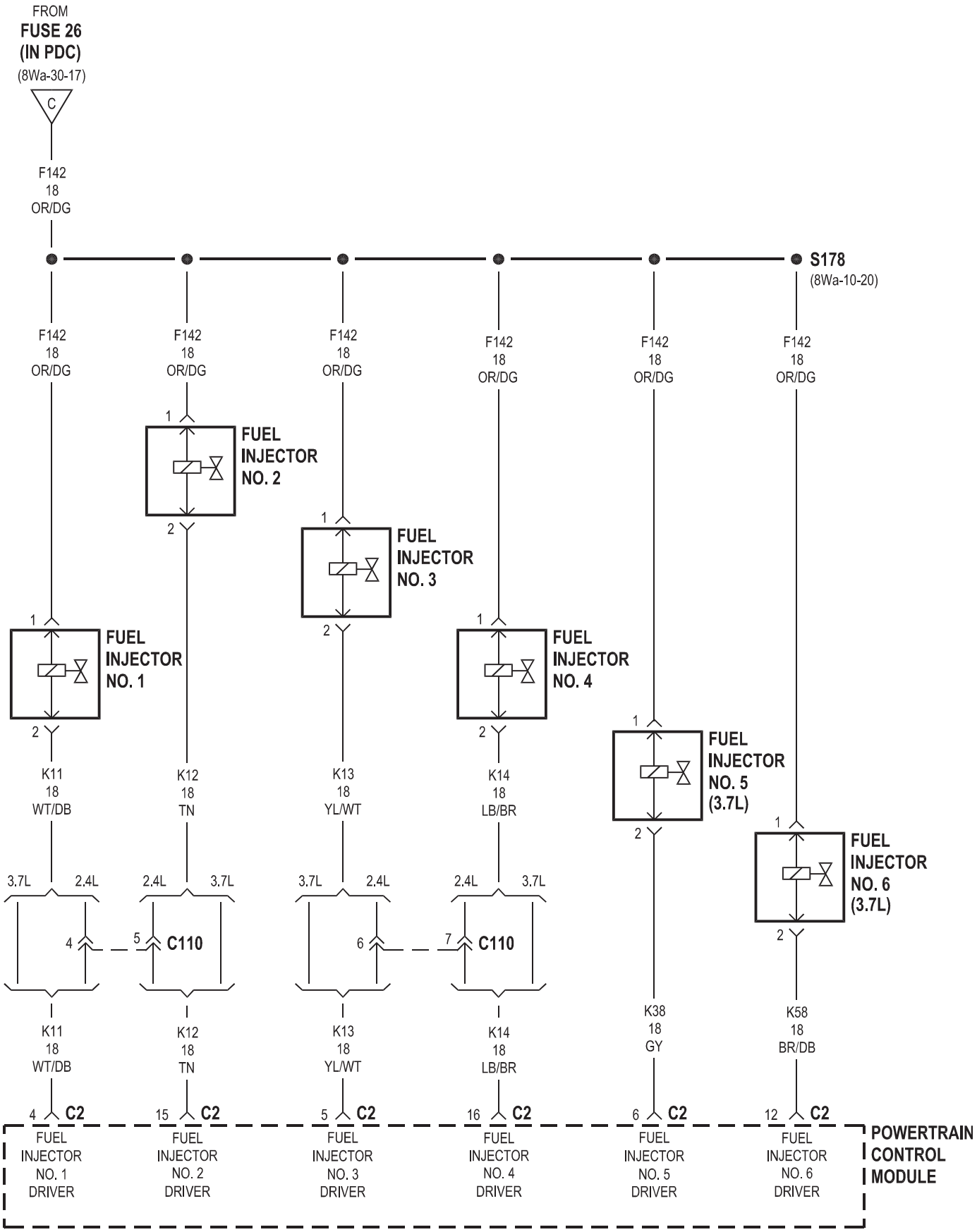
DOOR LOCK RELAY

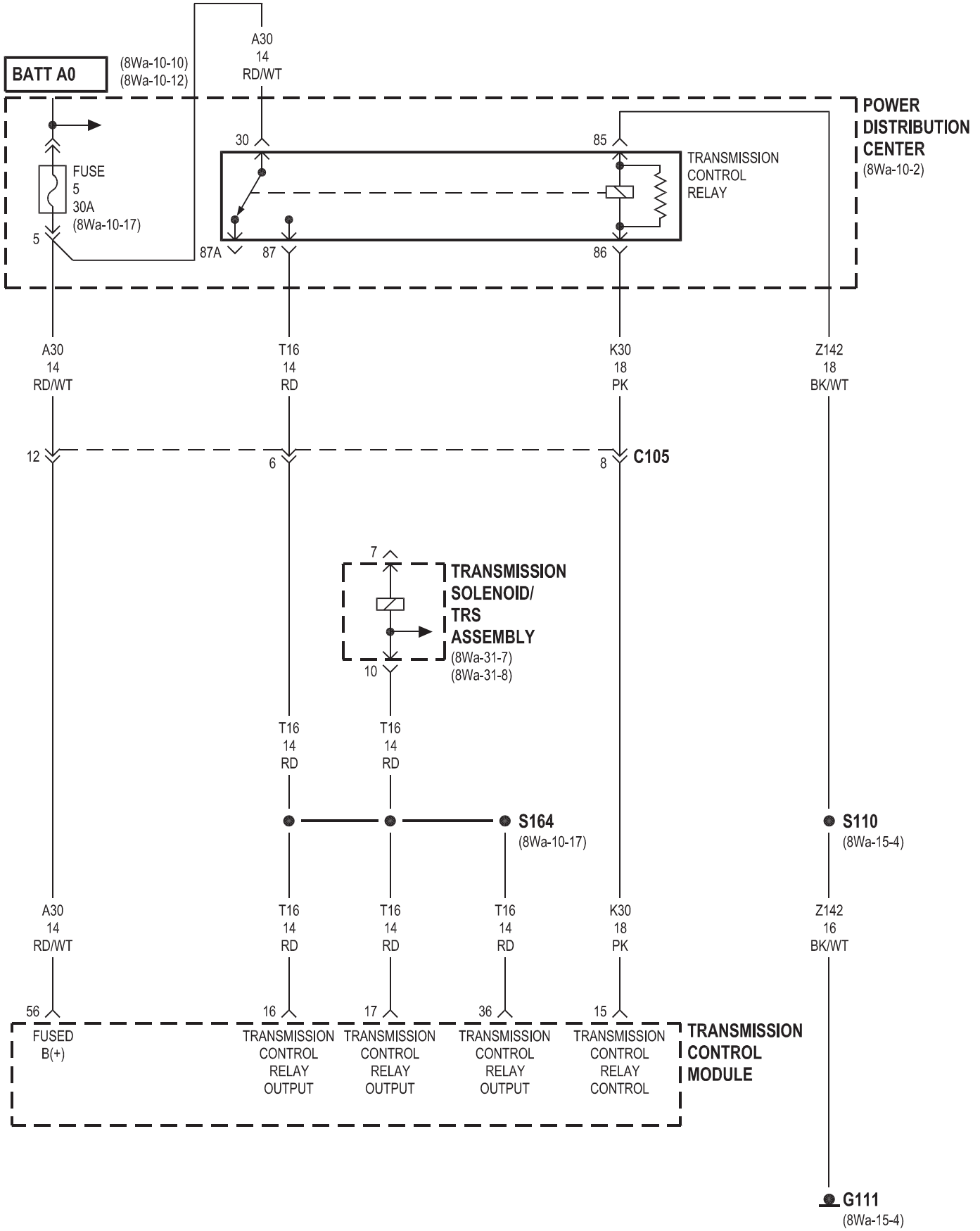
CAVITY	CIRCUIT	FUNCTION
30	P33 18OR/BK	DOOR LOCK RELAY OUTPUT
85	INTERNAL	FUSED B(+)
86	INTERNAL	DOOR LOCK RELAY CONTROL
87	INTERNAL	FUSED B(+)
87A	INTERNAL	GROUND

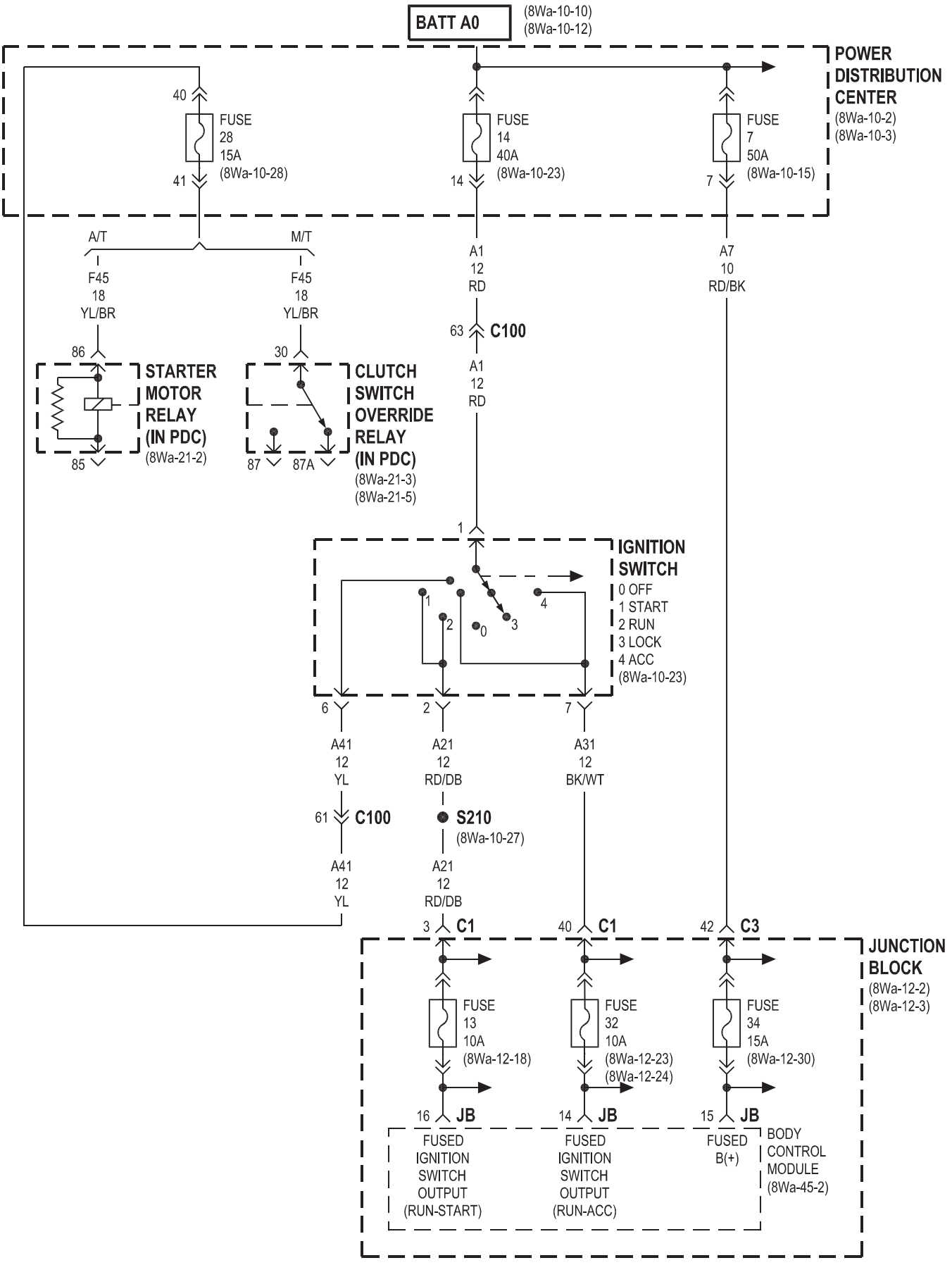

RUN A22
(8Wa-10-29)
JUNCTION BLOCK
(8Wa-12-2)
(8Wa-12-3)
FUSE 25 10A
23 C2
25 C2
24 C2
28 C1
29 C1
29 C1
28 C1
30 C1
V23 20 BR/PK
NOT USED
10 C306
11 C301
3
BLEND DOOR ACTUATOR
(8Wa-42-2)
BUILT-UP-EXPORT EXCEPT TRAILER TOW
TRAILER TOW
S318
2 C2
A/C-HEATER CONTROL
(8Wa-42-2)
5
POWER MIRROR SWITCH
(8Wa-62-3)
(8Wa-62-5)
4 C312
5 C314
8 C310
NOT USED
86
TRAILER TOW RELAY
(8Wa-54-6)
1
RIGHT HEATED SEAT SWITCH
(8Wa-63-4)
1
LEFT HEATED SEAT SWITCH
(8Wa-63-5)
LHD
RHD
EXCEPT BASE
MIDLINE/HIGHLINE
HIGHLINE

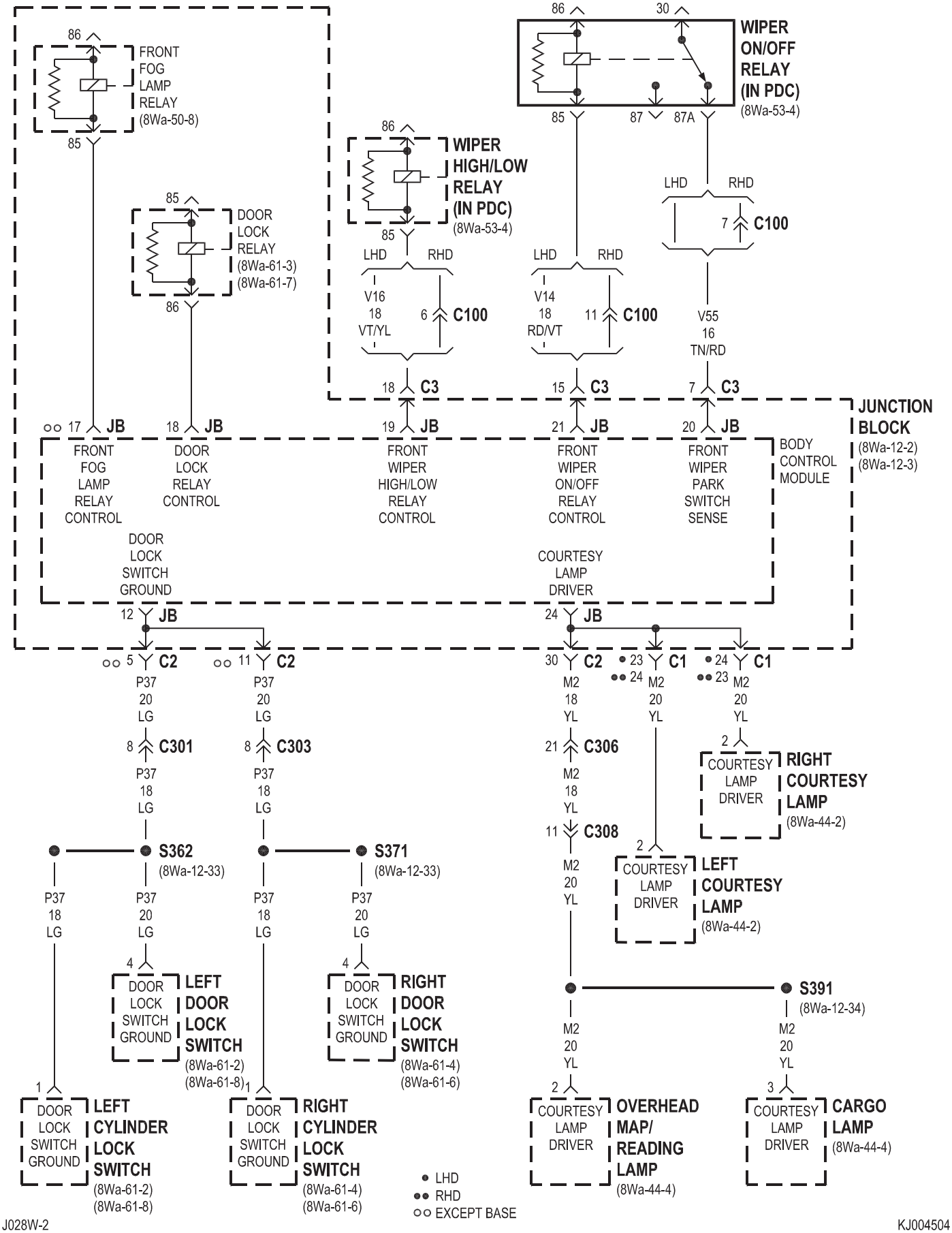

LEFT POWER SEAT SWITCH
(8Wa-63-2)
1
Z238
14
BK/WT
EXCEPT HEATED SEATS
HEATED SEAT
LEFT HEATED SEAT SWITCH (HIGHLINE)
(8Wa-63-5)
5
Z238
20
BK/WT
HEATED SEAT MODULE (HIGHLINE)
(8Wa-63-5)
13
Z238
16
BK/WT
LEFT HEATED SEAT ASSEMBLY (HIGHLINE)
(8Wa-63-5)
2
Z238
16
BK/WT
S326
Z238
14
BK/WT
RIGHT HEATED SEAT SWITCH (HIGHLINE)
(8Wa-63-4)
5
RIGHT HEATED SEAT ASSEMBLY (HIGHLINE)
(8Wa-63-4)
2
RIGHT POWER SEAT SWITCH
(8Wa-63-3)
1
3 C311
Z238
14
BK/WT
Z238
14
BK/WT
Z238
20
BK/WT
Z238
16
BK/WT
HEATED SEAT
EXCEPT HEATED SEATS
Z238
14
BK/WT
Z238
14
BK/WT
10 C312
S329
Z238
14
BK/WT
POWER WINDOW MASTER SWITCH
(8Wa-60-2)
14
2 C314
3 C313
Z238
14
BK/WT
Z238
12
BK/WT
Z238
14
BK/WT
Z238
14
BK/WT
S332
Z238
12
BK/WT
B
TO
G301
(8Wa-15-9)

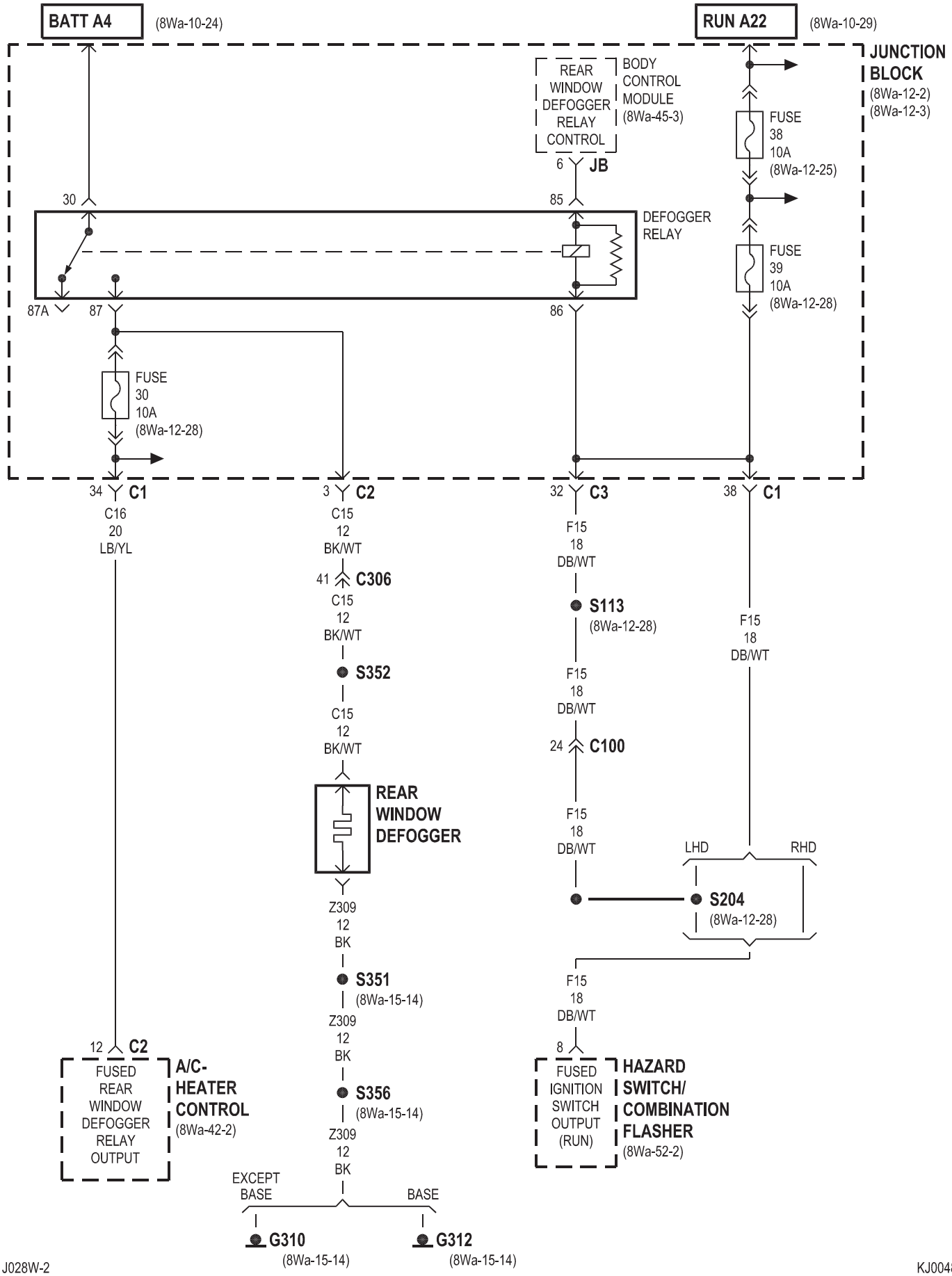

FROM
CLUTCH
SWITCH
OVERRIDE
RELAY
(8Wa-21-3)
A
T141
18
YL/RD
CLUTCH
INTERLOCK
RELAY
OUTPUT
13
C1
POWER
DISTRIBUTION
CENTER
(8Wa-10-2)
(8Wa-10-3)
T141
18
YL/RD
10
C105
T141
18
YL/RD
FUSE
8
40A
(8Wa-10-23)
8
POWER
DISTRIBUTION
CENTER
(8Wa-10-2)
(8Wa-10-3)
A2
12
PK/BK
S101
(8Wa-10-23)
A2
12
PK/BK
A0
6
RD
BATTERY
(8Wa-20-2)
86
30
STARTER
MOTOR
RELAY
(IN PDC)
85
87
A0
6
RD
T40
12
BR
GAS
DIESEL
4
C108
12
C111
T40
12
BR
Z142
18
BK/WT
S110
(8Wa-15-4)
2
1
STARTER
MOTOR
1 PULL-IN
2 HOLD-IN
M
Z142
16
BK/WT
G111
(8Wa-15-4)

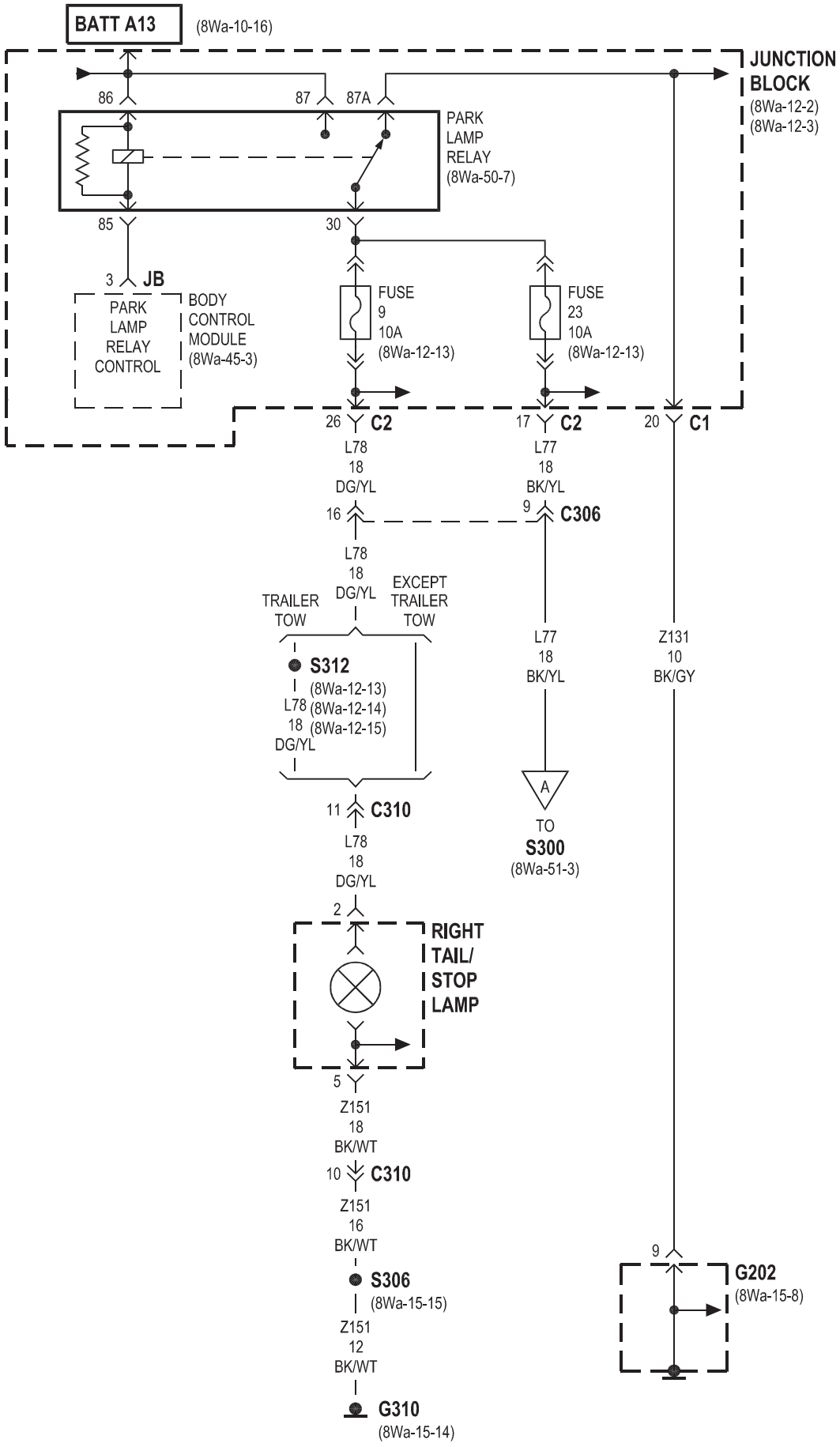

FROM
FUSE 26
(IN PDC)
(8Wa-30-17)
C
F142
18
OR/DG
S178
(8Wa-10-20)
FUEL
INJECTOR
NO. 1
FUEL
INJECTOR
NO. 2
FUEL
INJECTOR
NO. 3
FUEL
INJECTOR
NO. 4
FUEL
INJECTOR
NO. 5
(3.7L)
FUEL
INJECTOR
NO. 6
(3.7L)
K11
18
WT/DB
K12
18
TN
K13
18
YL/WT
K14
18
LB/BR
K38
18
GY
K58
18
BR/DB
3.7L
2.4L
C110
C2
FUEL
INJECTOR
NO. 1
DRIVER
FUEL
INJECTOR
NO. 2
DRIVER
FUEL
INJECTOR
NO. 3
DRIVER
FUEL
INJECTOR
NO. 4
DRIVER
FUEL
INJECTOR
NO. 5
DRIVER
FUEL
INJECTOR
NO. 6
DRIVER
POWERTRAIN
CONTROL
MODULE

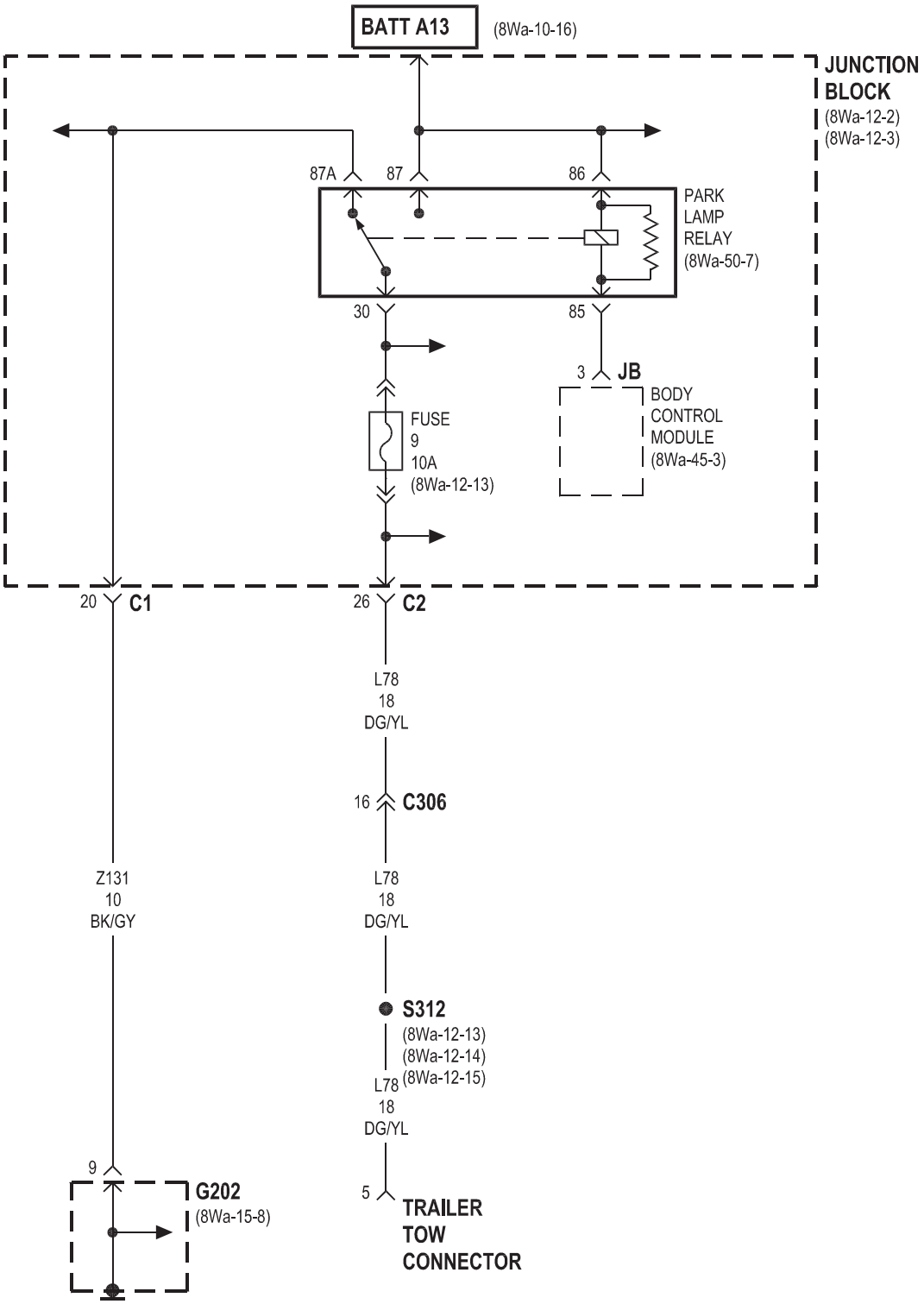

BATT A0
(8Wa-10-10)
(8Wa-10-12)
A30
14
RD/WT
POWER
DISTRIBUTION
CENTER
(8Wa-10-2)
FUSE
5
30A
(8Wa-10-17)
5
30
85
TRANSMISSION
CONTROL
RELAY
87A
87
86
A30
14
RD/WT
T16
14
RD
K30
18
PK
Z142
18
BK/WT
12
6
8
C105
7
TRANSMISSION
SOLENOID/
TRS
ASSEMBLY
(8Wa-31-7)
(8Wa-31-8)
10
T16
14
RD
T16
14
RD
S164
(8Wa-10-17)
S110
(8Wa-15-4)
A30
14
RD/WT
T16
14
RD
T16
14
RD
T16
14
RD
K30
18
PK
Z142
16
BK/WT
56
16
17
36
15
FUSED
B(+)
TRANSMISSION
CONTROL
RELAY
OUTPUT
TRANSMISSION
CONTROL
RELAY
OUTPUT
TRANSMISSION
CONTROL
RELAY
OUTPUT
TRANSMISSION
CONTROL
RELAY
CONTROL
TRANSMISSION
CONTROL
MODULE
G111
(8Wa-15-4)

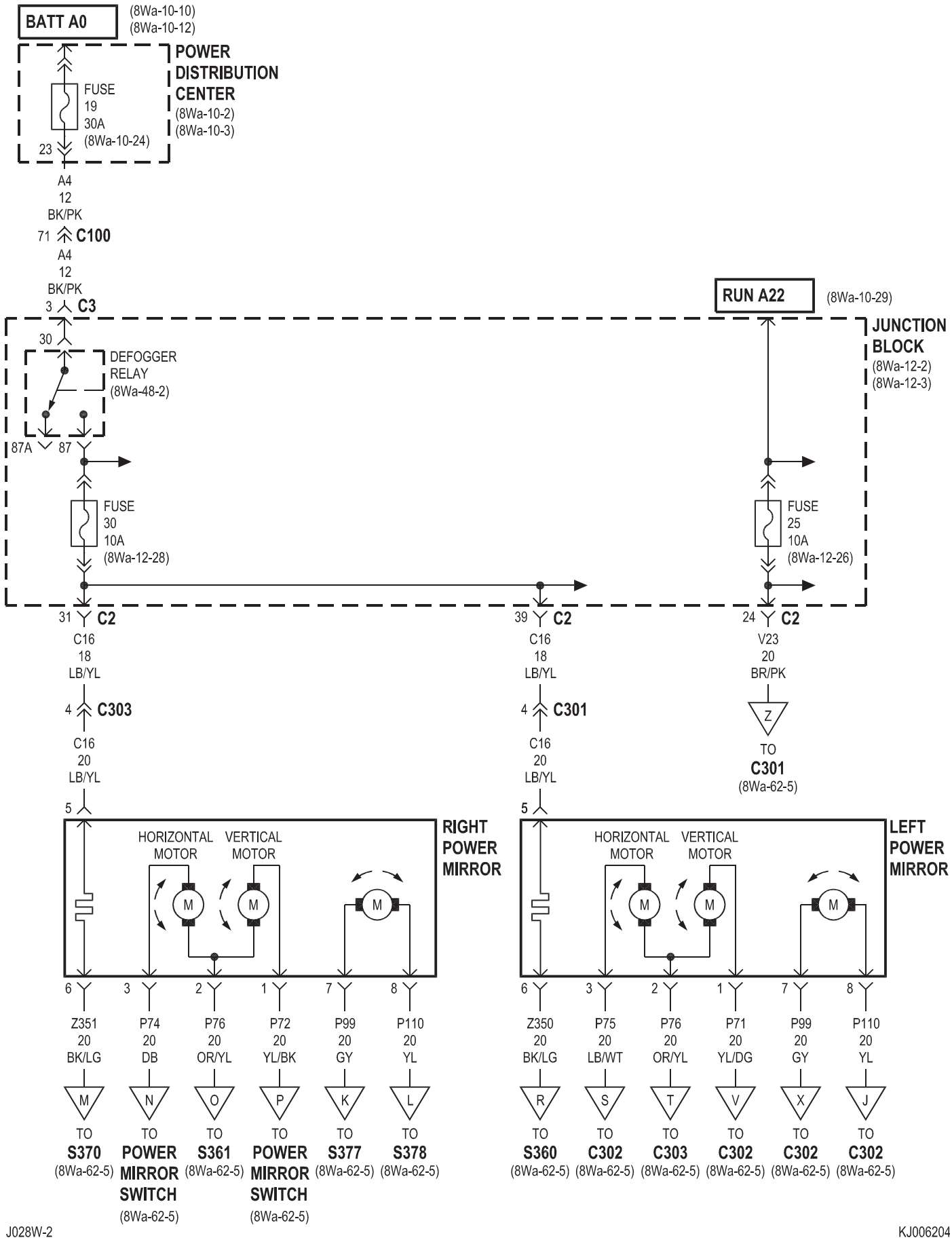

BATT A0
(8Wa-10-10)
(8Wa-10-12)
POWER DISTRIBUTION CENTER
(8Wa-10-2)
(8Wa-10-3)
40
FUSE 28 15A
(8Wa-10-28)
41
FUSE 14 40A
(8Wa-10-23)
14
FUSE 7 50A
(8Wa-10-15)
7
A/T
M/T
F45 18 YL/BR
F45 18 YL/BR
A1 12 RD
A7 10 RD/BK
63 C100
A1 12 RD
86
30
STARTER MOTOR RELAY (IN PDC)
(8Wa-21-2)
85
CLUTCH SWITCH OVERRIDE RELAY (IN PDC)
(8Wa-21-3)
(8Wa-21-5)
87
87A
1
IGNITION SWITCH
0 OFF
1 START
2 RUN
3 LOCK
4 ACC
(8Wa-10-23)
6
2
7
A41 12 YL
A21 12 RD/DB
A31 12 BK/WT
61 C100
S210
(8Wa-10-27)
A41 12 YL
A21 12 RD/DB
3 C1
40 C1
42 C3
JUNCTION BLOCK
(8Wa-12-2)
(8Wa-12-3)
FUSE 13 10A
(8Wa-12-18)
FUSE 32 10A
(8Wa-12-23)
(8Wa-12-24)
FUSE 34 15A
(8Wa-12-30)
16 JB
14 JB
15 JB
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
FUSED B(+)
BODY CONTROL MODULE
(8Wa-45-2)


FRONT FOG LAMP RELAY (8Wa-50-8)
DOOR LOCK RELAY (8Wa-61-3) (8Wa-61-7)
WIPER HIGH/LOW RELAY (IN PDC) (8Wa-53-4)
WIPER ON/OFF RELAY (IN PDC) (8Wa-53-4)
JUNCTION BLOCK (8Wa-12-2) (8Wa-12-3)
BODY CONTROL MODULE
FRONT FOG LAMP RELAY CONTROL
DOOR LOCK RELAY CONTROL
FRONT WIPER HIGH/LOW RELAY CONTROL
FRONT WIPER ON/OFF RELAY CONTROL
FRONT WIPER PARK SWITCH SENSE
DOOR LOCK SWITCH GROUND
COURTESY LAMP DRIVER
C100
C301
C303
C306
C308
S362 (8Wa-12-33)
S371 (8Wa-12-33)
S391 (8Wa-12-34)
LEFT DOOR LOCK SWITCH (8Wa-61-2) (8Wa-61-8)
RIGHT DOOR LOCK SWITCH (8Wa-61-4) (8Wa-61-6)
LEFT CYLINDER LOCK SWITCH (8Wa-61-2) (8Wa-61-8)
RIGHT CYLINDER LOCK SWITCH (8Wa-61-4) (8Wa-61-6)
RIGHT COURTESY LAMP (8Wa-44-2)
LEFT COURTESY LAMP (8Wa-44-2)
OVERHEAD MAP/ READING LAMP (8Wa-44-4)
CARGO LAMP (8Wa-44-4)
LHD
RHD
EXCEPT BASE


BATT A4
(8Wa-10-24)
RUN A22
(8Wa-10-29)
JUNCTION BLOCK
(8Wa-12-2)
(8Wa-12-3)
REAR WINDOW DEFOGGER RELAY CONTROL
BODY CONTROL MODULE
(8Wa-45-3)
6 JB
FUSE 38 10A
(8Wa-12-25)
FUSE 39 10A
(8Wa-12-28)
30
85
DEFOGGER RELAY
87A
87
86
FUSE 30 10A
(8Wa-12-28)
34 C1
C16
20
LB/YL
3 C2
C15
12
BK/WT
41 C306
C15
12
BK/WT
S352
C15
12
BK/WT
REAR WINDOW DEFOGGER
Z309
12
BK
S351
(8Wa-15-14)
Z309
12
BK
S356
(8Wa-15-14)
Z309
12
BK
EXCEPT BASE
BASE
G310
(8Wa-15-14)
G312
(8Wa-15-14)
12 C2
FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
A/C-HEATER CONTROL
(8Wa-42-2)
32 C3
F15
18
DB/WT
S113
(8Wa-12-28)
F15
18
DB/WT
24 C100
F15
18
DB/WT
38 C1
F15
18
DB/WT
LHD
RHD
S204
(8Wa-12-28)
F15
18
DB/WT
8
FUSED IGNITION SWITCH OUTPUT (RUN)
HAZARD SWITCH/ COMBINATION FLASHER
(8Wa-52-2)

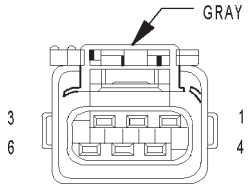

BATT A13
(8Wa-10-16)
JUNCTION BLOCK
(8Wa-12-2)
(8Wa-12-3)
86
87
87A
PARK LAMP RELAY
(8Wa-50-7)
85
30
3
JB
PARK LAMP RELAY CONTROL
BODY CONTROL MODULE
(8Wa-45-3)
FUSE 9 10A
(8Wa-12-13)
FUSE 23 10A
(8Wa-12-13)
26 C2
17 C2
20 C1
L78 18 DG/YL
L77 18 BK/YL
16
9 C306
L78 18 DG/YL
TRAILER TOW
EXCEPT TRAILER TOW
S312
(8Wa-12-13)
L78 (8Wa-12-14)
18 (8Wa-12-15)
DG/YL
L77 18 BK/YL
Z131 10 BK/GY
A
TO S300
(8Wa-51-3)
11 C310
L78 18 DG/YL
2
RIGHT TAIL/ STOP LAMP
5
Z151 18 BK/WT
10 C310
Z151 16 BK/WT
S306
(8Wa-15-15)
Z151 12 BK/WT
G310
(8Wa-15-14)
9
G202
(8Wa-15-8)


BATT A13
(8Wa-10-16)
JUNCTION BLOCK
(8Wa-12-2)
(8Wa-12-3)
87A
87
86
PARK LAMP RELAY
(8Wa-50-7)
30
85
3
JB
BODY CONTROL MODULE
(8Wa-45-3)
FUSE
9
10A
(8Wa-12-13)
20
C1
26
C2
L78
18
DG/YL
16
C306
Z131
10
BK/GY
L78
18
DG/YL
S312
(8Wa-12-13)
(8Wa-12-14)
(8Wa-12-15)
L78
18
DG/YL
9
G202
(8Wa-15-8)
5
TRAILER TOW CONNECTOR


BATT A0
(8Wa-10-10)
(8Wa-10-12)
POWER DISTRIBUTION CENTER
(8Wa-10-2)
(8Wa-10-3)
FUSE 19 30A
(8Wa-10-24)
23
A4 12 BK/PK
71 C100
A4 12 BK/PK
3 C3
RUN A22
(8Wa-10-29)
JUNCTION BLOCK
(8Wa-12-2)
(8Wa-12-3)
30
DEFOGGER RELAY
(8Wa-48-2)
87A
87
FUSE 30 10A
(8Wa-12-28)
FUSE 25 10A
(8Wa-12-26)
31 C2
C16 18 LB/YL
4 C303
C16 20 LB/YL
5
39 C2
C16 18 LB/YL
4 C301
C16 20 LB/YL
5
24 C2
V23 20 BR/PK
Z
TO C301
(8Wa-62-5)
HORIZONTAL MOTOR
VERTICAL MOTOR
M
RIGHT POWER MIRROR
LEFT POWER MIRROR
6
3
2
1
7
8
Z351 20 BK/LG
P74 20 DB
P76 20 OR/YL
P72 20 YL/BK
P99 20 GY
P110 20 YL
Z350 20 BK/LG
P75 20 LB/WT
P76 20 OR/YL
P71 20 YL/DG
P99 20 GY
P110 20 YL
M
N
O
P
K
L
R
S
T
V
X
J
TO S370 (8Wa-62-5)
TO POWER MIRROR SWITCH (8Wa-62-5)
TO S361 (8Wa-62-5)
TO POWER MIRROR SWITCH (8Wa-62-5)
TO S377 (8Wa-62-5)
TO S378 (8Wa-62-5)
TO S360 (8Wa-62-5)
TO C302 (8Wa-62-5)
TO C303 (8Wa-62-5)
TO C302 (8Wa-62-5)
TO C302 (8Wa-62-5)
TO C302 (8Wa-62-5)

C107 - BLACK (FRONT END LIGHTING SIDE)

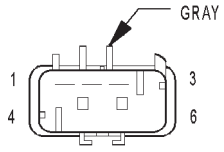
CAV	CIRCUIT
6	L62 18BR/RD
7	-
8	L39 18LB (FOG LAMPS)
9	-
10	L63 18DG/RD



C108
(GAS)

C108 (GAS) - GRAY (BATTERY SIDE)

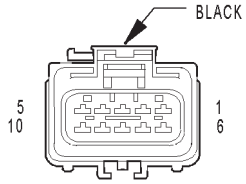
CAV	CIRCUIT
1	K52 18PK/BK
2	K20 18DG
3	K125 18WT/DB
4	T40 12BR
5	F1 18DB
6	-



C108
(GAS)

C108 (GAS) - GRAY (HEADLAMP AND DASH SIDE)

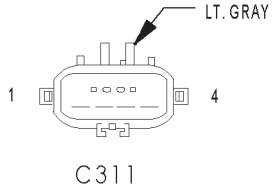
CAV	CIRCUIT
1	K52 18PK/BK
2	K20 18DG
3	K125 18WT/DB
4	T40 12BR
5	F1 18DB
6	-



C110
(2.4L)

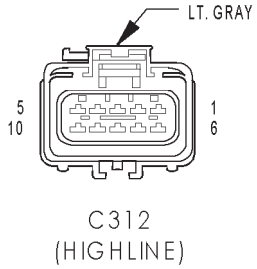
C110 (2.4L) - BLACK (ENGINE TO HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	F142 18OR/DG
2	C3 18DB/BK
3	Z246 18BK/GY
4	K11 18WT/DB
5	K12 18TN
6	K13 18YL/WT
7	K14 18LB/BR
8	K44 18TN/YL
9	K4 18BK/LB
10	-



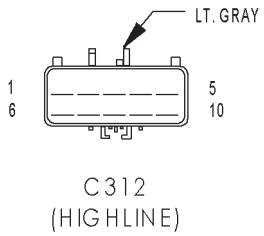
C311 - LT. GRAY (LEFT FRONT SEAT SIDE)

CAV	CIRCUIT
1	F37 18RD/LB (EXCEPT BASE)
2	R58 18GY (RHD)
2	R57 18DG (LHD)
3	Z238 14BK/WT (EXCEPT BASE)
4	R60 18VT (RHD)
4	R59 18LB (LHD)



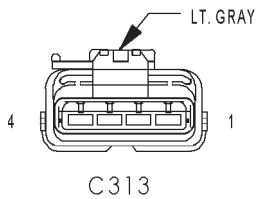
C312 (HIGHLINE) - LT. GRAY (MAIN BODY SIDE)

CAV	CIRCUIT
1	-
2	P86 20PK/BK
3	F98 14RD/WT
4	V23 20BR/PK
5	A3 16RD/WT
6	P142 20TN/DB
7	P134 20TN/LG
8	P138 20VT/LG
9	P140 20VT/BK
10	Z238 14BK/WT



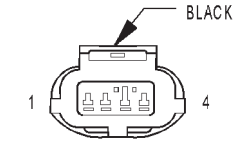
C312 (HIGHLINE) - LT. GRAY (LEFT FRONT SEAT SIDE)

CAV	CIRCUIT
1	P141 20TN/LB
2	P86 20PK/BK
3	F98 16RD/WT
4	V23 1BR/PK
5	A3 20RD/WT
6	P142 20TN/DB
7	P134 20TN/LG
8	P138 20VT/LG
9	P140 20VT/BK
10	Z238 14BK/WT



C313 - LT. GRAY (MAIN BODY SIDE)

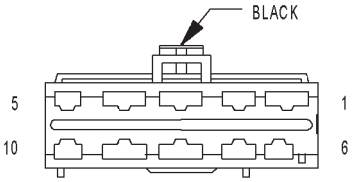
CAV	CIRCUIT
1	F37 14RD/LB (HIGHLINE)
2	R57 18DG (RHD)
2	R58 18GY (LHD)
3	Z238 14BK/WT (HIGHLINE)
4	R59 18LB (RHD)
4	R60 18VT (LHD)



IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR - BLACK 4 WAY

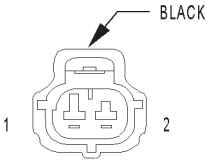
CAV	CIRCUIT	FUNCTION
1	K59 18VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER
2	K40 18BR/WT	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
3	K60 18YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
4	K39 18GY/RD	IDLE AIR CONTROL MOTOR NO. 3 DRIVER



IGNITION SWITCH

IGNITION SWITCH - BLACK 10 WAY

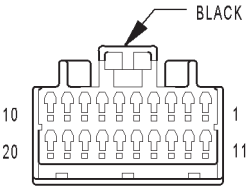
CAV	CIRCUIT	FUNCTION
1	A1 12RD	FUSED (+)
2	A21 12RD/DB	IGNITION SWITCH OUTPUT (RUN-START)
3	F81 12TN	IGNITION SWITCH OUTPUT (RUN-ACC)
4	A25 12DB	FUSED B(+)
5	G26 20LB	KEY-IN IGNITION SWITCH SENSE
6	A41 12YL	IGNITION SWITCH OUTPUT (START)
7	A31 12BK/WT	IGNITION SWITCH OUTPUT (RUN-ACC)
8	A22 12BK/OR	IGNITION SWITCH OUTPUT (RUN)
9	A2 12PK/BK	FUSED B (+)
10	Z232 16BK/LB	GROUND



INPUT SPEED SENSOR (3.7L)

INPUT SPEED SENSOR (3.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	T52 18RD/BK	INPUT SPEED SENSOR SIGNAL
2	T13 18DB/BK	SPEED SENSOR GROUND



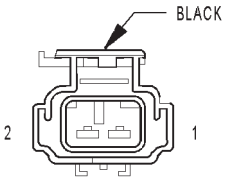
INSTRUMENT CLUSTER

INSTRUMENT CLUSTER - BLACK 20 WAY

CAV	CIRCUIT	FUNCTION
1	Z105 20BK/LG	GROUND
2	-	-
3	Y98 20GY/DB	INSTRUMENT CLUSTER WAKE UP SIGNAL
4	-	-
5	G18 20PK/BK	LOW COOLANT FLUID LEVEL SENSE
6	L63 20DG/RD	LEFT TURN SIGNAL
7	G9 20GY/BK	PARK BRAKE SWITCH SENSE
8	G69 20BK/OR	VTSS INDICATOR DRIVER
9	-	-
10	M1 20PK	FUSED B(+)
11	L78 20DG/YL	FUSED PARK LAMP RELAY OUTPUT
12	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
13	-	-
14	D25 20YL/VT/RD	PCI BUS
15	-	-

POWERTRAIN CONTROL MODULE-C3 (GAS) - LT. GRAY 32 WAY

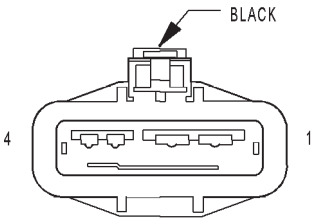
CAV	CIRCUIT	FUNCTION
26	K226 18DB/WT	FUEL LEVEL SENSOR SIGNAL
27	D21 18PK	SCI TRANSMIT
28	-	-
29	D32 18LG	SCI RECEIVE (PCM)
30	D25 18YL/VT	PCI BUS
31	-	-
32	V37 18RD/LG	SPEED CONTROL SWITCH SIGNAL



RADIATOR FAN MOTOR

RADIATOR FAN MOTOR - BLACK 2 WAY

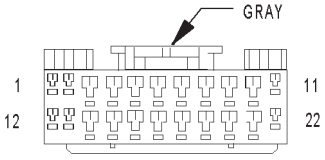
CAV	CIRCUIT	FUNCTION
1	C25 12YL	RADIATOR FAN RELAY OUTPUT
2	Z212 12BK/OR	GROUND



RADIATOR FAN RELAY

RADIATOR FAN RELAY - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	C24 12DB/PK	FUSED B(+)
2	C25 12YL	RADIATOR FAN RELAY OUTPUT
3	Z212 18BK/OR	GROUND
4	K173 18LG	RADIATOR FAN RELAY CONTROL



RADIO C1

RADIO C1 - GRAY 22 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	F89 18OR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
4	-	-
5	-	-
6	-	-
7	X54 18VT	RIGHT FRONT DOOR SPEAKER (+)
8	X56 18DB/RD	RIGHT FRONT DOOR SPEAKER (-)
9	X55 18BR/RD	LEFT FRONT DOOR SPEAKER (-)
10	X53 18DG	LEFT FRONT DOOR SPEAKER (+)
11	Z9 16BK	GROUND
12	M1 20PK	FUSED B(+)
13	X16 18LG (PREMIUM)	ANTENNA RELAY OUTPUT
14	D25 18YL/VT	PCI BUS
15	-	-
16	-	-
17	-	-
18	X51 18BR/YL	LEFT REAR SPEAKER (+)
19	X57 18BR/LB	LEFT REAR SPEAKER (-)
20	X58 18DB/OR	RIGHT REAR SPEAKER (-)
21	X52 18DB/WT	RIGHT REAR SPEAKER (+)
22	Z9 16BK	GROUND

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Coil On Plug No.5 (3.7L)	BK	Left Side of Engine Near Fuel Injector No.5	1
Coil On Plug No.6 (3.7L)	BK	Right Side of Engine Near Fuel Injector No.6	2
Coil Rail (2.4L)	BK	Right Side of Engine	11, 12
Combination Flasher	WT	Under Left Side of Instrument Panel	N/S
Compass Mini-Trip Computer	BK	At Overhead Console	N/S
Controller Antilock Brake	BK	Left Side of Engine Compartment	30
Crankshaft Position Sensor (2.4L)	BK	Top of Engine	N/S
Crankshaft Position Sensor (3.7L)	BK	Right Lower Side of Engine	4
Crankshaft Position Sensor (Diesel)	BK	Right Rear Side of Engine	17
Data Link Connector	BK	Under Center of Instrument Panel	N/S
Diagnostic Junction Port	BK	Under Center of Instrument Panel	49
Dome Lamp (Base)	BK	On Headliner	N/S
Driver Airbag Squib 1	GY	In Steering Wheel	N/S
Driver Airbag Squib 2	BK	In Steering Wheel	N/S
Driver Seat Belt Switch	LG	At Drive Seat	N/S
Driver Seat Belt Tensioner (LHD)	YL	Lower Left B-Pillar	35
Driver Seat Belt Tensioner (RHD)	YL	Lower Right B-Pillar	39
EGR Solenoid		Right Rear Side of Engine Compartment	27
Engine Control Module C1	BK	Left Rear Side of Engine Compartment	19
Engine Control Module C2	BK	Left Rear Side of Engine Compartment	19
Engine Coolant Level Sensor (Diesel)	LG	Rear Side of Engine Compartment	18
Engine Coolant Temperature Sensor (Diesel)	BK	Left Side of Engine	20
Engine Coolant Temperature Sensor (Gas)	BK	Front Side of Engine	2
Engine Oil Pressure Sensor (2.4L)	BK	Top of Engine	N/S
Engine Oil Pressure Sensor (3.7L)	BK	Left Front Side of Engine	3
Engine Oil Pressure Sensor (Diesel)	BK	Right Rear Side of Engine	17
Engine Starter Motor		Right Front Side of Engine	20
Evap/Purge Solenoid	BK	At Solenoid	N/S
Flip-Up Glass Release Motor	BK	In Tailgate	46
Flip-Up Glass Release Switch	WT	In Tailgate	46
Front Washer Pump	BK	Right Front Side of Engine Compartment	28
Front Wiper Motor (LHD)	BK	Left Side of Cowl	24

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

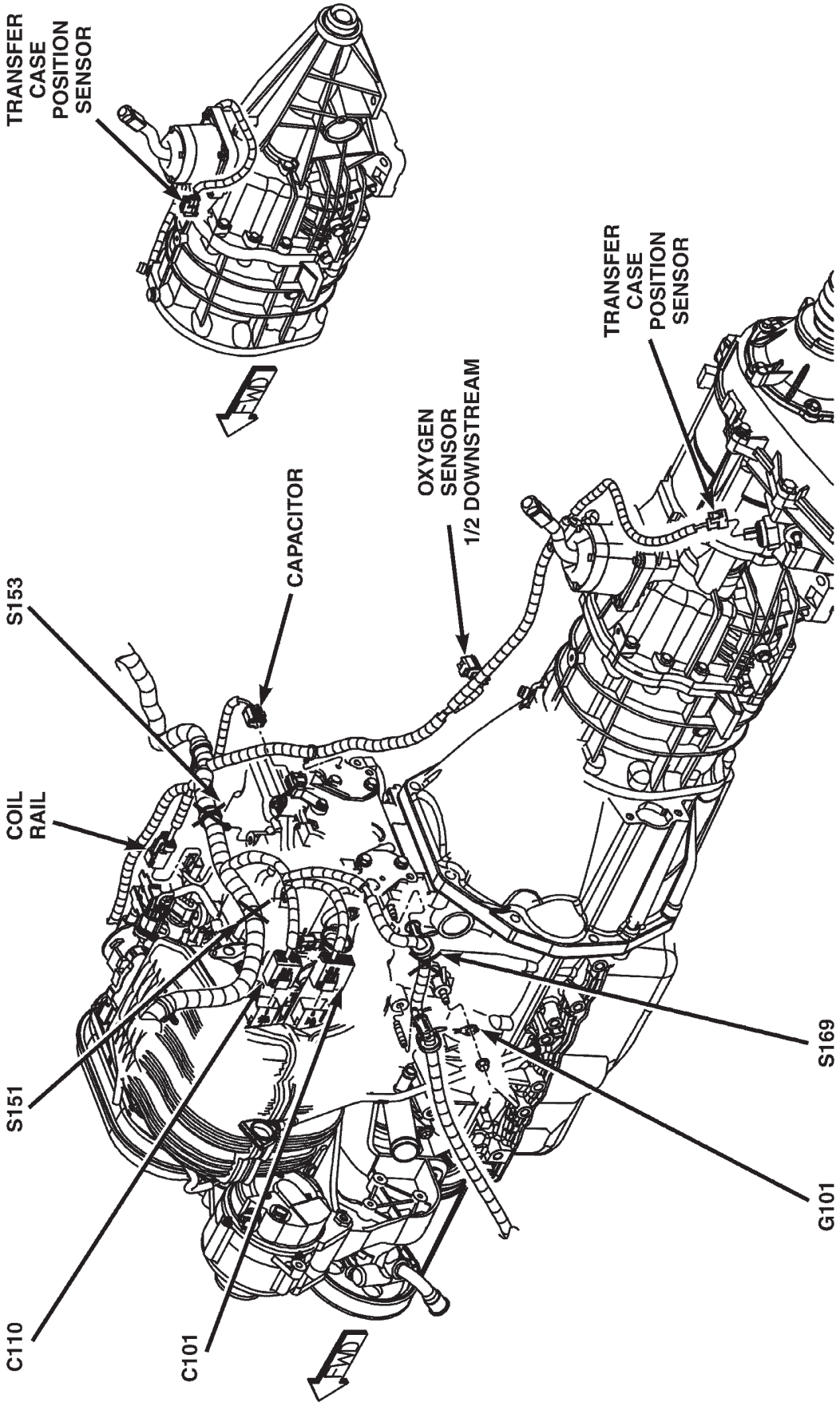


Fig. 11 ENGINE/TRANSMISSION, 2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

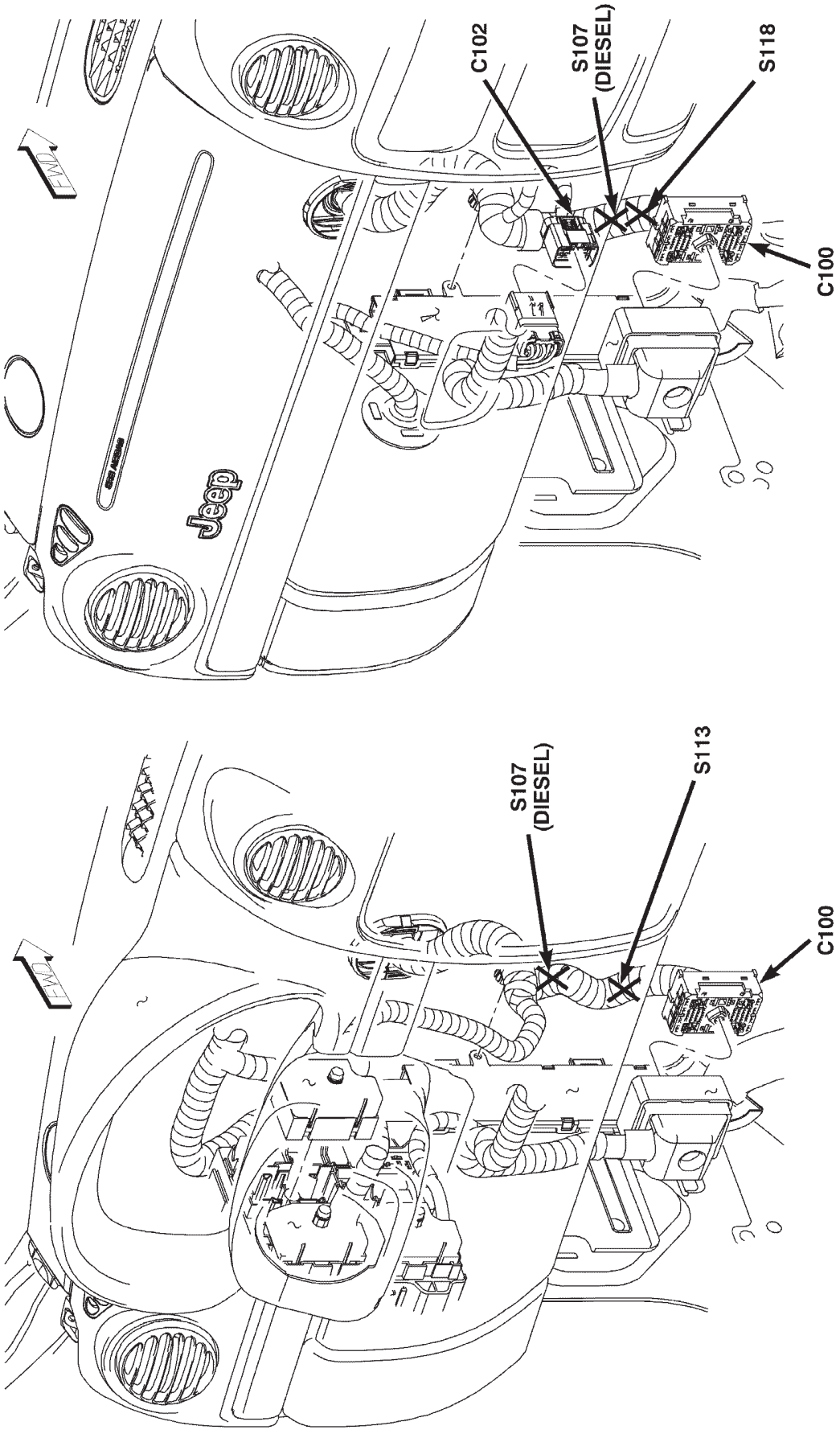


Fig. 32 ENGINE TO INSTRUMENT PANEL

ENGINE - 3.7L (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE

DIAGNOSIS - INTRODUCTION

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

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

(Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)—PERFORMANCE and (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)—MECHANICAL for possible causes and corrections of malfunctions. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING) and (Refer to 14 - FUEL SYSTEM/FUEL INJECTION - DIAGNOSIS AND TESTING) for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

- Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Cylinder Combustion Pressure Leakage Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Engine Cylinder Head Gasket Failure Diagnosis (Refer to 9 - ENGINE/CYLINDER HEAD - DIAGNOSIS AND TESTING).
- Intake Manifold Leakage Diagnosis (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery	1. Charge or replace as necessary.
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to the terminals.
	3. Faulty starter.	3. (Refer to 8 - ELECTRICAL/ STARTING - DIAGNOSIS AND TESTING).
	4. Faulty coil or control unit.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	5. Incorrect spark plug gap.	5. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	6. Incorrect right bank cam timing.	6. Refer to engine timing in this section.
	7. Dirt or water in fuel system.	7. Clean system and replace fuel filter.
	8.Faulty fuel pump, relay or wiring.	8.Repair or replace as necessary.
	9. Faulty cam or crank sensor	9. Refer to Ignition system.
ENGINE STALLS OR ROUGH IDLE	1. Vacuum leak.	1. Inspect intake manifold and vacuum hoses, repair or replace as necessary.
	2. Faulty crank position sensor	2. Replace crank position sensor.
	4. Faulty coil.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).

CAMSHAFT(S) (Continued)

REMOVAL

CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

CAUTION: When removing the cam sprocket, timing chains or camshaft, Failure to use Special Tool 8379 will result in hydraulic tensioner ratchet over extension, requiring timing chain cover removal to reset the tensioner ratchet.

(1) Remove cylinder head cover. Refer to CYLINDER HEAD COVER in this section.
(2) Set engine to TDC cylinder #1, camshaft sprocket V6 marks at the 12 o'clock position.
(3) Mark one link on the secondary timing chain on both sides of the V6 mark on the camshaft sprocket to aid in installation.

CAUTION: Do not hold or pry on the camshaft target wheel (Located on the right side camshaft sprocket) for any reason, Severe damage will occur to the target wheel resulting in a vehicle no start condition.

(4) Loosen but **DO NOT** remove the camshaft sprocket retaining bolt. Leave the bolt snug against the sprocket.

NOTE: The timing chain tensioners must be secured prior to removing the camshaft sprockets. Failure to secure tensioners will allow the tensioners to extend, requiring timing chain cover removal in order to reset tensioners.

CAUTION: Do not force wedge past the narrowest point between the chain strands. Damage to the tensioners may occur.

(5) Position Special Tool 8379 timing chain wedge between the timing chain strands, tap the tool to securely wedge the timing chain against the tensioner arm and guide (Fig. 12).
(6) Hold the camshaft with Special Tool 8428 Camshaft Wrench, while removing the camshaft sprocket bolt and sprocket (Fig. 13).
(7) Using Special Tool 8428 Camshaft Wrench, gently allow the camshaft to rotate 5° clockwise until the camshaft is in the neutral position (no valve load).
(8) Starting at the outside working inward, loosen the camshaft bearing cap retaining bolts 1/2 turn at a time. Repeat until all load is off the bearing caps.

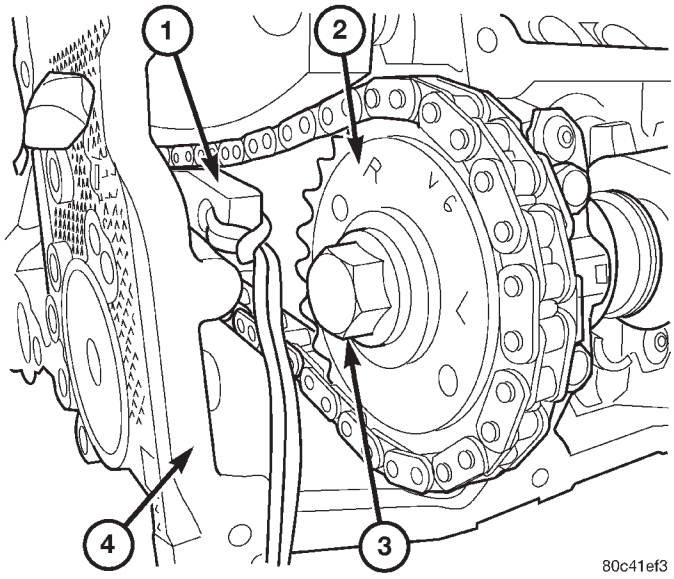


Fig. 12 SECURING TIMING CHAIN TENSIONERS USING TIMING CHAIN WEDGE — Typical

1 - SPECIAL TOOL 8379
2 - CAMSHAFT SPROCKET
3 - CAMSHAFT SPROCKET BOLT

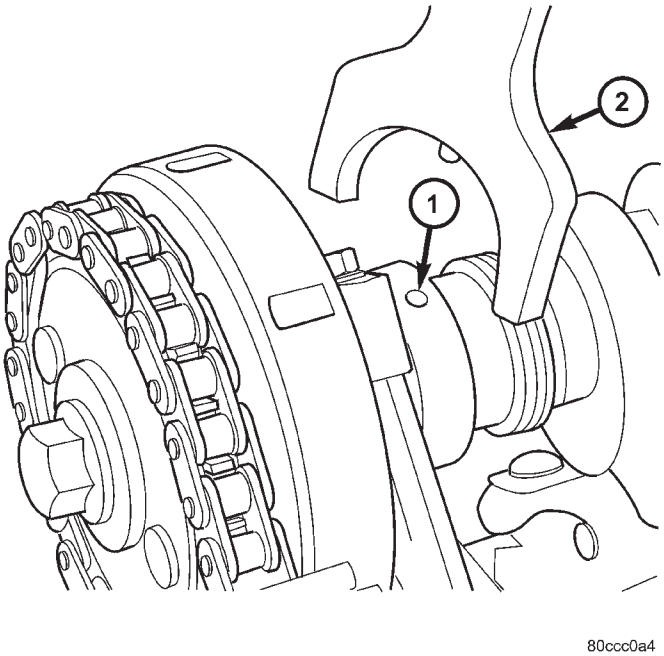


Fig. 13 Special Tool 8428

1 - Camshaft hole
2 - Special Tool 8428

CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

CRANKSHAFT (Continued)

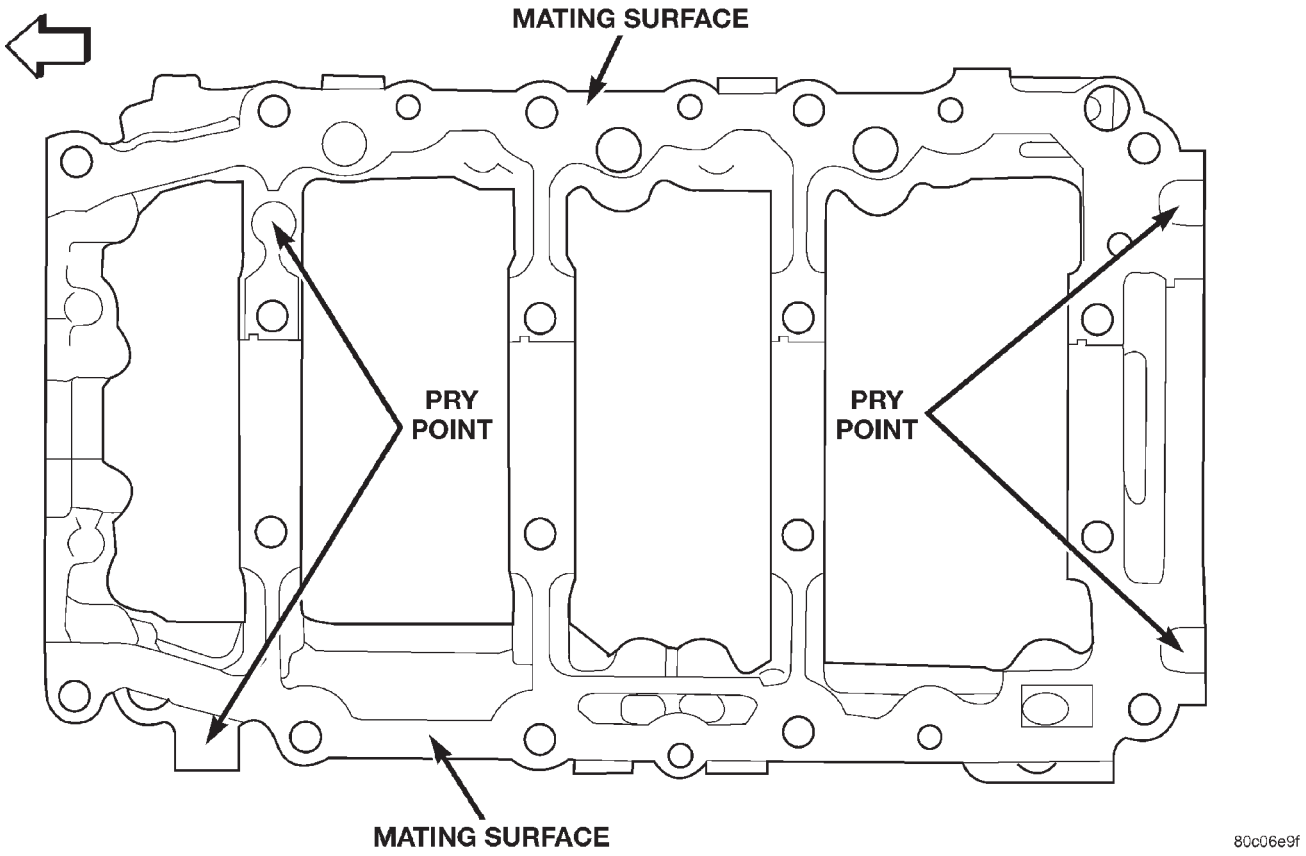


Fig. 41 BEDPLATE PRY POINT LOCATION

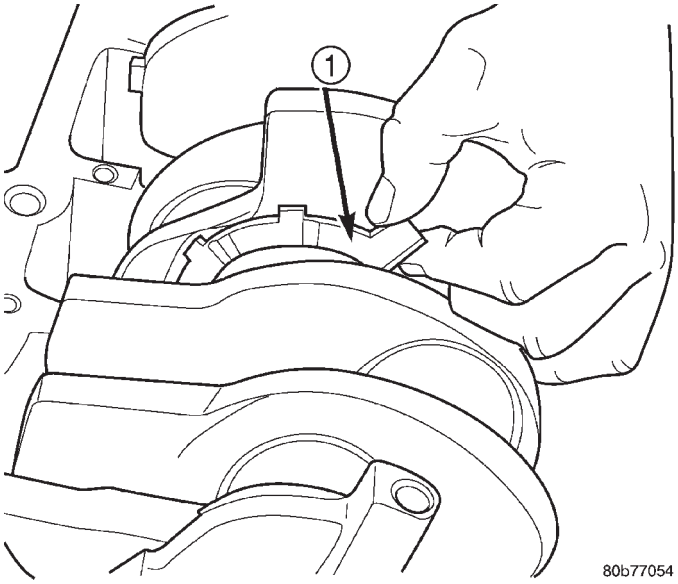


Fig. 42 Crankshaft Thrust Washer Installation

1 - CRANKSHAFT THRUST WASHER

NOTE: Lubricate the bedplate retaining bolts with clean engine oil prior to installation.

(7) Install the bedplate retaining bolts, making sure to place the stud bolts in the correct location, Torque the bolts in the sequence shown (Fig. 43).

- Hand tighten bolts **1D,1G and 1F** until the bedplate contacts the block.
- Tighten bolts **1–8** to 27 N·m (20 ft. lbs.)
- Tighten bolts **1A–1J** to 20 N·m (15 ft. lbs.)
- Tighten bolts **A–E** 8 N·m (6 ft. lbs.).
- Turn bolts **1–8** an additional 66°.
- Turn bolts **1D,1G, and 1F** an additional 42°.
- Turn bolts **1A,1B,1C,1E,1H,1I,and 1J** an additional 36°.
- Turn bolts **A–E** an additional 32°.

(8) Measure crankshaft end play. Refer to Crankshaft Main Bearings in this section for procedure.

(9) Install the connecting rods and measure side clearance. Refer to Connecting Rod Bearings in this section for procedure.

(10) Position the oil pan gasket/windage tray, using a new o-ring, install the oil pickup tube. Torque the bolt to 28N·n (20 ft. lbs.) torque the nuts to 28N·m (20 ft. lbs.).

(11) Install the oil pan. Torque the retaining bolts to 15 N·m (11 ft. lbs.) in the sequence shown.

(12) Install the engine.

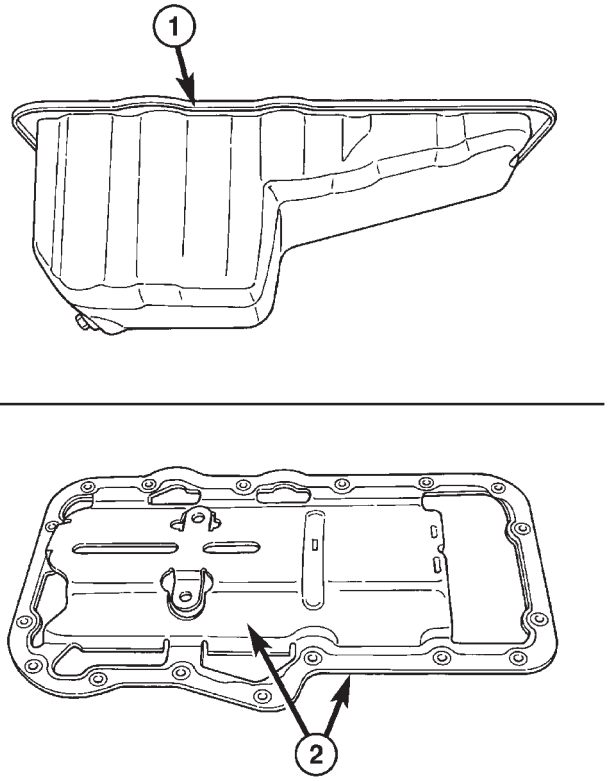


Fig. 75 OIL PAN AND GASKET

1 - OIL PAN
2 - WINDAGE TRAY AND INTEGRATED OIL PAN GASKET

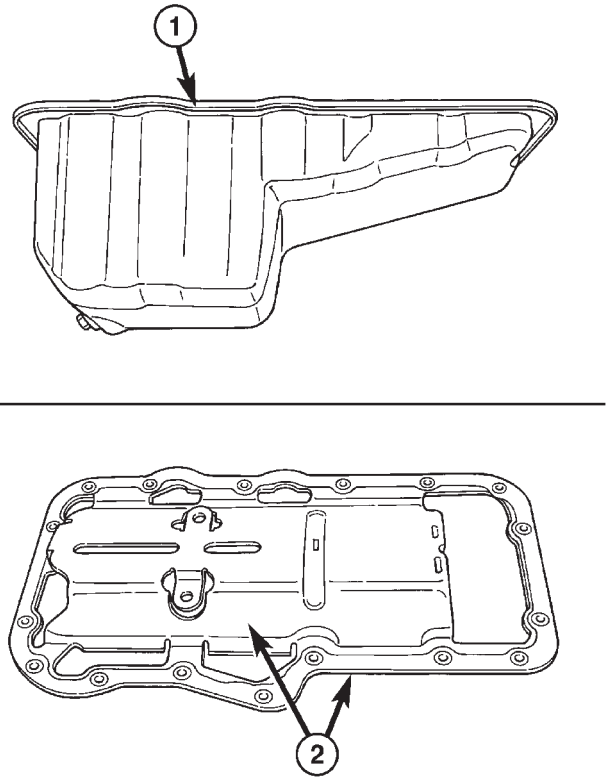


Fig. 76 OIL PAN AND GASKET

1 - OIL PAN
2 - WINDAGE TRAY AND INTEGRATED OIL PAN GASKET

(2) Inspect the oil pan mounting flange for bends or distortion. Straighten flange, if necessary.

INSTALLATION

(1) Clean the oil pan gasket mating surface of the bedplate and oil pan.

(2) Inspect integrated oil pan gasket, and replace as necessary.

(3) Position the integrated oil pan gasket/windage tray assembly.

(4) Install the oil pickup tube

(5) Install the mounting bolt and nuts. Tighten nuts to 28 N·m (20 ft. lbs.).

(6) Position the oil pan and install the mounting bolts. Tighten the mounting bolts to 15 N·m (11 ft. lbs.) in the sequence shown (Fig. 77).

(7) Remove engine from engine stand.

(8) Install engine (Refer to 9 - ENGINE - INSTALLATION).

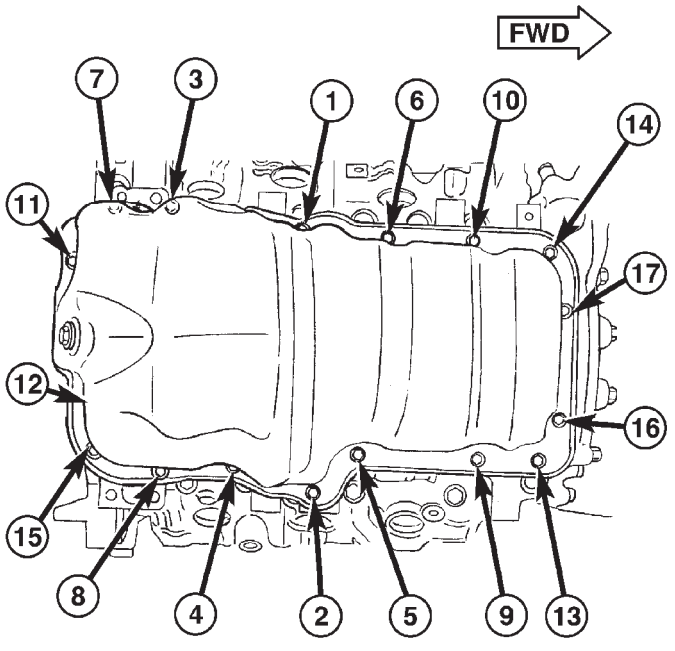


Fig. 77 OIL PAN MOUNTING BOLT SEQUENCE

CYLINDER HEAD (Continued)

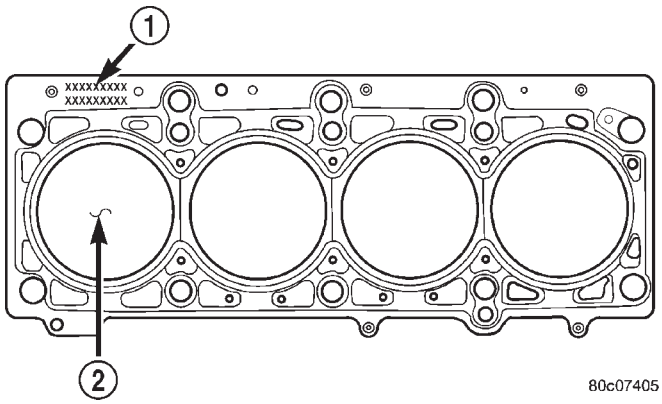


Fig. 10 Cylinder Head Gasket Positioning

1 - PART NUMBER FACES UP
2 - NO. 1 CYLINDER

- Third All to 68 N·m (50 ft. lbs.)

CAUTION: Do not use a torque wrench for the following step.

- Fourth Turn an additional 1/4 Turn,

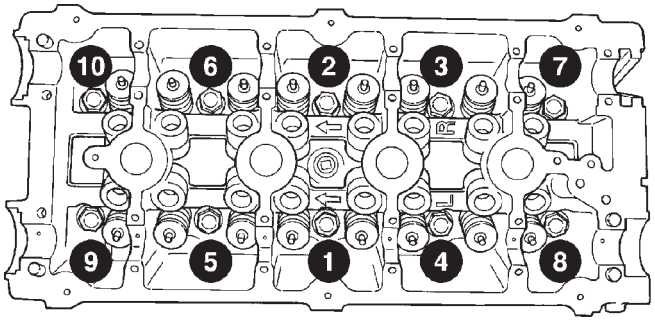


Fig. 11 Cylinder Head Tightening Sequence

(5) Install rocker arms. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION)

(6) Install camshafts. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION).

(7) Install cylinder head cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(8) Install timing belt rear cover and timing belt idler pulley. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(9) Install timing belt and camshaft sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(10) Connect cam sensor and fuel injectors wiring connectors.

(11) Install ignition coil and wires. Connect ignition coil wiring connector.

(12) Install accessary drive bracket.

(13) Install power steering pump to cylinder head.

(14) Raise vehicle and install the exhaust pipe to the manifold.

(15) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(16) Install heater tube support bracket to cylinder head.

(17) Install intake manifold.

(18) Connect all vacuum lines, electrical wiring, ground straps and fuel line.

(19) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(20) Connect battery negative cable.

CAMSHAFT OIL SEAL(S)

REMOVAL

(1) Remove timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Hold each camshaft sprocket with Special Tool 6847 while removing center bolt (Fig. 12).

(3) Remove camshaft sprockets.

(4) Remove exhaust camshaft target ring.

(5) Remove exhaust camshaft sensor.

CAUTION: Inspect sensor and target ring for excessive wear. Clean sensor face and install new spacer pad.

(6) Remove rear timing belt cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(7) Remove camshaft seal using Special Tool C-4679-A (Fig. 13).

CAUTION: Do not nick shaft seal surface or seal bore.

INSTALLATION

NOTE: Clean and inspect sensor and target ring for excessive wear. Clean sensor face and always install a new spacer pad.

(1) Shaft seal surface must be free of varnish, dirt or nicks. Polish with 400 grit paper if necessary.

(2) Install camshaft seals into cylinder head using Special Tool MD-998306 until flush with head (Fig. 14).

PISTON RINGS

STANDARD PROCEDURE

PISTON RING - FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 inch) from bottom of cylinder bore. Check gap with feeler gauge (Fig. 65). Refer to Engine Specifications.

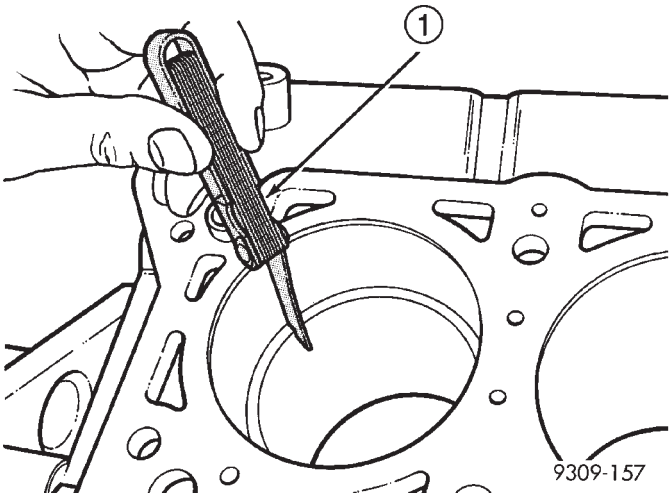


Fig. 65 Piston Ring Gap

1 - FEELER GAUGE

(2) Check piston ring to groove side clearance (Fig. 66). Refer to Engine Specifications.

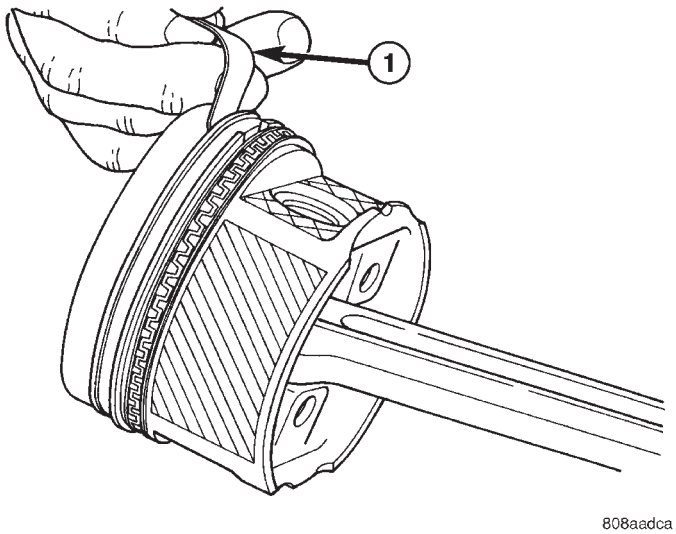


Fig. 66 Piston Ring Side Clearance

1 - FEELER GAUGE

PISTON RINGS - INSTALLATION

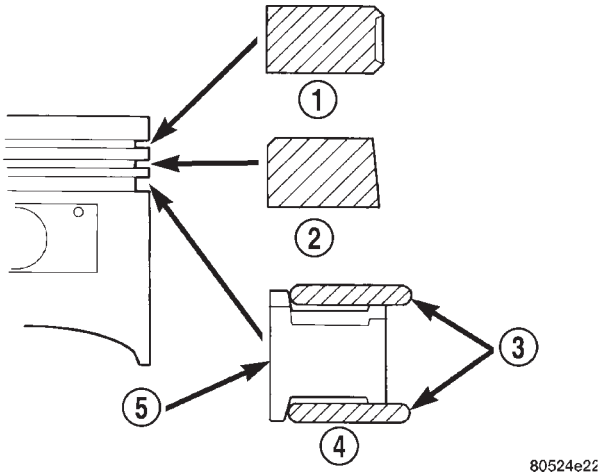


Fig. 67 Piston Ring Installation

1 - NO. 1 PISTON RING
2 - NO. 2 PISTON RING
3 - SIDE RAIL
4 - OIL RING
5 - SPACER EXPANDER

(1) Install rings with manufacturers I.D. mark facing up, to the top of the piston (Fig. 67).

CAUTION: Install piston rings in the following order:

a. Oil ring expander.
b. Upper oil ring side rail.
c. Lower oil ring side rail.
d. No. 2 Intermediate piston ring.
e. No. 1 Upper piston ring.

(2) Install the side rail by placing one end between the piston ring groove and the expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander** (Fig. 68).

(3) Install upper side rail first and then the lower side rail.

(4) Install No. 2 piston ring and then No. 1 piston ring.

(5) Position piston ring end gaps as shown in (Fig. 69).

(6) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

BALANCE SHAFT (Continued)

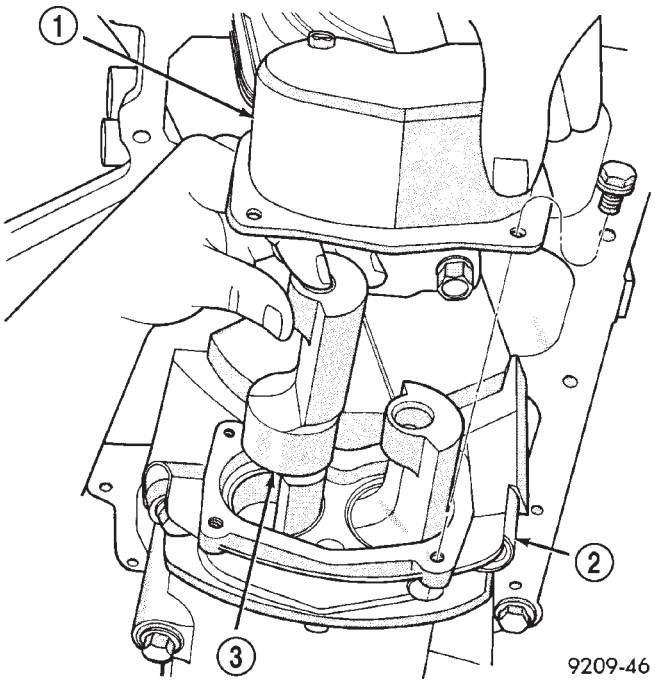


Fig. 110 Balance Shaft - Removal/Installation

1 - REAR COVER
2 - CARRIER
3 - BALANCE SHAFT

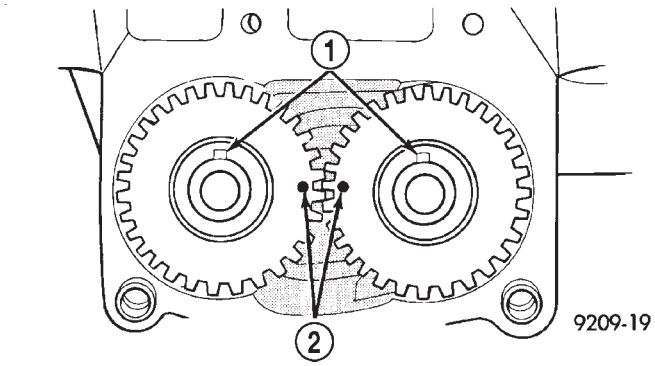


Fig. 111 Gear Timing

1 - KEY WAYS UP
2 - GEAR ALIGNMENT DOTS

(5) Install balance shaft drive sprocket on crankshaft using Special Tool 6052 (Fig. 113).

(6) Turn crankshaft until number 1 cylinder is at top dead center (TDC). The timing marks on the chain sprocket should line up with the parting line on the left side of number one main bearing cap. (Fig. 114).

(7) Place chain over crankshaft sprocket so that the plated link of the chain is over the number 1 cylinder timing mark on the balance shaft crankshaft sprocket (Fig. 114).

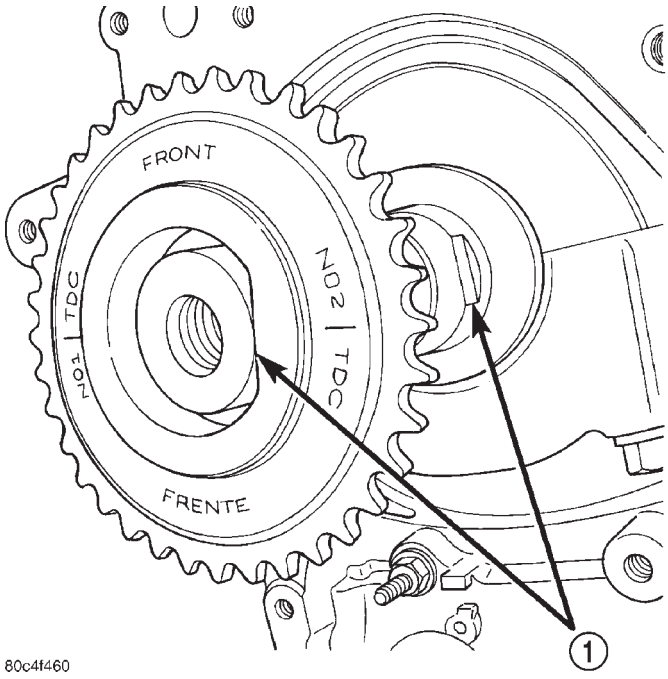


Fig. 112 Balance Shaft Sprocket Alignment to Crankshaft

1 - ALIGN FLATS

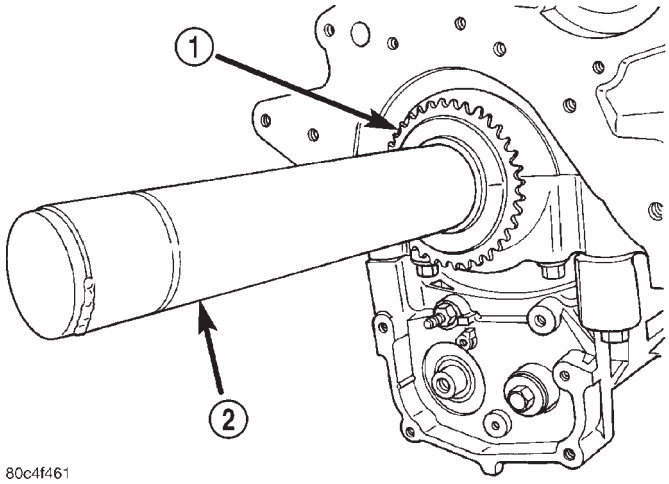


Fig. 113 Balance Shaft Drive

1 - SPROCKET
2 - SPECIAL TOOL 6052

(8) Place balance shaft sprocket into the timing chain (Fig. 114) and align the timing mark on the sprocket (dot) with the (lower) plated link on the chain.

NOTE: The lower plated link is 8 links from the upper link.

FRAME (Continued)

SPECIFICATIONS - TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
ENGINE CRADLE CROSSMEMBER INNER RAIL BOLTS	47	35	—
ENGINE CRADLE CROSSMEMBER MOUNTING BOLTS	122	90	—
ENGINE MOUNT THROUGH BOLTS/NUTS	88	65	—
FRONT SKID PLATE BOLTS	61	45	—
FRONT TOW HOOK NUTS/BOLT	61	45	—
FUEL TANK SKID PLATE	88	65	—
REAR CROSSMEMBER BOLTS	47	35	—
REAR TOW HOOK BOLTS	88	65	—
TRAILER HITCH BOLTS	88	65	—
TRANSFER CASE SKID PLATE BOLTS	34	25	—
TRANSMISSION MOUNT THROUGH BOLT/NUT	88	65	—

FRONT SKID PLATE

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the skid plate bolts and remove the skid plate. (Fig. 7)

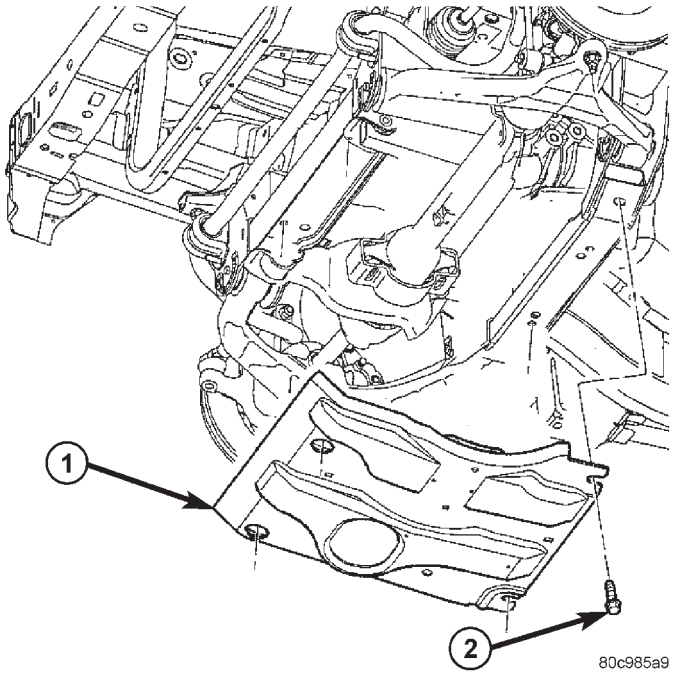


Fig. 7 SKID PLATE

1 - SKID PLATE
2 - BOLTS (4)

INSTALLATION

(1) Install the skid plate.

(2) Install the bolts and tighten to 61 N·m (45 ft. lbs.).

ENGINE CRADLE CROSSMEMBER

REMOVAL

(1) Install a suitable engine support tool.

(2) Raise and support the vehicle.

(3) Remove the lower control arms. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL)

(4) Remove the sway bar. (Refer to 2 - SUSPENSION/FRONT/STABILIZER BAR - REMOVAL)

(5) Remove the front axle, if equipped. (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE - REMOVAL)

(6) Remove the power steering rack. (Refer to 19 - STEERING/GEAR - REMOVAL)

(7) Loosen the engine mount through bolts.

(8) Support the engine cradle with a suitable lifting device.

(9) Using a grease pencil or equivalent, mark the location of the engine support cradle.

(10) Remove the engine cradle bolts and remove the engine cradle.

INSTALLATION

(1) Raise and support the vehicle.

(2) Using a suitable lifting device raise the engine cradle into the vehicle while lining up the engine mount through bolts.

FUEL PUMP (Continued)

(1) Remove protective cap at fuel rail test port. Connect the 0–414 kPa (0-60 psi) fuel pressure gauge (from gauge set 5069) to test port pressure fitting on fuel rail (Fig. 20). **The DRB® III Scan Tool along with the PEP module, the 500 psi pressure transducer, and the transducer-to-test port adapter may also be used in place of the fuel pressure gauge.**

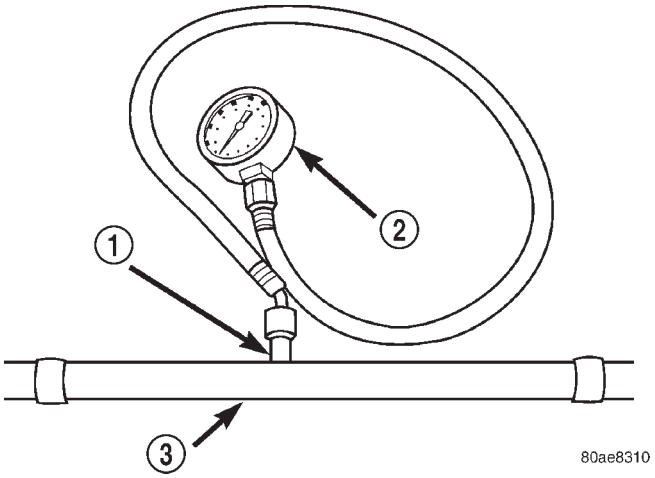


Fig. 20 FUEL PRESSURE TEST GAUGE (TYPICAL GAUGE INSTALLATION AT TEST PORT)

1 - SERVICE (TEST) PORT
2 - FUEL PRESSURE TEST GAUGE
3 - FUEL RAIL

(2) Start and warm engine and note pressure gauge reading. Fuel pressure should be 339 kPa ± 34 kPa (49.2 psi ± 5 psi) at idle.

(3) If engine runs, but pressure is below 44.2 psi, check for a kinked fuel supply line somewhere between fuel rail and fuel pump module. If line is not kinked, but specifications for either the Fuel Pump Capacity, Fuel Pump Amperage or Fuel Pressure Leak Down Tests were not met, replace lower section of fuel pump module. Refer to Fuel Pump Module Removal/Installation.

(4) If operating pressure is above 54.2 psi, electric fuel pump is OK, but fuel pressure regulator is defective. Replace lower section of fuel pump module. Refer to Fuel Pump Module Removal/Installation.

(5) Install protective cap to fuel rail test port.

DIAGNOSIS AND TESTING - FUEL PUMP AMPERAGE TEST

This amperage (current draw) test is to be done in conjunction with the Fuel Pump Pressure Test, Fuel Pump Capacity Test and Fuel Pressure Leak Down Test. Before performing the amperage test, be sure the temperature of the fuel tank is above 50° F (10° C).

The DRB® Scan Tool along with the DRB Low Current Shunt (LCS) adapter (Fig. 21) and its test leads will be used to check fuel pump amperage specifications.

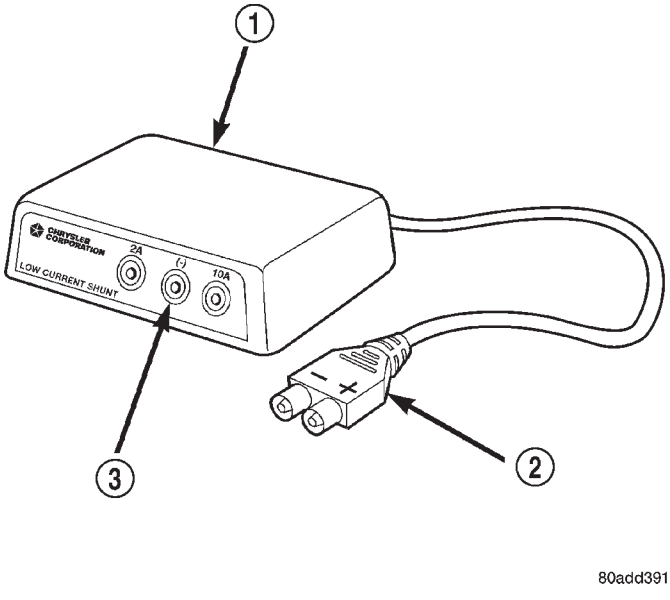


Fig. 21 LOW CURRENT SHUNT

1 - LOW CURRENT SHUNT ADAPTER
2 - PLUG TO DRB
3 - TEST LEAD RECEPTACLES

(1) Be sure fuel tank contains fuel before starting test. If tank is empty or near empty, amperage readings will be incorrect.

(2) Obtain LCS adapter.

(3) Plug cable from LCS adapter into DRB scan tool at SET 1 receptacle.

(4) Plug DRB into vehicle 16–way connector (data link connector).

(5) Connect (-) and (+) test cable leads into LCS adapter receptacles. Use **10 amp (10A +)** receptacle and common (-) receptacles.

(6) Gain access to MAIN MENU on DRB screen.

(7) Press DVOM button on DRB.

(8) Using left/right arrow keys, highlight CHANNEL 1 function on DRB screen.

(9) Press ENTER three times.

(10) Using up/down arrow keys, highlight RANGE on DRB screen (screen will default to 2 amp scale).

(11) Press ENTER to change 2 amp scale to 10 amp scale. **This step must be done to prevent damage to DRB scan tool or LCS adapter (blown fuse).**

(12) Remove cover from Power Distribution Center (PDC).

(13) Remove fuel pump relay from PDC. Refer to label on PDC cover for relay location.

IDLE AIR CONTROL MOTOR (Continued)

REMOVAL

2.4L

The Idle Air Control (IAC) motor is located on the rear side of the throttle body (Fig. 12).

(1) Disconnect electrical connector from IAC motor.
(2) Remove two mounting bolts (screws).
(3) Remove IAC motor from throttle body.

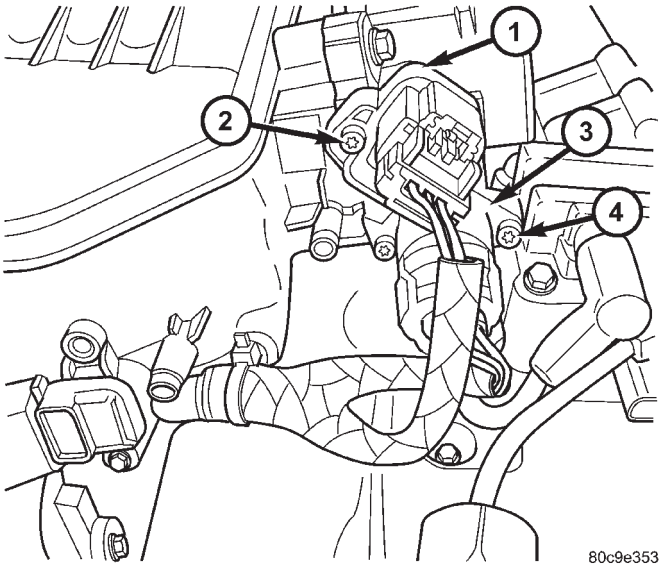


Fig. 12 TPS/IAC MOTOR - 2.4L

1 - THROTTLE POSITION SENSOR (TPS)
2 - MOUNTING SCREWS
3 - IDLE AIR CONTROL MOTOR (IAC)
4 - MOUNTING SCREWS

3.7L

The Idle Air Control (IAC) motor is located on the side of the throttle body (Fig. 13).

(1) Disconnect electrical connector from IAC motor.
(2) Remove two mounting bolts (screws).
(3) Remove IAC motor from throttle body.

INSTALLATION

2.4L

The Idle Air Control (IAC) motor is located on the rear side of the throttle body.

(1) Install IAC motor to throttle body.
(2) Install and tighten two mounting bolts (screws) to 7 N·m (60 in. lbs.) torque.
(3) Install electrical connector.

3.7L

The Idle Air Control (IAC) motor is located on the side of the throttle body (Fig. 13).

(1) Install IAC motor to throttle body.

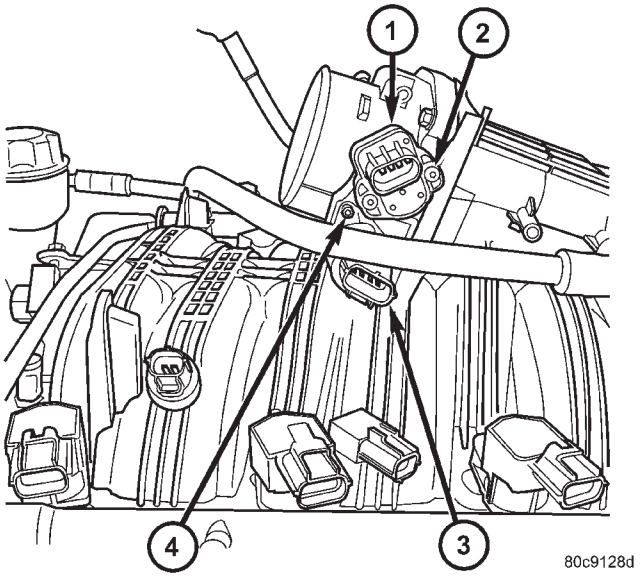


Fig. 13 TPS/IAC MOTOR - 3.7L

1 - THROTTLE POSITION SENSOR (TPS)
2 - MOUNTING SCREWS
3 - IDLE AIR CONTROL MOTOR (IAC)
4 - MOUNTING SCREWS

(2) Install and tighten two mounting bolts (screws) to 7 N·m (60 in. lbs.) torque.
(3) Install electrical connector.

INTAKE AIR TEMPERATURE SENSOR

DESCRIPTION

The 2–wire Intake Manifold Air Temperature (IAT) sensor is installed in the intake manifold with the sensor element extending into the air stream.

The IAT sensor is a two-wire Negative Thermal Coefficient (NTC) sensor. Meaning, as intake manifold temperature increases, resistance (voltage) in the sensor decreases. As temperature decreases, resistance (voltage) in the sensor increases.

OPERATION

The IAT sensor provides an input voltage to the Powertrain Control Module (PCM) indicating the density of the air entering the intake manifold based upon intake manifold temperature. At key-on, a 5–volt power circuit is supplied to the sensor from the PCM. The sensor is grounded at the PCM through a low-noise, sensor-return circuit.

The PCM uses this input to calculate the following:

- Injector pulse-width
- Adjustment of spark timing (to help prevent spark knock with high intake manifold air-charge temperatures)

COLUMN (Continued)

SPECIFICATIONS

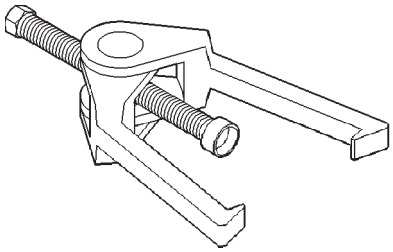
TORQUE CHART

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Tilt Steering Column Steering Wheel Bolt	54	40	—
Tilt Steering Column Mounting Bolts	17	—	150
Tilt Steering Column Coupler Bolt	49	36	—
Non-Tilt Steering Column Steering Wheel Bolt	54	40	—
Non-Tilt Steering Column Mounting Bolts	17	—	150
Non-Tilt Steering Column Coupler Bolt	49	36	—
Ignition Switch Screws	2	—	17

SPECIAL TOOLS

STEERING COLUMN



Puller C-3894-A

IGNITION SWITCH

DESCRIPTION

The electrical ignition switch is located on the steering column. It is used as the main on/off switching device for most electrical components. The mechanical key lock cylinder is used to engage/disengage the electrical ignition switch.

DIAGNOSIS AND TESTING - IGNITION SWITCH

ELECTRICAL DIAGNOSIS

For ignition switch electrical schematics, Refer to the appropriate section for the component.

MECHANICAL DIAGNOSIS (KEY DIFFICULT TO ROTATE)

Vehicles equipped with an automatic transmission and a floor mounted shifter: a cable is used to connect the interlock device in the steering column assembly, to the transmission floor shift lever. This interlock system is used to lock the transmission shifter in the PARK position when the key lock cylinder is rotated to the LOCKED or ACCESSORY position. If the ignition key is difficult to rotate to or from the LOCK or ACCESSORY position, it may not be the fault of the key cylinder or the steering column components. The brake transmission shift interlock cable may be out of adjustment. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 30RH/GEAR SHIFT CABLE - ADJUSTMENTS). The interlock system within the steering column is not serviceable. If repair is necessary, the steering column assembly must be replaced. (Refer to 19 - STEERING/COLUMN - REMOVAL).

Vehicles equipped with a manual transmission and a floor mounted shifter: on certain models, a button is located on the steering column behind the ignition key lock cylinder. The button must be manually depressed to allow rotation of the ignition key lock cylinder to the LOCK or ACCESSORY position. If it is difficult to rotate the key to the LOCK or ACCESSORY position, the lever mechanism may be defective. This mechanism is not serviceable. If repair is necessary, the steering column assembly must be replaced.(Refer to 19 - STEERING/COLUMN - REMOVAL).

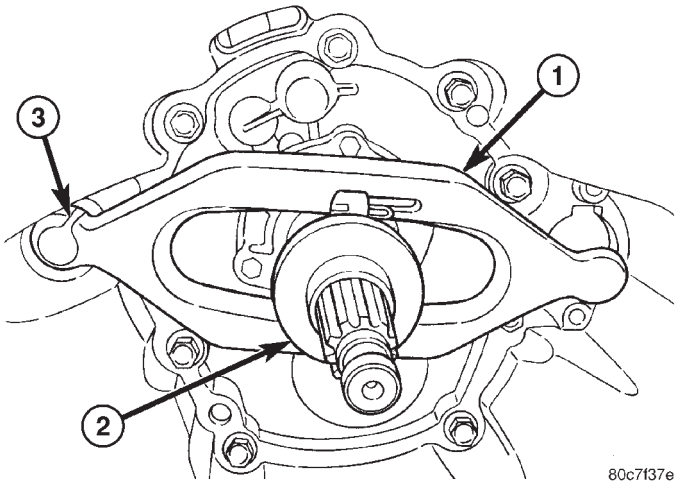


Fig. 4 CLUTCH RELEASE BEARING

1 - FORK
2 - BEARING
3 - CLIP

DISASSEMBLY

FRONT HOUSING

(1) Shift transmission into Neutral.

(2) Remove drain plug and drain lubricant into a container.

(3) Remove backup light switch (Fig. 5).

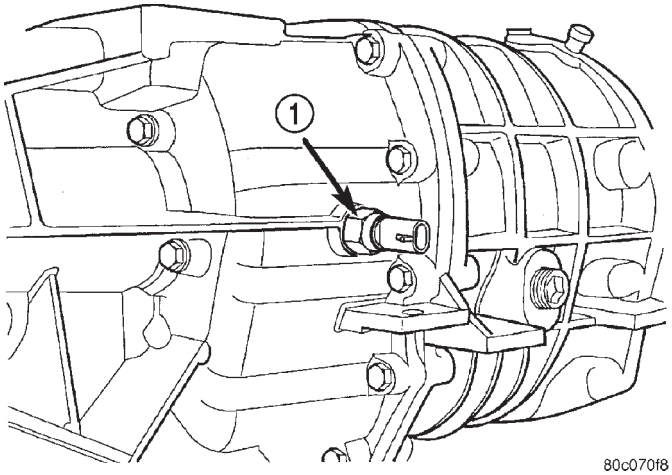


Fig. 5 BACKUP LIGHT SWITCH

1 - BACKUP LAMP SWITCH

(4) Remove shift tower bolts and remove tower and lever assembly (Fig. 6).

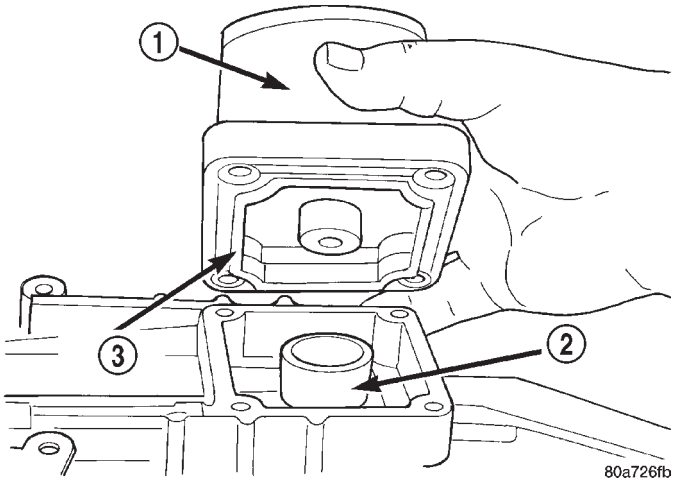


Fig. 6 SHIFT TOWER

1 - SHIFT TOWER AND LEVER ASSEMBLY
2 - SHIFT SOCKET
3 - SEAL

(5) Remove shift shaft lock bolt (Fig. 7). Bolt secures the shift shaft bushing and lever.

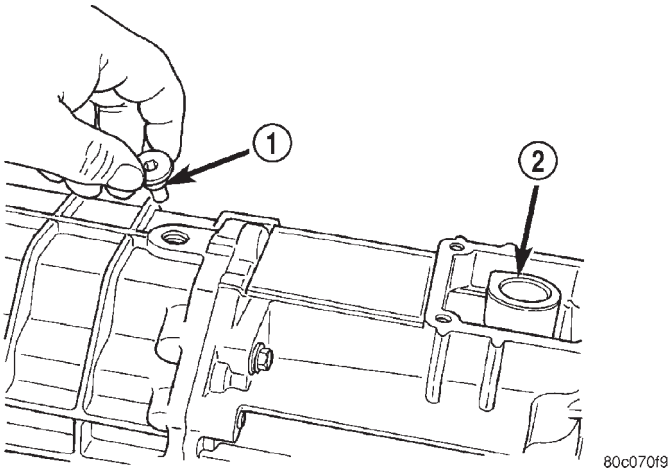


Fig. 7 SHIFT SHAFT BUSHING LOCK BOLT

1 - SHIFT SHAFT LOCK BOLT
2 - SHAFT SOCKET

MANUAL - NV1500 (Continued)

SHIFT SHAFT, SHAFT LEVER AND BUSHING AND SHIFT SOCKET

(1) Verify all synchro sleeves are in Neutral position (centered on hub).

CAUTION: Synchros must all be in Neutral position to prevent damage to the housings, shift forks and gears during installation of the two housings.

(2) Install 3-4 shift fork in synchro sleeve (Fig. 74). Verify groove in fork arm is aligned with grooves in 1-2 and fifth-reverse fork arms.

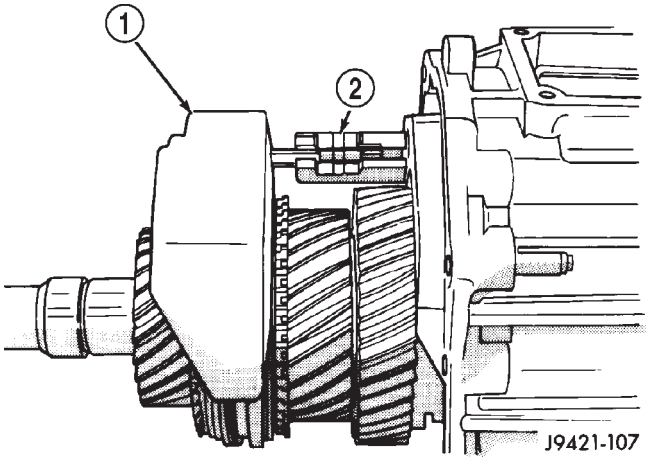


Fig. 74 3-4 SHIFT FORK

1 - 3-4 FORK
2 - ALIGN GROOVES IN FORK ARMS

(3) Slide shift shaft through the shift forks (Fig. 75).

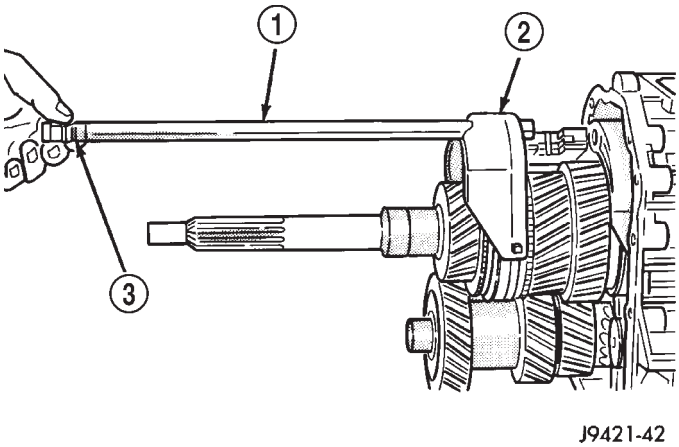


Fig. 75 SHIFT SHAFT

1 - SHIFT SHAFT
2 - 3-4 FORK
3 - SHAFT DETENT NOTCHES

(4) Assemble shift shaft shift lever and bushing (Fig. 76). Slot in bushing must face up and roll pin hole for lever to align with hole in shaft.

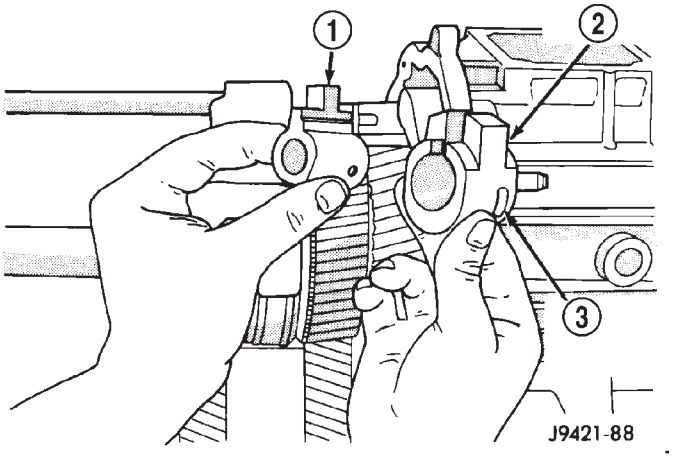


Fig. 76 SHIFT SHAFT LEVER AND BUSHING

1 - SHAFT LEVER
2 - LEVER BUSHING
3 - BUSHING LOCK PIN SLOT

(5) Install assembled lever and bushing on shift shaft (Fig. 77).

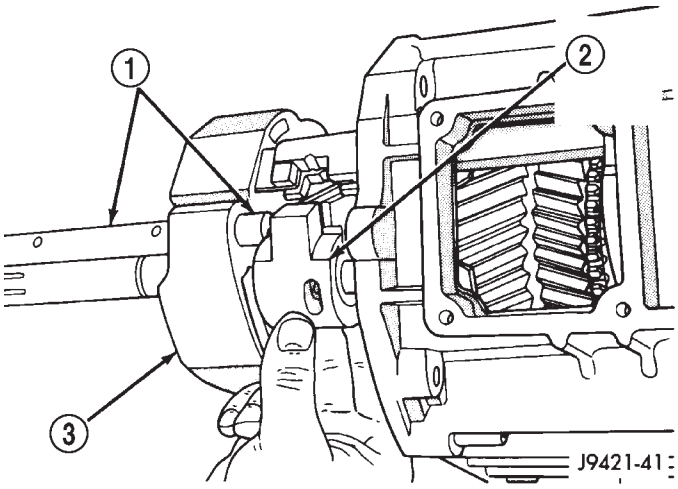


Fig. 77 SHIFT SHAFT LEVER AND BUSHING

1 - SHIFT SHAFT
2 - SHAFT LEVER AND BUSHING
3 - 3-4 FORK

(6) Slide shift shaft through 1-2 and fifth-reverse fork and into shift lever opening in rear housing (Fig. 78).

(7) Align shift socket with shaft and slide shaft through socket and into shift shaft bearing in rear housing (Fig. 79).

(8) Rotate shift shaft so detent notches in shaft are facing the TOP of the transmission housing.

MANUAL - NV3550 (Continued)

NOTE: Record location of washer locating lugs in shaft notches for installation reference.

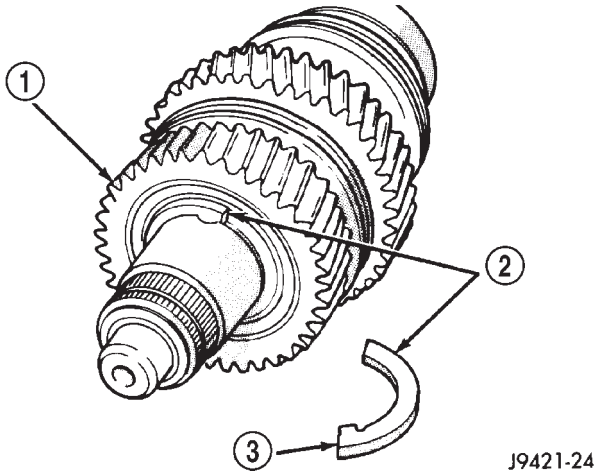


Fig. 39 TWO-PIECE THRUST WASHER

1 - SECOND GEAR
2 - THRUST WASHER (2-PIECE)
3 - WASHER LOCATING LUG

(6) Remove second gear and needle bearing (Fig. 40).

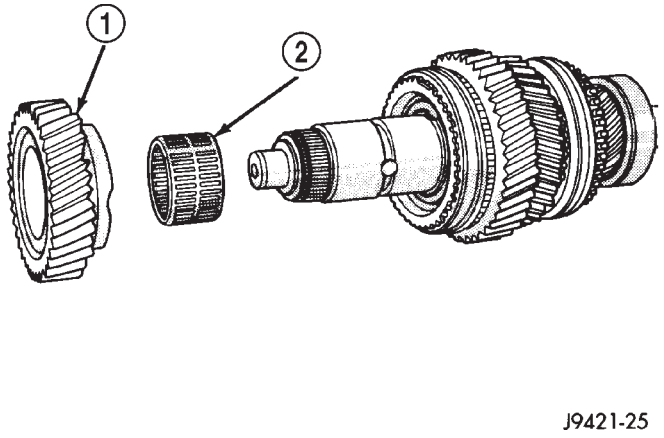


Fig. 40 SECOND GEAR AND NEEDLE BEARING

1 - SECOND GEAR
2 - SECOND GEAR NEEDLE BEARING

(7) Remove second gear synchro ring, synchro friction cone and synchro cone (Fig. 41).

(8) Remove interim ring and 1-2 synchro hub snap ring.

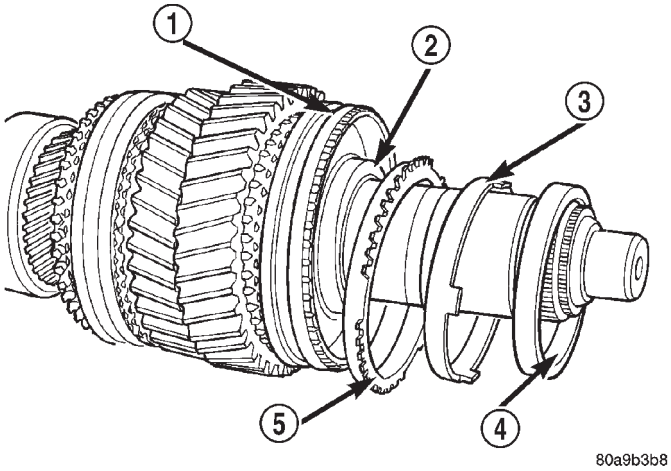


Fig. 41 SECOND GEAR SYNCHRO RING AND CONES

1 - 1-2 SYNCHRO HUB AND SLEEVE
2 - INTERM RING
3 - SYNCHRO FRICTION CONE
4 - SYNCHRO CONE
5 - SYNCHRO RING

(9) Remove 1-2 synchro hub, sleeve and first gear from output shaft with a press and Bearing Splitter 1130 (Fig. 42). Position splitter between first and reverse gears.

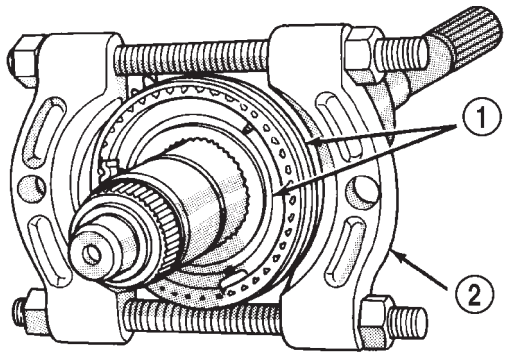


Fig. 42 HUB SLEEVE AND 1-2 SYNCHRO

1 - 1-2 SYNCHRO HUB AND SLEEVE
2 - BEARING SPITTER

MANUAL - NV3550 (Continued)

SHIFT SHAFT, SHAFT LEVER AND BUSHING AND SHIFT SOCKET

CAUTION: Transmission synchros must be in the Neutral position, to prevent damage to the housings, shift forks and gears during installation of the two housings.

(1) Install 3-4 shift fork in synchro sleeve (Fig. 104). Verify groove in fork arm is aligned with grooves in 1-2 and fifth-reverse fork arms as shown.

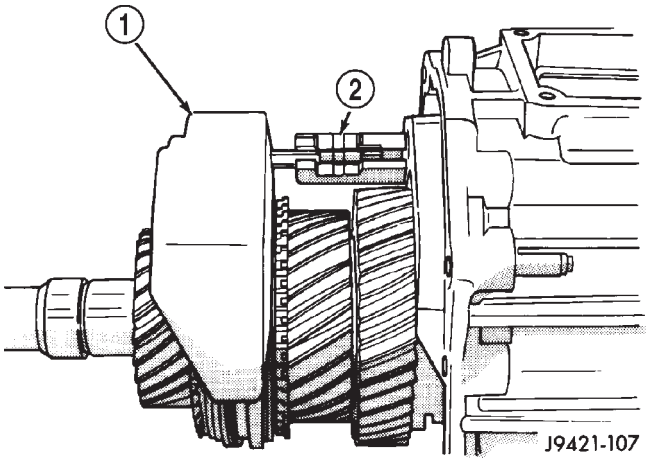


Fig. 104 3-4 SHIFT FORK

1 - 3-4 FORK
2 - ALIGN GROOVES IN FORK ARMS

(2) Slide the end of shift shaft with shaft detent notches through 3-4 shift fork.

(3) Assemble shift shaft shift lever and bushing (Fig. 105). The slot in bushing must face up and roll pin hole for lever must be aligned with hole in shaft.

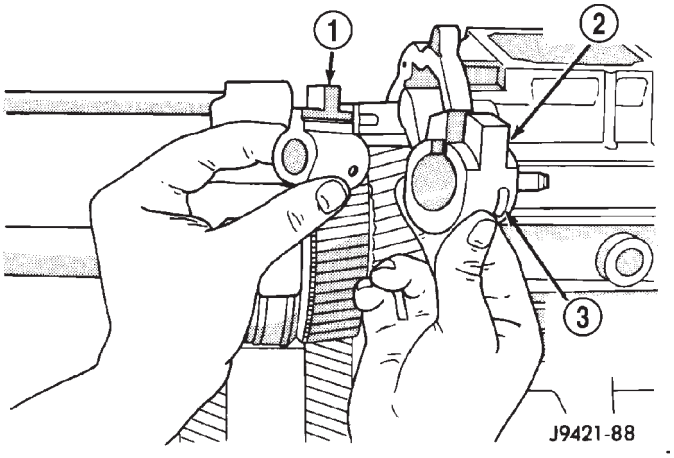


Fig. 105 LEVER AND BUSHING

1 - SHAFT LEVER
2 - LEVER BUSHING
3 - BUSHING LOCK PIN SLOT

(4) Install assembled lever and bushing on shift shaft (Fig. 106).

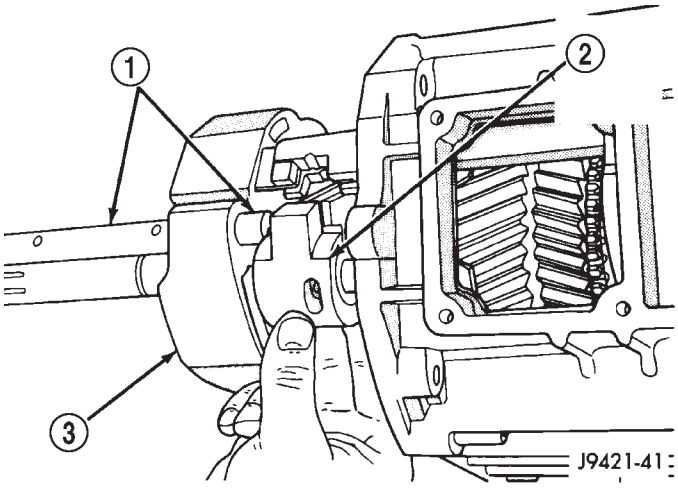


Fig. 106 LEVER AND BUSHING ASSENBLY

1 - SHIFT SHAFT
2 - SHAFT LEVER AND BUSHING
3 - 3-4 FORK

(5) Slide shift shaft through forks (Fig. 107) and into shift lever opening in rear housing (Fig. 108).

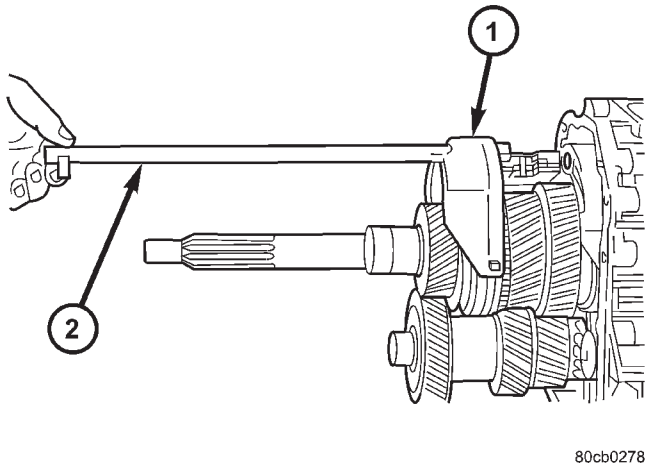


Fig. 107 SHIFT SHAFT

1 - SHIFT SHAFT
2 - 3-4 SHIFT FORK

(2) Clean exterior of transmission with suitable solvent or pressure washer.

(3) Remove the torque converter from the transmission.

(4) Remove the manual shift lever from the transmission.

(5) Remove the input, output, and line pressure sensors from the transmission case (Fig. 18).

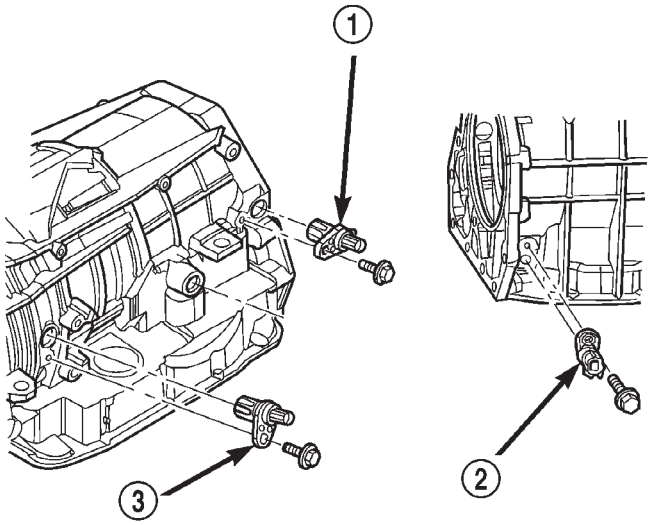


Fig. 18 Remove Input, Output, and Line Pressure Sensors

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

(6) Inspect the ends of the sensors for debris, which may indicate the nature of the transmission failure.

(7) Install Support Stand 8257 onto the transmission case (Fig. 19).

(8) Using Adapter 8266-1 from End-Play Tool Set 8266 and Dial Indicator C-3339, measure and record the input shaft end-play (Fig. 20).

NOTE: When measuring the input shaft end-play, two ″stops″ will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first ″stop″ felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading.

(9) Remove the bolts holding the transmission extension/adapter housing to the transmission case.

(10) Remove the extension/adapter housing from the transmission case.

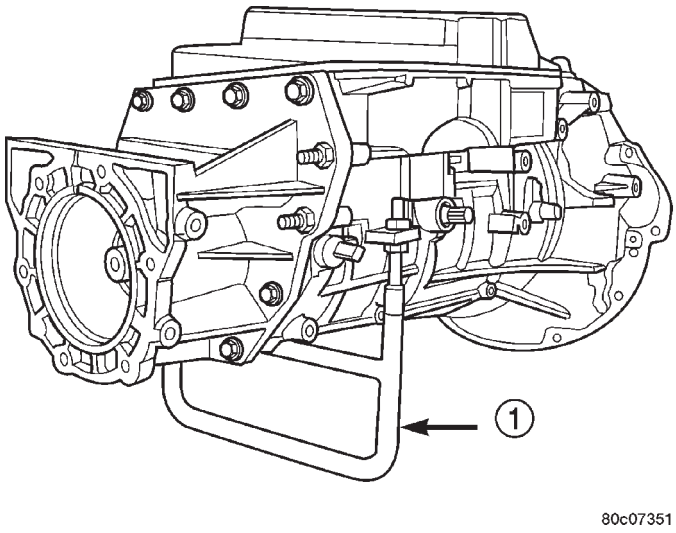


Fig. 19 Install Support Stand - Tool 8257

1 - TOOL 8257

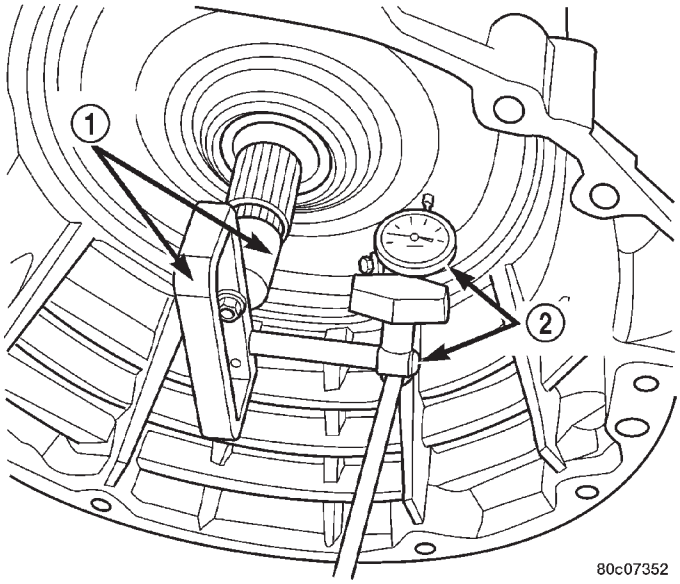


Fig. 20 Measure Input Shaft End Play

1 - TOOL 8266
2 - TOOL C-3339

(11) Using Alignment Plate 8261, Adapter 8266-17 from End-Play Tool Set 8266 and Dial Indicator C-3339, measure and record the output shaft end-play (Fig. 21).

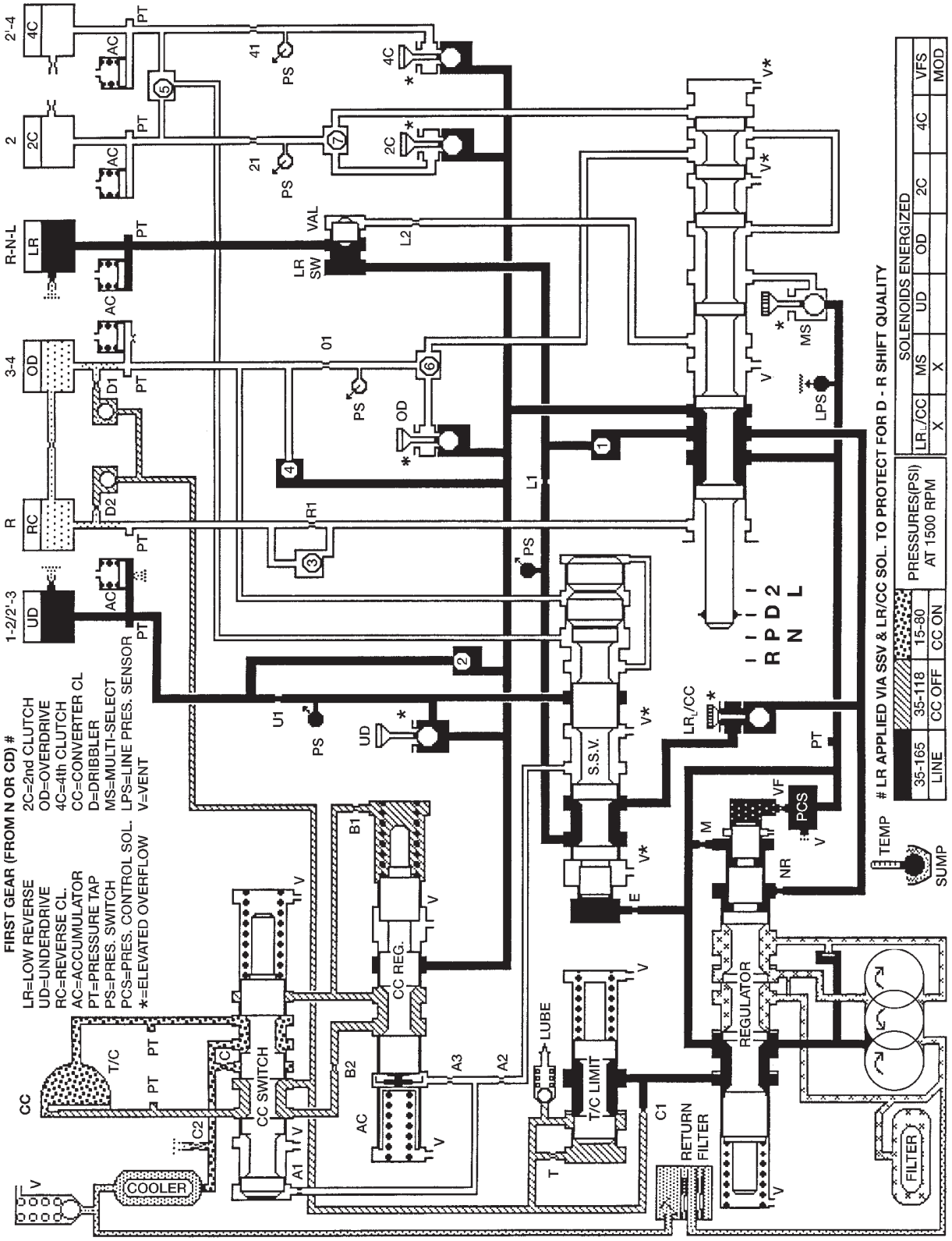
(12) Remove the bolts holding the transmission oil pan to the transmission case.

(13) Remove the transmission oil pan from the transmission case.

(14) Remove the primary oil filter and the oil cooler return filter (Fig. 22).

(15) Remove the cooler return filter bypass valve.

AUTOMATIC TRANSMISSION - 45RFE (Continued)



HYDRAULIC FLOW IN FIRST GEAR (FROM N OR OD)

4C RETAINER/BULKHEAD (Continued)

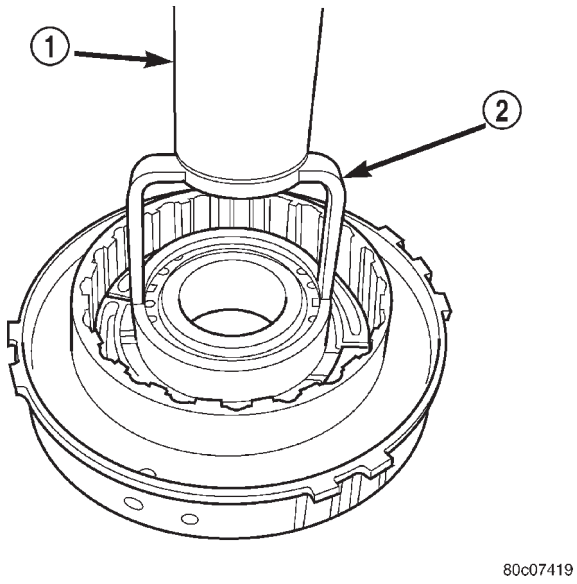


Fig. 67 Compress 4C Piston Return Spring Using Tool 8250

1 - PRESS
2 - TOOL 8250

(13) Using Spring Compressor 8249 and a suitable shop press (Fig. 68), compress the belleville spring until the snap-ring is engaged with the snap-ring groove in the retainer/bulkhead.

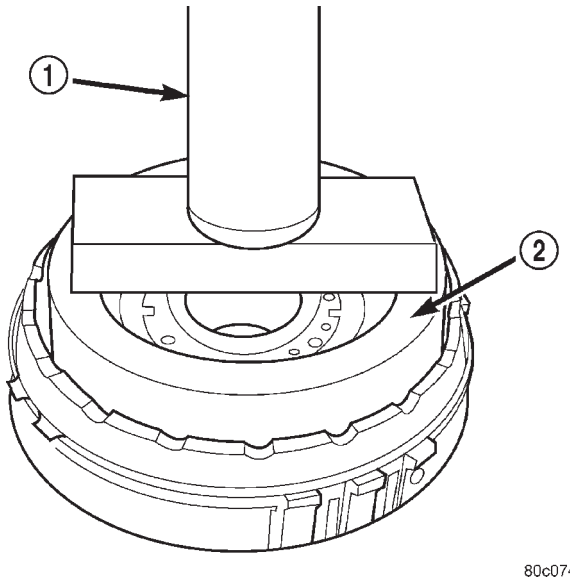


Fig. 68 Compress 2C Belleville Spring Using Tool 8249

1 - PRESS
2 - TOOL 8249

ADAPTER HOUSING SEAL

REMOVAL

(1) Remove the transfer case from the transmission.

(2) Using a screw mounted on a slide hammer, remove the adapter housing seal.

INSTALLATION

(1) Clean the adapter seal bore in the adapter housing of any residue or particles remaining from the original seal.

(2) Install new oil seal in the adapter housing using Seal Installer C-3860-A (Fig. 69). A properly installed seal is flush to the face of the seal bore.

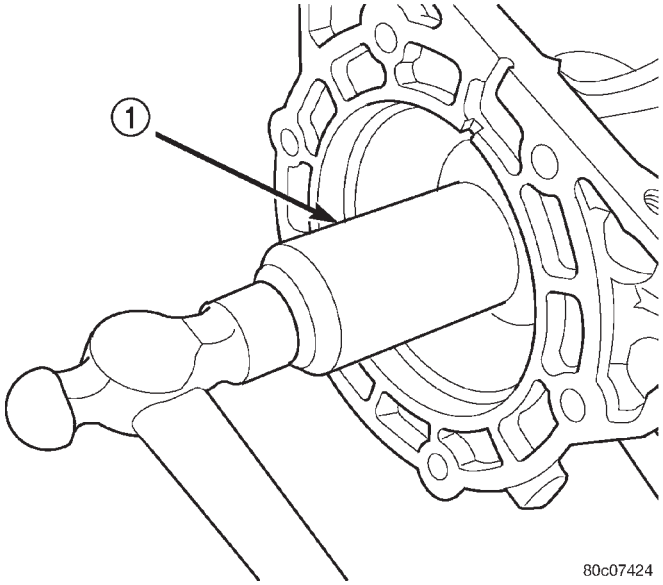


Fig. 69 Adapter Housing Seal Installation

1 - TOOL C-3860-A

(3) Install the transfer case onto the transmission.

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM

DESCRIPTION

The Brake Transmission Shift Interlock Sytem (BTSI), consists of a Park-Interlock cable and a solenoid mounted in the shift lever assembly. The Park-Interlock cable connects the automatic transmission floor mounted shifter to the steering column ignition switch.

INPUT SPEED SENSOR (Continued)

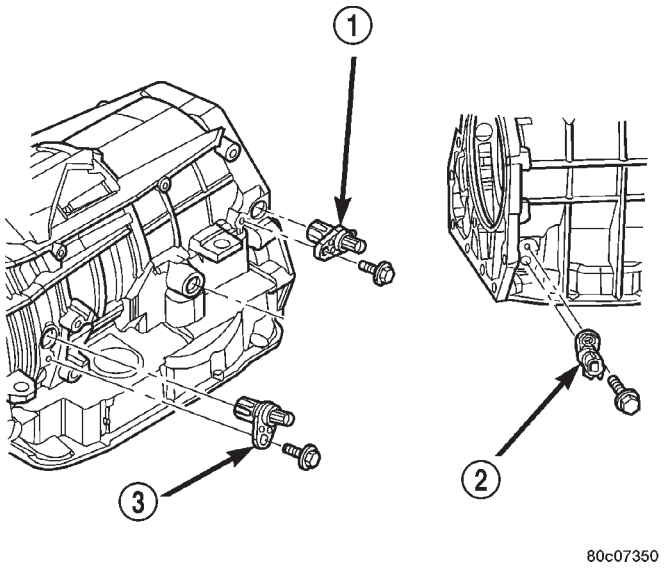


Fig. 95 Input Speed Sensor

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

(2) Install the bolt to hold the input speed sensor into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).

(3) Install the wiring connector onto the input speed sensor

(4) Verify the transmission fluid level. Add fluid as necessary.

(5) Lower vehicle.

LINE PRESSURE (LP) SENSOR

DESCRIPTION

The TCM utilizes a closed-loop system to control transmission line pressure. The system contains a variable force style solenoid, the Pressure Control Solenoid, mounted on the side of the solenoid and pressure switch assembly. The solenoid is duty cycle controlled by the TCM to vent the unnecessary line pressure supplied by the oil pump back to the sump. The system also contains a variable pressure style sensor, the Line Pressure Sensor, which is a direct input to the TCM. The line pressure solenoid monitors the transmission line pressure and completes the feedback loop to the TCM. The TCM uses this information to adjust its control of the pressure control solenoid to achieve the desired line pressure.

OPERATION

The TCM calculates the desired line pressure based upon inputs from the transmission and engine. The TCM calculates the torque input to the transmission and uses that information as the primary input to the calculation. The line pressure is set to a predetermined value during shifts and when the transmission is in the PARK and NEUTRAL positions. This is done to ensure consistent shift quality. During all other operation, the actual line pressure is compared to the desired line pressure and adjustments are made to the pressure control solenoid duty cycle.

REMOVAL

(1) Raise vehicle.

(2) Place a suitable fluid catch pan under the transmission.

(3) Remove the wiring connector from the line pressure sensor (Fig. 96).

(4) Remove the bolt holding the line pressure sensor to the transmission case.

(5) Remove the line pressure sensor from the transmission case.

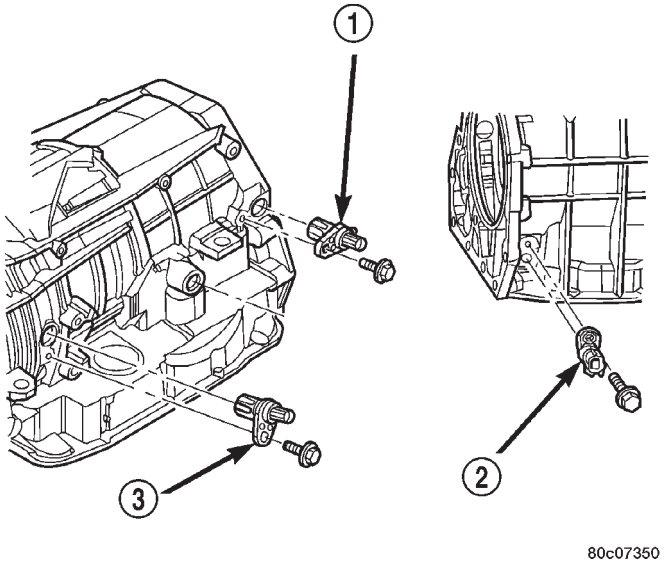


Fig. 96 Line Pressure Sensor

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

INSTALLATION

(1) Install the line pressure sensor into the transmission case.

(2) Install the bolt to hold the line pressure sensor into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).

(3) Install the wiring connector onto the line pressure sensor

(4) Verify the transmission fluid level. Add fluid as necessary.

(5) Lower vehicle.

TORQUE CONVERTER (Continued)

TURBINE

The turbine (Fig. 126) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

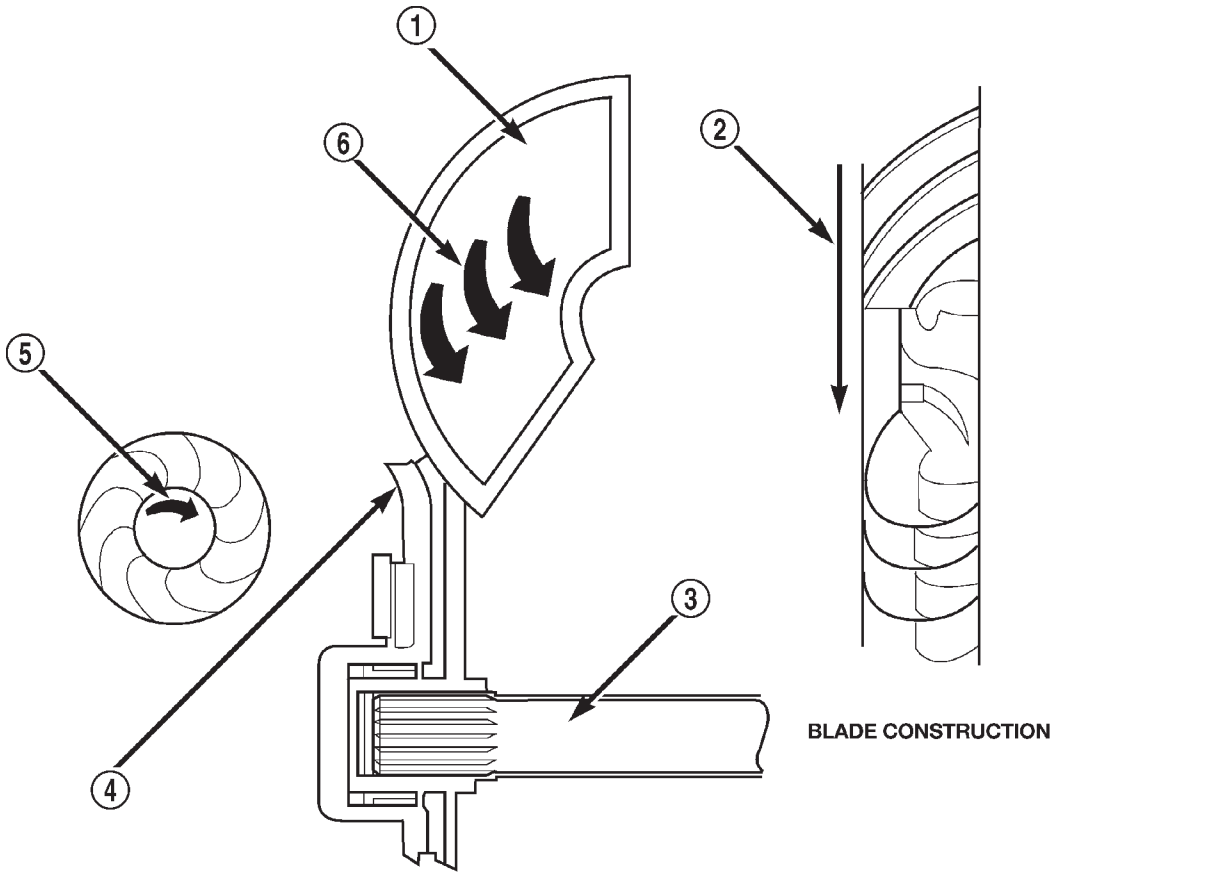


Fig. 126 Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

TRANSFER CASE - NV231 (Continued)

COMPANION FLANGE AND RANGE LEVER

(1) Remove transfer case position sensor (Fig. 13).

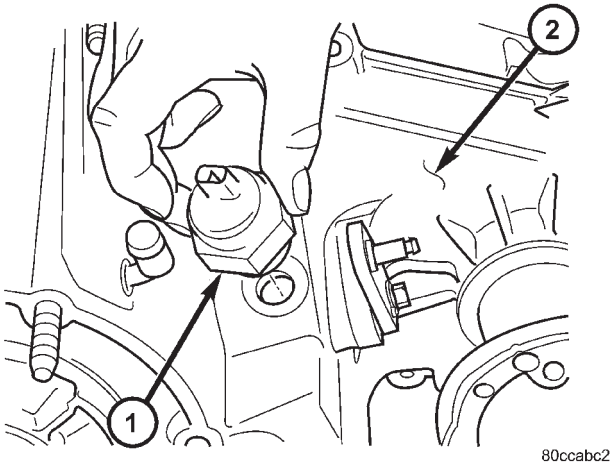


Fig. 13 Remove Transfer Case Position Sensor

1 - TRANSFER CASE POSITION SENSOR
2 - TRANSFER CASE

(2) Install two bolts (Fig. 14) partially into the propellor shaft companion flange, 180° from each other.

(3) Install the rectangular end of the Flange Holder C-3281 over the bolts to hold the companion flange stationary and remove the nut holding the companion flange to the output shaft.

(4) Use Remover C-452 (Fig. 15) to remove the companion flange.

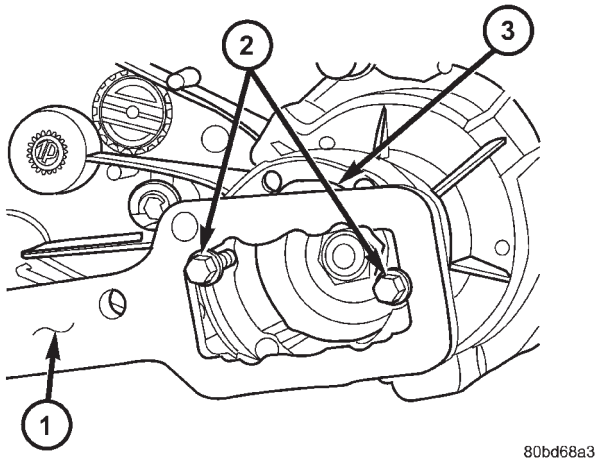


Fig. 14 Hold Companion Flange - Typical

1 - HOLDER C-3281
2 - BOLTS
3 - COMPANION FLANGE

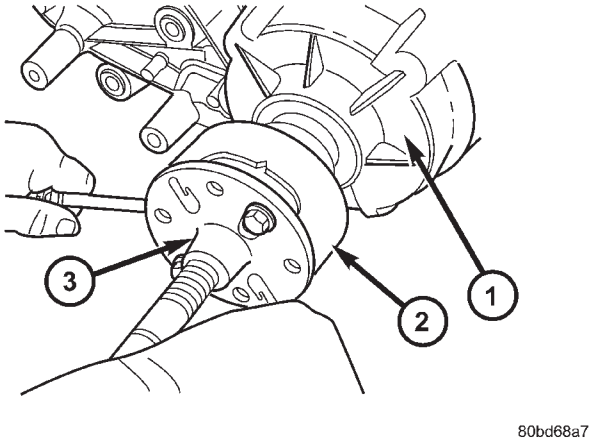


Fig. 15 Remove Companion Flange - Typical

1 - TRANSFER CASE
2 - COMPANION FLANGE
3 - REMOVER C-452

(5) Remove seal washer from front output shaft. Discard washer as it should not be reused.

(6) Remove the bolt (Fig. 16) that attaches the range lever to sector shaft. Then move sector to neutral position and remove range lever from shaft.

NOTE: Be sure to note the orientation of the range lever (lever up or down) so that it may be re-installed in the same direction.

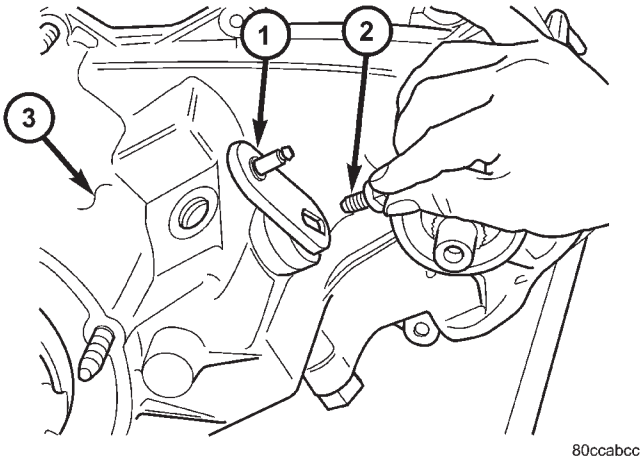


Fig. 16 Remove Shift Lever Bolt

1 - RANGE LEVER
2 - RANGE LEVER BOLT
3 - TRANSFER CASE

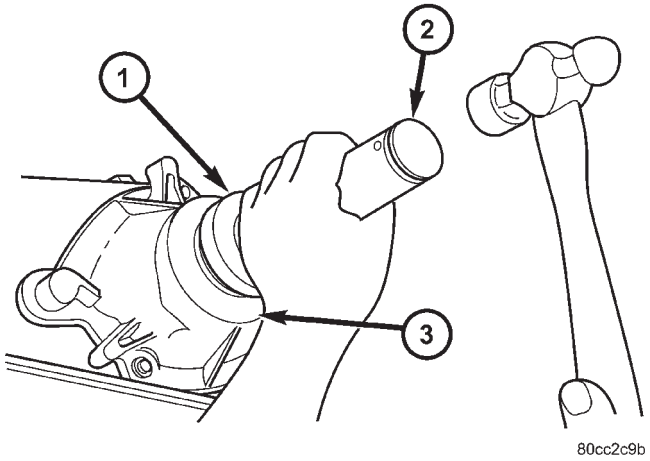


Fig. 84 Rear Seal Installation

1 - SPECIAL TOOL 8691
2 - HANDLE
3 - TRANSFER CASE

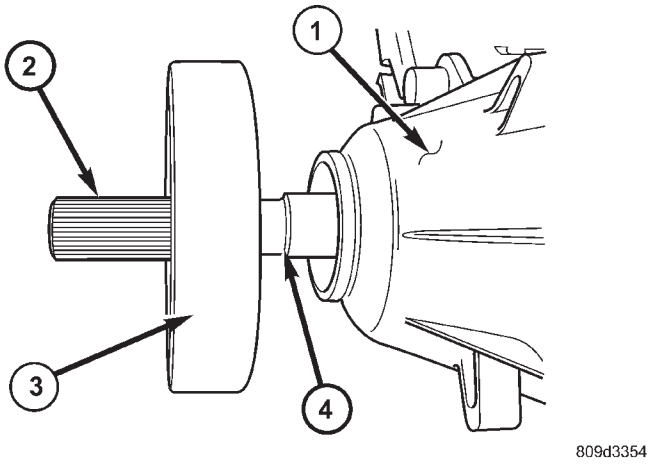


Fig. 85 Position Damper on Output Shaft

1 - TRANSFER CASE
2 - OUTPUT SHAFT
3 - DAMPER WEIGHT
4 - CHAMFER

(8) Install a new output shaft rear slinger with Installer 8408, if the vehicle is equipped with an automatic transmission.

(9) If the vehicle is equipped with a manual transmission, install the output shaft damper as follows:

(a) Position the damper weight on the output shaft. Start the damper onto the output shaft chamfer, being careful to keep the weight square to the output shaft. (Fig. 85)

NOTE: Be sure that the damper is installed with the raised mounting flange for the propeller shaft boot is towards the rear of the mainshaft.

(b) Position Driver Installer 8680 (Fig. 86) onto the damper, making sure the legs of the installer are positioned through the slots of the damper.

(c) Thread the puller screw from Installer 8422 into the output shaft by hand only. Make sure the screw is fully threaded into the output shaft.

(d) Using a wrench to hold the pulling screw stationary (Fig. 87), turn the pulling screw nut until the driver legs contact the rear face of the transfer case rear retainer. When the legs contact the retainer, the damper is properly positioned on the output shaft.

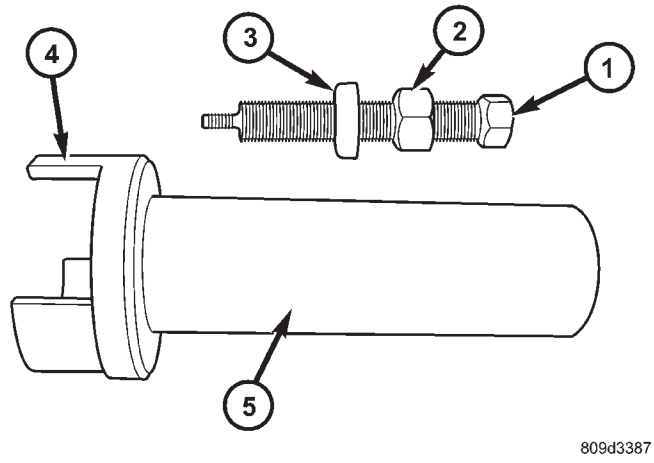


Fig. 86 Driver Installer 8680 and Puller Screw from 8422

1 - PULLING SCREW
2 - PULLING SCREW NUT
3 - BEARING
4 - DRIVER LEGS
5 -INSTALLER DRIVER

TRANSFER CASE - NV242 (Continued)

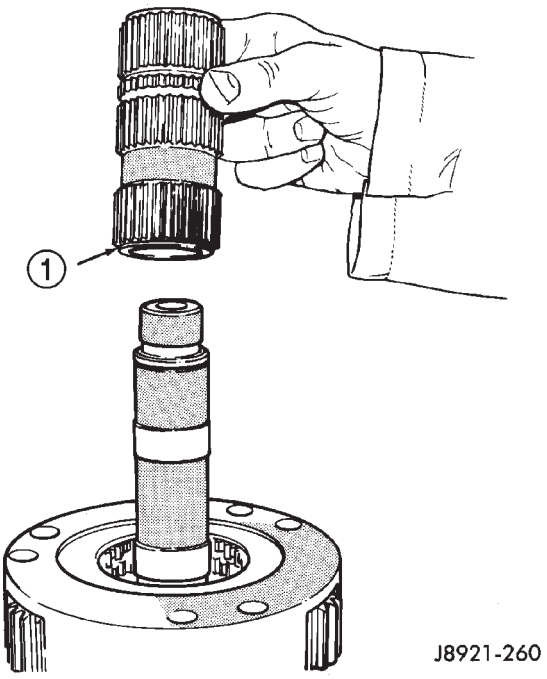


Fig. 29 Intermediate Clutch Shaft Removal

1 - INTERMEDIATE CLUTCH SHAFT

(10) Remove differential snap-ring (Fig. 30).
(11) Remove differential (Fig. 31).
(12) Remove differential needle bearings and both needle bearing thrust washers from mainshaft.

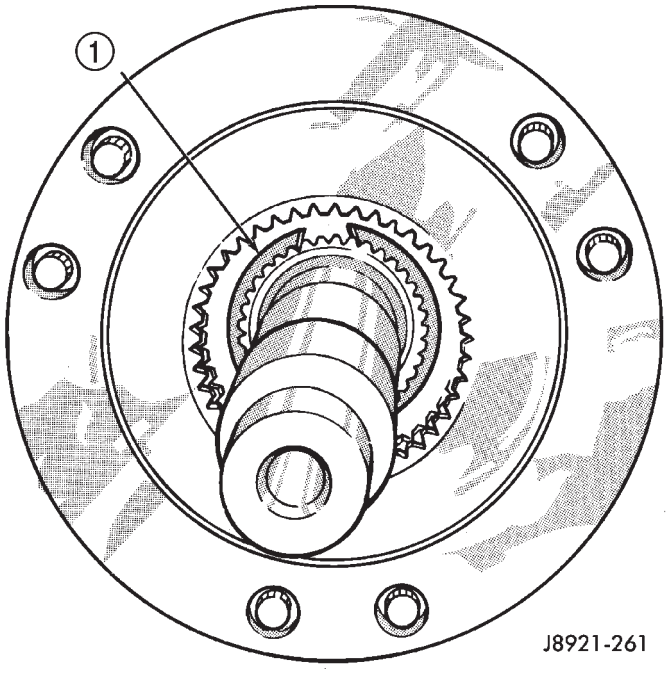


Fig. 30 Differential Snap-Ring Removal

1 - DIFFERENTIAL SNAP-RING

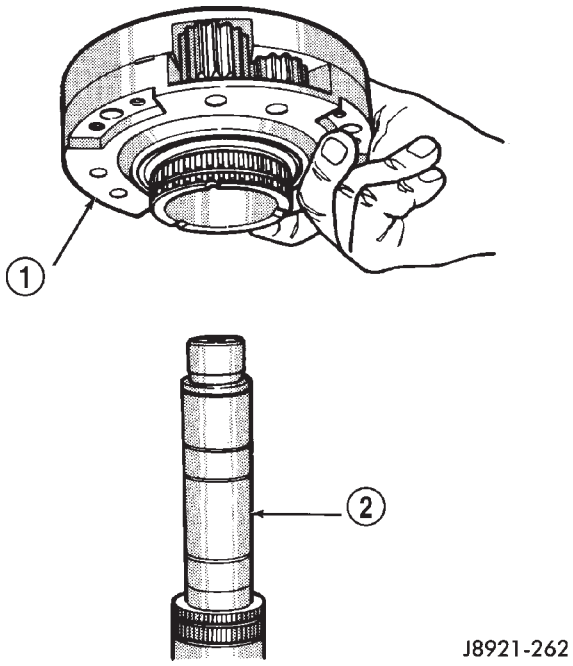


Fig. 31 Differential Removal

1 - DIFFERENTIAL
2 - MAINSHAFT

(13) Slide low range fork pin out of shift sector slot.
(14) Remove low range fork and sleeve (Fig. 32).
(15) Remove shift sector.

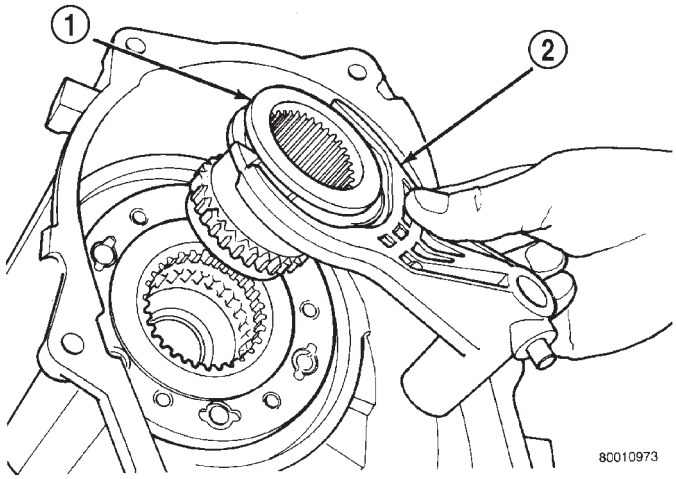


Fig. 32 Range Fork And Sleeve Removal

1 - RANGE HUB
2 - RANGE FORK

TRANSFER CASE - NV242 (Continued)

SPECIFICATIONS

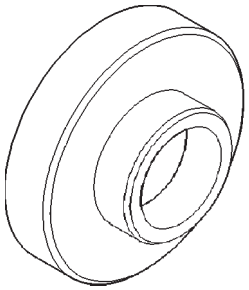
NV242 TRANSFER CASE

TORQUE SPECIFICATIONS

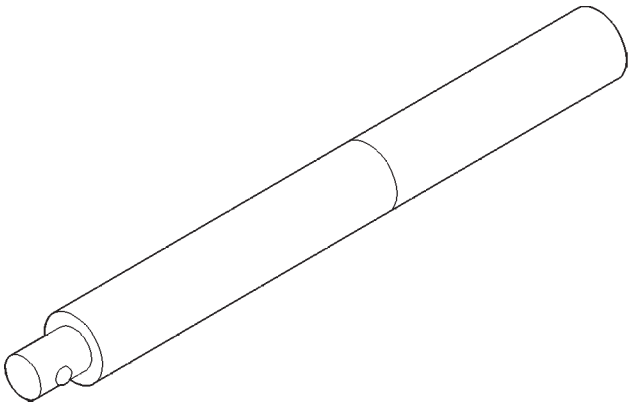
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-24	12-18	-
Bolt, Differential Case	17-27	15-24	-
Plug, Drain/Fill	20-34	15-25	-
Bolt, Front Brg. Retainer	16-27	12-20	-
Bolt, Case Half	35-46	26-34	-
Nut, Front Companion Flange	122-176	90-130	-
Bolt, Range Lever	27-34	20-25	-
Bolt, Rear Retainer	35-46	26-34	-
Nuts, Mounting	35	26	-
Screw, Oil Pump	1.2-1.8	-	12-15
Sensor, Transfer Case Position	20-34	16-25	-

SPECIAL TOOLS

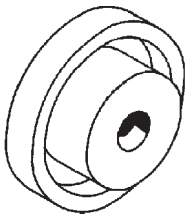
TRANSFER CASE - NV242



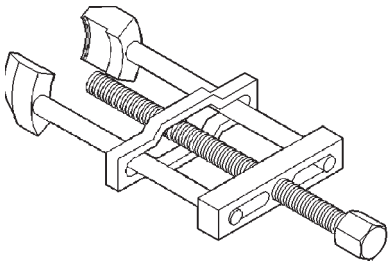
Installer - C-4076-B



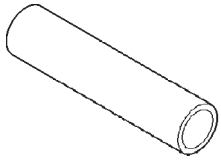
Handle, Universal - C-4171



Remover - C-4210



Puller, Slinger - MD-998056-A



Installer - MD-998323

BODY (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WATER LEAKS

Water leaks can be caused by poor sealing, improper body component alignment, body seam porosity, missing plugs, or blocked drain holes. Centrifugal and gravitational force can cause water to drip from a location away from the actual leak point, making leak detection difficult. All body sealing points should be water tight in normal wet-driving conditions. Water flowing downward from the front of the vehicle should not enter the passenger or luggage compartment. Moving sealing surfaces will not always seal water tight under all conditions. At times, side glass or door seals will allow water to enter the passenger compartment during high pressure washing or hard driving rain (severe) conditions. Overcompensating on door or glass adjustments to stop a water leak that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After completing a repair, water test vehicle to verify leak has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE WATER LEAK TESTS

Verify that floor and body plugs are in place, body drains are clear, and body components are properly aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

WATER LEAK TESTS

WARNING: DO NOT USE ELECTRIC SHOP LIGHTS OR TOOLS IN WATER TEST AREA. PERSONAL INJURY CAN RESULT.

When the conditions causing a water leak have been determined, simulate the conditions as closely as possible.

- If a leak occurs with the vehicle parked in a steady light rain, flood the leak area with an open-ended garden hose.
- If a leak occurs while driving at highway speeds in a steady rain, test the leak area with a reasonable velocity stream or fan spray of water. Direct the spray in a direction comparable to actual conditions.
- If a leak occurs when the vehicle is parked on an incline, hoist the end or side of the vehicle to simulate this condition. This method can be used when the leak occurs when the vehicle accelerates, stops or turns. If the leak occurs on acceleration, hoist the front of the vehicle. If the leak occurs when braking, hoist the back of the vehicle. If the leak occurs on left turns, hoist the left side of the vehicle. If the leak occurs on right turns, hoist the right side of the vehicle. For hoisting recommendations refer to Group 0, Lubrication and Maintenance, General Information section.

WATER LEAK DETECTION

To detect a water leak point-of-entry, do a water test and watch for water tracks or droplets forming on the inside of the vehicle. If necessary, remove interior trim covers or panels to gain visual access to the leak area. If the hose cannot be positioned without being held, have someone help do the water test.

Some water leaks must be tested for a considerable length of time to become apparent. When a leak appears, find the highest point of the water track or drop. The highest point usually will show the point of entry. After leak point has been found, repair the leak and water test to verify that the leak has stopped.

Locating the entry point of water that is leaking into a cavity between panels can be difficult. The trapped water may splash or run from the cavity, often at a distance from the entry point. Most water leaks of this type become apparent after accelerating, stopping, turning, or when on an incline.

MIRROR INSPECTION METHOD

When a leak point area is visually obstructed, use a suitable mirror to gain visual access. A mirror can also be used to deflect light to a limited-access area to assist in locating a leak point.

BRIGHT LIGHT LEAK TEST METHOD

Some water leaks in the luggage compartment can be detected without water testing. Position the vehicle in a brightly lit area. From inside the darkened luggage compartment inspect around seals and body seams. If necessary, have a helper direct a drop light over the suspected leak areas around the luggage compartment. If light is visible through a normally sealed location, water could enter through the opening.

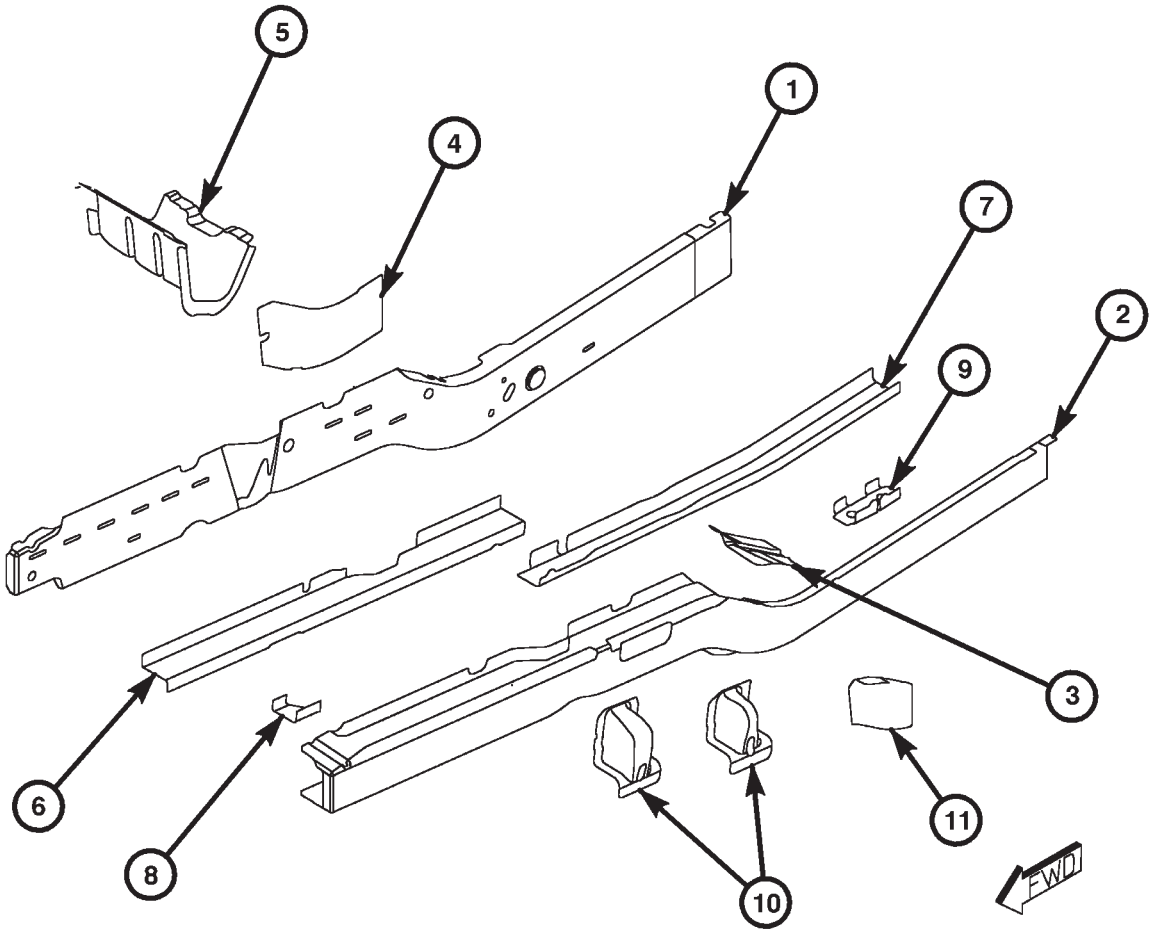
PRESSURIZED LEAK TEST METHOD

When a water leak into the passenger compartment cannot be detected by water testing, pressurize the passenger compartment and soap test exterior of the vehicle. To pressurize the passenger compartment, close all doors and windows, start engine, and set heater control to high blower in HEAT position. If engine can not be started, connect a charger to the battery to ensure adequate voltage to the blower. With interior pressurized, apply dish detergent solution to suspected leak area on the exterior of the vehicle. Apply detergent solution with spray device or soft bristle brush. If soap bubbles occur at a body seam, joint, seal or gasket, the leak entry point could be at that location.

WELD AND STRUCTURAL ADHESIVE LOCATIONS (Continued)

1. FRONT OUTER RAIL ASSEMBLY
2. FRONT INNER RAIL ASSEMBLY
3. FRONT FLOOR REINFORCEMENT PLATE
4. TRUCK TIE DOWN BRACKET
5. FRONT TORQUE BOX
6. TIP REINFORCEMENT
7. U-CHANNEL REINFORCEMENT
8. CLOSEOUT SPACER BRACKET
9. REAR SPACER BRACKET
10. MOUNTING BRACKET
11. REINFORCEMENT PLATE

NOTE
ITEMS 4,5 ARE PARTS OF THE FRONT OUTER RAIL ASSEMBLY
ITEMS 6,7,8,9,10 AND 11 ARE PARTS OF THE FRONT INNER RAIL ASSEMBLY



RIGHT-HAND SHOWN
LEFT-HAND OPPOSITE UNLESS SHOWN

Fig. 13 FRONT OUTER RAILS

WELD AND STRUCTURAL ADHESIVE LOCATIONS (Continued)

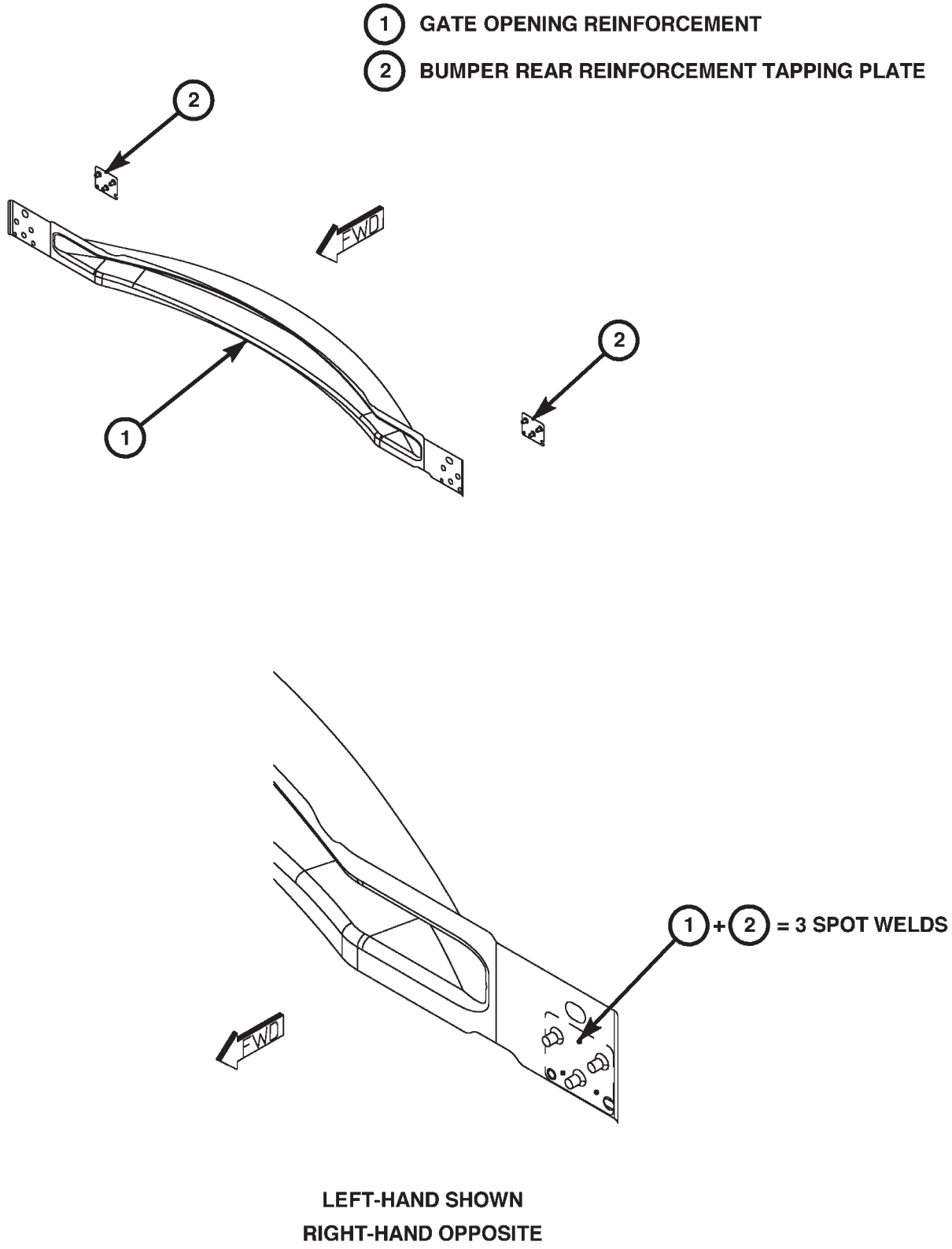


Fig. 33 BUMPER AND SWING GATE REINFORCEMENT

WELD AND STRUCTURAL ADHESIVE LOCATIONS (Continued)

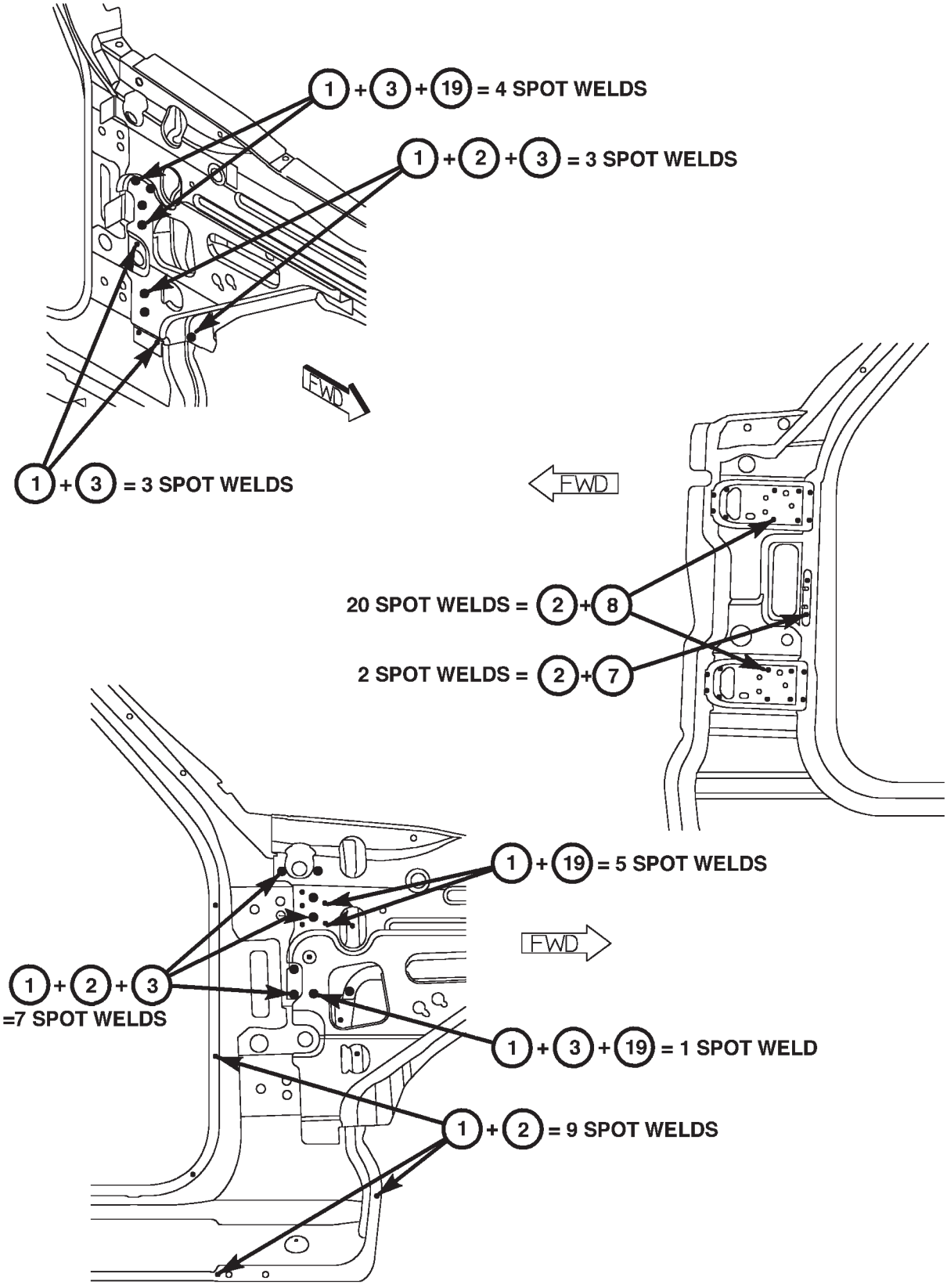


Fig. 53 FENDER REINFORCEMENT

WELD AND STRUCTURAL ADHESIVE LOCATIONS (Continued)

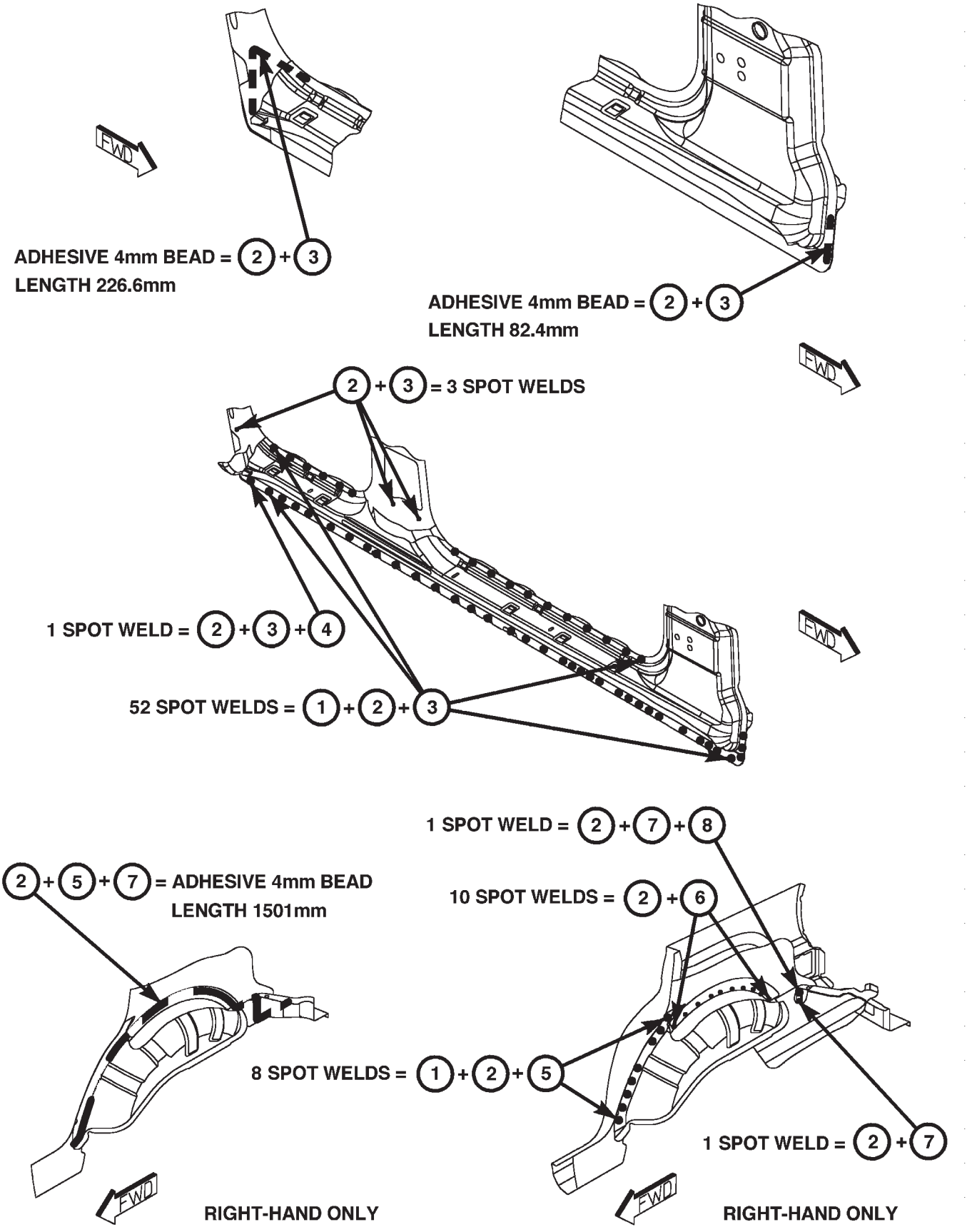


Fig. 73 BODY SIDE PANEL

SEALER LOCATIONS (Continued)

1. TAIL LAMP MOUNTING GATE PANEL - RIGHT
2. GATE STRIKER REINFORCEMENT
3. REAR GATE OPENING PANEL
4. REAR CROSSMEMBER
5. REAR FLOOR PAN
6. BODY SIDE INNER PANEL
7. A-PILLAR REINFORCEMENT
8. BODY SIDE OUTER PANEL
9. BODY SIDE SILL
10. COWL SIDE PANEL

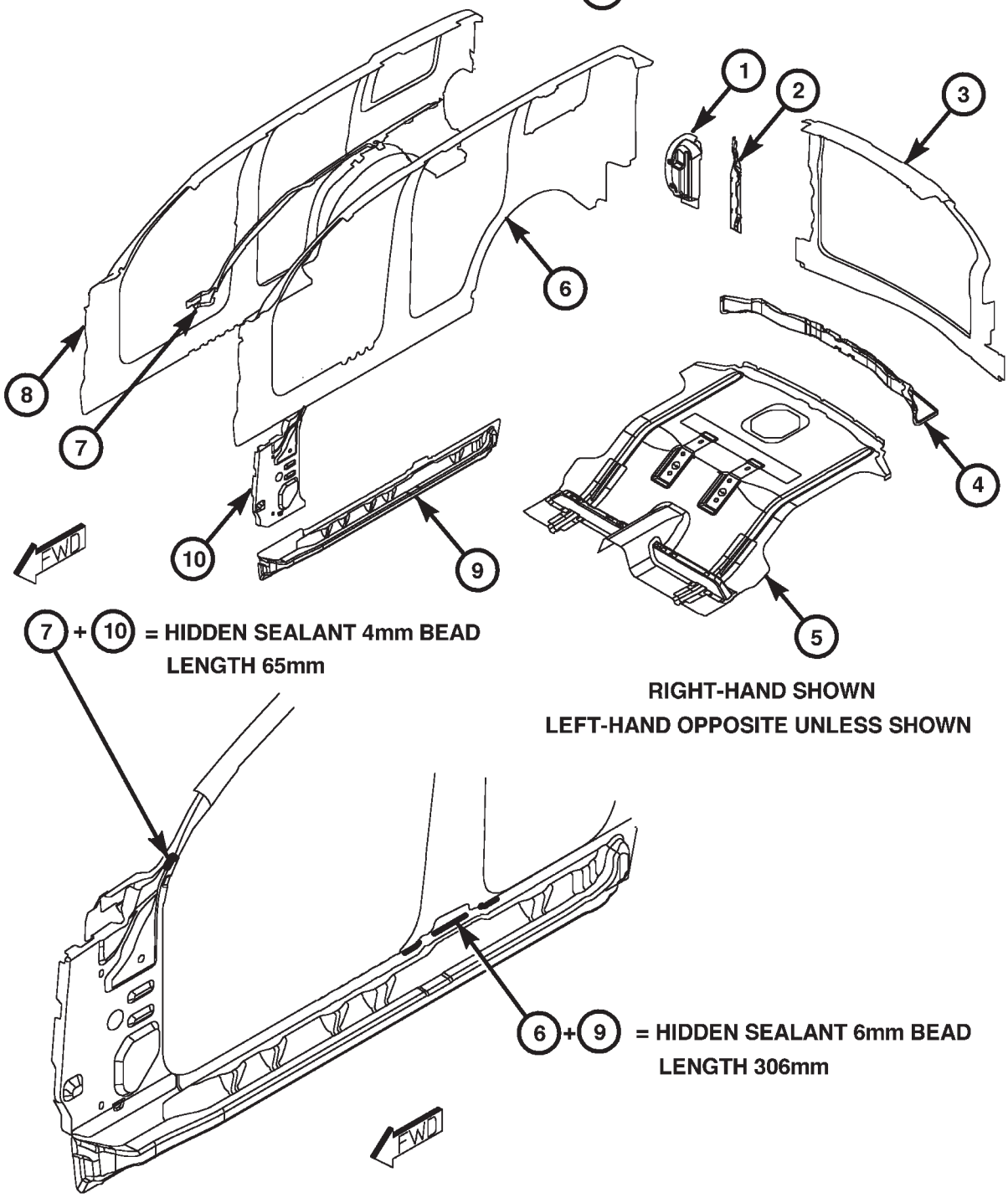


Fig. 92 BODY SIDE PANEL ASSEMBLY

DOOR

REMOVAL

(1) Disconnect the door wire harness electrical connector at the A-pillar.

(2) Support the door with a suitable lifting device.

(3) Remove the bolts attaching the check strap to the a-pillar.

NOTE: The epoxy washers should not be removed from the hinge. If the washers are removed the door may have to be re-adjusted.

(4) Remove the nuts attaching the door hinges to the door. (Fig. 2)

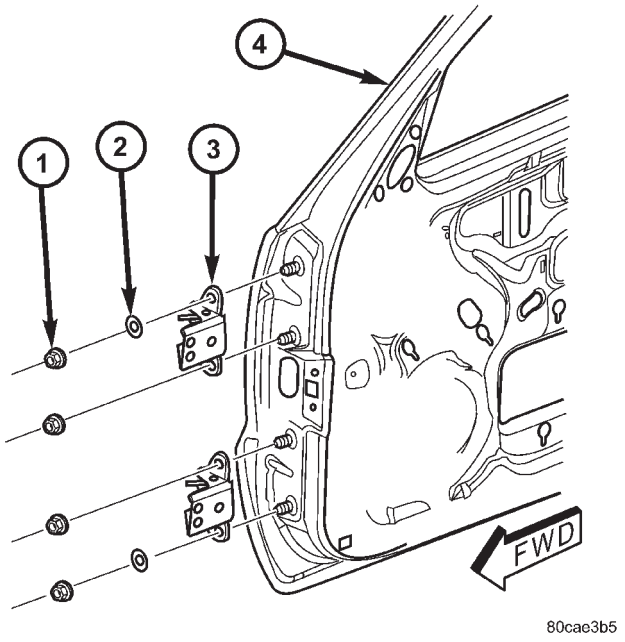


Fig. 2 HINGES

1 - NUTS (4)
2 - EPOXY WASHERS (2) (NOT REMOVABLE)
3 - HINGES
4 - DOOR

INSTALLATION

(1) Support the door with a suitable lifting device and install the door onto the hinges.

(2) Install the nuts and washers if they were removed previously and tighten to 23 N·m (17 ft. lbs.).

(3) Connect the door wire harness electrical connector.

(4) Connect the check strap to the a-pillar and install the bolts.

(5) Tighten the check strap bolts to 12 N·m (9 ft. lbs.).

(6) Adjust the door as necessary. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS)

DOOR GLASS

REMOVAL

(1) Remove the outer belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR OUTER BELT MOLDING - REMOVAL)

(2) Remove the waterdam. (Refer to 23 - BODY/DOOR - FRONT/WATERDAM - REMOVAL)

(3) Raise the glass to the position shown and using a long flat blade or hook type tool, disengage clips attaching glass retainer to regulator lift plate. (Fig. 3)

(4) Disconnect the glass from the regulator lift plate and re-install the clips.

(5) Rotate the top of the glass toward the front and remove the glass from the window opening.

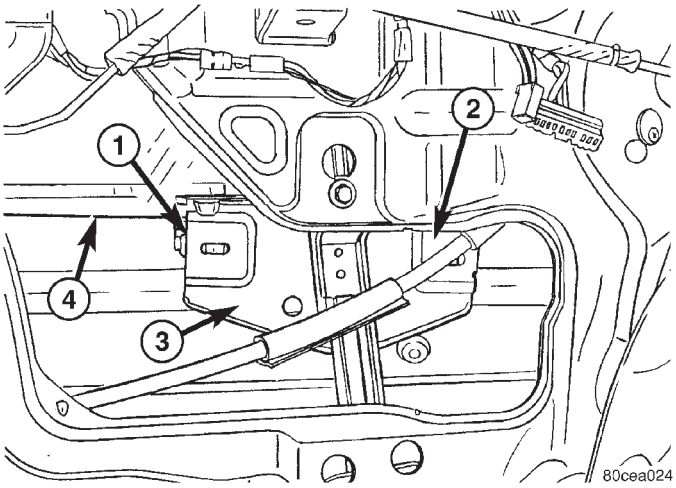


Fig. 3 DOOR GLASS/REGULATOR

1 - DOOR GLASS ATTACHMENT CLIP (2)
2 - DOOR OPENING
3 - REGULATOR LIFT PLATE
4 - DOOR GLASS

INSTALLATION

(1) Install the glass through the window opening and align the mounting plate to the lift plate.

(2) Engage the glass to the regulator lift plate.

(3) Install the outer belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR OUTER BELT MOLDING - INSTALLATION)

(4) Install the waterdam. (Refer to 23 - BODY/DOOR - FRONT/WATERDAM - INSTALLATION)

FUEL FILL DOOR/HOUSING (Continued)

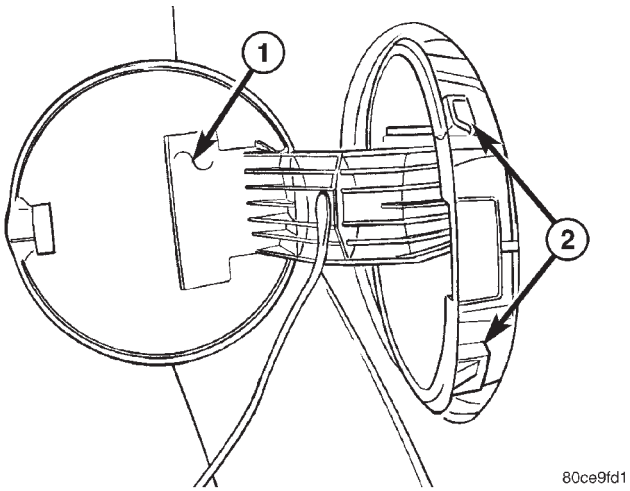


Fig. 3 FUEL FILL DOOR/HOUSING

1 - FUEL FILL DOOR
2 - HOUSING TABS

(2) Install the three screws.
(3) Install the fuel cap.

GRILLE

REMOVAL

(1) Remove the upper screws. (Fig. 4)
(2) Roll the grille forward and disengage the two grille hooks under the headlamp units.
(3) Lift the grille forward and up off of the location tabs at the bottom and remove.

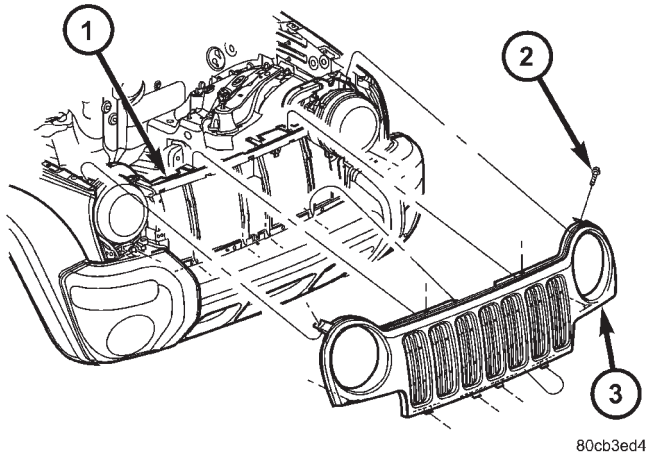


Fig. 4 GRILLE

1 - GRILLE OPENING REINFORCEMENT
2 - SCREWS (4)
3 - GRILLE CLIPS

INSTALLATION

(1) Install the grille onto the locating tabs at the bottom.
(2) Push the grille back and snap into the hooks in the grille opening reinforcement.
(3) Check that the black welts at the outboard ends of the grille have a uniform appearance relative to the fender and install the screws.

GRILLE OPENING REINFORCEMENT

REMOVAL

(1) Remove the grille. (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL)
(2) Remove the front fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)
(3) Disconnect the electrical connectors. (Fig. 5)
(4) Disconnect the rubber side flap push pin connectors.
(5) Remove the seven bolts and remove the grille opening reinforcement.
(6) Disconnect the headlamp units electrical connectors.
(7) Remove the headlamp units. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL)

INSTALLATION

(1) Install the headlamp units. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION)
(2) Connect the headlamp unit electrical connectors.
(3) Install the grille opening reinforcement and install the seven bolts.
(4) Connect the rubber side flap and install the push pin connectors.
(5) Connect the electrical connectors. (Fig. 5)
(6) Install the front fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION)
(7) Install the grille. (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION)

PAINT

TABLE OF CONTENTS

PAINT

SPECIFICATIONS - PAINT CODES

EXTERIOR COLORS

EXTERIOR COLOR	DAIMLERCHRYSLER CODE
Black Clear Coat	DX8
Bright Cactus Green Pearl Coat	AFM
Bright Silver Metallic Clear Coat	WS2
Dark Garnet Red Pearl Coat	XRV
Flame Red Clear Coat	PR4
Patriot Blue Pearl Coat	WB7
Salsa Red Pearl Coat	WE5
Shale Green Metallic Clear Coat	XGR
Steel Blue Pearl Coat	XBQ
Stone White Clear Coat	SW1
Woodland Brown Satin Glow	YU2

INTERIOR COLORS

INTERIOR COLOR	DAIMLERCHRYSLER CODE
Taupe	L5
Dark Slate Gray	DV
Dark Slate Gray/Light Taupe	D2
Taupe/Light Taupe	L2

ACCESSORY COLORS

PART	COLOR	DAIMLERCHRYSLER CODE
Renegade Roof Rack/Light Bar	Deep Gray	ZSP
Sport Fascia/Wheel Flare	Dark Neutral Gray	HS5

PAINT CODE

DESCRIPTION

The paint code is identified on the Vehicle Safety Certification Label which is located on the drivers door shut face. The color names provided in the Paint and Trim Code Description chart are the color names used on most repair product containers.

BASE COAT/CLEAR COAT FINISH

DESCRIPTION

The original equipment finish is a multi step process that involves cleaning, applying electro de-position (E-coat), anti-chip primer, base coat, and clear coat steps.

On most vehicles a two-part paint application (base coat/clear coat) is used. Color paint that is applied to primer is called base coat. The clear coat protects the base coat from ultraviolet light and provides a durable high-gloss finish.

MODULE ASSEMBLY (Continued)

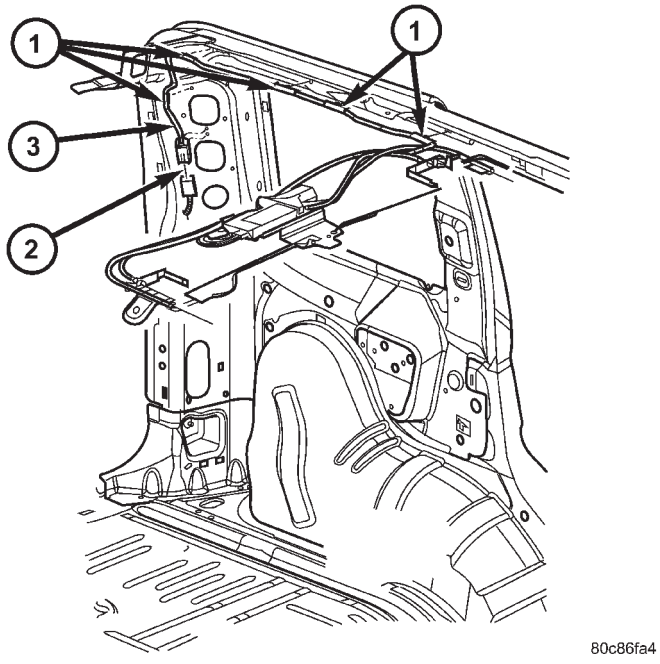


Fig. 9 WIRE HARNESS

1 - CLIPS
2 - ELECTRICAL CONNECTOR
3 - WIRE HARNESS

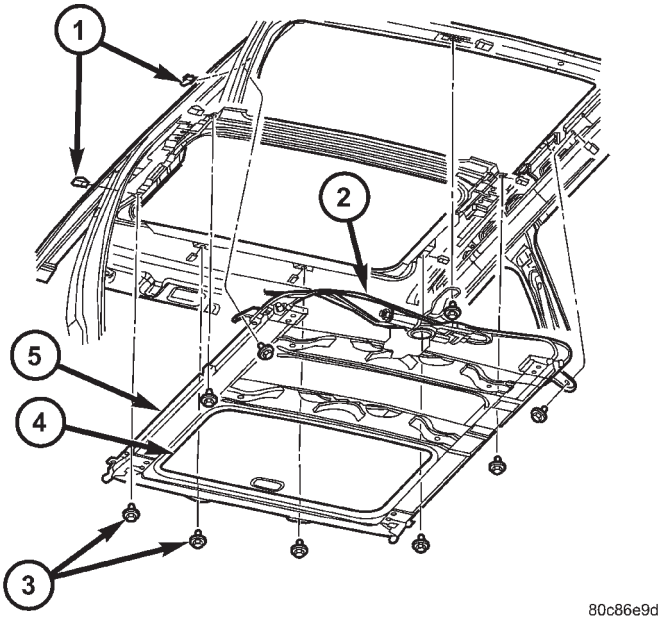


Fig. 10 MODULE ASSEMBLY

1 - U-NUTS
2 - DRIVE MOTOR
3 - BOLTS
4 - GLASS OPENING
5 - MODULE ASSEMBLY

(5) Connect wire harness.
(6) Install the headliner. (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION)
(7) Install the opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION)
(8) Connect battery negative cable.
(9) Test sunroof operation, adjust as necessary. (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS)

DRIVE MOTOR

REMOVAL

(1) Remove headliner. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL)
(2) Cut wire retaining tape being careful not to cut wires.
(3) Disconnect the electrical connector (Fig. 11).
(4) Remove three motor assembly attaching screws from bottom side of motor assembly and remove motor assembly from the motor bracket.

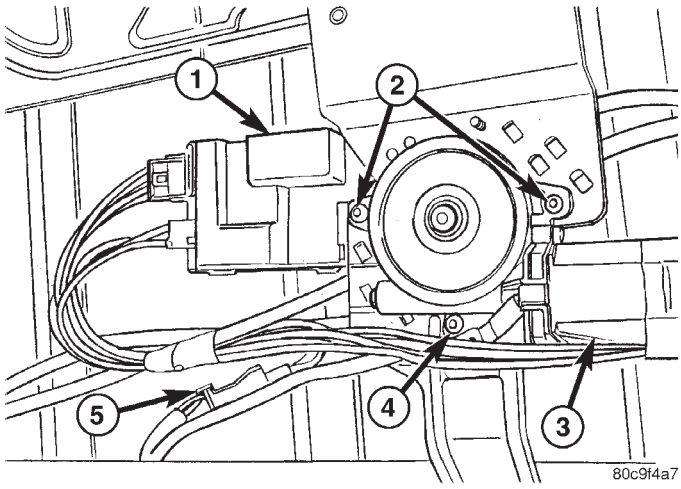


Fig. 11 DRIVE MOTOR ASSEMBLY

1 - CONTROL MODULE
2 - SCREWS
3 - DRIVE MOTOR
4 - SCREW
5 - ELECTRICAL CONNECTOR

INSTALLATION

(1) Place motor into position and install screws attaching motor to bracket.

NOTE: Hold electronics module to motor bracket when inserting motor shaft to avoid disengaging drive cables.

(2) Connect electrical connector.
(3) Tape wires to drive cables to prevent rattles.

A/C COMPRESSOR CLUTCH (Continued)

(11) Install the puller through-bolts (Special Tool C-6461 or equivalent) through the puller flange and into the jaws of the rotor puller and tighten (Fig. 5). Turn the puller center bolt clockwise until the rotor is free.

CAUTION: DO NOT APPLY FORCE TO THE END OF THE COMPRESSOR SHAFT.

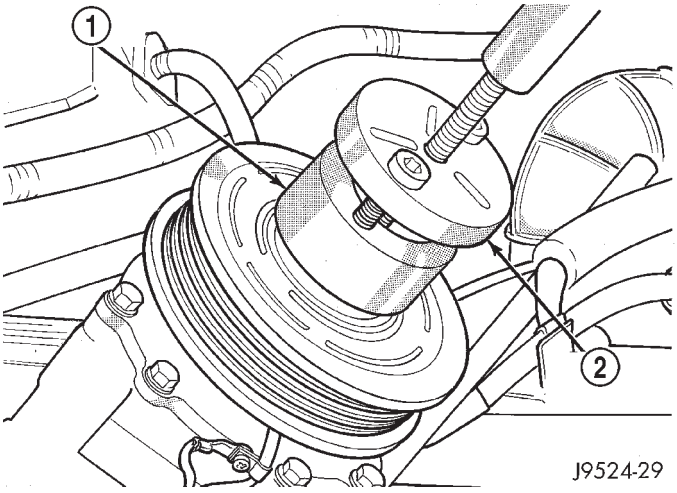


Fig. 5 INSTALL PULLER PLATE

1 - PULLER JAW
2 - PULLER

(12) Remove the screw and retainer from the clutch coil lead wire harness on the compressor front housing (Fig. 6).

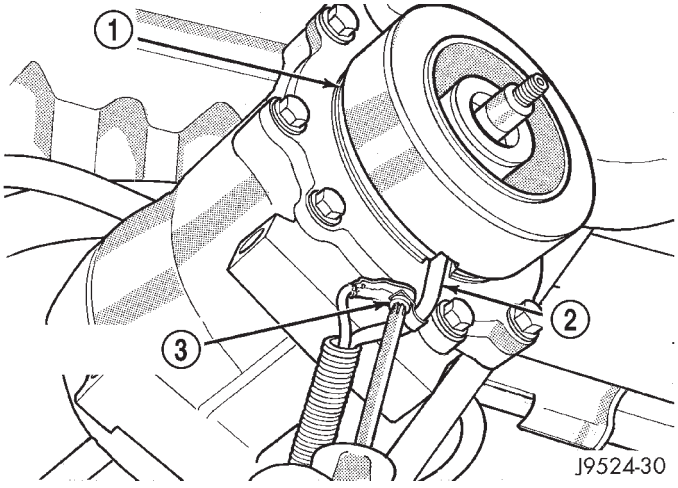


Fig. 6 CLUTCH COIL LEAD WIRE HARNESS

1 - COIL
2 - COIL WIRE
3 - RETAINER SCREW

(13) Remove the snap ring from the compressor hub and remove the clutch field coil (Fig. 7). Slide the clutch field coil off of the compressor hub.

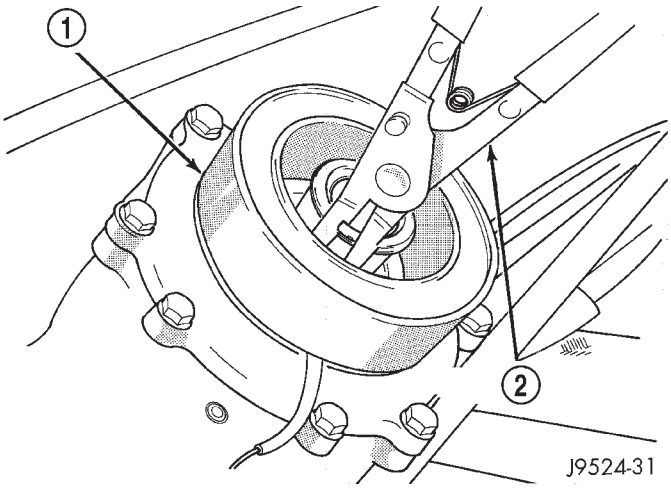


Fig. 7 CLUTCH FIELD COIL SNAP RING REMOVE

1 - COIL
2 - SNAP RING PLIERS

INSPECTION

Examine the friction surfaces of the clutch rotor and the clutch plate for wear. The rotor and clutch plate should be replaced if there is excessive wear or scoring.

If the friction surfaces are oily, inspect the shaft and nose area of the compressor for oil. Remove the felt from the front cover. If the felt is saturated with oil, the shaft seal is leaking and the compressor must be replaced.

Check the rotor bearing for roughness or excessive leakage of grease. Replace the rotor and clutch plate, if required.

INSTALLATION

(1) Install the clutch field coil and snap ring.

(2) Install the screw and retainer on the clutch coil lead wire harness on the compressor front housing. Tighten screw to 2.2 N·m (20 in. lbs.).

(3) Align the rotor assembly squarely on the front compressor housing hub.

(4) Install the rotor bearing assembly with the installer (Special Tool C-6871 or equivalent) (Fig. 8). Thread the installer on the shaft, then turn the nut until the rotor assembly is seated.

(5) Install the external front housing snap ring with snap ring pliers. The bevel side of the snap ring must be facing outward. Press the snap ring to make sure it is properly seated in the groove.

HVAC HOUSING (Continued)

(7) Disconnect the heater hoses from the heater core tubes. Install plugs in, or tape over the opened heater core tubes.

(8) Unplug the HVAC system vacuum supply line connector from the engine side harness.

(9) Remove the nuts from the HVAC housing mounting studs.

(10) Remove the HVAC housing from inside the vehicle taking care not to allow any remaining coolant to drain on the vehicles interior.

DISASSEMBLY

(1) Remove the HVAC housing from the vehicle and place it on the workbench. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL)

(2) Unplug the vacuum harness connectors from the mode and recirculation door actuators and the recirculation door actuator.

(3) Disengage the vacuum harness from any routing clips located on the lower half of the HVAC housing.

(4) Remove the blower motor and blower wheel unit from the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/ BLOWER MOTOR - REMOVAL)

(5) Pop out the grommet onl the vacuum supply line and slide hole in housing.

(6) Carefully remove the foam seals from the heater core and evaporator coil tube mounting flange of the HVAC housing. If the either seal is deformed or damaged it must be replaced.

(7) Use a screwdriver to pry off the four snap clips that help secure the upper and lower HVAC housing halves together.

(8) Remove the screws that secure the upper and lower HVAC housing halves together.

(9) Carefully separate the upper HVAC housing from the lower half.

ASSEMBLY

(1) Assemble the upper HVAC housing half to the lower half. During assembly, be certain of the following.

(a) That each of the mode door pivot shaft ends and the two temperature blend door shafts are properly engaged in there pivot holes.

(b) That the blower motor venturi ring is properly indexed and installed.

(c) If the unit is equipped with air conditioning, that the evaporator coil tube rubber seal is properly positioned in the grooves in both the upper and lower HVAC housing halves.

(2) Install the screws and four snap clips that secure the upper and lower HVAC housing halves to each other. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Install the blower motor and wheel unit in the HVAC housing. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/BLOWER MOTOR - INSTALLATION)

(4) Install the foam seals on the flanges around the heater core and evaporator coil tube mounting flange of the HVAC housing.

(5) Insert the vacuum supply line and connector through the foam seal on the heater core and evaporator coil tube mounting flange of the HVAC housing. Check that the vacuum grommet is securely seated into the housing hole flange.

(6) Engage the vacuum harness to the routing clips and plug in the vacuum harness connector at the floor door actuator and, if the unit is so equipped, at the recirculation air door actuator.

INSTALLATION

WARNING: IF THE VEHICLE IS EQUIPPED WITH AIR CONDITIONING, REVIEW THE WARNINGS AND CAUTIONS IN PLUMBING BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - CAUTION) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION - REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS)

(1) Position the HVAC housing to the dash panel. Be certain that the evaporator condensate drain tube and the housing mounting studs are inserted into their correct mounting holes.

(2) Install and tighten the nuts onto the HVAC housing mounting studs. Tighten the nuts to 6.2 N·m (55 in.lbs.).

(3) Connect the HVAC system vacuum supply line connector.

(4) Unplug or remove the tape from the heater core tubes. Connect the heater hoses to the heater core tubes and fill the engine cooling system(Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(5) If the vehicle is not equipped with air conditioning, go to Step 10.

(6) Unplug or remove the tape from the liquid line and the evaporator inlet tube fittings. Connect the liquid line coupler to the evaporator inlet tube. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - A/C LINE COUPLERS)

(7) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING -

REFRIGERANT OIL (Continued)

oils are not compatible with PAG oils, and should never be introduced to an R-134a refrigerant system.

There are different PAG oils available, and each contains a different additive package. The PXF–18 compressor used in this vehicle is designed to use an SP–10 PAG refrigerant oil. Use only refrigerant oil of this same type to service the refrigerant system.

OPERATION

After performing any refrigerant recovery or recycling operation, always replenish the refrigerant system with the same amount of the recommended refrigerant oil as was removed. Too little refrigerant oil can cause compressor damage, and too much can reduce air conditioning system performance.

PAG refrigerant oil is much more hygroscopic than mineral oil, and will absorb any moisture it comes into contact with, even moisture in the air. The PAG oil container should always be kept tightly capped until it is ready to be used. After use, recap the oil container immediately to prevent moisture contamination.

STANDARD PROCEDURE - REFRIGERANT OIL LEVEL

When an air conditioning system is assembled at the factory, all components except the compressor are refrigerant oil free. After the refrigerant system has been charged and operated, the refrigerant oil in the compressor is dispersed throughout the refrigerant system. The accumulator, evaporator, condenser, and compressor will each retain a significant amount of the needed refrigerant oil.

It is important to have the correct amount of oil in the refrigerant system. This ensures proper lubrication of the compressor. Too little oil will result in damage to the compressor. Too much oil will reduce the cooling capacity of the air conditioning system.

It will not be necessary to check the oil level in the compressor or to add oil, unless there has been an oil loss. An oil loss may occur due to a rupture or leak from a refrigerant line, a connector fitting, a component, or a component seal. If a leak occurs, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system after the repair has been made. Refrigerant oil loss will be evident at the leak point by the presence of a wet, shiny surface around the leak.

Refrigerant oil must be added when a accumulator, evaporator coil, or condenser are replaced. See the Refrigerant Oil Capacities chart. When a compressor is replaced, the refrigerant oil must be drained from the old compressor and measured. Drain all of the refrigerant oil from the new compressor, then fill the new compressor with the same amount of refrigerant oil that was drained out of the old compressor.

Refrigerant Oil Capacities		
Component	ml	fl oz
A/C System	240	8
Accumulator	90	3
Condenser	22	.75
Evaporator	45	1.5
Compressor	drain and measure the oil from the old compressor as noted	

an associated limp in will take two trips to illuminate the MIL.

Refer to the Diagnostic Trouble Codes Description Charts in this section and the appropriate Powertrain Diagnostic Procedure Manual for diagnostic procedures.

DESCRIPTION - NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems and conditions that could have malfunctions causing driveability problems. The PCM might not store diagnostic trouble codes for these conditions. However, problems with these systems may cause the PCM to store diagnostic trouble codes for other systems or components. For example, a fuel pressure problem will not register a fault directly, but could cause a rich/lean condition or misfire. This could cause the PCM to store an oxygen sensor or misfire diagnostic trouble code

FUEL PRESSURE

The fuel pressure regulator controls fuel system pressure. 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 the PCM to store an oxygen sensor or fuel system diagnostic trouble code.

SECONDARY IGNITION CIRCUIT

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

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, although it may set a fuel system fault.

FUEL INJECTOR MECHANICAL MALFUNCTIONS

The PCM cannot determine if a fuel injector is clogged, the needle is sticking or if the wrong injector is installed. However, these could result in a rich or lean condition causing the PCM to store a diagnostic trouble code for either misfire, an oxygen sensor, or the fuel system.

EXCESSIVE OIL CONSUMPTION

Although the PCM monitors engine exhaust oxygen content when the system is in closed loop, it cannot determine excessive oil consumption.

THROTTLE BODY AIRFLOW

The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.

VACUUM ASSIST

The PCM cannot detect leaks or restrictions in the vacuum circuits of vacuum assisted engine control system devices. However, these could cause the PCM to store a MAP sensor diagnostic trouble code and cause a high idle condition.

PCM SYSTEM GROUND

The PCM cannot determine a poor system ground. However, one or more diagnostic trouble codes may be generated as a result of this condition. The module should be mounted to the body at all times, also during diagnostic.

PCM CONNECTOR ENGAGEMENT

The PCM may not be able to determine spread or damaged connector pins. However, it might store diagnostic trouble codes as a result of spread connector pins.

DESCRIPTION - HIGH AND LOW LIMITS

The PCM compares input signal voltages from each input device with established high and low limits for the device. If the input voltage is not within limits and other criteria are met, the PCM stores a diagnostic trouble code in memory. Other diagnostic trouble code criteria might include engine RPM limits or input voltages from other sensors or switches that must be present before verifying a diagnostic trouble code condition.

DESCRIPTION - LOAD VALUE

ENGINE	IDLE/NEUTRAL	2500 RPM/NEUTRAL
All Engines	2% to 8% of Maximum Load	9% to 17% of Maximum Load