CLUTCH

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GENERAL INFORMATION

CLUTCH COMPONENTS

The modular clutch assembly used in this vehicle consists of a single, dry-type clutch disc and a diaphragm style clutch cover.

The clutch disc has cushion springs riveted to the disc hub assembly. The clutch disc facings are riveted to the cushion springs. The facings are made from a non-asbestos material.

The clutch cover pressure plate assembly is a diaphragm type unit with a one-piece diaphragm spring with multiple release fingers. The pressure plate release fingers are preset during manufacture and are not adjustable.

A sleeve-type release bearing is used to engage and disengage the clutch cover pressure plate. The bearing is prelubed during manufacture and is a sealed unit.

The release bearing is operated by a pivoting release fork in the clutch housing. The fork pivots on a ball stud within the housing. The release fork is actuated by a hydraulic clutch system.

The hydraulic clutch automatically adjusts for any slack in the mechanism. This compensates for clutch disc wear. The system requires no maintenance or lubrication.

The clutch pedal is connected to the clutch master cylinder through a plastic bushing. The upper end of the clutch pedal pivots in the pedal bracket on two nylon bushings and a shaft (Fig. 1). These bushings are greased at assembly and do not require periodic lubrication.

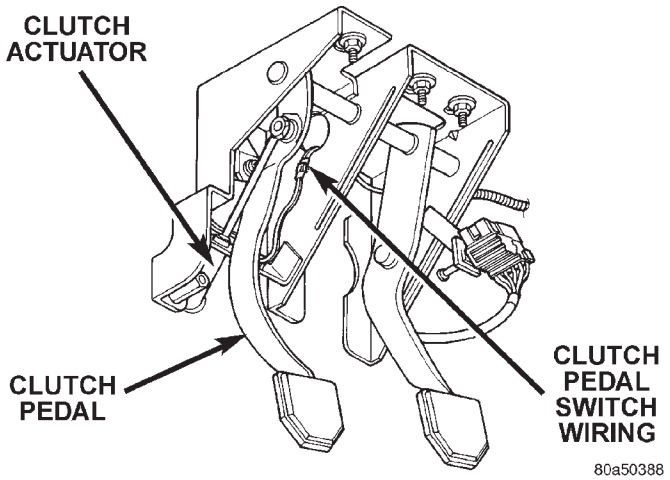

Fig. 1 Clutch Pedal Components

CLUTCH DISC AND COVER APPLICATION

The 2.0L single overhead cam engine uses a 216 mm (8.5 in.) clutch disc. The manual transaxle is available only with the 2.0 liter engine.

CLUTCH REPLACEMENT

The transaxle must be removed to service the modular clutch assembly, drive plate, and/or clutch release bearing and lever.

DESCRIPTION AND OPERATION

HYDRAULIC CLUTCH SYSTEM

The hydraulic clutch linkage consists of a clutch master cylinder, remote hydraulic fluid reservoir, lower clutch slave cylinder, damper, and hydraulic lines. The clutch master cylinder is connected to the clutch pedal. The slave cylinder push rod is connected to the clutch release fork. The clutch master cylinder is mounted on the driver's side of the dash panel adjacent to the brake master cylinder and booster assembly.

NOTE: The clutch hydraulic system is serviced as two separate systems (master cylinder assembly w/lines and lower slave cylinder assembly w/lines. If a malfunction occurs within a system, replacement of that system is required. It is not recommended or necessary to bleed the clutch hydraulic system. the service parts are prefilled.

CLUTCH PEDAL POSITION SWITCH

The clutch pedal position switch functions as an interlock device. It prevents possible engine cranking with the clutch engaged.

The clutch pedal position switch is wired in series between the starter relay coil and the ignition switch.

The clutch pedal position switch is mounted to a bracket located behind the clutch pedal. The switch is held in place by four plastic wing tabs.

The clutch pedal position switch IS NOT adjustable. The pedal blade contacts the switch in the down position (Fig. 2).

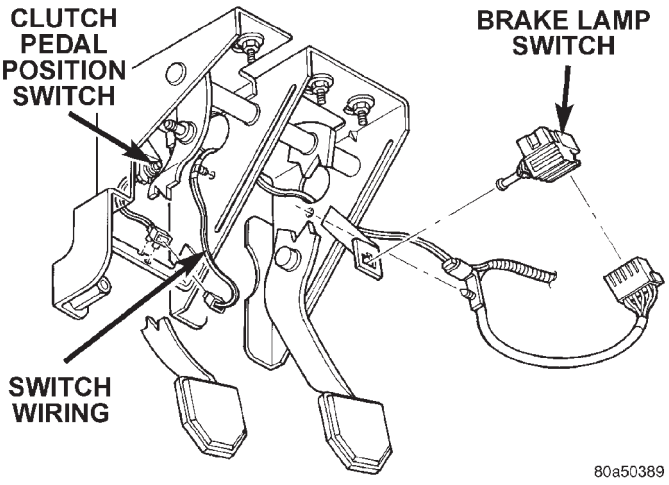

Fig. 2 Clutch Pedal Position Switch and Components

DIAGNOSIS AND TESTING

CLUTCH PEDAL POSITION SWITCH

CLUTCH PEDAL POSITION SWITCH–ELECTRICAL TEST

Disconnect clutch pedal position switch harness from instrument panel wiring harness. Using an ohmmeter, check for continuity between the two terminals in the connector on the switch harness. There should be no continuity between the terminals when the switch is in its normal (fully extended) position. When the switch is depressed more than 1.25 mm (0.050), the ohmmeter should show continuity (zero ohms).

If ohmmeter readings do not fall within these ranges, the switch is defective, and must be replaced.

CLUTCH PEDAL POSITION SWITCH–MECHANICAL TEST

With the park brake set and the vehicle **IN NEUTRAL,** turn the key to the start position. The vehicle should not crank. If the vehicle cranks, the switch is defective (shorted out) and must be replaced. If the vehicle does not crank, proceed to the next step.

WARNING: BEFORE PERFORMING THIS STEP, BE SURE THAT THE AREA IN FRONT OF THE VEHICLE IS CLEAR OF OBSTRUCTIONS AND PEOPLE. VEHICLE MAY MOVE WHEN PERFORMING THIS TEST.

With the park brake set and the vehicle **IN GEAR,** turn the key to the start position and hold it there.

Slowly depress the clutch pedal and feel for any vehicle motion when the starter is energized. If there is no motion, the switch is working properly.

If motion is felt, check to see if the switch is making contact when the pedal is between 25 mm (1.0 in.) and 6 mm (0.25 in.) from the floor. If this condition is met, then the problem is the clutch (See "Clutch Will Not Disengage Properly"). If this condition is not met, then the switch mounting tab on the bracket is bent. Bend switch mounting bracket to achieve switch contact of 1.25mm minimum, or replace clutch pedal module assembly.

If vehicle will not crank, even with clutch pedal pressed to the floor, refer to "Service Diagnosis-Clutch Pedal Position Switch" chart in this section.

DIAGNOSIS AND TESTING (Continued)

SERVICE DIAGNOSIS–CLUTCH PEDAL POSITION SWITCH

CONDITION	POSSIBLE CAUSES	CORRECTION
ENGINE WON'T CRANK WHEN CLUTCH PEDAL IS PRESSED TO THE FLOOR	Switch does not have continuity when plunger is depressed 1.25 mm	Defective switch. Replace switch.
	Switch plunger is not depressed when clutch pedal is pushed to the floor	Floor mat interferes with clutch pedal movement. Move floor mat out of the way.
	Problem is related to other components in the starting circuit	Check other components in the starting circuit. Refer to Section 8A, Battery/Starting/Charging System.
	Switch mounting bracket out of position	Bend to achieve switch contact of 1.25 mm minimum or replace clutch pedal module assembly

CLUTCH DIAGNOSIS

Problem diagnosis will generally require a road test to determine the type of fault. Component inspection will then determine the problem after road testing.

Drive the vehicle at normal speeds during road test. Shift the transaxle through all gear ranges and observe clutch action. If chatter, grab, slip, or improper release is experienced, remove and inspect the clutch components. If the problem is noise or hard shifting, further diagnosis may be needed. The transaxle or other driveline components may actually be at fault.

SERVICE DIAGNOSIS—CLUTCH GRAB/CHATTER

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC FACING COVERED WITH OIL OR GREASE	Oil leak at engine rear main or transaxle input shaft seal	Correct leak and replace w/modular clutch assembly
	Too much grease applied to splines of disc and input shaft	Apply lighter coating of grease to splines
NO FAULT FOUND WITH CLUTCH COMPONENTS	Problem actually related to suspension or driveline component	Further diagnosis required. Check engine/transmission mounts, suspension attaching parts and other driveline components as needed.
	Engine related problems	Check EFI and ignition systems
PARTIAL ENGAGEMENT OF CLUTCH DISC	Clutch cover, spring, or release fingers bent, distorted (rough handling, improper assembly)	Replace w/modular clutch assembly
	Clutch disc damaged or distorted	Replace w/modular clutch assembly
	Clutch misalignment	Check alignment and runout of flywheel, disc, or cover. Check clutch housing to engine dowels and dowel holes for damage. Correct as necessary.

DIAGNOSIS AND TESTING (Continued)

SERVICE DIAGNOSIS—CLUTCH SLIPS

CONDITION	POSSIBLE CAUSES	CORRECTION
DISC FACING WORN OUT	Normal wear.	Replace w/modular clutch assembly.
	Driver frequently rides (slips) clutch, results in rapid wear and overheating.	Replace w/modular clutch assembly
	Insufficient clutch cover diaphragm spring tension	Replace w/modular clutch assembly
CLUTCH DISC FACING CONTAMINATED WITH OIL OR GREASE	Leak at rear main oil seal or transaxle input shaft seal	Replace leaking seals. Replace w/modular clutch assembly.
	Excessive amount of grease applied to input shaft splines	Apply less grease to input shaft. Replace w/modular clutch assembly
	Road splash, water entering housing	Seal housing. Inspect clutch assembly.
CLUTCH IS RUNNING PARTIALLY DISENGAGED	Release bearing sticking or binding, does not return to normal running position.	Verify that bearing is actually binding. Then, replace bearing and transmission front bearing retainer if sleeve surface is damaged.
	Hydraulic clutch mechanism sticking or binding causing high preload	Verify that clutch slave cylinder and fork are free to move
CLUTCH DISC FACINGS HAVE FRACTURED INTO SMALL PIECES	Driver performs a 5-1 downshift at vehicle speed in excess of 60 miles per hour	Alert driver to problem cause. Replace w/modular clutch assembly.
	Leak at rear main or transaxle input shaft seal	Replace w/modular clutch assembly. Replace seal.
	Excessive heat from slippage	Replace w/modular clutch assembly

DIAGNOSIS AND TESTING (Continued)

SERVICE DIAGNOSIS—IMPROPER CLUTCH RELEASE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC BINDS ON INPUT SHAFT SPLINES	Clutch disc hub splines damaged during installation	Clean, smooth, and lubricate disc and shaft splines. Replace w/modular clutch assembly and/or input shaft if splines are severely damaged.
	Input shaft splines rough, damaged.	Clean input shaft splines. Then lube.
	Corrosion or rust formations on splines of input shaft and disc	Clean input shaft splines and disc splines, then lube
CLUTCH DISC RUSTED TO FLYWHEEL AND/OR PRESSURE PLATE	Occurs in vehicles stored or not driven for extended period of time. Also occurs after steam cleaning if vehicle is not used for extended period.	Replace w/modular clutch assembly
CLUTCH WILL NOT DISENGAGE PROPERLY	Disc bent, distorted during transaxle installation	Replace w/modular clutch assembly
	Clutch cover diaphragm spring damaged during transaxle installation	Replace w/modular clutch assembly
	Release fork bent, loose, or damaged	Replace fork if worn or damaged
	Clutch pedal binding or does not return	Lubricate pedal bushings. Check system for leaks and replace as needed
	Hydraulic clutch system has air in the lines.	Stroke pedal rapidly 20 to 30 times to force air bubbles into reservoir. Check for leaks. Replace appropriate upper or lower hydraulic system.

SERVICE DIAGNOSIS–CLUTCH PEDAL NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH PEDAL SQUEAKS WHEN DEPRESSED TO FLOOR	Pedal bushings worn out or inadequate lubrication	Replace or lubricate bushings

SERVICE DIAGNOSIS–CLUTCH PEDAL NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH PEDAL SQUEAKS WHEN DEPRESSED TO FLOOR	Pedal bushings worn out or inadequate lubrication	Replace or lubricate bushings

DIAGNOSIS AND TESTING (Continued)

DRIVE PLATE MISALIGNMENT

Common causes of misalignment are:

- Heat warping
- Mounting drive plate on a dirty crankshaft flange
- Incorrect bolt tightening
- Improper seating on the crankshaft shoulder
- Loose crankshaft bolts

Clean the crankshaft flange before mounting the drive plate. Dirt and grease on the flange surface may misalign the drive plate, causing excessive runout. Use new bolts when mounting drive plate to crankshaft. Tighten drive plate bolts to specified torque only. Over-tightening can distort the drive plate hub causing excessive runout.

CLUTCH COVER AND DISC RUNOUT

Check condition of the clutch cover before installation. A warped cover or diaphragm spring will cause grab and/or incomplete release or engagement. Use care when handling the clutch assembly. Impact can distort the cover, diaphragm spring, and release fingers.

CLUTCH CHATTER COMPLAINTS

For all clutch chatter complaints, do the following:

(1) Check for loose, misaligned, or broken engine and transmission mounts. If present, they should be corrected at this time. Test vehicle for chatter. If chatter is gone, there is no need to go any further. If chatter persists:

(2) Check for loose connections in drive train. Correct any problems and determine if clutch chatter complaints have been satisfied. If not:

(3) Remove transaxle. See Group 21, Manual Transaxle for procedure.

(4) Check to see if the release bearing is sticky or binding. Replace bearing, if needed.

(5) Check linkage for excessive wear on the pivot stud and fork fingers. Replace all worn parts.

(6) Check clutch assembly for contamination (dirt, oil). Replace clutch assembly, if required.

(7) Check to see if the clutch disc hub splines are damaged. Replace with new clutch assembly, if necessary.

(8) Check input shaft splines for damage. Replace, if necessary.

(9) Check for uneven wear on clutch fingers.

(10) Check for broken clutch cover diaphragm spring fingers. Replace with new clutch assembly, if necessary.

CLASH–INTO–REVERSE COMPLAINTS

All Right Hand Drive NV T350 (A-578) manual transaxles are equipped with a reverse brake. It prevents clash when shifting into reverse, but only if the vehicle is not moving. See Group 21, Transaxle for further diagnosis.

(1) Depress clutch pedal to floor and hold. After three seconds, shift to reverse. If clash is present, clutch has excessive spin time, and the reverse brake may not be functioning.

NOTE: Verify that nothing is obstructing pedal travel. Floormats or other articles located underneath the clutch pedal could prevent the clutch from disengaging fully. Also make sure that the hydraulic clutch release mechanism is functioning properly.

(2) Remove transaxle. See Group 21, Manual Transaxle for procedure.

(3) Check the input shaft spline, clutch disc splines, and release bearing for dry rust. If present, clean rust off and apply a light coat of bearing grease to the input shaft splines. Apply grease on the input shaft splines only where the clutch disc slides. Verify that the clutch disc slides freely along the input shaft spline.

(4) Check to see if the clutch disc hub splines are damaged, and replace with new clutch assembly if required.

(5) Check the input shaft for damaged splines. Replace as necessary.

(6) Check for broken clutch cover diaphragm spring fingers.

(7) Install clutch assembly and transaxle.

REMOVAL AND INSTALLATION

CLUTCH MASTER CYLINDER

The clutch master cylinder and remote reservoir are serviced as an assembly. The linkage components and cylinder cannot be overhauled or serviced separately.

REMOVAL

(1) Hoist vehicle.

(2) Disconnect quick-connector coupler at lower hydraulic damper using Special Tool 6638 (Fig. 3).

(3) Lower vehicle.

(4) Unsnap hydraulic line from left rail retainer clips (Fig. 4).

(5) From underneath dash panel, remove cotter pin from pedal bushing.

(6) Remove pedal pivot pin from master pushrod assembly and bushing.

NOTE: Verify that the reservoir cap is on securely. This is necessary to avoid undue spillage during removal.

(7) Slide remote reservoir up out of bracket.

REMOVAL AND INSTALLATION (Continued)

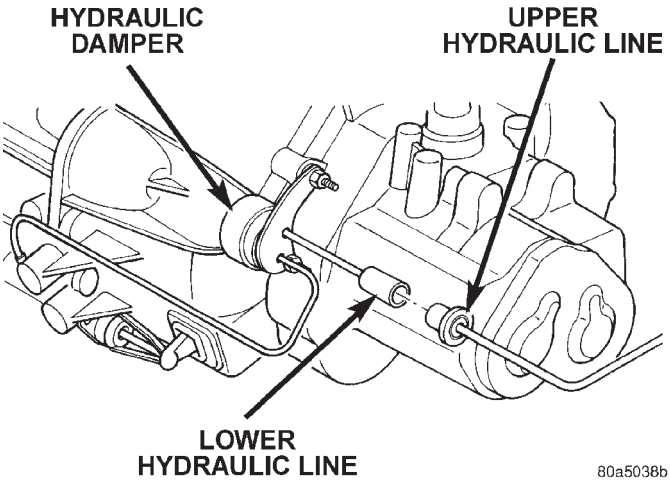

Fig. 3 Quick-Connect Coupler

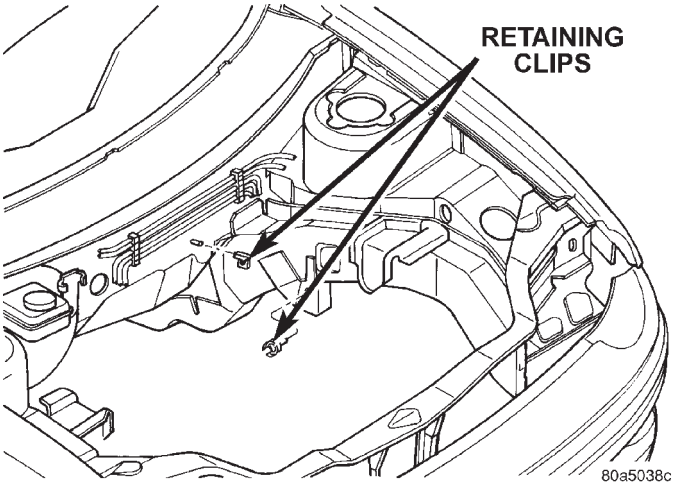

Fig. 4 Routing Clips

(8) Grasp clutch master cylinder and turn 1/4 turn counterclockwise (Fig. 5).

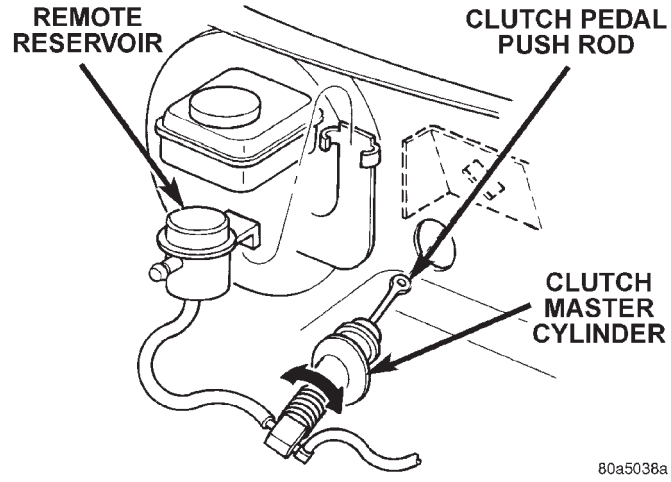

Fig. 5 Hydraulic Clutch Master Cylinder

(9) Remove cylinder from dash panel.

INSTALLATION

NOTE: Verify that the reservoir cap is on securely. This is necessary to avoid undue spillage during installation.

(1) Position clutch master cylinder to dash panel approximately 45° counterclockwise. (Fig. 6).

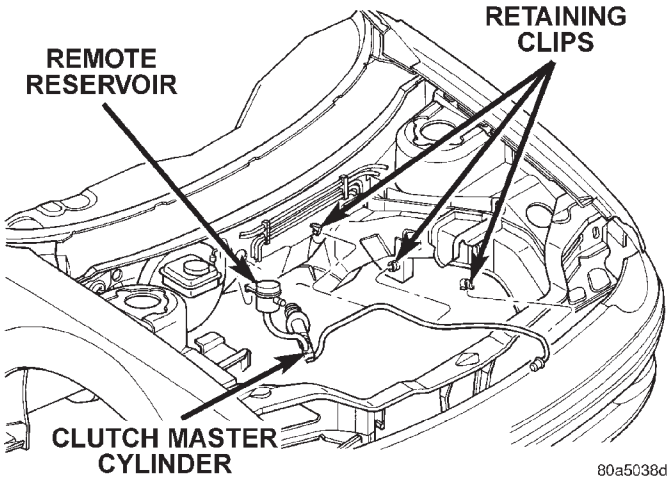

Fig. 6 Master Cylinder at Dash Panel

(2) Position master cylinder push rod so that retention fingers are facing towards the right side of the vehicle.

(3) Insert push rod through dash panel hole and slide push rod eye between the clutch pedal and locator bracket.

(4) Rotate cylinder 1/4 turn clockwise.

(5) Slide remote reservoir into bracket at dash panel until locked in.

(6) From underneath dash panel, ensure clutch master cylinder push rod is located between the pedal and locator bracket. Snap clutch pedal pin into pushrod and slide cotter pin into bushing.

(7) Route hydraulic lines to retaining clips at frame rail.

(8) Raise vehicle.

(9) Connect upper clutch hydraulic line from master cylinder (quick–connect) to lower clutch hydraulic line near damper.

(10) Check the operation of the hydraulic clutch release system.

(11) Actuate clutch pedal rapidly 20–30 times. Check for leaks

REMOVAL AND INSTALLATION (Continued)

HYDRAULIC SLAVE CYLINDER

REMOVAL

(1) Raise vehicle on hoist.

(2) Separate hydraulic line at quick-disconnect using Special Tool 6638. (Fig. 7).

(3) Remove nuts retaining hydraulic damper to transaxle (Fig. 8).

(4) Remove engine mount bracket.

(5) Disconnect ground wire from starter.

(6) Remove two bolts retaining hydraulic slave cylinder to transaxle (Fig. 8).

(7) Remove slave cylinder from transmission.

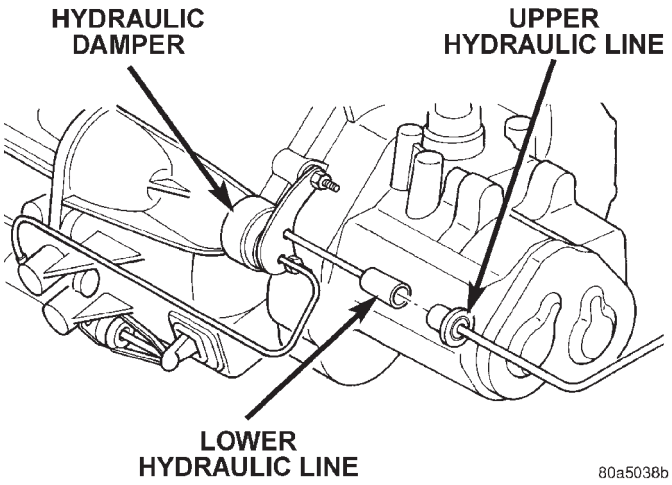

Fig. 7 Hydraulic Line

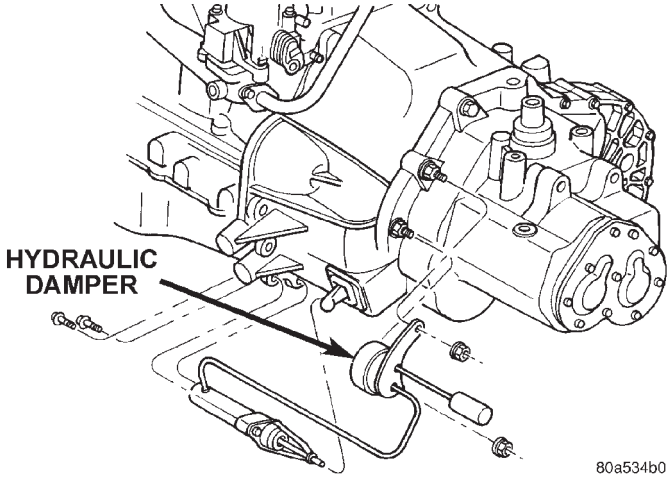

Fig. 8 Damper and Slave Cylinder

INSTALLATION

CAUTION: When reinstalling starter wiring, make certain wiring does not contact hydraulic tubing.

(1) To install, reverse above procedure.

(2) Actuate clutch pedal 20–30 times. Check for leaks.

CLUTCH PEDAL POSITION SWITCH

The clutch pedal position switch is mounted to a bracket located behind the clutch pedal. The switch is held in place by four plastic wing tabs.

The clutch pedal position switch IS NOT adjustable. The pedal blade contacts the switch in the down position (Fig. 9).

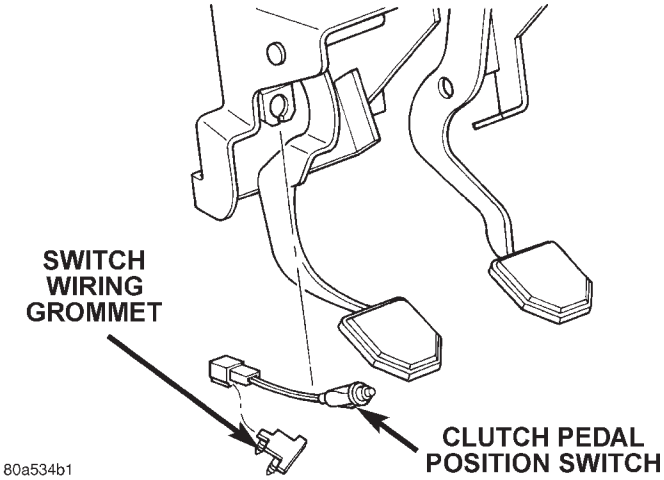

Fig. 9 Clutch Pedal Position Switch and Components

REMOVAL

(1) Disconnect electrical harness to switch connector.

(2) Depress wing tabs on switch and push switch out of mounting bracket. Then slide wires through slot in bracket.

INSTALLATION

(1) Slide switch wires through slot in switch bracket.

(2) Line up switch tab with slot in switch bracket and push switch into position. Do not pull on the switch wires to seat switch into bracket, switch damage may occur.

(3) Attach switch wiring harness to vehicle wiring harness.

(4) After installation, the switch must be checked for proper operation. Refer to Diagnosis and Testing section for proper testing procedures.

CLUTCH ASSEMBLY

The transaxle must be removed to service the modular clutch disc assembly and lever.

REMOVAL

(1) Remove the starter wiring. Remove the starter assembly.

(2) Remove the rear transaxle support bracket.

(3) Remove the front transaxle support bracket.

(4) Remove modular clutch retaining bolts.

REMOVAL AND INSTALLATION (Continued)

(5) Remove transaxle. See Group 21, Manual Transaxle, for procedure.

(6) The transaxle and modular clutch come out as an assembly.

(7) Remove the modular clutch assembly from the transaxle input shaft (Fig. 10). Handle carefully to avoid contaminating the friction surfaces.

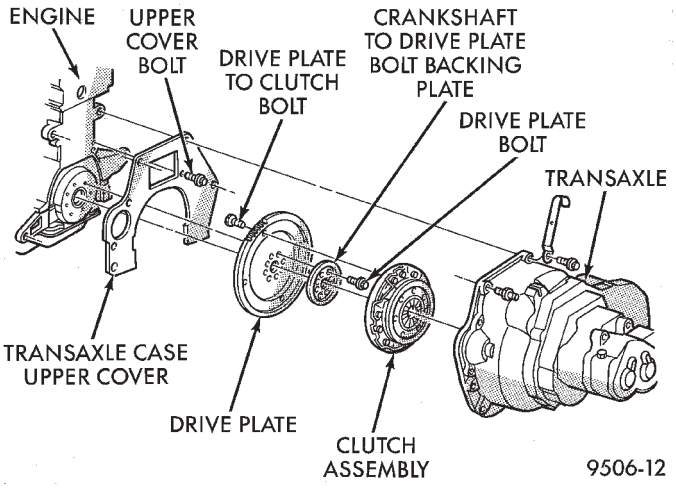

Fig. 10 Clutch Components

INSPECTION

(1) Inspect for oil leakage through engine rear main bearing oil seal and transaxle input shaft seal. If leakage is noted, it should be corrected at this time.

INSTALLATION

(1) Mount modular clutch assembly onto input shaft.

(2) Install transaxle. See Group 21, Manual Transaxle, for procedure.

NOTE: Use new bolts when mounting modular clutch assembly to drive plate.

(3) To avoid distortion of the drive plate, bolts should be tightened a few turns at a time. Use a crisscross pattern, until all bolts are seated. Tighten bolts to 75 N·m (55 ft. lbs.) following a crisscross pattern sequence.

(4) Install clutch inspection cover.

(5) Install transaxle lower support brackets.

(6) Install starter assembly.

RELEASE BEARING AND FORK

Remove the transaxle from the vehicle. See Group 21, Transaxle for removal and installation procedures.

REMOVAL

(1) Move the lever and bearing assembly to a vertical in-line position. Grasp the release lever with two hands in the pivot stud socket area. Pull with even pressure and the lever will pop off the pivot–stud. Do not use a screwdriver or pry bar to pop off the lever. This may damage the spring clip on the lever.

(2) As a unit, remove the fork from the bearing thrust plate. Be careful not to damage retention tabs on bearing.

(3) Examine the condition of the bearing. **It is pre-lubricated and sealed and should not be immersed in oil or solvent.**

(4) The bearing should turn smoothly when held in the hand under a light thrust load. A light drag caused by the lubricant fill is normal. If the bearing is noisy, rough, or dry, replace the complete bearing assembly with a new bearing.

(5) Check the condition of the pivot stud spring clips on back side of clutch fork. If the clips are broken or distorted, replace the clutch fork.

INSTALLATION

(1) The pivot ball pocket in the fork is Teflon coated and should be installed WITHOUT any lubricant such as grease. Using grease will break down the Teflon coating. Be sure the ball stud and fork pocket are clean of contamination and dirt.

(2) Assemble the fork to the bearing. The small pegs on the bearing must go over the fork arms.

(3) Slide the bearing and fork assembly onto the input shaft bearing retainer, as a unit.

(4) Snap the clutch fork onto the pivot ball.

(5) Reinstall transaxle assembly. Refer to Group 21, Transaxle for further information.

CLEANING AND INSPECTION

CLUTCH CONTAMINATION

Fluid contamination is a frequent cause of clutch malfunctions. Oil, grease, water, or other fluids on the clutch contact surfaces will cause faulty operation.

During inspection, note if any components are contaminated. Look for evidence of oil, grease, or water/road splash on clutch components.

OIL CONTAMINATION

Oil contamination indicates a leak at the rear main seal and/or transaxle input shaft. Oil leaks produce a residue of oil on the transaxle housing interior, clutch cover and flywheel. Heat buildup caused by slippage can bake the oil residue onto the components. This glaze-like residue ranges in color from amber to black.

CLEANING AND INSPECTION (Continued)

GREASE CONTAMINATION

Grease contamination is usually a product of over-lubrication. During clutch service, apply only a small amount of grease to the input shaft splines. Excess grease may be thrown off during operation, contaminating the disc.

ROAD SPLASH/WATER CONTAMINATION

Road splash contamination is usually caused by driving the vehicle through deep water puddles. Water can be forced into the clutch housing, causing clutch components to become contaminated. Facing of disc will absorb moisture and bond to the flywheel and/or, pressure plate, if vehicle is allowed to stand for some time before use. If this condition occurs, replacement of clutch assembly may be required. Drive the vehicle until normal clutch operating temperature has been obtained. This will dry off disc assembly, pressure plate, and flywheel.

CLEANING PRECAUTIONS

Condensation from steam vapors tend to accumulate on the internal clutch mechanism when the vehicle is steam cleaned. Facing of disc will absorb moisture and will bond to flywheel and/or pressure plate, if vehicle is allowed to stand for some time before use. If this condition occurs, it may require replacement of clutch assembly. After cleaning, drive the vehicle to its normal clutch operating temperature. This will dry off disc assembly, pressure plate, and flywheel.

ADJUSTMENTS

CLUTCH PEDAL POSITION SWITCH

The clutch pedal position switch is mounted to a bracket located behind the clutch pedal. The switch is held in place by four plastic wing tabs.

The clutch pedal position switch IS NOT adjustable. The pedal blade contacts the switch in the down position (Fig. 11).

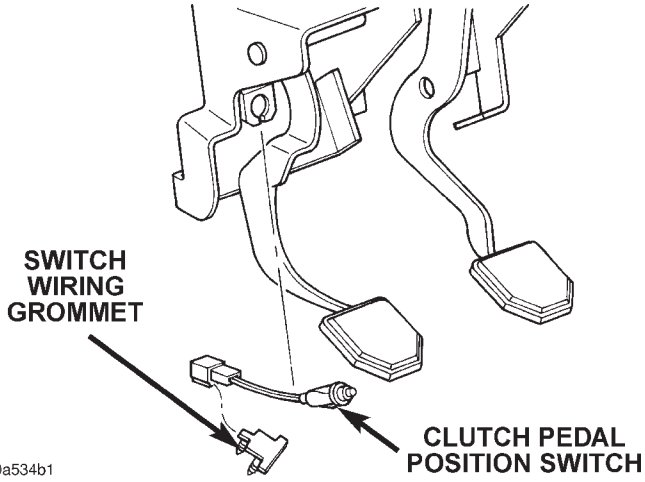

Fig. 11 Clutch Pedal Position Switch and Components

SPECIFICATIONS

NV T350 (A-578) CLUTCH TIGHTENING REFERENCE

DESCRIPTION	TORQUE
Drive Plate To Clutch Bolts	75 N·m (55 ft. lbs.)
Drive Plate To Crankshaft Bolts	95 N·m (70 ft. lbs.)