

# CLUTCH

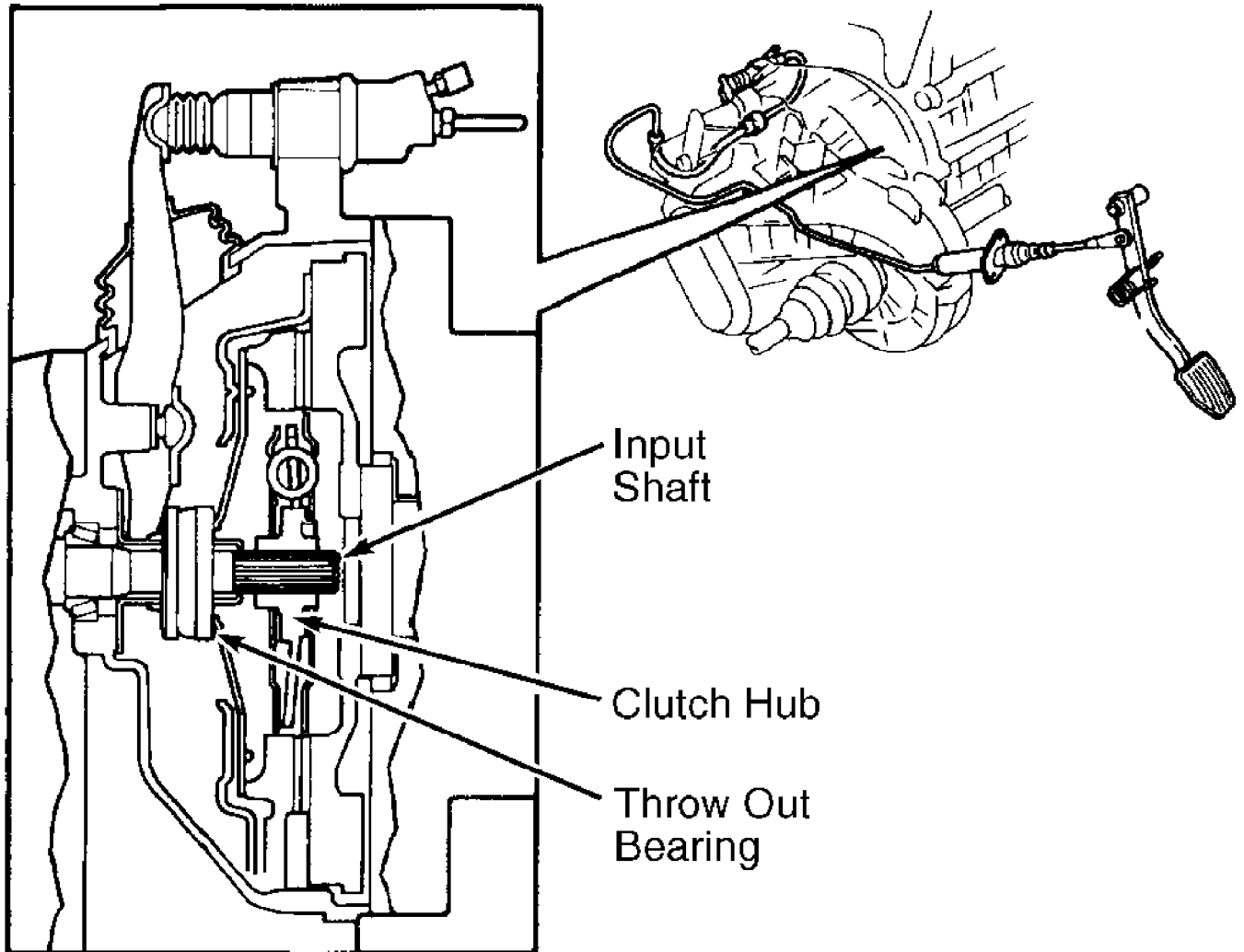
1995 Volvo 850

1995-96 Clutch

Volvo 850

## DESCRIPTION & OPERATION

Clutch pedal movement is transferred to clutch via a servo system which prevents noise and vibration from engine entering passenger compartment. Entire system from clutch pedal to throw-out bearing requires no lubrication. Hydraulic clutch transmission system does not require any preventive maintenance. See Fig. 1.



93F82516

Fig. 1: Sectional View Of Clutch Assembly  
Courtesy of Volvo Cars of North America.

## ADJUSTMENTS

NOTE: Adjustments to clutch system are not necessary. System is

self-adjusting.

## REMOVAL & INSTALLATION

### CLUTCH ASSEMBLY

NOTE: If engine and transaxle are already removed and/or separated, go to step 18).

#### Removal

1) Release steering wheel adjustment lever. Push steering wheel as far forward and upward as possible. Lock steering wheel with lever. Put shift lever in Neutral. Remove battery, air cleaner, air intake, battery shelf and air cleaner bracket retaining screws.

2) On turbo models, disconnect timing valve from air cleaner. Remove clip and hose from turbo air pipe. Remove air intake between air cleaner and turbo unit. On all models, remove transmission selector cables from bracket and levers. Tap out pin and remove selector link plate. Disconnect back-up light switch connector.

3) On turbo models, remove accessory belt idler pulley cover. Disconnect turbo inlet pipe from turbo. Move and secure turbo inlet pipe away from turbo. Remove upper oil coolant hose from engine oilcooler.

4) On all models, remove cable tie from engine cable harness. Remove ground wire from transaxle. Remove circlip and clutch slave cylinder from transaxle. Leave boots on cylinder. Loosen nut on rear engine mount/splash guard. Remove 5 bolts securing starter motor and transaxle.

5) Remove cover over high tension wiring. Lift coolant expansion tank off bracket and allow to hang free. Remove electrical cable conduit from subframe behind A/C compressor. On models equipped with EGR valve, disconnect hoses from EGR thermostatic control valve located on top of radiator.

6) On all models, remove bolt securing torque arm to engine. Disconnect ground lead next to torque arm. Install Lifting Yoke (999 5534) to torque arm and valve cover.

7) Install Supports (999 5033) on fenders. Install Lifting Beam (999 5006) on supports. Install lifting beam directly above lugs on lifting yoke. Install Lifting Hook (999 5460). Lift hook about .20" (5 mm) to relieve weight on engine mountings. Measure and record height of lifting hook above engine.

8) Remove front wheels. Remove ABS sensor from left outboard shaft. DO NOT disconnect ABS electrical connector. Disconnect left and right brake lines, and ABS cable brackets. Unhook brackets and allow to hang free. Remove front plastic nuts from left fender liner and any Torx screws. Remove left hub center nut locking clip. Using Center Lock Nut Remover (999 5461) for 4-bolt wheel, or Center Lock Nut Remover (999 5540) for 5 bolt wheel, remove left hub center nut.

9) Using plastic mallet, tap driveshaft end about .39-59" (10-15 mm) into hub to loosen driveshaft. Remove front splash guard bolts. Push guard forward so locating pins on back come loose. Disconnect front of splash guard and remove. Remove splash guard under engine. Remove ball joint-to-link arm nuts on both sides. Disconnect link arms from ball joints. Disconnect and remove link arms from anti-roll bar.

10) Remove bolts connecting cable pipe on subframe and unhook pipe from frame. Disconnect charcoal canister from subframe and hang from body. Disconnect exhaust pipe tie behind 3-way catalytic converter. Remove bolts holding power steering pipe brackets to subframe. Remove 2 bolts holding steady-bar bracket to transaxle. Drain transaxle.

11) Remove right axle shaft support bearing cap. Remove axle

shaft from transaxle. Twist and pull out MacPherson strut. Use care not to damage drive axle seal or boots. Install Plug (999 5488) to seal hole. DO NOT completely remove axle shaft. Allow axle shaft to rest on subframe and oil pipe.

12) Loosen bolts securing steering gear to engine mounting about one turn. Remove nuts holding steering gear to subframe. Disconnect subframe from vehicle by positioning Jack (998 5972-0) under left side of subframe. Tighten jack up gently against subframe. Remove bolts on both sides of subframe brackets. Loosen 2 right subframe-to-body bolts about .59" (15 mm). Remove left subframe-to-body bolts.

13) Lower subframe while ensuring steering gear bolts do not hang up. Ensure MacPherson strut disengages from right drive axle boots. Remove jack and allow subframe to hang free on right side bolts. Hang steering gear on left side using Hook (999 5045) in hole in frame member flange. Ensure lower steering wheel shaft section does not slip out of steering column.

14) Remove engine mount-to-subframe bolts and nut on top of engine mount. Remove engine mount. Secure axle shaft to oil pipe. Disconnect HO2S cable terminals from cover. Disconnect speedometer connector and cable. Remove rear engine mount cover and rear mounting from transaxle.

15) Remove left axle shaft by twisting and pulling out MacPherson strut. Tap drive axle end with plastic mallet and pull shaft from hub. Using Lever (999 5462), remove drive axle from transaxle. Use care not to damage drive axle seal or boots. Install Plug (999 5488) to seal hole. Clean metal glue off hub drive axle splines.

16) Use lifting hook and lower engine and transaxle until about 12.6" (320 mm) of clearance exists between lifting beam and valve cover. DO NOT lower engine too much, as exhaust pipe may press on steering gear. Ensure no wiring or hoses are pinched or stretched, and that dipstick clears fan.

17) Install Universal Tool (999 5972) and Transaxle Fixture (999 5463) to jack. Attach transaxle fixture to transaxle using bolts from steady-bar bracket. At same time, position Support Plate (5463-2) on fixture. Raise engine. Remove remaining bolts securing transaxle to engine. Pull transaxle straight out from engine without damaging clutch disc and pressure plate.

18) With engine and transaxle separated, install Immobilizing Tool (999 5112) to keep flywheel from turning. Remove 6 flywheel bolts in a crisscross order. Remove pressure plate and driven plate assembly. Remove throw-out bearing from sleeve and fork. Remove fork and dust cap.

#### Inspection

1) Clean all parts. Ensure throw-out bearing rotates freely and silently. Check fork for cracking or other wear. Ensure dust cap is intact. Check pressure plate and flywheel friction surfaces for signs of overheating, cracks, or other damage. Ensure diaphragm spring is not split or damaged.

2) Check inside surface of pressure plate for warpage by placing a straightedge across plate surface. If warpage exceeds .007" (.20 mm), replace pressure plate. Ensure flywheel is free from cracks and scoring.

3) Ensure clutch disc is free of oil and dirt, and damper springs in center of plate are in good condition. Clutch disc hub should slide smoothly. See CLUTCH SPECIFICATIONS.

#### Installation

1) Lubricate ball joint and throw-out bearing fork with Paste (1161246-2). Install throw-out bearing fork with dust cap. Install throw-out bearing in fork and onto sleeve. Place a strap around fork

to hold throw-out bearing in place during installation.

2) Place Centering Drift (999 5487) on input shaft. Install clutch disc and pressure plate. Install pressure plate bolts, tightening bolts evenly in a crisscross pattern. Remove drift and immobilizing tool. DO NOT apply lubricant to transaxle input shaft splines or inside of throw-out bearing.

3) Ensure mating flanges on transaxle and engine are clean and engine locating sleeves are in place. Coat locating sleeve holes with grease. Install transaxle using jack and transaxle fixture. Ensure transaxle lines up straight with engine and clutch disc hub.

4) Install and alternately tighten engine-to-transaxle locating sleeve bolts. Install remaining 5 engine-to-transaxle bolts and tighten in a crisscross pattern. Remove transaxle fixture and jack from transaxle.

5) Raise Lifting Hook (999 5460) to level previously recorded in step 7) under REMOVAL. Ensure no cables, wiring, or hoses are pinched or trapped. Install 3 rear engine mount-to-transaxle bolts. Tighten 2 rear bolts. Remove front bolt. Install engine mount cover.

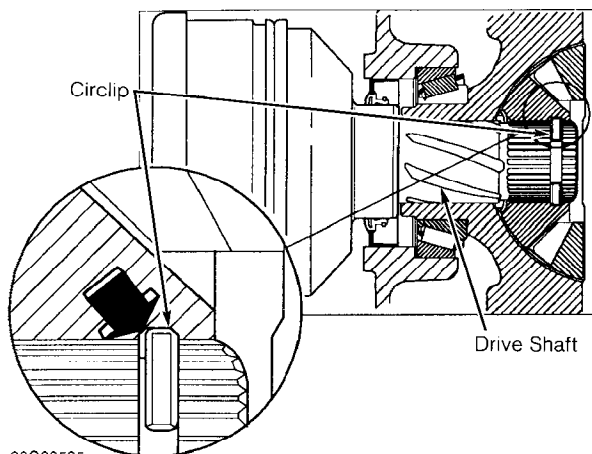
6) Install engine mount locating pin in cover and install, but DO NOT tighten NEW nut. Install, but DO NOT tighten, engine mount-to-steering gear bolt. Disconnect support hook. Install HO2S cable and clips in cover. Install Vehicle Speed Sensor (VSS) connector and cable.

7) Start with left side and raise subframe. Install 4 NEW bolts with greased threads. Install bolts to subframe and support plate. Tighten frame bolts and frame bracket bolts. See TORQUE SPECIFICATIONS. Move jack to right side, remove existing bolts, and repeat procedure.

8) Remove lifting hook, lifting beam, supports and lifting lug. Install NEW steering gear nuts. Install front engine mount-to-subframe bolts. Tighten remaining front and rear engine mount bolts.

9) Install NEW steady bar bracket-to-transaxle bolts. Install bolts holding pipe brackets to steering gear. Tighten exhaust clamp (wiggle exhaust pipe while tightening).

10) Use care not to damage drive axle seal or boots and install right axle shaft into transaxle. Install bearing cap. Ensure ABS sensor gear well area is free of dirt and install left axle shaft. Push in axle shaft so shaft engages with transaxle. Ensure axle shaft circlip snaps into place. See Fig. 2. Use care not to damage axle shaft seal or boots.



93G82525  
Fig. 2: Ensuring Axle Shaft Circlip Snaps Into Place  
Courtesy of Volvo Cars of North America.

11) Apply Metal Glue (1161370-0) to drive axle splines. Use a socket wrench to hold suspension arm down and twist MacPherson strut

clear. Insert axle shaft in hub. Oil nut threads and flange, and hand-tighten NEW drive axle nut.

12) Ensure ball joint seating in suspension arm is clean and free of grease. Tighten NEW inside and outside nuts. Apply Rustproofing Material (1161432-8) to area between ball joint, suspension arm and nuts. Use NEW nuts and install link arm to anti-roll bar.

13) Tighten left hub center nut. Use a chisel and tap locking flange onto axle shaft slot. Install brake lines and ABS cable brackets on both sides.

NOTE: Ensure ABS sensor seat is perfectly clean.

14) Install ABS sensor on wheel spindle. Install plastic nuts and Torx screws to inner shield on left side. Install cable pipe on subframe, charcoal canister, and subframe under engine.

15) Install cover under engine and push toward front of vehicle. Push up at back so cover locating pins fall in place. Install bolts. Install wheels. Ensure brake disc pad contact surfaces are clean. Grease hub center locating pin in front of pad using Rustproofing Agent (1161038-3). Install bolts and tighten in pairs.

16) Install transaxle-to-starter bolts and coolant hose bracket. Install clutch slave cylinder and clip. Without moving fork, remove temporary strap from throw-out bearing fork. Install ground wire and lead tie. Install back-up light switch connector. Install shift lever link plate and locking pin. Install selector cables in brackets.

NOTE: Outside bracket and selector cables have Yellow markings.

17) Lubricate selector levers with Grease (1161241-3). Install selector cables to levers. Install 2 washers and clips. Install high tension wire cover, expansion tank, air cleaner-to-bracket bolts, spark plug cover, battery shelf, air cleaner and battery. Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS. Fill transaxle with 5W/30 synthetic oil. Transaxle capacity is 4.4Pts. (2.1L)

## CLUTCH MASTER CYLINDER

### Removal

1) Remove air filter box. On turbo models, disconnect timing valve from air cleaner. On all models, secure holding bracket to air cleaner. Remove cable tie to drain hose and move hose to one side. Remove as much brake fluid as possible from brake fluid reservoir. Place a shop towel around brake fluid reservoir and disconnect hose from bottom of reservoir. Remove quick release clip and disconnect line from clutch master cylinder.

2) Remove lower dash panel and knee guard. Fold back carpeting and remove clip securing clutch master cylinder pushrod to clutch pedal. Remove nut and bolt securing clutch master cylinder to firewall. Remove clutch master cylinder.

### Installation

1) Transfer brake fluid supply hose to NEW clutch master cylinder. Apply small amount of silicone grease to clutch master cylinder lug for pushrod. Install clutch master cylinder. Install clip securing pushrod to clutch pedal. Install knee guard and tighten bolts. Install lower dash panel and carpet. Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS.

2) Install clutch master cylinder line. Install brake fluid reservoir hose. Install drain hose with cable tie. Replace brake fluid and bleed system. Install bracket retaining screws to air cleaner.

Install air cleaner.

## OVERHAUL

NOTE: Manufacturer recommends replacement of faulty clutch master cylinder and does not provide overhaul procedure.

## CLUTCH SPECIFICATIONS

CLUTCH SPECIFICATIONS TABLE

Application	In. (mm)
Clutch Disk Diameter	
2.3L .....	9.409-9.488 (239-241)
2.5L .....	8.937-9.015 (227-229)
Clutch Disk Thickness	
2.3L .....	.303-.326 (7.70-8.30)
2.5L .....	.284-.286 (7.22-7.28)
Clutch Fork Travel .....	.660 (17-22)
Clutch Pedal Travel .....	5.08 (129.2)
Clutch Slave Cylinder Travel .....	.33" (8.5 mm)
Pressure Plate Diameter	
2.3L .....	9.488 (241)
2.5L .....	9.055 (230)
Pressure Plate Warpage (Maximum) .....	.007 (.20)

## TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
ABS Sensor Bolt .....	7 (10)
Axle Shaft Bearing Cap Bolt .....	18 (25)
Clutch Master Cylinder Bolt .....	18 (25)
Clutch Cover-To-Flywheel Bolt .....	18 (25)
Engine Mount-To-Transaxle Bolt .....	37 (50)
Engine-To-Transaxle Bolt .....	37 (50)
Transaxle-To-Engine Bolt .....	37 (50)
Transaxle-To-Starter Bolt .....	29 (40)
Hub Center Nut .....	(1) 89 (120)
Knee Guard Bolt .....	15 (20)
Link Arm-To-Anti-Roll Bar Nut .....	37 (50)
Pipe Brackets-To-Steering Gear Bolt .....	18 (25)
Rear Splash Guard Nut .....	37 (50)
Steady Bar Bracket-To-Transaxle Bolt	
Early Version .....	(2) 13 (18)
Later Version .....	(3) 26 (35)
Steering Gear Nut .....	37 (50)
Subframe Bracket Bolt .....	37 (50)
Subframe & Support Plate Bolt .....	(4) 77 (105)
Suspension Arm-To-Ball Joint Nut .....	(5) 13 (18)
Wheel Lug Nut .....	81 (110)

- (1) - Tighten nut an additional 60 degrees.
- (2) - Tighten bolt another 90 degrees (early version).
- (3) - Tighten bolt another 60 degrees (late version).
- (4) - Tighten bolt another 120 degrees.
- (5) - Tighten nut an additional 120 degrees.

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