

1992 Volvo 940

Submodel: | Engine Type: L4 | Liters: 2.3

Fuel Delivery: FI | Fuel: GAS

1. Clutch play is adjusted under the vehicle at the clutch fork.
2. Loosen the locknut on the fork side of the cable bracket and turn the adjust nut until the proper play is achieved.
3. Tighten the locknut.

NOTE: Vehicles equipped with hydraulic clutch assemblies are not adjustable.

4. Clutch play for all engines except turbocharged is 0.12–0.20 in. (3–5mm). Turbocharged engine clutch play (free movement rearward) is 0.04–0.12 in. (1–3mm).

Fig. 1: Checking the clutch negative play

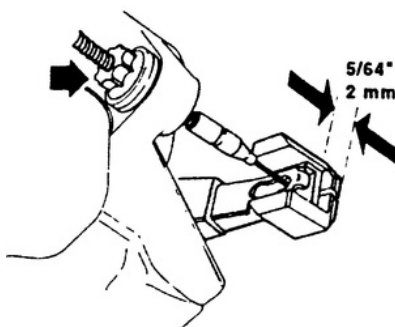
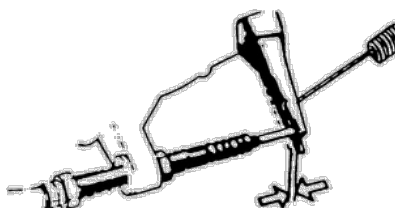


Fig. 2: Adjust the clutch cable by turning the locknut



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This procedure does not apply to hydraulic clutches.

1. Raise and support the vehicle safely.
2. Disconnect the clutch cable from the clutch fork. Some vehicles are equipped with a release bearing that rotates. These vehicles will have a clutch return spring at the pedal assembly.
3. Disconnect the cable at the pedal assembly.
4. Remove the cable. On some early vehicles, the clutch cable is fitted with a weight. Do not replace the weight when installing the new cable.

To install:

5. Install the cable in the vehicle.
6. Connect the clutch cable at the clutch fork and the pedal assembly.
7. Adjust the clutch cable.

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Check the pressure plate for heat damage, cracks, scoring, or other damage to the friction surface. Check the curvature of the pressure plate with a steel ruler.

Place the ruler diagonally over the pressure plate friction surface and measure the distance between the straight edge of the ruler and the inner diameter of the pressure plate. This measurement must not be greater than 0.008 inch (0.2mm). In addition, there must be no clearance between the straight edge of the ruler and the outer diameter of the pressure plate. This check should be made at several points. Additionally, inspect the tips of the diaphragm springs (fingers) for any sign of wear. Replace the clutch as a unit (disc, pressure plate and throwout bearing) if any fault is found.

Check the throwout bearing by rotating it several times while applying finger pressure, so that the ball bearings roll against the inside of the races. If the bearing does not turn easily or if it binds at any point, replace it as a unit. Also make sure that the bearing slides easily on the guide sleeve from the transmission.

Inspect the clutch disc for signs of slippage (burns) or oil contamination. Make sure the rivets are not loose and that the clutch contact surfaces are well above the rivet heads. The thickness of the disc above the rivet heads is the "remaining life" of the disc; always replace the disc if in doubt.

When reassembling, apply grease to the splines and end shaft, the throwout bearing and the pivot ball and seat of the clutch fork.

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Rear Drive Models

1. Remove the transmission.
2. Scribe alignment marks on the clutch and flywheel.
3. Slowly loosen the bolts holding the clutch to the flywheel in a diagonal pattern.
4. Remove the bolts and lift off the clutch and pressure plate.
5. Inspect the pressure plate for heat damage, cracks, scoring or any other damage.
6. Place a ruler diagonally over the pressure plate friction surface and measure the distance between the straightedge of the ruler and the inner diameter of the pressure plate. This measurement must not be greater than 0.008 inch (0.2mm). In addition, there must be no clearance between the straightedge and the outer diameter of the pressure plate. This check should be made at several points.

To install:

7. Clean the pressure plate and flywheel with solvent to remove any traces of oil and wipe them clean with a cloth.
8. Position the clutch assembly with the longest side of the hub facing away from the engine. Fit it to the flywheel and align the bolt holes.
9. Insert centering tool 5111 or equivalent or an input shaft from an old transmission of the same type, through the clutch assembly and flywheel. This centers the assembly and pilot bearing.
10. Install the clutch retaining bolts and tighten them in a diagonal pattern, a few turns at a time. After all the bolts are tightened, remove the centering tool.
11. Install the transmission.

Front Drive Models

1. Remove the transaxle.
2. Lock the flywheel in position.
3. Remove the six bolts retaining the pressure plate and disc, loosen them in rotation.
4. Remove the pressure plate and disc.
5. Remove the throwout bearing from the sleeve and fork.
6. Remove the fork and dust cap from the transaxle.
7. Clean and check the throwout bearing. It should rotate freely and quietly.
8. Clean and check the fork for cracks and wear and that the dust cap is intact.
9. Check the pressure plate carefully for signs of overheating, cracks, scoring or other damage to the friction surface. Make sure that the diaphragm spring is not split or damaged. If any part of the pressure plate is damaged, it must be replaced.
10. Check the pressure plate for warpage by laying a straightedge across the contact surface and checking the distance with a feeler gauge. The maximum width is 0.008 in. (0.2mm).

NOTE: Warpage is permitted in one direction only.

11. Check the flywheel for cracks and heavy scoring. If it is damaged it must be replaced.
12. Check the clutch disc for oil or dirt and clean if necessary.

To install:

13. Install the throwout bearing fork, and lubricate the ball joint with grease.
14. Install the throwout bearing and dust cap.
15. Secure the fork to the transaxle, so that it cannot be moved during installation.
16. Install the clutch disc and pressure plate using centering drift 999 5487 or equivalent clutch alignment tool.
17. Install the clutch bolts, tightening them in rotation so that the clutch slides over the locating pins and lies evenly against the flywheel. Then tighten the bolts to 18 ft. lbs. (25 Nm). Remove the centering drift.

NOTE: Do not apply any grease to the splines on the transaxle input shaft.

18. Install the transaxle and check the clutch operation.

Fig. 1: Typical clutch alignment tool, note how the splines match the transmission's input shaft



Fig. 2: Loosen and remove the clutch and pressure plate bolts evenly, a little at a time . . .

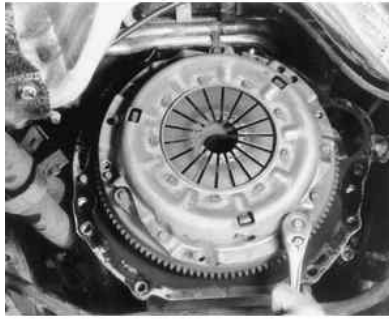


Fig. 3: . . . then carefully removing the clutch and pressure plate assembly from the flywheel

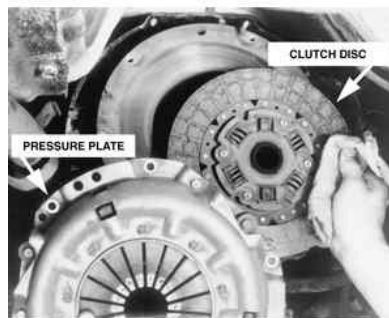


Fig. 4: Check across the flywheel surface, it should be flat



Fig. 5: If necessary, lock the flywheel in place and remove the retaining bolts . . .



Fig. 6: . . . then remove the flywheel from the crankshaft in order to replace it or have it machined



Fig. 7: Upon installation, it is usually a good idea to apply a threadlocking compound to the flywheel bolts



Fig. 8: Check the pressure plate for excessive wear

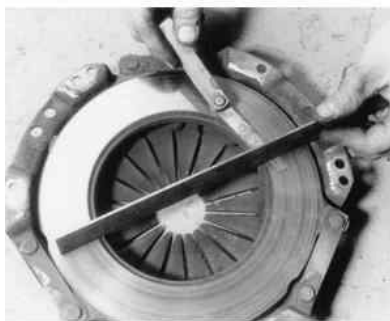


Fig. 9: Be sure that the flywheel surface is clean, before installing the clutch



Fig. 10: Install a clutch alignment arbor, to align the clutch assembly during installation

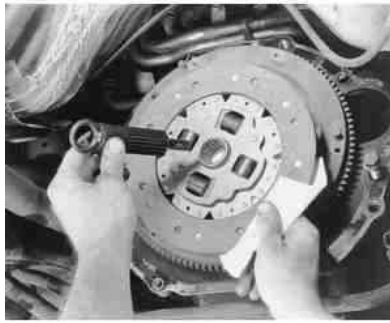


Fig. 11: Clutch plate installed with the arbor in place



Fig. 12: Clutch plate and pressure plate installed with the alignment arbor in place

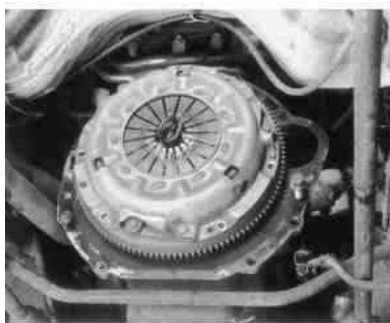


Fig. 13: Pressure plate-to-flywheel bolt holes should align



Fig. 14: You may want to use a threadlocking compound on the clutch assembly bolts



Fig. 15: Install the clutch assembly bolts and tighten in steps, using an X pattern

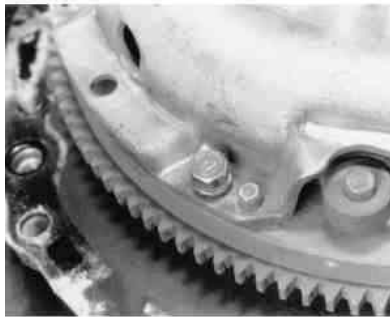


Fig. 16: Be sure to use a torque wrench to tighten all bolts



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On some models, the brake master cylinder incorporates the clutch master cylinder. For those models, refer to Brake Master Cylinder removal and installation in Section 9.

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1. Disconnect the negative battery cable.
2. Drain the clutch reservoir with a bulb syringe.

WARNING

Be careful not to drip brake fluid on any painted surfaces.

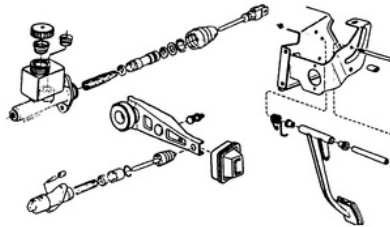
3. Remove the underdash panel and remove the lockring and pin from the clutch pedal.
4. Remove the hose from the master cylinder. Use a clean jar to collect spillage.
5. Unfasten the retaining bolts and remove the master cylinder.

To install:

NOTE: When reinstalling, make sure that the clearance (free-play) between the pushrod and piston is 0.04 inch (1mm).

6. Install the master cylinder and tighten the retaining bolts.
7. Install the hose onto the master cylinder. Make certain the hose is correctly threaded and secure.
8. Install the pushrod onto the pedal.
9. Top up the fluid and bleed the system as explained later in this section.
10. Connect the negative battery cable.

Fig. 1: Exploded view of the hydraulic clutch system



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The hydraulic clutch system should be bled any time the hoses have been loosened or any component replaced. The bleeding process is quite simple and eliminates any air which has become trapped within the lines. The clutch system may be bleed using Tool 998 5876 or equivalent, or with the help of an assistant.

Add brake fluid to the reservoir. Attach a length of hose to the bleeder nipple on the slave cylinder (at the transmission) and put the other end in a clear glass jar. Put enough brake fluid in the jar to cover the end of the hose.

Have an assistant press the clutch pedal to the floor and open the bleed screw on the slave cylinder. Close off the bleeder while the pedal is still depressed and repeat the process with another application of the clutch pedal. As the bleeder is released each time, observe the fluid in the jar. When no bubbles are coming out of the hose, the system is bled. Secure the fitting, remove the hose and jar, and top up the brake fluid to its proper level.

Fig. 1: If clutch pedal travel exceeds 170mm before engaging the clutch, bleed the clutch

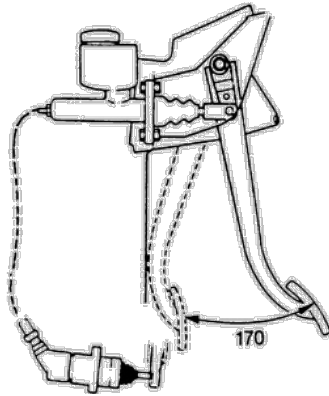
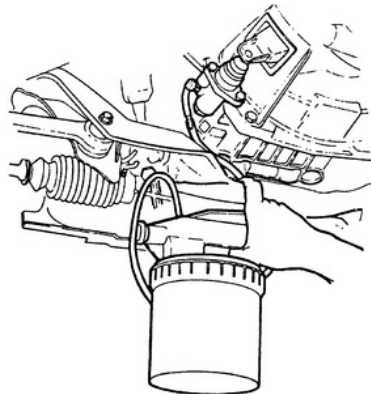


Fig. 2: Bleeding the clutch using tool 998 5876 or equivalent



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- 1. Raise and support the front end on jackstands.
- 2. Disconnect the fluid line at the cylinder.
- 3. Unbolt the cylinder from the flywheel housing.

To install:

- 4. Install the cylinder and tighten the retaining bolts.
- 5. Connect the fluid line.
- 6. Lower the vehicle.
- 7. Bleed the clutch system.

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CAUTION

The clutch driven disc may contain asbestos, which has been determined to be a cancer causing agent. Never clean clutch surfaces with compressed air! Avoid inhaling any dust from any clutch surface! When cleaning clutch surfaces, use a commercially available brake cleaning fluid.

The purpose of the clutch is to disconnect and connect engine power at the transaxle. A vehicle at rest requires a lot of engine torque to get all that weight moving. An internal combustion engine does not develop a high starting torque (unlike steam engines) so it must be allowed to operate without any load until it builds up enough torque to move the vehicle. Torque increases with engine rpm. The clutch allows the engine to build up torque by physically disconnecting the engine from the transaxle, relieving the engine of any load or resistance.

The transfer of engine power to the transaxle (the load) must be smooth and gradual; if it weren't, drive line components would wear out or break quickly. This gradual power transfer is made possible by gradually releasing the clutch pedal. The clutch disc and pressure plate are the connecting link between the engine and transaxle. When the clutch pedal is released, the disc and plate contact each other (the clutch is engaged) physically joining the engine and transaxle. When the pedal is pushed inward, the disc and plate separate (the clutch is disengaged) disconnecting the engine from the transaxle.

Most clutches utilize a single plate, dry friction disc with a diaphragm-style spring pressure plate. The clutch disc has a splined hub which attaches the disc to the input shaft. The disc has friction material where it contacts the flywheel and pressure plate. Torsion springs on the disc help absorb engine torque pulses. The pressure plate applies pressure to the clutch disc, holding it tight against the surface of the flywheel. The clutch operating mechanism consists of a release bearing, fork and cylinder assembly.

The release fork and actuating linkage transfer pedal motion to the release bearing. In the engaged position (pedal released) the diaphragm spring holds the pressure plate against the clutch disc, so engine torque is transmitted to the input shaft. When the clutch pedal is depressed, the release bearing pushes the diaphragm spring center toward the flywheel. The diaphragm spring pivots the fulcrum, relieving the load on the pressure plate. Steel spring straps riveted to the clutch cover lift the pressure plate from the clutch disc, disengaging the engine drive from the transaxle and enabling the gears to be changed.

The clutch is operating properly if:

1. It will stall the engine when released with the vehicle held stationary.
2. The shift lever can be moved freely between 1st and Reverse gears when the vehicle is stationary and the clutch disengaged.