UNRESPONSIVE CLUTCH: AIR ENTRAPPED IN HYDRAULIC SYS

TECHNICAL SERVICE BULLETIN

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CONDITIONS

CLUTCH - "SOFT" UNRESPONSIVE CLUTCH PEDAL - AIR ENTRAPPED IN HYDRAULIC SYSTEM - SERVICE TIPS

CLUTCH - HYDRAULIC - UNABLE TO RELEASE - AIR ENTRAPPED IN SYSTEM - SERVICE TIPS

CLUTCH - HYDRAULIC BLEED PROCEDURE - SERVICE TIPS

TRANSMISSION - M50D AND ZF LIGHT DUTY - GEAR CLASH - AIR ENTRAPPED IN CLUTCH HYDRAULIC SYSTEM - SERVICE TIPS

APPLICATION

Model(s): FORD LIGHT TRUCK: 1993 AEROSTAR, BRONCO, EXPLORER, F-150-350 SERIES, F-47, RANGER

Group: Transmission

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A "soft" unresponsive clutch pedal may be felt or the driver may be unable to release the clutch. This is caused by air entrapped in the clutch hydraulic system.

ACTION

Use the information in this TSB article in addition to the appropriate bleeding procedure. This article includes detail as well as extra service tips for easier hydraulic clutch bleeding.

The clutch hydraulic system for the 1993 model year is new and more difficult to bleed than the previous hydraulic system. Therefore, a different bleeding procedure is required for these vehicles.

RANGER, EXPLORER, AEROSTAR

The most difficult systems to bleed are on the Ranger, Explorer, Aerostars.

NOTE: **When installing dry clutch cylinder or tube service parts, do the bench bleed procedure first.**

BENCH BLEED

The compact vehicles are more difficult to bleed because the downward angle of the master cylinder makes it difficult for air to escape up into the reservoir. Therefore, if the master cylinder is removed from the vehicle and bled while held in a vertical orientation (a bench bleed) air can escape much more efficiently. Refer to **Fig. 1** .

BENCH BLEEDING PROCEDURE (CONCENTRIC SLAVE CYLINDER)

1. Remove master cylinder, line and reservoir from vehicle and assemble with replacement parts required based on initial concern.
2. Hold the master cylinder vertically with the reservoir feed hose in the highest position on the body. See **Fig. 1** .
3. Fill the reservoir and extend above the master cylinder and assure the quick connect on the clutch line is below the master cylinder. (Lightly clamp reservoir in a vise).
4. Using a small screwdriver, depress the internal mechanism of the male quick connect coupling to open the valve. See **Fig. 1** .
5. Stroke and hold master cylinder pushrod.
6. Close quick connect valve.
7. Release master cylinder pushrod.
8. Fill reservoir.
9. Repeat Steps 4 through 8 four more times.
10. With the master cylinder still being held with the outlet tube and reservoir feed tube ends high, quick connect closed and the reservoir full, proceed as follows:
    a. Push the pushrod into the body several times quickly to expel any remaining air.
    b. If it is a remote reservoir, pinch the supply hose with your fingers two or three times to help move air into reservoir.
11. When the movement of the pushrod is .130" (4mm) or less when stroked in Step 10, reinstall the master cylinder into the vehicle and couple it to the slave cylinder.

Fig. 1: Out-of-Vehicle Bench Bleed Master Cylinder Orientation

ON VEHICLE BLEED PROCEDURE, CONCENTRIC SLAVE CYLINDER

Under normal conditions, disconnecting the clutch coupling will not introduce air into the system. However, if there appears to be air in the system (spongy pedal or insufficient bearing travel), the system must be bled. See **Fig. 2** . The following procedure is used with the hydraulic system installed on the vehicle.

1. Disconnect the coupling at the transmission with a coupling disconnect tool (T88T70522A) or equivalent by sliding the white plastic sleeve toward the slave cylinder while applying a slight tug on the clutch tube.

2. Clean dirt and grease from around the reservoir cap.
3. Remove cap and diaphragm and fill reservoir to the step with Heavy Duty Brake Fluid (C6AZ-19542-AA or BA) (ESA-M6C25-A) or equivalent.

CAUTION: Brake fluid must be certified to DOT 3 specification.

   a. By hand, apply 10-15 lbs. to clutch pedal.
   b. If pedal is hard (.25-.50 movement), skip to Step 9.
   c. If pedal is spongy, proceed to the next step.

4. Using a small screwdriver ...
   a. Depress the internal mechanism of the male coupling to open the valve.
   b. While continuing to hold the valve open, slowly depress the clutch pedal to the floor and hold.
5. Remove the screwdriver from the coupling, closing the valve.
6. Release the clutch pedal.
7. Refill the reservoir to level at step.

NOTE: The reservoir must be kept full at all times to ensure that there will be no additional introduction of air into the system.

8. Repeat Steps 4 through 7.
9. Install cap on reservoir.
   a. Reconnect the coupling to the slave cylinder.
   b. Check that the connection is secure by applying a slight tug to the clutch tube.
10. Stroke the clutch pedal as rapidly as possible for five to ten strokes.
11. Wait one to three minutes.
12. Repeat Steps 10 and 11 three more times.
13. Loosen the bleed screw which is located in the slave cylinder body next to the inlet connection.
14. Depress and hold the clutch pedal while tightening the bleed screw 3-5 N-m (2.2-3.7 lb-ft).
15. Refill the reservoir to level at step.
16. The hydraulic system should now be fully bled and should release the clutch. Check the clutch reserve.

Fig. 2: In-Vehicle Master Cylinder Installation

F-SERIES, BRONCO

Since full size vehicles have master cylinders which are mounted in a level attitude, they bleed more efficiently than do compact vehicles. However, some difficulties may still be encountered if the new procedure is not used.

VEHICLES WITH CONCENTRIC SLAVE CYLINDERS

Use the same bleed procedure as specified for the compact vehicles which is included in this article. The optional bench bleed procedure may be used, but is probably not necessary.

VEHICLES WITH EXTERNAL SLAVE CYLINDERS

1. Clean reservoir cap and slave cylinder in area of the tube connection.
2. Remove slave cylinder from the transmission bell housing.
3. Use a 3/32-inch diameter punch to drive out tube holding pin.
4. Remove the tube from the slave cylinder and place tube end into a container for waste fluid.

   NOTE: The tube is connected to the master cylinder, so keep the reservoir cap tight to minimize fluid loss.

5. Hold slave cylinder so connector port is at highest point, by tipping cylinder to approximately 30 degrees. Fill with approved DOT 3 brake fluid through connector port. See **Fig. 3** .

   NOTE: It may be necessary to "rock" slave cylinder around or push gently on push rod to expel all the air. Pushing on push rod too hard will cause fluid to spray out of the connector hole.

   NOTE: Do not allow any moisture or foreign matter to enter slave with brake fluid.

6. When all the air is expelled from the slave cylinder and no more bubbles come out of the port hole, install slave cylinder.

   Fig. 3: Filling Slave Cylinder

   NOTE: Fluid is expelled from the connector port, as the push rod is compressed attaching it to the transmission and lever.

7. Gravity fill the master cylinder and tube as follows.
   - Remove the reservoir cap and diaphragm.
   - Fluid should flow out the open end of the tube into waste container. Be sure to keep the reservoir full.
   - When fluid is flowing out in a steady uninterrupted flow and fluid is level with step in reservoir, install cap and diaphragm.
   - Install end of tube into slave cylinder.
   - Replace pin holding tube to slave cylinder.
8. Remove the slave cylinder from the transmission.
9. Holding the cylinder so that the port for the tube is at the highest point, slowly push the pushrod into the cylinder and slowly let it return. Be sure the reservoir is full of fluid beforehand. Repeat this step two more times.
10. Re-attach the slave cylinder to the transmission.

11. Rapidly depress the clutch pedal 10 times through a travel of about 1" (26.4mm).
12. If the pedal is not hard within .25" (6.35mm) to .5" (12.7mm) of travel, repeat Step d.
13. System should be bled and functioning properly.
    - To verify proper system function, set parking brake and put vehicle in neutral.
    - Start vehicle and shift into reverse gear.
    - If gears grind, other components may be causing the concern.
    - Check slave cylinder push rod travel as described in this section.

PARTS INFORMATION

Part Number	Part Name	Class
C6AZ-19542-AA	Heavy Duty Brake Fluid	B