

- **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**

**Article No.  
93-12-19**

**FORD:** 1993 AEROSTAR, BRONCO, EXPLORER, F-150-350 SERIES, F-47, RANGER

### **ISSUE**

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 bleed procedure specified in the 1993 Service Manual. 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 Rangers, Explorers and Aerostars. Follow the bleed procedure as outlined in the 1993 Service Manual, Page 08-00-6. This procedure with the addition of the bench bleed process is included in this TSB article.

### **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 Figure 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, Figure 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 vice).
4. Using a small screwdriver, depress the internal mechanism of the male quick connect coupling to open the valve, Figure 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.

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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 .160" (4mm) or less when stroked in Step 10, reinstall the master cylinder into the vehicle and couple it to the slave cylinder.

### **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 Figure 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 per the instruction in the 1993 Service Manual, Section 08-00.

### **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**

The procedure given in the Service Manual on page 08-00-9 is incorrect. 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**

The procedure in the 1993 Service Manual on page 08-00-10 should be modified as follows:

1. Do not use the Alternate Method.
2. After Step 7 and before Step 8, do the following...
  - a. Remove the slave cylinder from the transmission.
  - b. 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.
  - c. Reattach the slave cylinder to the transmission.

- d. Rapidly depress the clutch pedal 10 times through a travel of about 1" (25.4mm).
- e. If the pedal is not hard within .25" (6.35mm) to .5" (12.7mm) of travel, repeat Step d.

PART NUMBER	PART NAME
C6AZ-19542-AA	Heavy Duty Brake Fluid

**OTHER APPLICABLE ARTICLES: NONE**

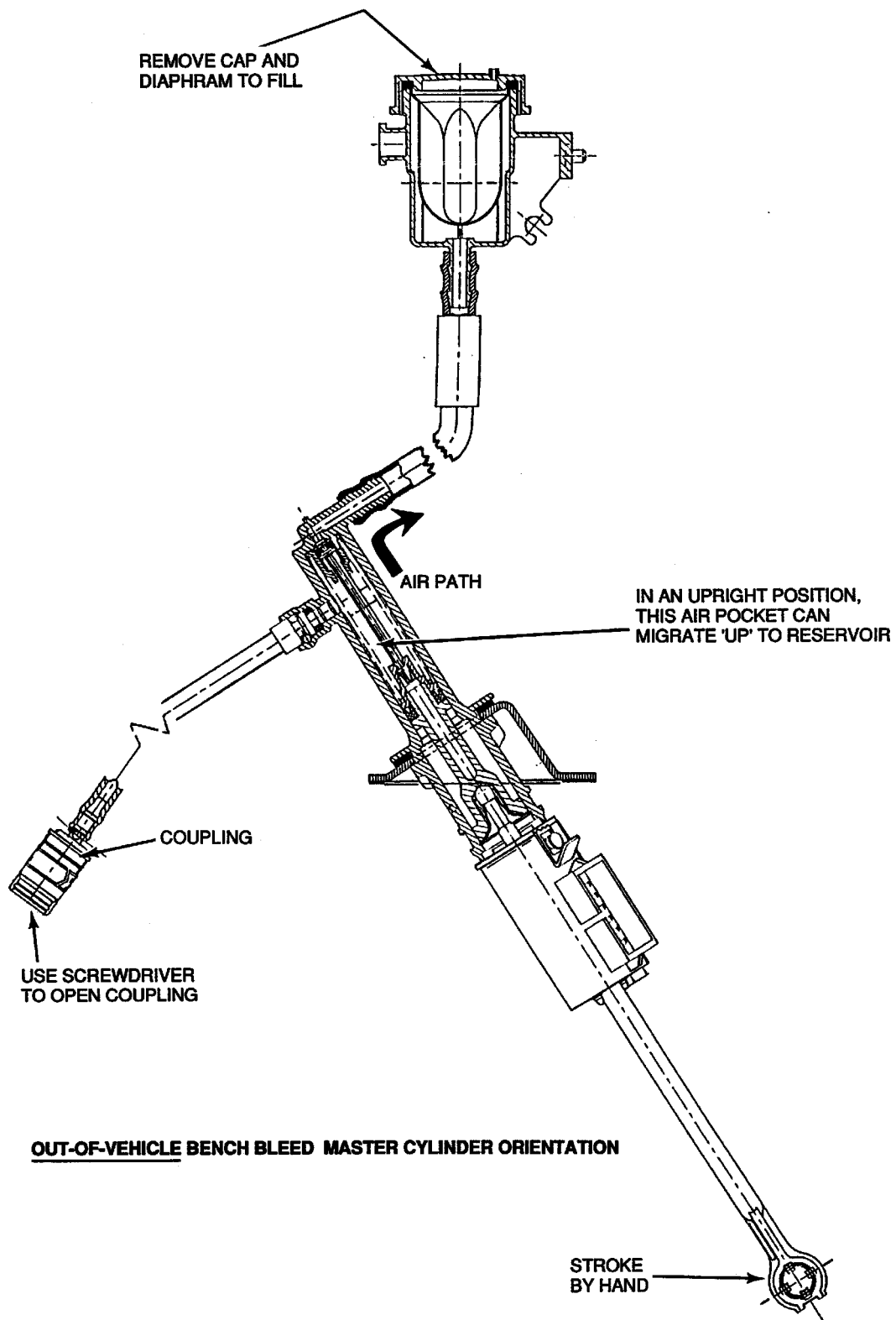
**WARRANTY STATUS:** Eligible Under Bumper To Bumper warranty Coverage

OPERATION	DESCRIPTION	TIME
931219A	On Vehicle Bleed Procedure - Concentric Slave Cylinder Equipped Vehicles	0.8 Hr.
931219B	Master Cylinder Bench Bleed Procedure - Concentric Slave Cylinder Equipped Vehicles	1.1 Hrs.
931219C	On-Vehicle Bleed Procedure - External Slave Equipped Vehicles	0.6 Hr.

**DEALER CODING**

BASIC PART NO.	CONDITION CODE
7A543	07
<b>OASIS CODES:</b> 505000, 505200, 506000, 590000	

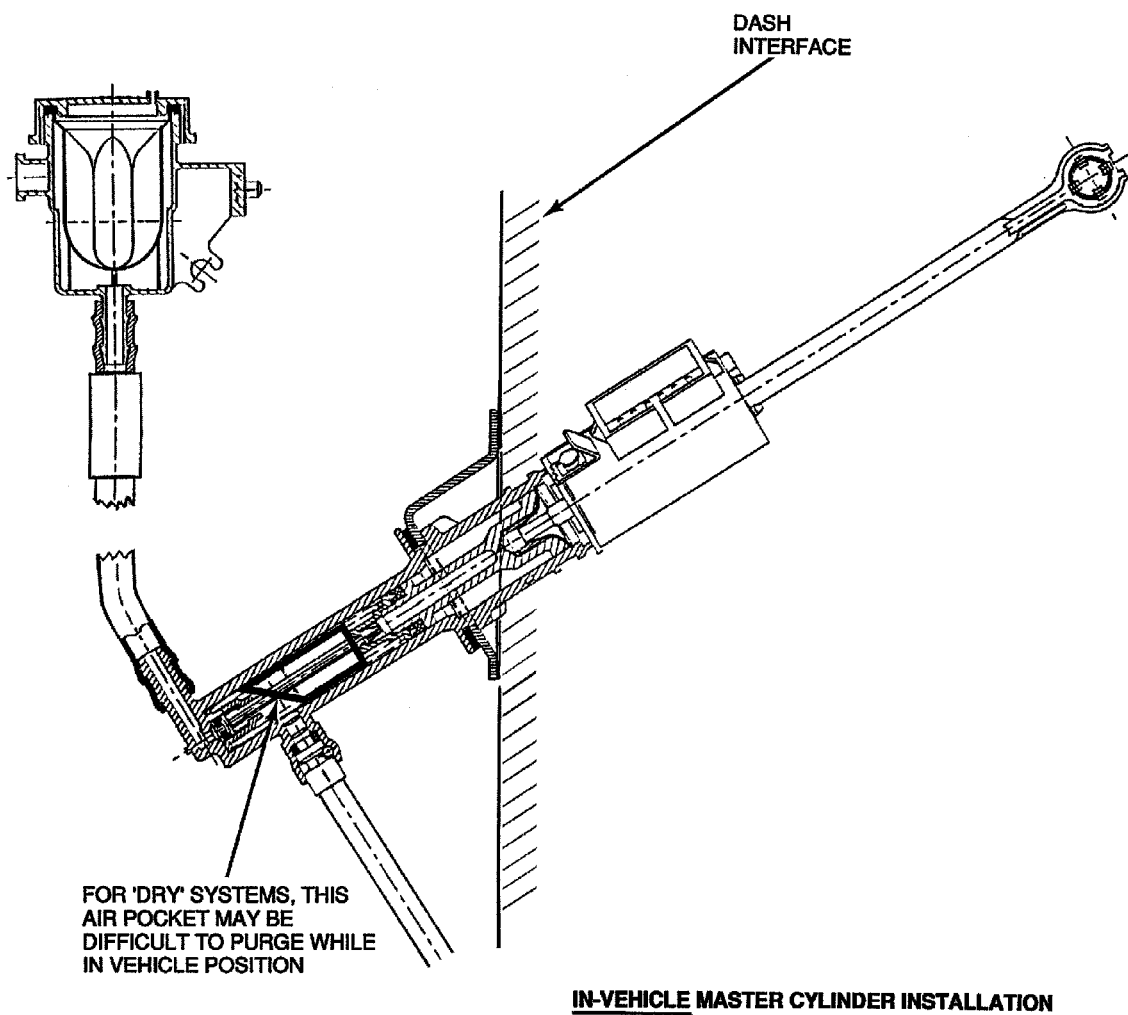
# COMPACT TRUCK BENCH BLEED PROCEDURE



TB-3125-A

Figure 1 - Article 93-12-19

## COMPACT TRUCK BENCH BLEED PROCEDURE



TB-3126-A

Figure 2 - Article 93-12-19