SECTION 14
BUMPERS
ENERGY ABSORBERS

DESCRIPTION

All vehicles have both bumpers mounted to energy absorbers. (figure 1)

The energy absorber is a device which uses hydraulic fluid within the cylinder tube to absorb impact energy and inert gas to restore the bumper to its original position after a low speed collision. Right and left energy absorbers are the same. (figure 1)

During impact (figure 2) the piston tube moves back into the cylinder tube. Hydraulic fluid is forced from the cylinder tube through the orifice around the metering pin into the piston tube. The metering pin controls the rate of fluid flow. Fluid pressure in the piston tube against the floating piston moves it and compresses the gas. After impact (figure 3), gas pressure against the floating piston forces fluid back into the cylinder tube and pushes the bumper back to its original position.

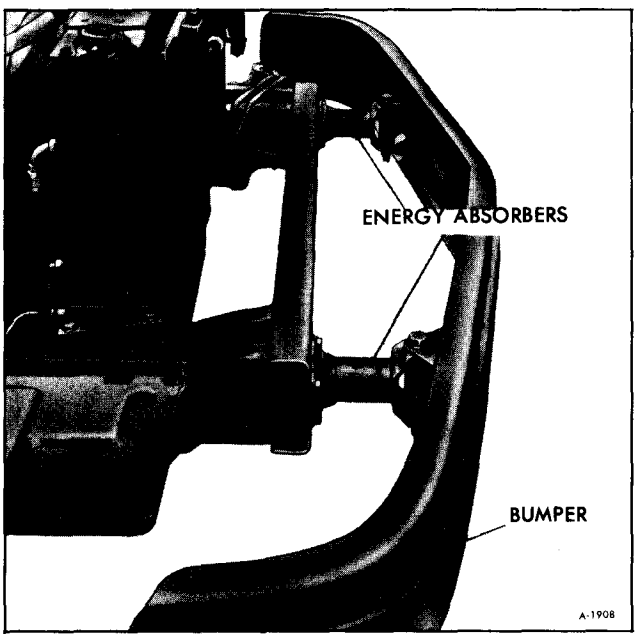

Figure 1—Energy Absorbing Bumper

DIAGNOSIS

LEAKAGE

A trace of oil on the piston tube is normal due to grease packed in the seal area during manufacturing. If oil is dripping from the unit it should be replaced.

DAMAGE

Inspect the bumper bracket, frame bracket, piston tube and cylinder tube for evidence of visible distortion. Scuff marks on the piston tube are normal. If there is obvious damage to the unit it should be replaced.

ON VEHICLE TEST

This test involves compressing EACH unit separately 3/8" or more and observing that the bumper returns to its normal position.

1. Turn off ignition, transmission in park, parking and service brakes set.

2. Use a barrier such as a pillar, wall, post, etc.

3. Align a pressure device, such as a hydraulic jack, with the energy absorber. Make sure it is positioned squarely with the bumper so it will not slip.

4. Apply pressure to compress the unit 3/8". Use a 6" scale to determine travel. Release pressure and note if the bumper returns to its normal position.

5. If either unit fails to return to its normal position, replace it.

BENCH TEST

The bench test may be used to pre-test service

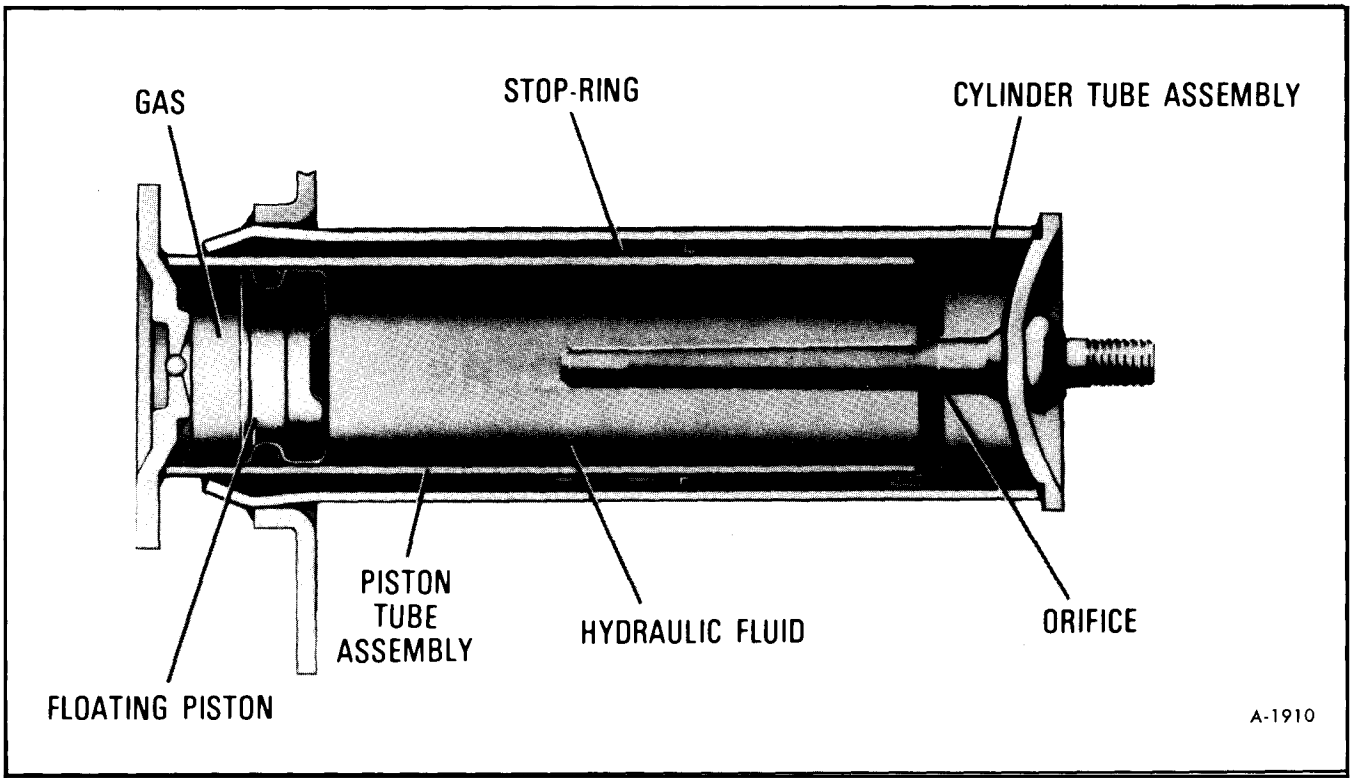

Figure 2–Energy Absorber–Collapsed Position

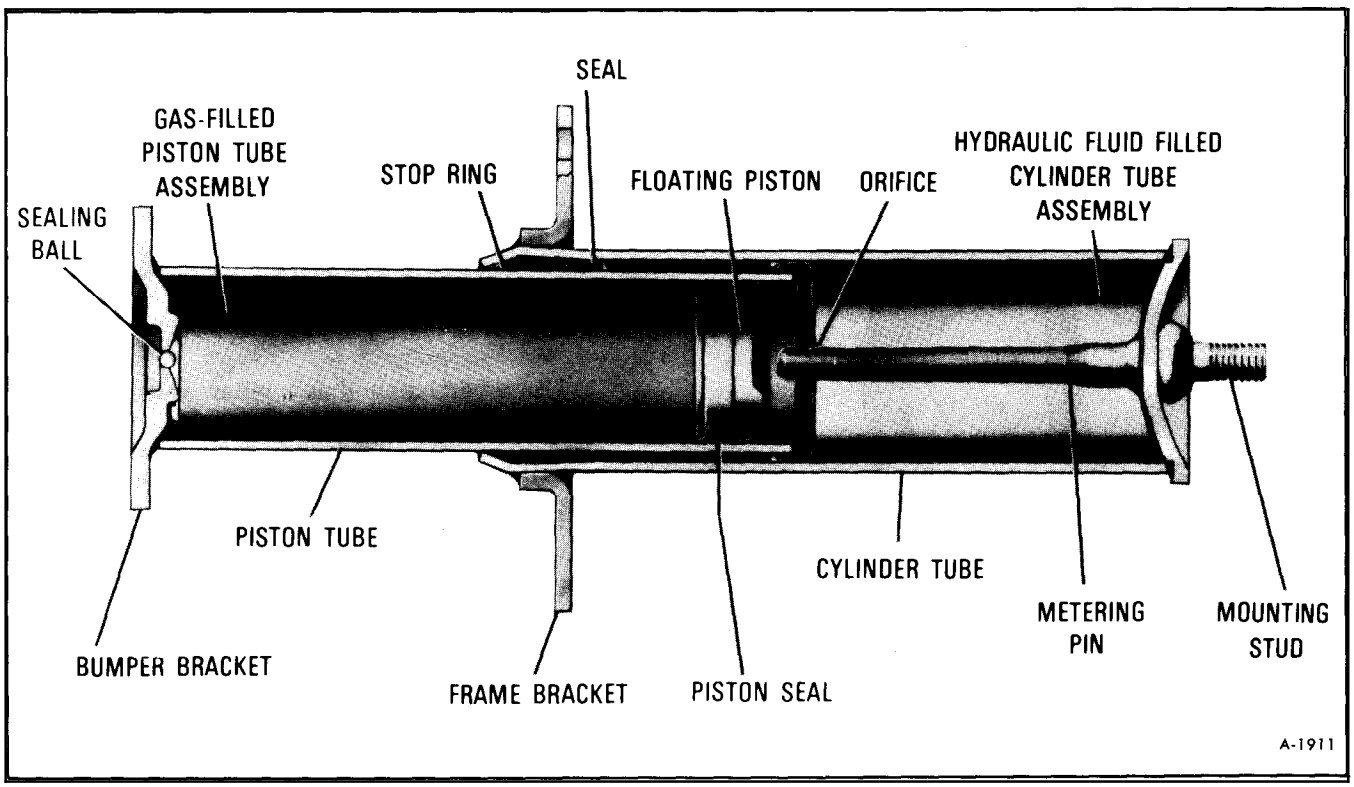

Figure 3–Energy Absorber–Extended Position

units prior to assembly on a vehicle or to check detached units that may have been removed for the purpose of making vehicle repairs after a collision.

A suitable arbor press should be used to compress the unit 3/8". Observe if it returns to its normal position. If not, this unit should be replaced.

INSPECTION

Recommendations for handling energy absorbers are:

1. Do not attempt to repair.

2. Do not weld.

3. Do not apply heat.

WARNING: BE SAFE! PROTECT YOUR EYES. WEAR APPROVED SAFETY GLASSES.

4. Relieve gas pressure prior to disposal of a unit. Make an indentation with a center punch in the small cylinder section of the energy absorber (recommend "WARNING" label on the unit as a target area). Then, use a 1/8-inch drill to penetrate the small cylinder and relieve gas pressure (See figure 4).

INSPECTION AFTER COLLISION

If the collision was so severe that the bumper did not return to its original position, the energy absorber(s) will require replacing.

WARNING: BE SAFE! PROTECT YOUR EYES. WEAR APPROVED SAFETY GLASSES.

1. Stand clear of the bumper.

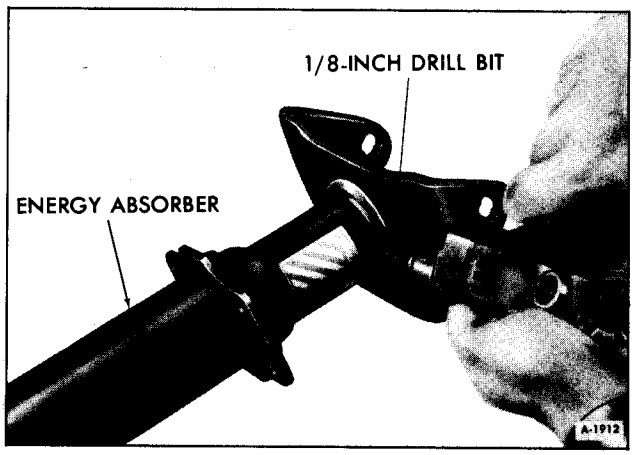

Figure 4—Relieving Pressure from Energy Absorber

2. Provide positive restraint, such as a chain or cable.

3. Relieve the pressure by drilling a 1/8-inch hole in the piston tube near the bumper bracket (See figure 4).

4. Remove the unit from the vehicle as described under "Replacement" only after the gas pressure has been relieved.

REPLACEMENT

IMPORTANT: Prior to replacement, be familiar with procedures given under "INSPECTION" of energy absorbers.

FRONT

1. Remove bumper by removing both bumper bracket thru bolts (See figure 5).

2. Remove the four bolts and nuts securing energy absorber to frame.

3. Secure new energy absorber to frame with bolts and nuts. Nut torque is 25-30 foot-pounds.

4. Install bumper on energy absorbers and secure with thru-bolts. Nut torque is 40-50 foot-pounds.

NOTE: Be sure lower bracket is properly installed (See figure 5) before tightening retaining nut.

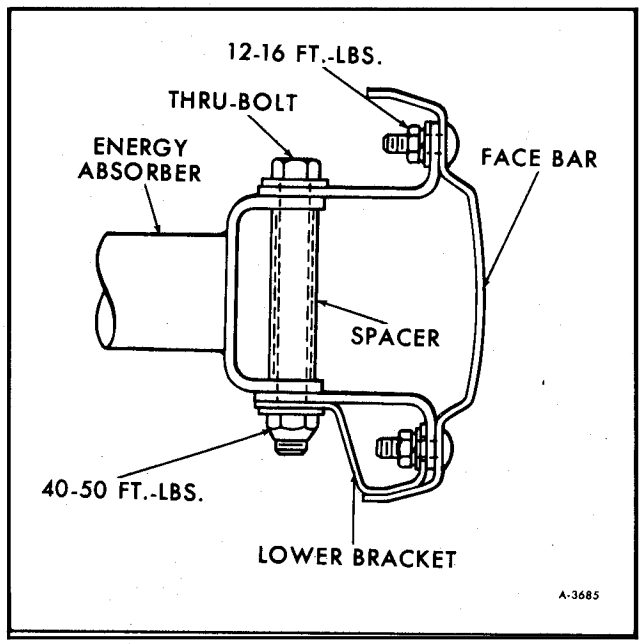

Figure 5—Front Bumper Bracket Mounting

REAR

1. Remove bumper by removing both bumper bracket thru bolts as shown in Figure 6.

2. Remove the four bolts and nuts securing energy absorber to frame.

3. Secure new energy absorber to frame with bolts and nuts. Nut torque is 25-30 foot-pounds.

4. Install bumper on energy absorbers and secure with thru bolts. Nut torque is 40-50 foot-pounds.

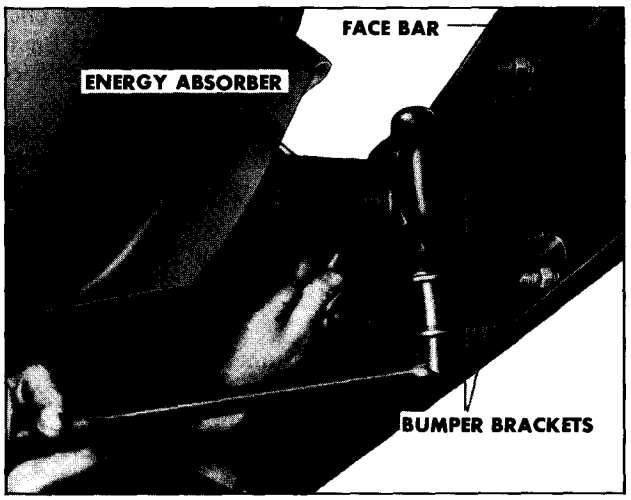

Figure 6—Removing Rear Bumper Bracket Thru-Bolts

BUMPER FACE BARS

NOTE: Front and rear bumper face bars are similarly mounted so replacement procedures are the same for front and rear. Also, due to the fact that both front and rear bumper face bars are two piece assemblies in some cases it may only be necessary to replace half of the face bar.

REPLACEMENT

1. Remove face bars by removing both bumper bracket thru- bolts (See figure 5).

2. Remove brackets and hardware from old face bar(s) and install on new face bar(s). Tighten bumper tie bar retaining nuts to 12-16 foot-pounds.

3. Once it has been determined that the energy absorbers are operative, install the face bar assembly on energy absorbers and secure with thru-bolts.