Cab Mounts, Short Conventional 60.00

Contents

Subject	Subject Number
General Information	050
Service Operations	
Front Mount Isolator Replacement	100
Rear Mount Solid Rubber Isolator Replacement	110
Rear Mount Hydraulic Isolator Replacement	120
Front Mount Replacement	130
Rear Solid Rubber Isolator Mount Replacement	140
Rear Hydraulic Isolator Mount Replacement	150
Specifications	400

General Information

The Short Conventional cab is supported at four points on the vehicle chassis. **See Fig. 1.**

The front of the cab has a cab mounting bracket at each side, directly above a cab support bracket attached to the outboard side of each frame rail. The rear of the cab is mounted on a pair of cab support brackets attached near the center of a frame crossmember.

Isolators, located at each of the four support points, cushion the cab from shock by absorbing energy as they are compressed. Each front support point has an upper and lower, solid, synthetic rubber isolator. Each rear support point has either an upper and lower solid rubber isolator or a single hydraulic isolator. Solid rubber upper isolators are fastened between the cab mounting brackets and cab support brackets, to compress when the cab and chassis are forced toward each other. Solid rubber lower isolators are attached to the bottom of the cab support brackets, to compress

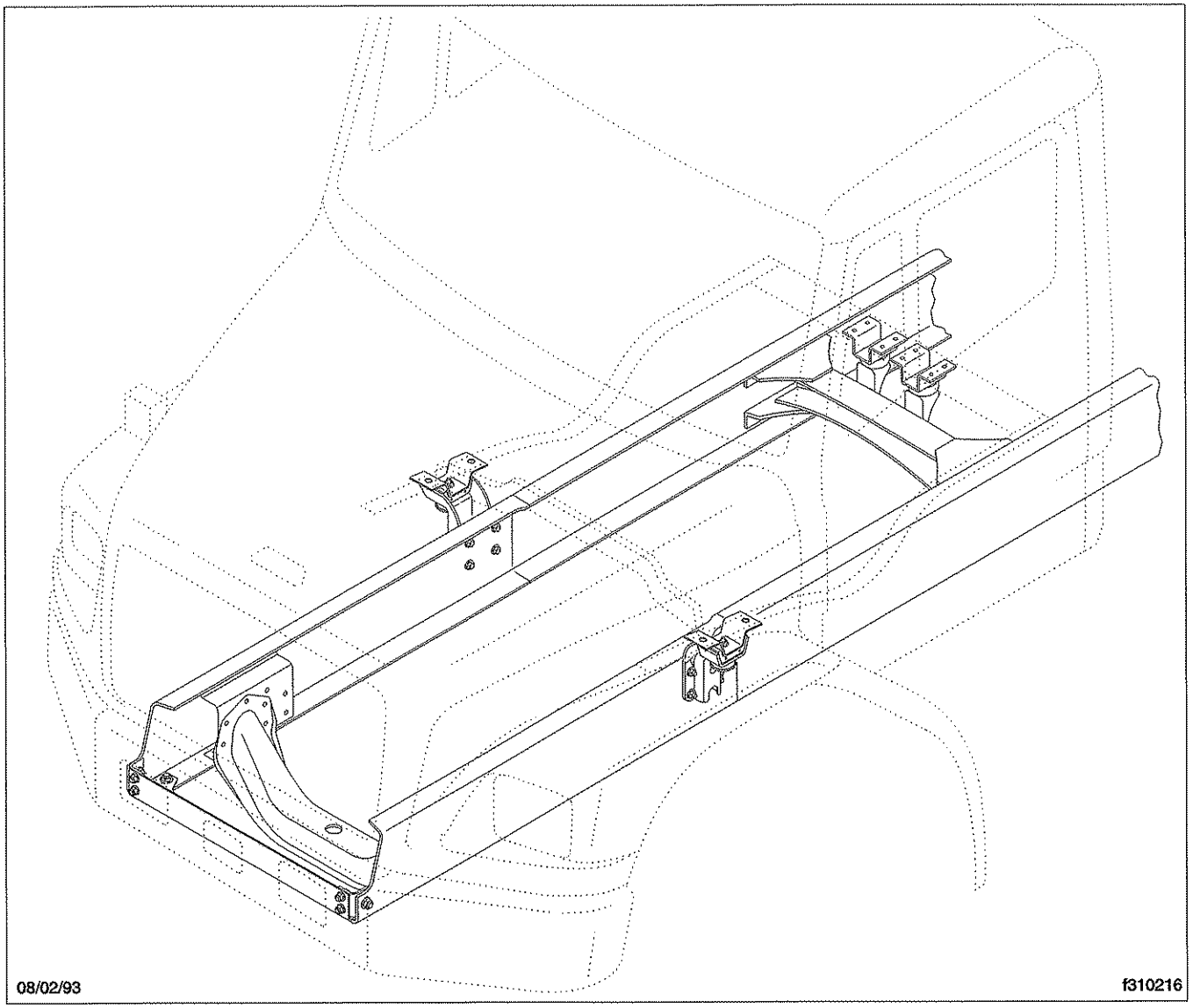


Fig. 1

General Information

when the cab and chassis are forced away from each other.

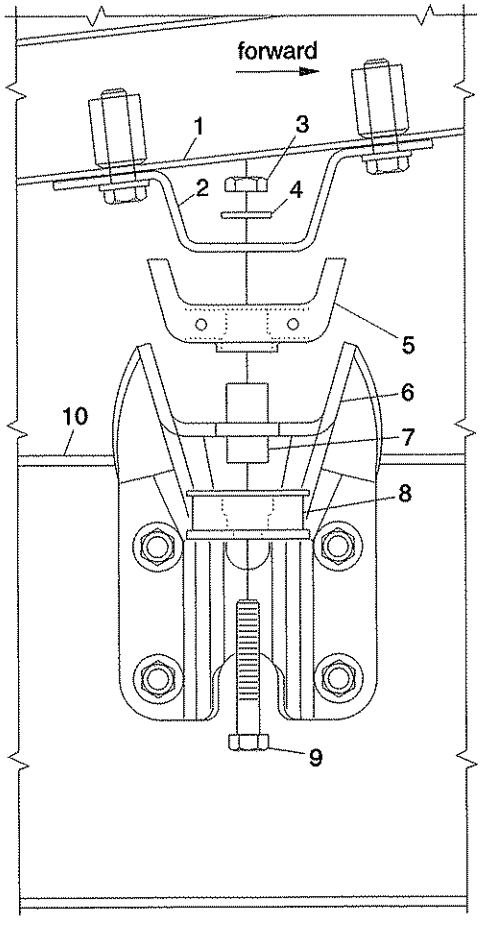
The hydraulic isolators are fastened between the cab mounting brackets and cab support brackets; they absorb energy both as they are compressed and stretched.

Front Mount Isolator Replacement

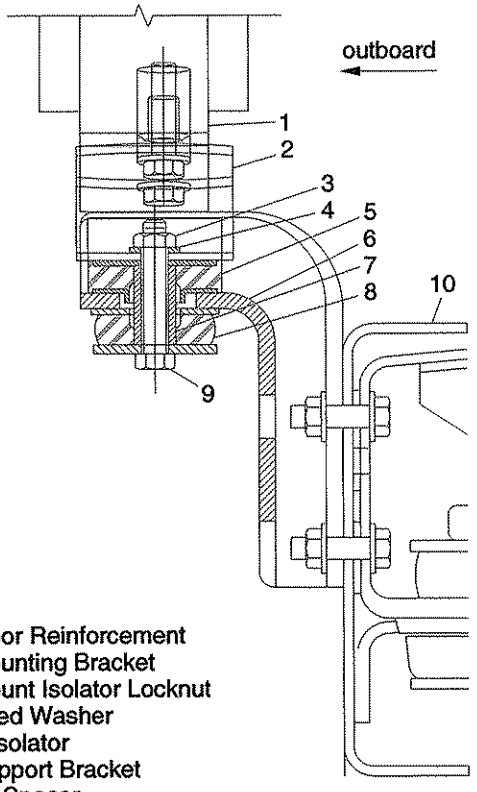
Replacement

NOTE: Don't replace only one isolator or a pair of isolators; as a set, replace the upper and lower isolators on both sides of the front of the vehicle.

1. Tilt the hood; refer to the vehicle driver's manual.
2. Remove the half fenders; **refer to the hood group** for instructions.
3. Remove the old isolators. **Refer to Fig. 1.**
   - 3.1 From each side of the cab, remove the locknut, hardened washer, bolt, lower isolator, and spacer.
   - 3.2 Use a jack to raise the front of the cab about 13 mm (1/2 in).
   - 3.3 Remove the upper isolator from each cab support bracket.
4. Install the new isolators. **Refer to Fig. 1.**
   - 4.1 Inspect the original locknuts, hardened washers, bolts, and spacers. If any wear, distortion, or other damage is found, replace the part.
   - 4.2 Install the new upper isolator in each cab support bracket.



RIGHT–SIDE VIEW



1. Cab Floor Reinforcement
2. Cab Mounting Bracket
3. Cab Mount Isolator Locknut
4. Hardened Washer
5. Upper Isolator
6. Cab Support Bracket
7. Isolator Spacer
8. Lower Isolator
9. Cab Mount Isolator Bolt
10. Right–Hand Frame Rail

08/02/93 f310214

Fig. 1

Front Mount Isolator Replacement

4.3 Lower the cab until the cab mount brackets just contact the top of the upper isolators.

4.4 Install a spacer and bolt in one of the new lower isolators, then install these parts at the bottom of one of the cab support brackets. Install a hardened washer and locknut.

Repeat this for the other side of the cab.

4.5 Lower the cab, and remove the jack.

4.6 Tighten the locknuts 92 N·m (68 lbf·ft).

5. Install the half fenders; **refer to the hood group** for instructions.

Rear Mount Solid Rubber Isolator Replacement

Replacement

NOTE: Don't replace only one isolator or a pair of isolators; as a set, replace the upper and lower isolators on both sides of the rear of the vehicle.

1. Tilt the hood; refer to the vehicle driver's manual.
2. Remove the old isolators. **Refer to Fig. 1.**
   - 2.1 From each side of the cab, remove the locknut, upper hardened washer, bolt, lower isolator, and spacer.
   - 2.2 Use a jack to raise the rear of the cab about 25 mm (1 in).
   - 2.3 Remove the upper isolator and lower hardened washer from each cab support bracket.
3. Install the new isolators. **Refer to Fig. 1.**
   - 3.1 Inspect the original locknuts, hardened washers, bolts, and spacers. If any wear, distortion, or other damage is found, replace the part.
   - 3.2 Install the new upper isolator and the lower hardened washer on each cab support bracket.
   - 3.3 Lower the cab until the cab mount brackets just contact the top of the upper isolators.
   - 3.4 Install a spacer and bolt in one of the new lower isolators, then install these parts at the bottom of one of the cab support brackets. Install a hardened washer and locknut.

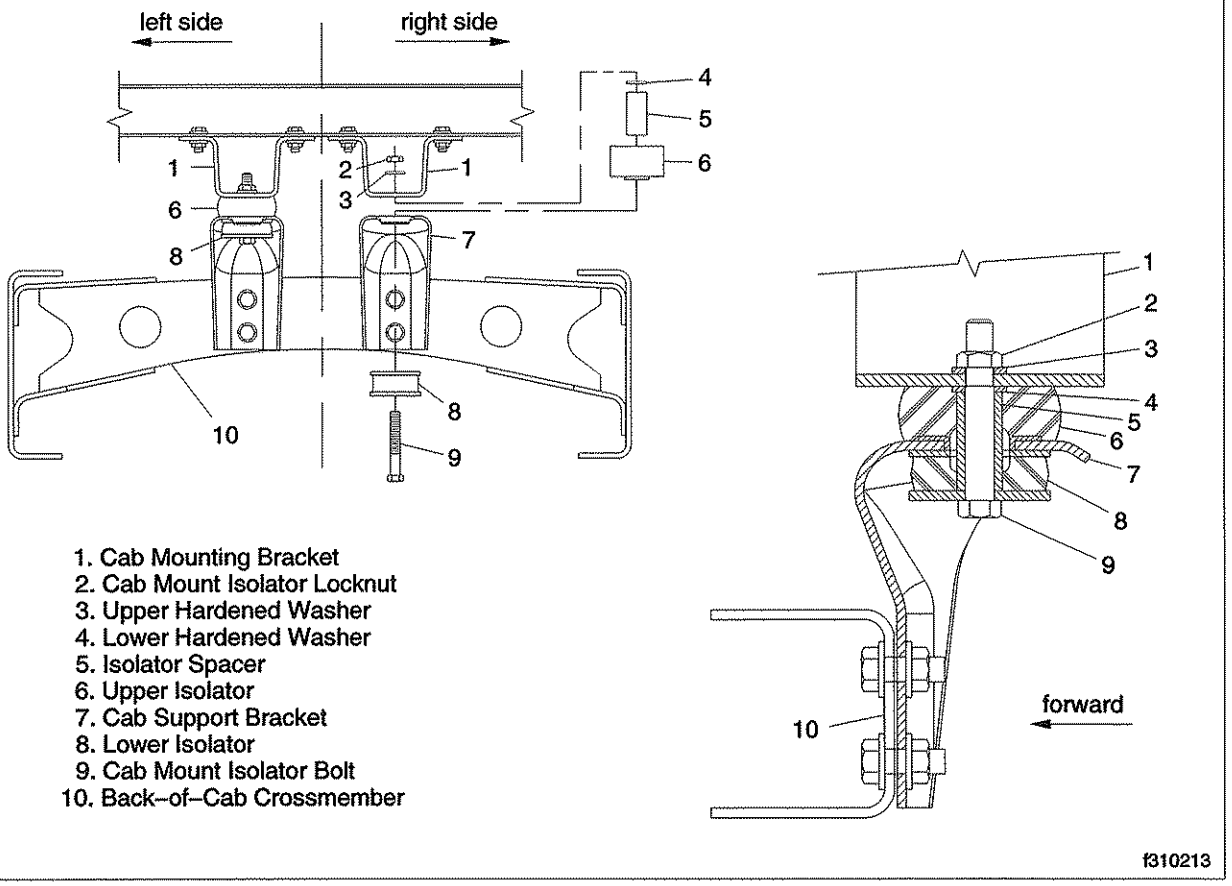


Fig. 1

Rear Mount Solid Rubber Isolator Replacement

Repeat this for the other cab support bracket.

3.5 Lower the cab, and remove the jack.

3.6 Tighten the locknuts 92 N·m (68 lbf·ft).

Rear Mount Hydraulic Isolator Replacement

Replacement

NOTE: Don't replace only one isolator; replace both isolators at the rear of the vehicle as a set.

1. Tilt the hood; refer to the vehicle driver's manual.
2. Remove the old isolators. **Refer to Fig. 1.**
   - 2.1 From each side of the cab, remove the locknut and hardened washer from the upper and lower studs on the isolator.
   - 2.2 Using a jack, raise the rear of the cab about 25 mm (1 in).
   - 2.3 Remove the isolator from each cab support bracket.
3. Install the new isolators. **Refer to Fig. 1.**
   - 3.1 Inspect the original locknuts and hardened washers. If any wear, distortion, or other damage is found, replace the part.
   - 3.2 Install each new isolator with the blue-colored stud pointing up.
   - 3.3 Lower the cab and remove the jack.
   - 3.4 Install the hardened washers and locknuts. Tighten the locknuts 92 N·m (68 lbf·ft).

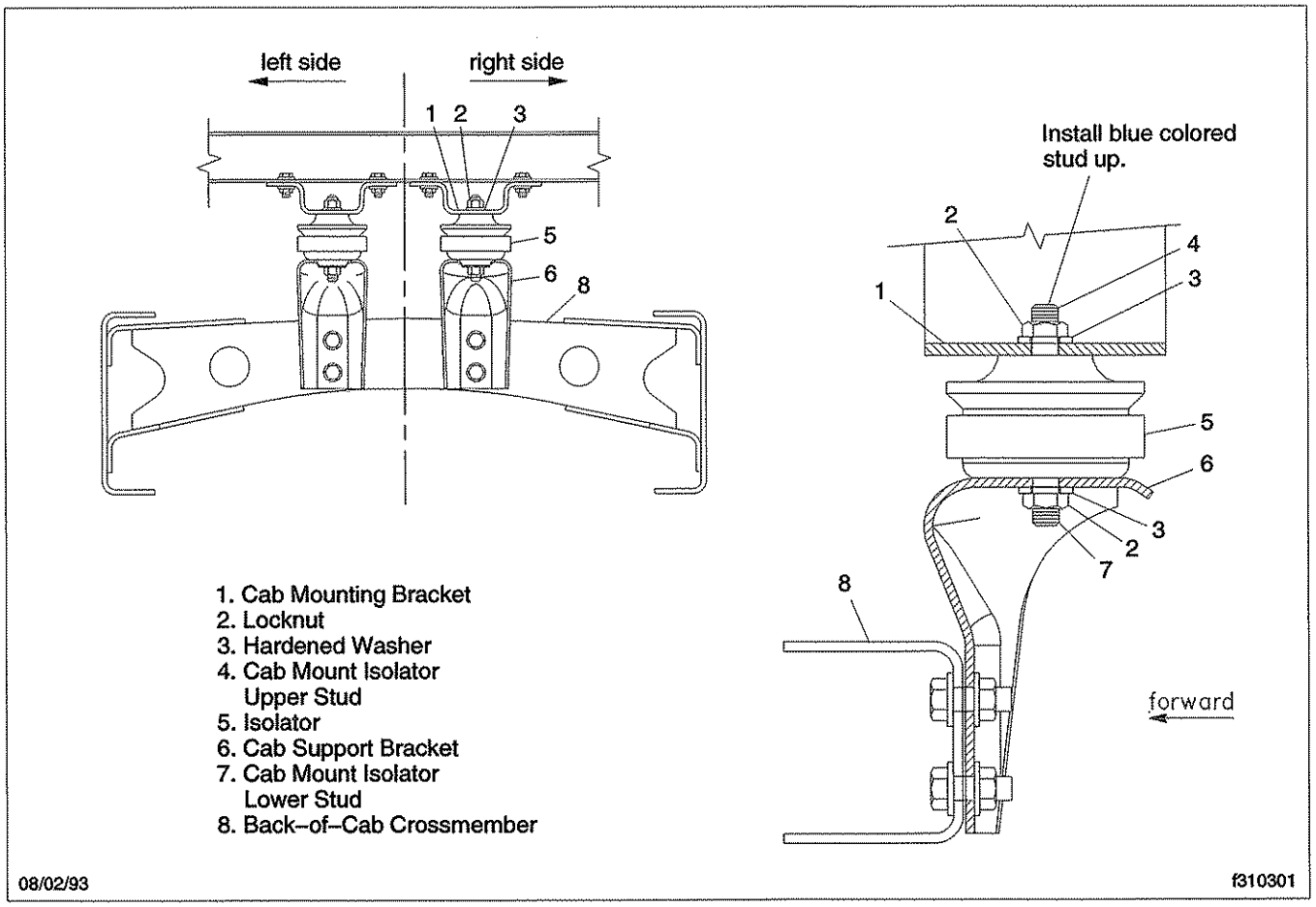


Fig. 1

Front Mount Replacement

Replacement

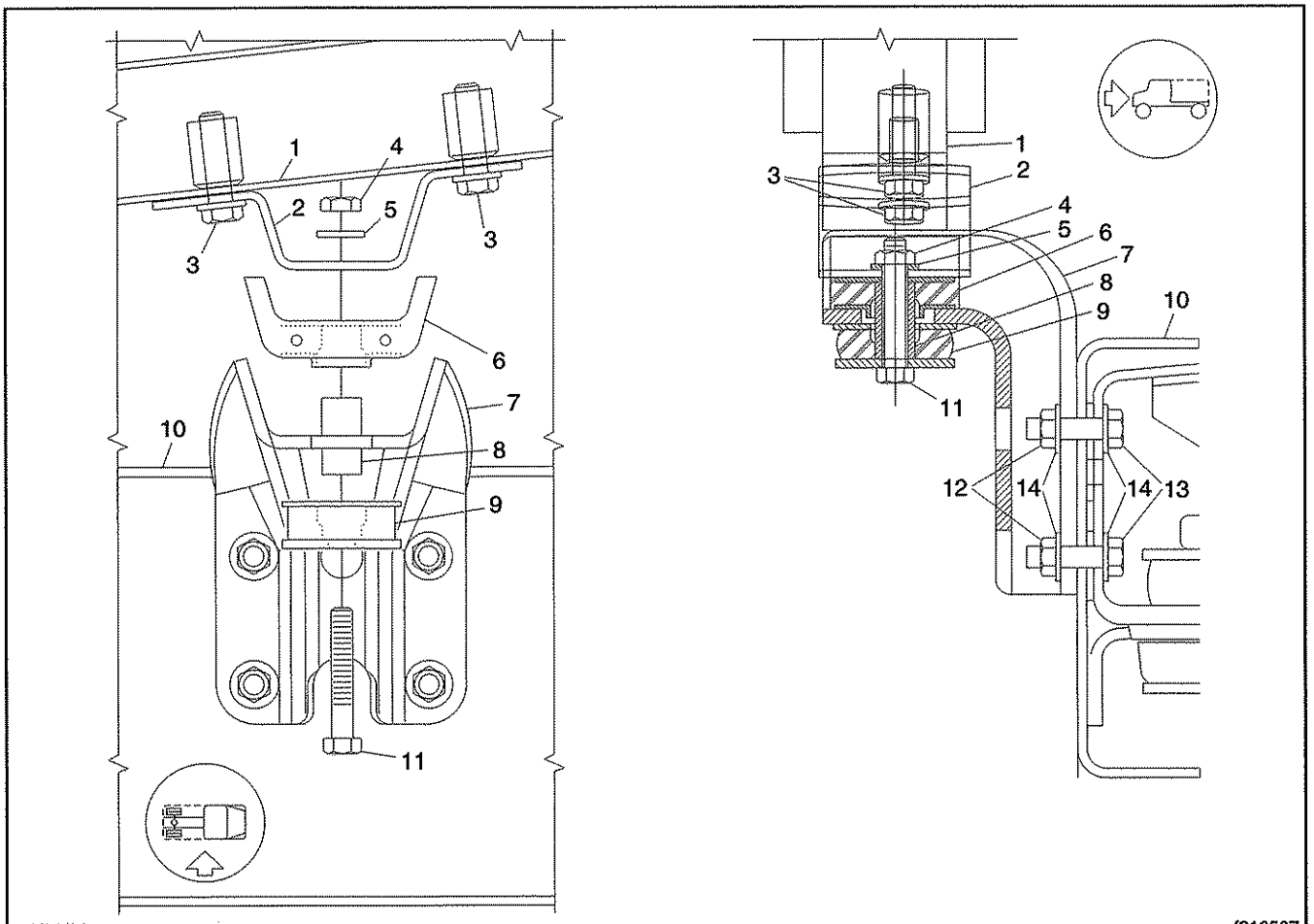
NOTE: Don't replace only one front cab mount; replace both front mounts as a set.

Front Cab Mounts

1. Park the vehicle on a level surface. Apply the parking brake; then chock the tires.
2. Tilt the hood; see the vehicle driver's manual.
3. Remove the half fenders; see **Group 88** for instructions.
4. Remove the cab mount assembly.
   - 4.1 Remove the isolator bolt. See **Fig. 1.**
   - 4.2 Place a bottle jack between the frame rail and cab deck; then raise the cab about 1-1/2 inches (40 mm).

   NOTE: The four frame-rail mounting bracket bolts go through the engine mounts.

   - 4.3 Place a jack under the transmission bell housing; then jack up the bell housing just enough to support the engine.



1. Cab Floor Reinforcement
2. Cab Mounting Bracket
3. Capscrew and Hardened Washer
4. Isolator Locknut
5. Hardened Washer
6. Upper Isolator
7. Cab Support Bracket
8. Isolator Spacer
9. Lower Isolator
10. Frame Rail
11. Isolator Bolt
12. Locknut
13. Capscrew
14. Hardened Washer

Fig. 1, Early-Style Front Cab Mount Assembly

Front Mount Replacement

4.4 Remove the four bolts from the cab support bracket along with the bracket.

4.5 Remove two capscrews from the cab mounting bracket along with the bracket.

5. Install the cab mount assembly. See **Fig. 1.**

5.1 Apply Loctite® 272 or equivalent to the cab mounting bracket capscrews. With the new cab mounting bracket separated from the cab mount assembly, position the cab mounting bracket; then install the two capscrews with washers. Tighten each capscrew 75 lbf·ft (100 N·m).

5.2 Position the cab support bracket; then install the four capscrews, locknut, and hardened washers in the lower bracket assembly. Tighten each capscrew 190 lbf·ft (260 N·m).

5.3 Position the upper isolator on the cab support bracket.

5.4 Lower the cab until the cab mounting bracket just contacts the top of the upper isolator.

5.5 Install a spacer and bolt and hardened washer in the lower isolator; then install these parts at the bottom of the cab support bracket. Install the hardened washer and locknut.

6. Install the half fenders; see **Group 88** for instructions.

7. Remove chocks from the tires.

FL106 and FL112 Front Cab Mounts

NOTE: FL106 and FL112 front cab mounts built after July 7, 1995 are slightly different. See **Fig. 2.**

1. Park the vehicle on a level surface. Apply the parking brake; then chock the tires.

2. Tilt the hood; see the vehicle driver's manual.

3. Remove the half fenders; see **Group 88** for instructions.

4. Remove the cab mount assembly.

4.1 Remove the isolator bolt. See **Fig. 3.**

4.2 Place a bottle jack between the frame rail and cab deck; then raise the cab about 1-1/2 inches (40 mm).

4.3 Place a jack under the transmission bell housing; then jack up the bell housing just enough to support the engine.

NOTE: Four of the five cab support bracket bolts go through the engine mount.

4.4 Remove the five bolts from the cab support bracket along with the bracket itself.

4.5 Remove three capscrews from the cab support bracket along with the bracket itself.

5. Install the new cab mount assembly. See **Fig. 3.**

5.1 Apply Loctite® 272 or equivalent to the cab mounting bracket M14–1.5 capscrews. With the cab mounting bracket separated from the cab mount assembly, position the cab mounting bracket; then install three (driver's side) or two (passenger's side) capscrews with washers. Tighten each capscrew 75 lbf·ft (100 N·m).

5.2 Position the cab support bracket; then install the five capscrews, locknuts and hardened washers. Tighten each capscrew 190 lbf·ft (260 N·m).

5.3 Position the upper isolator on the cab support bracket.

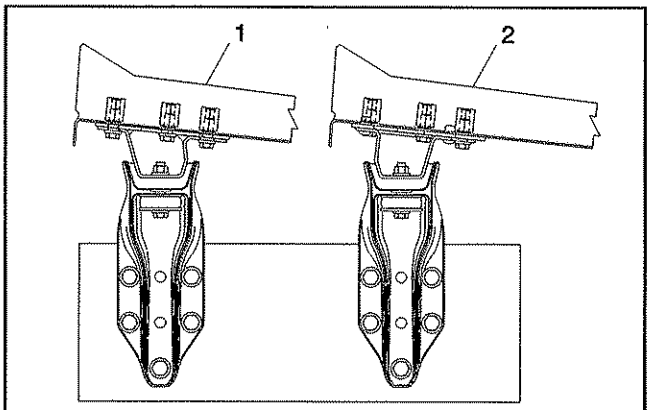
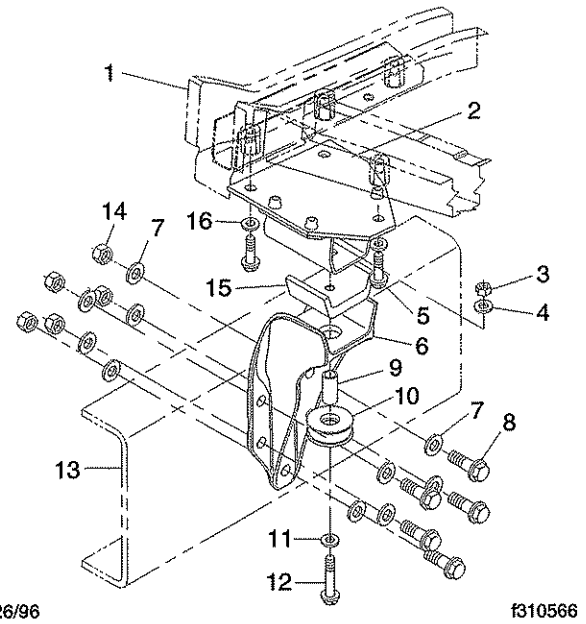


Fig. 2, Driver's-Side Cab Mount Assemblies, FL106 and FL112 Vehicles Built After July 7, 1995 (passenger's side similar)



1. Cab Support
2. Cab Mounting Bracket
3. Isolator Locknut
4. Hardened Washer
5. M14–1.5 Capscrew
6. Cab Support Bracket
7. Hardened Washer
8. 5/8–11 Capscrew
9. Isolator Spacer
10. Lower Isolator
11. Hardened Washer
12. Isolator Bolt
13. Frame Rail
14. 5/8–11 Locknut
15. Upper Isolator
16. Hardened Washer

Fig. 3, Driver's-Side Cab Mount Assembly, FL106 and FL112 Vehicles Built After July 7, 1995 (passenger's side similar)

5.4 Lower the cab until the cab mount bracket just contacts the top of the upper isolator.

5.5 Install the isolator spacer, isolator bolt and hardened washer in the lower isolator; then install these parts at the bottom of the cab support bracket. Install the hardened washer and locknut.

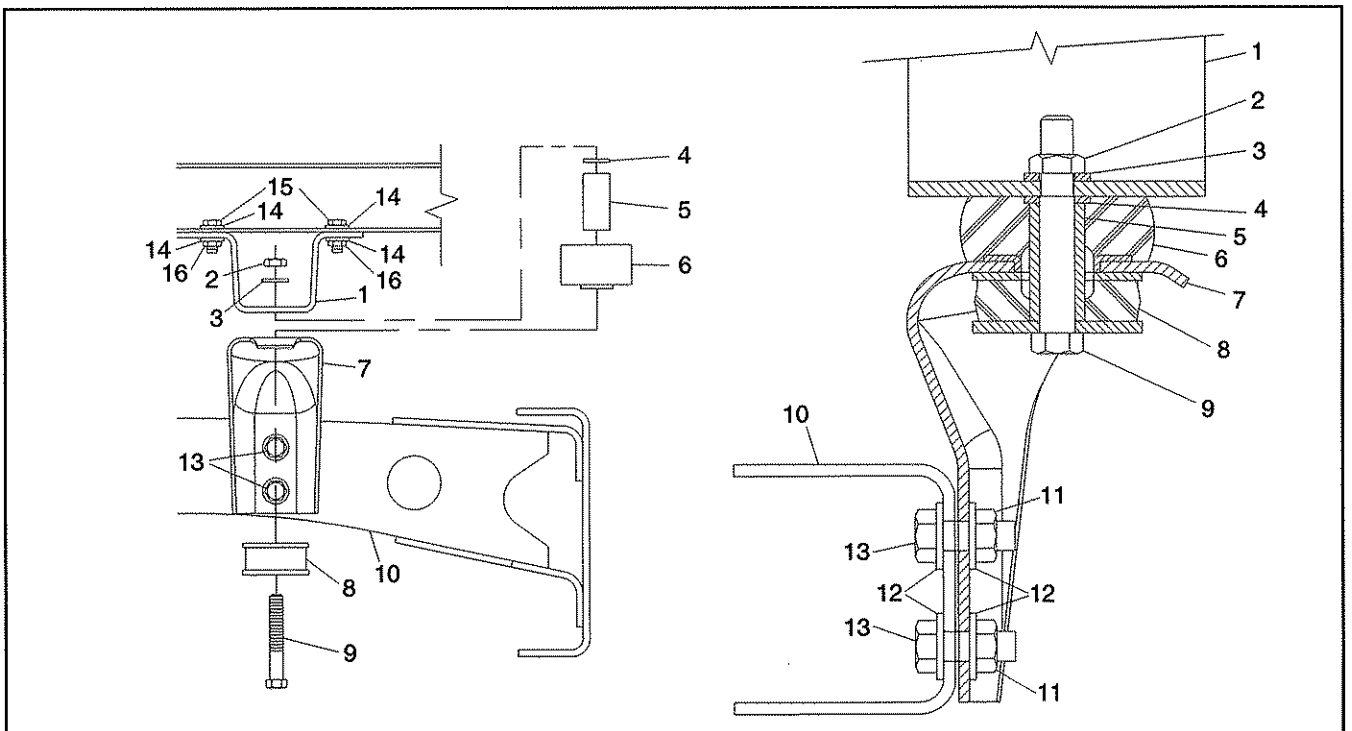
6. Repeat procedure for the other side of the cab.
7. Lower the cab, and remove the jack under the cab and the jack under the bell housing.
8. Install the half fenders; see **Group 88** for instructions.
9. Remove the chocks from the tires.

Rear Solid Rubber Isolator Mount Replacement

Replacement

NOTE: Don't replace only one rear cab mount; replace both mounts at the rear of the vehicle as a set.

1. Park the vehicle on a level surface. Apply the parking brake; then chock the tires.
2. Tilt the hood; refer to the vehicle driver's manual.
3. Remove the cab mounts. See **Fig. 1.**
   - 3.1 From each side of the cab, remove the locknut, upper hardened washer, isolator bolt, lower isolator, and isolator spacer.
   - 3.2 Using a jack, raise the rear of the cab about 1 inch (25 mm).
   - 3.3 Remove the upper isolator and lower hardened washer from each cab support bracket.
   - 3.4 Remove the two capscrews, hardened washers, and locknuts from the cab support bracket along with the cab support brackets.
   - 3.5 Remove the two cab mounting bracket capscrews, hardened washers and locknuts along with each cab mounting bracket.
4. Install the new rear cab mounts. See **Fig. 1.**
   - 4.1 Inspect the original locknuts and hardened washers. If any wear, distortion, or other damage is found, replace the part.



11/21/96 f310568

1. Cab Mounting Bracket
2. Cab Mount Isolator Locknut
3. Upper Hardened Washer
4. Lower Hardened Washer
5. Isolator Spacer
6. Upper Isolator
7. Cab Support Bracket
8. Lower Isolator
9. Cab Mount Isolator Bolt
10. Back-of-Cab Crossmember
11. 1/2–13 Locknut
12. Hardened Washer
13. 1/2–13 Capscrew
14. Hardened Washer
15. 7/16–14 Capscrew
16. 7/16–14 Locknut

Fig. 1, Rear Rubber Isolator Cab Mount

Rear Solid Rubber Isolator Mount Replacement

4.2 Install the cab mounting brackets, capscrews, hardened washers and locknuts. Tighten each capscrew to 65 lbf·ft (90 N·m).

4.3 Install the cab support brackets, capscrews, hardened washers and locknuts. Tighten each capscrew to 95 lbf·ft (130 N·m).

4.4 Install the upper isolator and lower hardened washer at each cab support bracket.

4.5 Lower the cab until the cab mount brackets just contact the top of the upper isolators.

4.6 Install a spacer and bolt in one of the new lower isolators, then install these parts at the bottom of one of the cab support brackets. Install a hardened washer and locknut.

Repeat this for the other cab support bracket.

4.7 Lower the cab, and remove the jack.

4.8 Tighten the upper and lower isolator stud locknuts 65 lbf·ft (90 N·m).

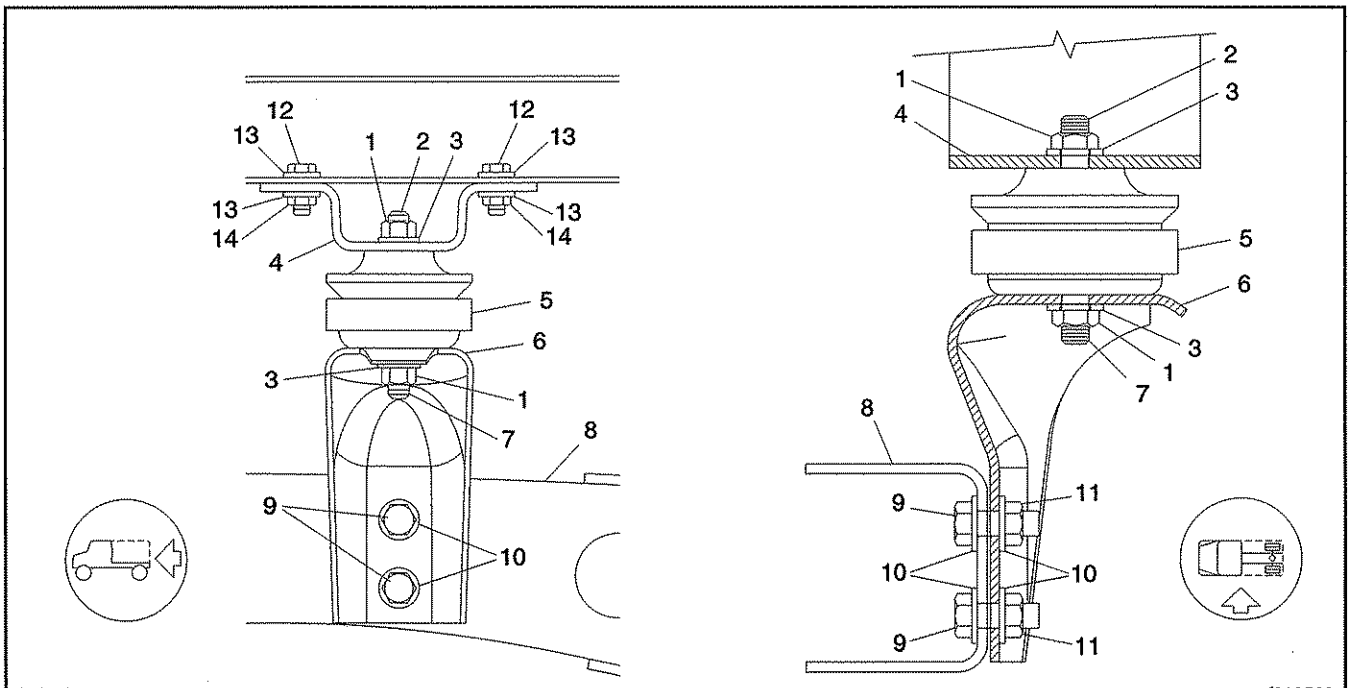
4.9 Remove chocks from the tires.

Rear Hydraulic Isolator Mount Replacement

Replacement

NOTE: Don't replace only one rear cab mount; replace both mounts at the rear of the vehicle as a set.

1. Park the vehicle on a level surface. Apply the parking brake; then chock the tires.
2. Tilt the hood; see the vehicle driver's manual.
3. Remove the cab mounts. See **Fig. 1.**
   - 3.1 From each side of the cab, remove the locknut and hardened washer from the upper and lower studs on the isolator.
   - 3.2 Using a jack, raise the rear of the cab about 1 inch (25 mm).
   - 3.3 Remove the isolator from each cab support bracket.
   - 3.4 Remove the two capscrews, hardened washers and locknuts from the cab support bracket along with the cab support brackets.
   - 3.5 Remove the two cab mounting bracket capscrews, hardened washers and locknuts along with each cab mounting bracket.
4. Install the new rear cab mounts. See **Fig. 1.**
   - 4.1 Inspect the original locknuts and hardened washers. If any wear, distortion, or other damage is found, replace the part.
   - 4.2 Install the cab mounting brackets, capscrews, hardened washers and locknuts. Tighten each capscrew to 65 lbf·ft (90 N·m).
   - 4.3 Install the cab support brackets, capscrews, hardened washers and locknuts. Tighten each capscrew to 95 lbf·ft (130 N·m).
   - 4.4 Install each new isolator with the blue-colored stud pointing up.



1. Locknut
2. Cab Mount Isolator Upper Stud
3. Hardened Washer
4. Cab Mounting Bracket
5. Isolator
6. Cab Support Bracket
7. Cab Mount Isolator Lower Stud
8. Back-of-Cab Crossmember
9. 1/2–13 Capscrew
10. Hardened Washer
11. 1/2–13 Locknut
12. 7/16–14 Capscrew
13. Hardened Washer
14. 7/16–14 Locknut

Fig. 1, Rear Hydraulic Isolator Cab Mount

Rear Hydraulic Isolator Mount Replacement

4.5 Lower the cab and remove the jack.

4.6 Install the hardened washers and isolator stud locknuts. Tighten the locknuts 68 lbf·ft (90 N·m).

4.7 Remove chocks from the tires.

Specifications

Fastener Torques			
Description	**Size**	**Grade**	**Torque lbf·ft (N·m)**
Front Isolator Locknut	1/2–13	8	68 (92)
Rear Solid Rubber Isolator Locknut	1/2–13	8	68 (92)
Rear Hydraulic Isolator Locknut	1/2–13	8	68 (92)
Rear Cab Mounting Bracket Capscrew	7/16–14	8	65 (88)
Rear Cab Support Bracket Hexnut	1/2–13	8	68 (92)
Front Cab Mounting Bracket Hexnut	1/2–13	8	68 (92)
Front Cab Support Bracket Capscrew	5/8–11	8	190 (258)

Table 1, Fastener Torques

Contents

Subject	Subject Number
General Description	050
Service Operations	
Windshield Removal and Installation	100
Rear Window Removal and Installation	110
Specifications	400

General Description

The windshield is a single curved piece of glass, available clear or tinted. Both types include a permanent, black band at the base of the windshield to mask dash components.

The cab rear windows are two flat pieces of glass, available clear or tinted. One-piece rubber retainers hold the rear windows and the windshield in the cab and seal the joints between the glass and the cab shell.

Windshield Removal and Installation

Removal (Refer to Fig. 1)

⚠ CAUTION

CAUTION: When replacing a cracked windshield glass, it is very important that you find the cause of glass breakage, and correct the condition before installing a new windshield. If not removed, a small obstruction or high spot somewhere around the windshield opening may crack or break the replacement windshield, especially when the glass is exposed to high winds, pressure, temperature extremes, and vehicle motion.

IMPORTANT: At least two people are required to remove a windshield.

1. Protect the paint finish and instrument panel inside the cab. Using tape and paper around the windshield opening and outside surfaces, lay suitable covering across the hood and fenders. Before removing the windshield, mark the windshield retainer and the windshield opening flange with the location of the break on the edge of the window.
2. Remove the windshield wiper arms.
   - 2.1 Remove the nut that holds each wiper arm on each wiper motor splined pivot shaft.
   - 2.2 Gently pull each wiper arm off its pivot shaft.

IMPORTANT: When handling the windshield glass, wear heavy protective gloves to prevent cutting your hands.

3. If replacing the windshield glass but not the retainer **(refer to Fig. 2)** loosen the lip of the windshield retainer from the flange along the top and at the sides by applying controlled pressure to the edge of the glass. At the same time, use a putty knife to lift the retainer over the flange. Remove the windshield.

   If replacing the windshield retainer or both the glass and the retainer, cut off the lip of the old retainer from the inside of the cab before applying pressure to the edge of the glass. **Refer to Fig. 2.** This will ease removal of the glass.

Installation

⚠ CAUTION

CAUTION: When handling the windshield glass, use care not to nick or splinter the edges of the glass. Chipped edges could cause future breaks.

IMPORTANT: At least two people are required to install a windshield.

1. Remove all sealant from the flange around the windshield opening. **See Fig. 3.**
2. If a stress crack occurred, thoroughly check the windshield opening flange and retainer before installing a replacement windshield.

   Check for the following conditions at the previously marked point of fracture on the windshield opening flange:

   - Chipped edges on the glass.
   - High spots or obstructions in the flange and surrounding surfaces.
   - High spots or obstructions in the windshield retainer.

   Correct any areas on the flange that need to be fixed.
3. Install the retainer on the glass.

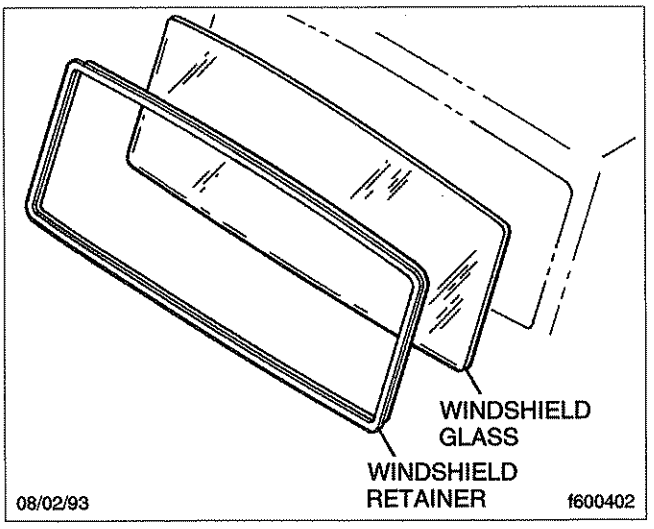


Fig. 1

Windshield Removal and Installation

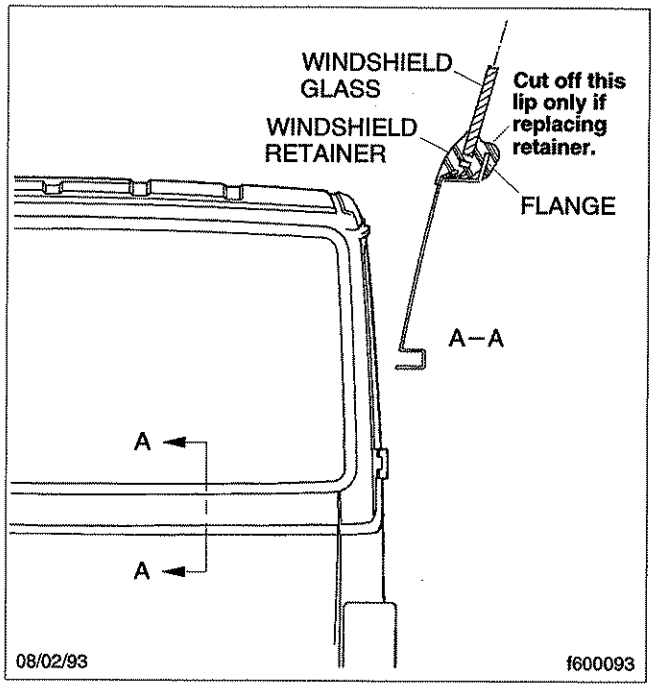


Fig. 2

4. Install a 3-mm (1/8-inch) nylon cord around the edge of the retainer **(refer to Fig. 4),** leaving a loop at the top and loose ends at the bottom.
5. Make sure the protective covering is over the front fenders and hood.

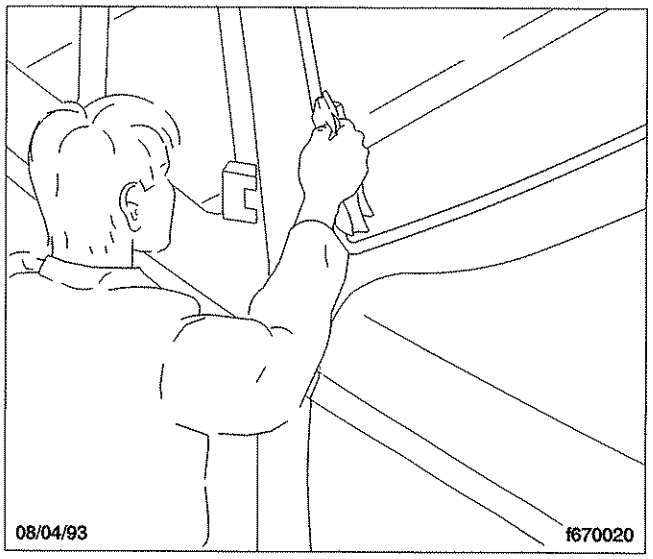


Fig. 3

6. Place the windshield and retainer assembly in the windshield opening.
7. With one person lightly pushing in on the windshield, have another person pull on the loose ends of the cord until each is within 51 mm (2 inches) of its respective upper corner. **See Fig. 5.**
8. Finish seating the corners by pulling both ends of the cord at the same time at each corner. This will position the upper corners.
9. Be sure the windshield and retainer are properly positioned in relation to each other.
10. Install the windshield wiper arms.
    - 10.1 Place each arm on its splined pivot shaft. Be careful the splines within the hole at the base of the arm are aligned with the splines on the pivot shaft. **See Fig. 6.**
    - 10.2 Install and tighten the wiper arm nuts 19 N·m (14 lbf·ft).

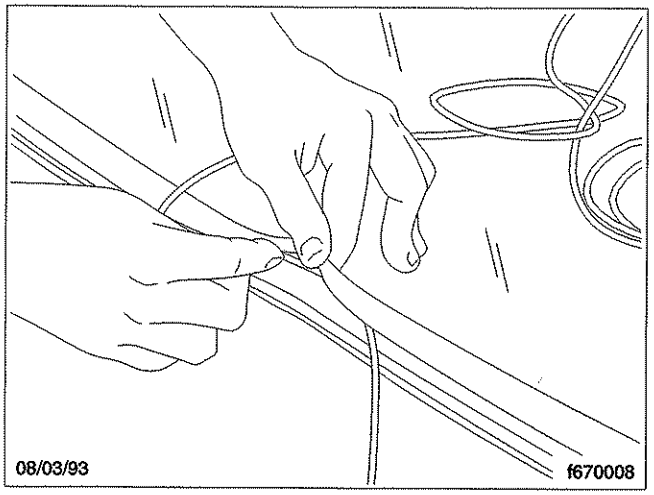


Fig. 4

Windshield Removal and Installation

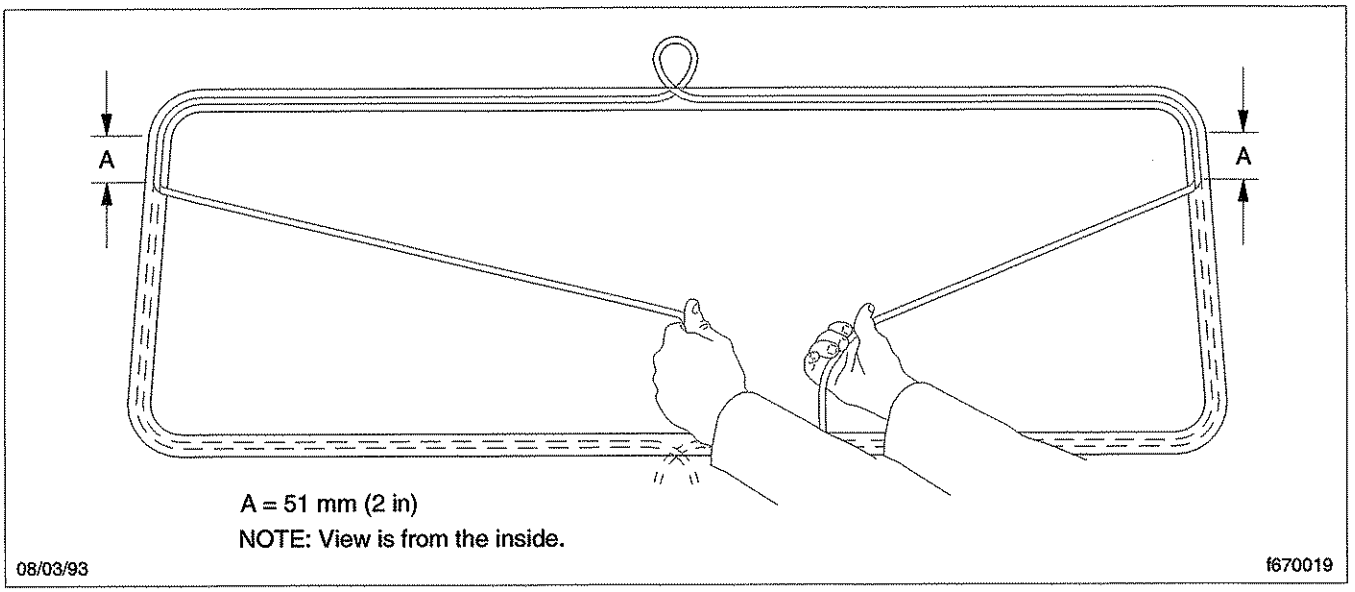


Fig. 5

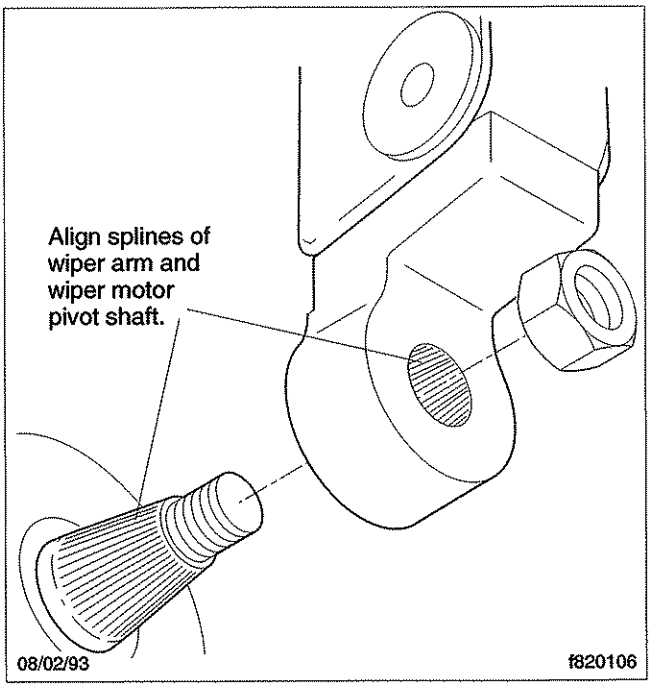


Fig. 6

Rear Window Removal and Installation

Removal (Refer to Fig. 1 and Fig. 2)

⚠ CAUTION

CAUTION: When replacing a broken rear window, it is very important that you find the cause of glass breakage, and correct the condition before installing a new window. If not removed, a small obstruction or high spot somewhere around the window opening may break the replacement glass, especially when it is exposed to high winds, pressure, temperature extremes, and vehicle motion.

1. Protect the paint finish and cab interior, using tape and paper around the window opening and outside surfaces. Before removing the window, mark the weather-seal retainer and the opening with the location of the break at the edge of the window.

IMPORTANT: When handling the window glass, wear heavy protective gloves to prevent cutting your hands.

2. Loosen the lip of the weather-seal retainer from the flange along the top and at the sides by applying firm, controlled pressure to the edge of the glass. At the same time, use a putty knife to lift the retainer over the window opening flange. Remove the window glass.

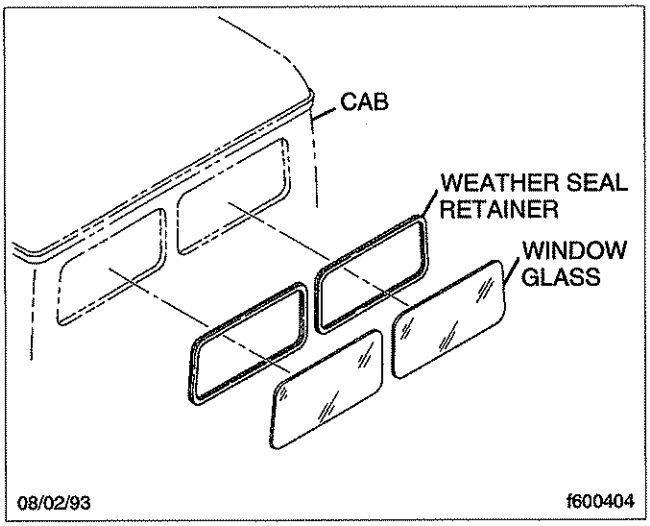


Fig. 1

Installation

⚠ CAUTION

CAUTION: When handling the window glass, use care not to nick or splinter the edges of the glass. Chipped edges could cause future breaks.

IMPORTANT: Two people are required to install a rear window glass.

Thoroughly check the window opening flange and the weather-seal retainer for alignment and roughness before installing a replacement glass. To check the alignment, hold the replacement glass up to the opening and use it as a guide.

1. Remove all sealant from the window opening flange.
2. Check for the following conditions at the previously marked point of fracture on the window opening flange:
   - Chipped edges on the glass.
   - High spots or obstructions in the window opening flange.
   - High spots or obstructions in the weather-seal retainer.

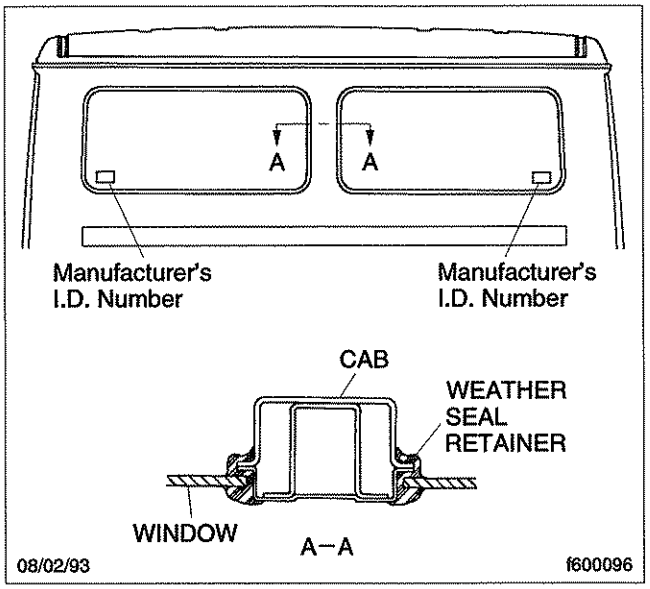


Fig. 2

Rear Window Removal and Installation

Correct any areas on the window opening that need to be fixed.

3. With the window supported and centered in the opening, check the relationship of the glass to the opening.
4. Mark any areas on the flange to be fixed, remove the glass, and correct as necessary.
5. Install the retainer on the glass.
6. Install a 3-mm (1/8-inch) nylon cord around the edge of the retainer, leaving a loop at the top and loose ends at the bottom. **See Fig. 3.**

NOTE: Make sure the reinforcement plate **(see Fig. 4 and Fig. 5)** is in place between the interior trim panel and the cab back skin along the lower edge of the window opening.

7. Place the window and retainer assembly in the opening.

   The rear window glass is not a rectangle: The upper edge of the glass is slightly shorter than the lower edge. If installing a left-side (driver's-side) window, locate the glass in the opening so that the manufacturer's I.D. number is in the lower left corner. If installing a right-side (passenger's side) window, locate the glass in the opening so that the manufacturer's I.D. number is in the lower right corner. **Refer to Fig. 2.**

8. With one person lightly pushing in on the window, have another person pull on the loose ends of the cord until each is within 51 mm (2 inches) of its respective upper corner.
9. Pull on the loop until the cord is within 51 mm (2 inches) of the upper corners.
10. Finish seating the corners by pulling both ends of the cord at the same time at each corner. This will position the upper corners.
11. Be sure the window and retainer are correctly positioned in relation to each other.

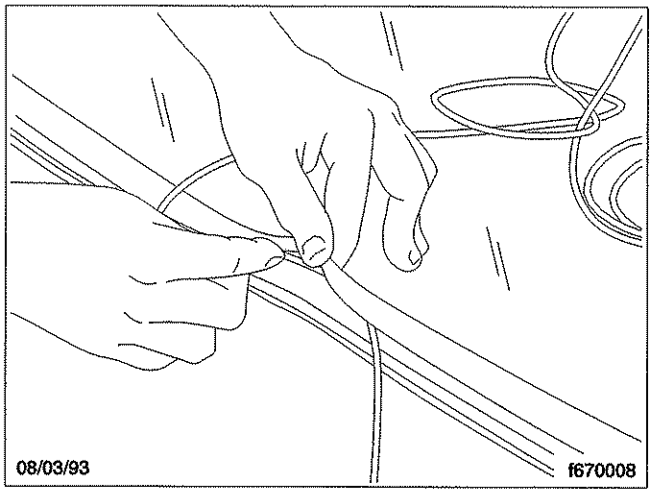


Fig. 3

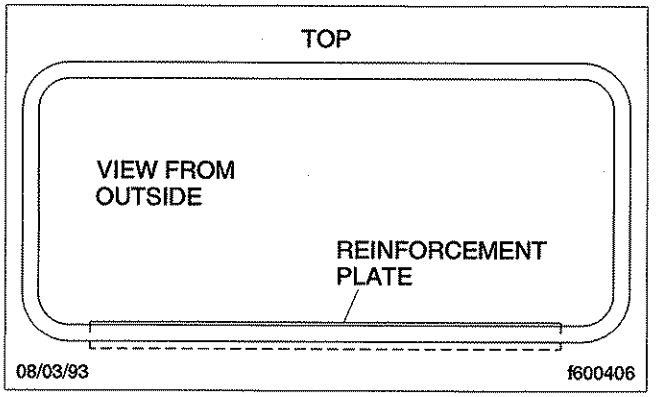


Fig. 4, Window Opening Frame

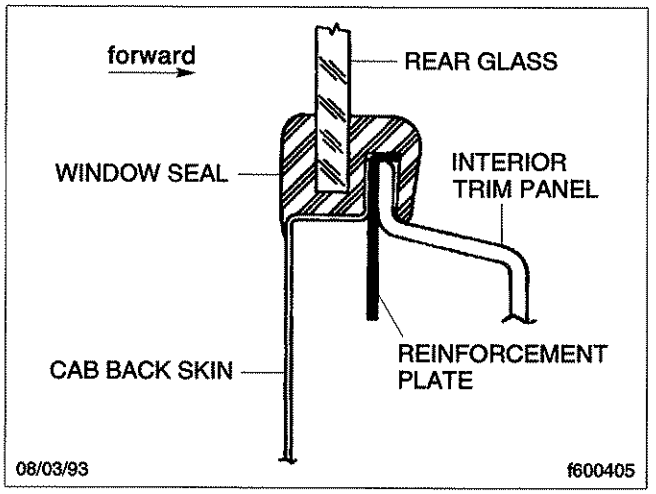


Fig. 5, Bottom Reinforcement Plate and Window Assembly, Installed

Specifications

Description	Grade	Size	Torque N·m (lbf·ft)
Wiper Arm Nuts	8.8	M6 x 1	19 (14)

Table 1, Fastener Torques

Contents

Subject	Subject Number
General Information	050
Service Operations	
Velvac Mirror Removal and Installation	100
Velvac Mirror Motor Replacement	110
Velvac Mirror Glass and Heating Element Removal and Installation	120
Troubleshooting	300

General Information

The Velvac mirror is an 8 by 16 inch (20 by 40 cm) electrically heated, remote-controlled mirror with marker lights. Using switches that mount in the cab, a driver can remotely adjust the position of each mirror. The mirror is rotated by an electric motor mounted to a slip clutch. The slip clutch allows for manual adjustment of the mirrors without damage to the electric motor or drive gears. A temperature-controlled heater heats the mirror surface to remove moisture and ice. Marker lights on the mirrors signal the widest points of the vehicle to oncoming traffic.

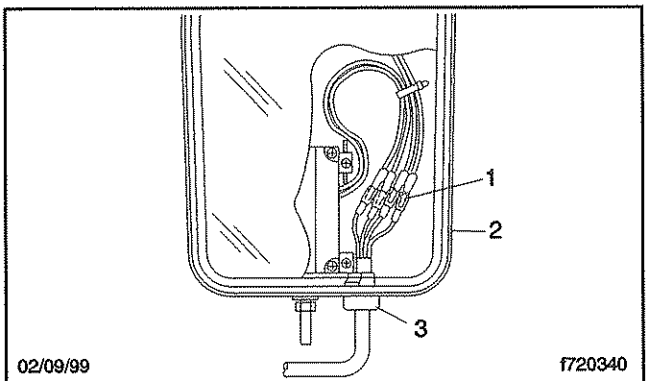
Velvac Mirror Removal and Installation

Removal

1. Apply the parking brake and chock the tires.
2. Disconnect the batteries.

NOTE: Most repairs to the Velvac mirrors can be made with the mirror head still mounted to the brackets on the vehicle.

3. Using pliers or a grommet tool, depress the grommet tab and remove the plastic grommet for the mirror wiring harness from the bottom of the mirror head. See **Fig. 1.**
4. Pull the wires through the hole for the grommet so that the wire connectors are outside the mirror head. Disconnect all the electrical connectors at the mirror.
5. If a convex mirror is mounted on the bottom shaft of the Velvac mirror, remove the convex mirror.
6. Remove the nuts securing the L-brackets to the C-bracket and remove the Velvac mirror from the vehicle. See **Fig. 2.**
7. Using a 1/2 inch backup wrench to prevent the jam nuts at the top of the mirror head from turning on the shaft, remove the locknut from the top shaft. Remove the washers and L-bracket from the top shaft.
8. Using a 9/16 inch backup wrench to prevent the nut at the bottom of the mirror head from turning, remove the locknut from the bottom shaft. Remove the washers and L-bracket from the bottom shaft. See **Fig. 3.**



1. Wiring Connectors
2. Mirror Head
3. Grommet

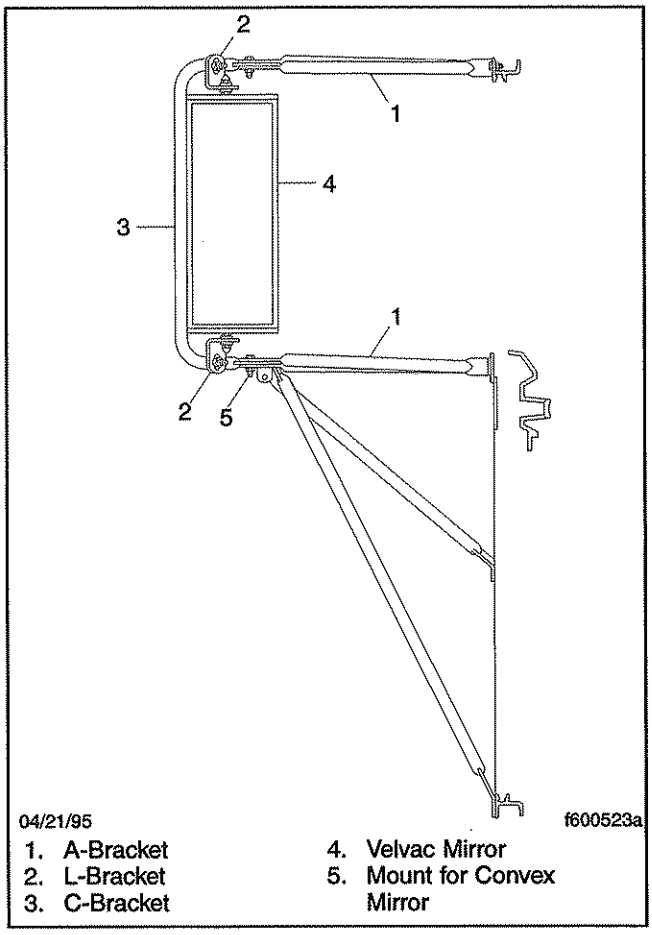
Fig. 1, Disconnecting the Wiring

IMPORTANT: Do not allow the lower nut next to the mirror head to turn on the bottom shaft when removing the locknut. The torque on this nut is set at the factory.

Installation

1. Install a flatwasher on top of the two jam nuts on the top shaft of the mirror head. Install the top L-bracket and another flatwasher. Install a hexnut with a split lockwasher onto the top shaft.

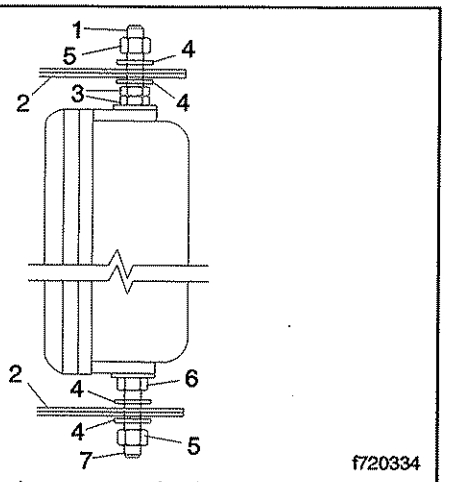
IMPORTANT: Use a backup wrench on the jam nuts to prevent the jam nuts from turning on the top shaft of the mirror. These jam nuts have been tightened at the factory and must not rotate when tightening the top L-bracket locknut. The top shaft must be free to rotate onthe mirror head.



1. A-Bracket
2. L-Bracket
3. C-Bracket
4. Velvac Mirror
5. Mount for Convex Mirror

Fig. 2, Typical Mirror Mounting Arrangement

Velvac Mirror Removal and Installation



1. 5/16–18 Thread
2. Clamp
3. Jam Nuts
4. Flatwasher
5. Locknut
6. Large Nut
7. Motor Shaft

Fig. 3, Typical Mirror Mounting Arrangement

2. With a backup wrench on the jam nuts, tighten the locknut that holds the L-bracket on the top shaft as follows:
   - 60 to 80 lbf·in (680 to 900 N·cm) for the non-motorized mirrors
   - 125 to 200 lbf·in (1410 to 2260 N·cm) for the motorized mirrors
3. Install a flatwasher on the bottom shaft of the mirror head. Install the bottom L-bracket and another flatwasher. Install the hexnut with a split lockwasher onto the bottom shaft.

IMPORTANT: Use a backup wrench on the nut next to the mirror head to prevent the nut from turning on the bottom shaft of the mirror. The nut was tightened at the factory and must not rotate when tightening the bottom L-bracket locknut. If the nut has loosened, tighten it only until the bottom shaft starts turning with the nut.

4. With a backup wrench on the nut next to the mirror head, tighten the locknut that holds the L-bracket on the bottom shaft 14 lbf·ft (19 N·m).
5. Connect the wires from the mirror to the wiring harness according to the color code chart in **Table 1**.

Mirror Wiring Color Code	
Mirror Head	**Harness**
Red (heater +)	Red
Black (heater, light –)	Black
Blue (light +)	Blue
White (motor)	White
Green (motor)	Green

Table 1, Mirror Wiring Color Code

6. Slide the plastic grommet to its original position on the jacket of the mirror harness. Using pliers or a grommet tool, push the grommet and harness into the hole in the bottom of the mirror head. Make sure that the grommet tab locks the grommet in place.
7. Install the convex mirror (if removed) on the end of the lower A-bracket.

⚠ WARNING

Grab only the mirror head when turning the mirror by hand. Do not apply force to the mirror glass or the glass could break and cause injury.

8. Rotate the mirror head by hand to make sure that there is clearance.
9. Connect the batteries.
10. Test the operation of all the mirror functions using the switches inside the cab. The mirror should be warm to the touch within 5 minutes of starting the mirror heater.
11. Remove the chocks from the tires.

Velvac Mirror Motor Replacement

Replacement

1. Apply the parking brake, and chock the tires.
2. Disconnect the batteries.

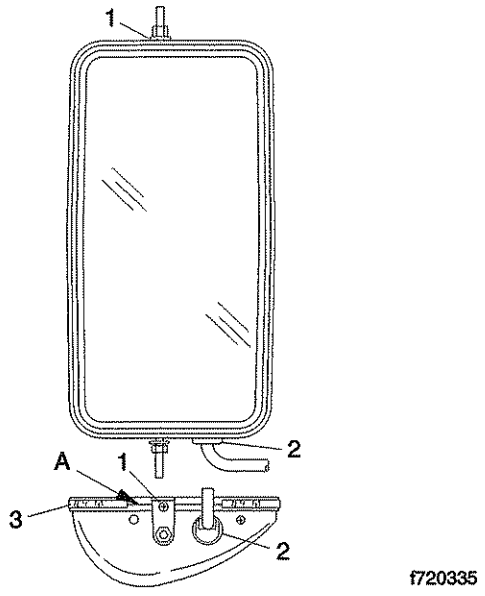
NOTE: The motor in the Velvac mirror can be replaced with the mirror head still mounted to the brackets on the vehicle.

3. Remove any tape from the perimeter of the bezel. Remove the two screws on both the top and the bottom of the mirror head. See **Fig. 1**.

⚠ CAUTION

Avoid putting force on the glass or using sharp tools to separate the glass from the mirror housing. The glass can easily break and the housing can be scratched by the use of sharp tools.

4. Use your hands to carefully separate the bezel and glass assembly from the mirror housing. The plastic bezel is held in the housing by six Tinnerman® clips in the internal groove along the rear edge of the mirror housing.



A. Separate bezel/mirror head here.
1. Bezel Screws
2. Grommet
3. Tape

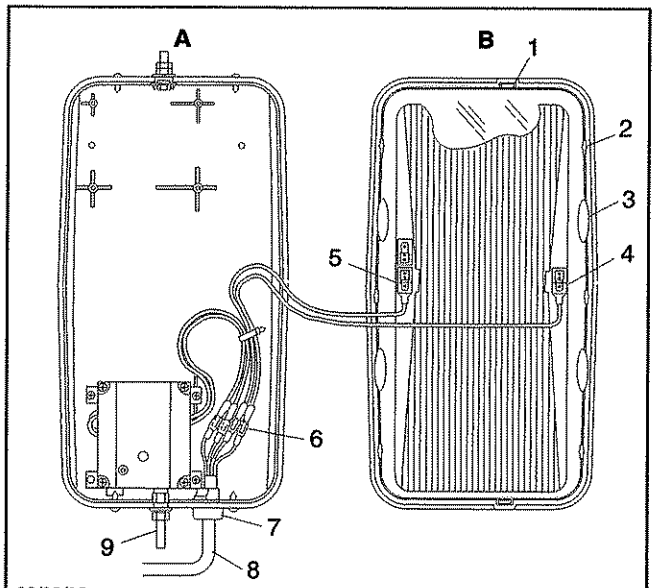
Fig. 1, Velvac Mirror Disassembly

5. Remove the wire connectors from the heater element on the back of the mirror glass. Put the mirror glass and heater element is a safe place.
6. Cut the tie strap and remove the wires to the mirror motor.
7. Remove the lower L-bracket from the A-bracket. Remove the locknut, L-bracket, and flatwashers from the motor shaft at the lower bracket.
8. Install two jam nuts on the motor shaft and tighten against each other. Hold a backup wrench on the outer jam nut to prevent the motor shaft from turning. Remove the large nut from the motor shaft.

NOTE: The nut on the motor shaft uses thread sealant to help it stay in position.

9. Using a Phillips screwdriver, remove the four screws that hold the motor to the housing. Lift the motor from the mirror housing.
10. Install the shaft of the new motor into its hole in the housing.
11. Install and carefully tighten the four screws that hold the motor to the housing.
12. Apply Loctite® 271 to the threads of the motor shaft nut and install it on the shaft. Tighten the nut until the shaft begins to turn.
13. Install a flatwasher, the lower L-bracket, another flatwasher, and a new nylon-insert locknut, but do not tighten the locknut.
14. Fasten the lower L-bracket to the A-bracket. Use a 9/16 inch backup wrench to prevent the shaft nut from turning and tighten the locknut on the end of the motor shaft.
15. Connect the wires from the motor to the wires of the same color in the harness. Install a tie strap in the same location as before.
16. Remove any Tinnerman clips left in the groove in the housing or on the bezel. Install new clips in the six locations on the bezel shown in **Fig. 2**.
17. Connect the black wire and the blue wire to the two terminals on the ground side of the heating element. Connect the red wire to the terminal on the other side of the element.
18. Align the tabs on the top and bottom of the bezel with the slots in the housing. Carefully and

Velvac Mirror Motor Replacement



A. Mirror Head
B. Glass/Heating Element and Bezel

1. Alignment Tab
2. Tinnerman Clips
3. Factory-applied Silicone
4. Heating Element Power Connection
5. Heating Element Ground Connection
6. Wire Connectors
7. Grommet
8. Wire Harness
9. Motor Shaft

Fig. 2, Velvac Mirror Assembly

evenly press the glass and bezel assembly into the groove in the housing so that the clips firmly hold the bezel assembly in place.

19. Carefully press the glass and bezel assembly against the housing while installing the bezel mounting screws into the housing. Push down on the screwdriver while turning the screws, but do not over-tighten the screws into the plastic mirror housing.
20. Apply the tape, that was removed earlier, around the perimeter of the bezel.
21. Connect the batteries and test the mirror operation.
22. Remove the chocks from the tires.

Velvac Mirror Glass and Heating Element Removal and Installation

Removal

1. Apply the parking brake, and chock the tires.
2. Disconnect the batteries.

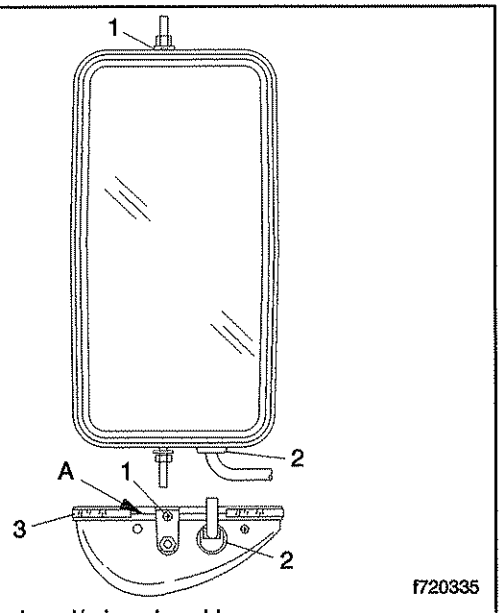
NOTE: The heating element in the Velvac mirror can be replaced with the mirror head still mounted to the brackets on the vehicle.

3. Remove and discard any tape from the perimeter of the bezel. Remove the screws on the top and the bottom that hold the bezel to the mirror head. See **Fig. 1**.

⚠ CAUTION

Avoid putting force on the glass or using sharp tools to separate the glass from the mirror housing. The glass can easily break and the housing can be scratched by the use of sharp tools.

4. Use your hands to carefully separate the bezel and glass assembly from the mirror housing. The plastic bezel is held in the housing by six Tinnerman® clips in the internal groove along the rear edge of the mirror housing. See **Fig. 2**.



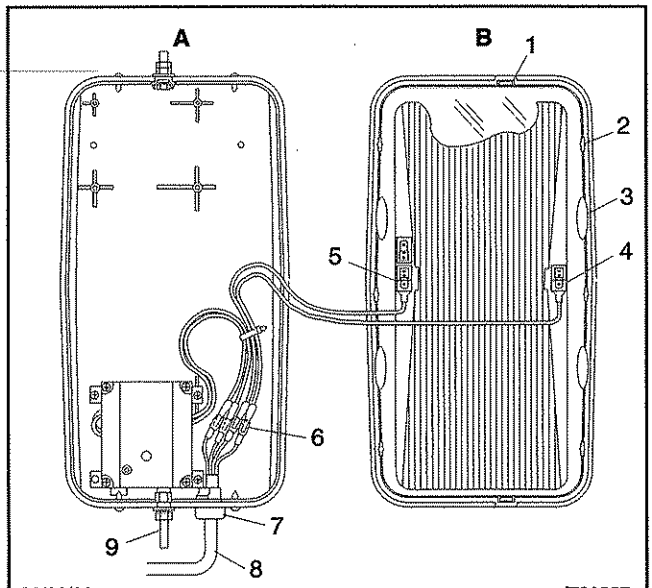
A. Separate bezel/mirror head here.
1. Bezel Screws
2. Grommet
3. Tape

Fig. 1, Removing the Bezel

5. Remove the wire connectors from the heater element on the back of the mirror glass.
6. Peel the silicon from the bezel and remove the mirror glass and heating element.

Installation

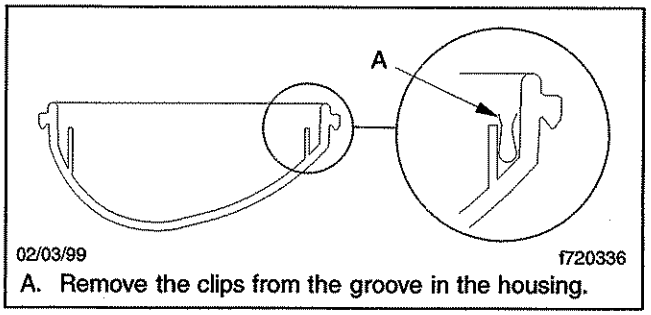
1. Remove any Tinnerman clips left in the groove in the housing or on the bezel. See **Fig. 3**. Install new clips in the six locations on the bezel shown in **Fig. 2**.
2. Install the glass and heater element into the bezel. Apply silicon sealer four places along the glass perimeter to hold the glass to the bezel.
3. Connect the black wire and the blue wire to the two terminals on one side of the heating element.



A. Mirror Head
B. Glass/Heating Element and Bezel
1. Alignment Tab
2. Tinnerman Clips
3. Factory-applied Silicone
4. Heating Element Power Connection
5. Heating Element Ground Connection
6. Wire Connectors
7. Grommet
8. Wire Harness
9. Motor Shaft

Fig. 2, Velvac Mirror Assembly

Velvac Mirror Glass and Heating Element Removal and Installation



A. Remove the clips from the groove in the housing.

Fig. 3, Removing the Clips

Connect the red wire to the terminal on the other side of the element.

4. Align the tabs on the top and bottom of the bezel with the slots in the housing. Carefully and evenly press the glass and bezel assembly into the groove in the housing so that the clips firmly hold the bezel assembly in place.
5. Carefully press the glass and bezel assembly against the housing while installing the bezel mounting screws into the housing. Push down on the screwdriver while turning the screws, but do not over-tighten the screws into the plastic mirror housing.
6. Connect the batteries and test the mirror operation.
7. Remove the chocks from the tires.

Troubleshooting

Use the information in the following troubleshooting tables to determine the possible causes and remedies of problems with the Velvac mirrors. To test the mirror components, go to the appropriate heading in this subject.

Problem—The Mirror Will Not Rotate When the Switch Is Closed

Problem—The Mirror Will Not Rotate When the Switch Is Closed	
Possible Cause	**Remedy**
An obstruction is in the path of the mirror.	Remove the obstruction.
The motor switch does not have power.	Turn the power on.
The fuse or circuit breaker is open.	Replace the fuse or reset the circuit breaker.
The switch is not working.	Test the switch. Replace it, if necessary.
The wiring is damaged.	Check and repair the wiring.
The motor is worn.	Test the motor. Go to "Testing the Electric Motor" in this subject.

Problem—The Heater Does Not Work

Problem—The Heater Does Not Work	
Possible Cause	**Remedy**
There is no power to the heater switch.	Turn the power on.
The fuse or circuit breaker is open.	Replace the fuse or reset the circuit breaker.
The switch is not working.	Test the switch. Replace it, if necessary.
The wiring is damaged.	Check and repair the wiring.
The heating element is not working.	Test the element. Go to "Testing the Heater" in this subject.

Problem—The Mirror Will Not Stay Adjusted, Moves at High Speed, or Vibrates

Problem—The Mirror Will Not Stay Adjusted, Moves at High Speed, or Vibrates	
Possible Cause	**Remedy**
The fasteners are not tight.	Tighten the mirror mounting hardware.
The slip clutch is worn.	Test the slip clutch. Go to "Testing the Slip Clutch" in this subject.

Problem—The Glass Is Broken

Problem—The Glass Is Broken	
Possible Cause	**Remedy**
An object has struck the glass.	Replace the glass. For instructions, go to **Subject 120.**

Problem—The Glass Surface Has Scratches

Problem—The Glass Surface Has Scratches	
Possible Cause	**Remedy**
The glass was cleaned incorrectly.	Replace the glass, if necesary. Use only non-abrasive cleaners and soft cloths to clean the glass surface.

Troubleshooting

Problem—The Glass Is Distorted

Problem—The Glass Is Distorted	
Possible Cause	**Remedy**
The mounting brackets are misaligned causing the head to flex.	Align the mounting brackets.
The mirror hits an obstruction during its rotation.	Remove the obstruction.

Problem—The Marker Light Does Not Illuminate

Problem—The Marker Light Does Not Illuminate	
Possible Cause	**Remedy**
The bulb is burnt.	Replace the bulb.
The switch is not working.	Test the switch. Replace it, if necessary.
The wiring is damaged.	Check and repair the wiring.
The fuse or circuit breaker is open.	Replace the fuse or reset the circuit breaker.

TESTING THE SLIP CLUTCH

The Velvac mirror slip clutch allows the mirror head to be positioned manually without damaging the motor gear assembly. The slip clutch resistance to rotation keeps the mirror from moving unintentionally. To test the torque needed to rotate the mirror head in relation to the motor shaft, use the following procedure.

1. Apply the parking brake and chock the tires.
2. Disconnect the batteries.
3. Remove the Velvac mirror head from the vehicle. See **Subject 100** for the instructions.
4. Install two 5/16–18 jam nuts on the motor shaft of the mirror head. Using a backup wrench on one of the jam nuts, tighten the other jam nut against the first. See **Fig. 1**.
5. Use a beam-type or dial-type torque wrench on the outer jam nut. Hold the mirror head from rotating and note the reading on the torque wrench while rotating the jam nuts and motor shaft.
6. The torque required to turn the motor shaft in relation to the motor head must be between 60 and 110 lbf·in (680 to 1230 N·cm).
7. Replace the motor assembly if the torque needed to rotate the shaft is more than 110 lbf·in (1230 N·cm). For instructions, see **Subject 110**. If the motor shaft begins to turn at a torque value of less than 60 lbf·in (680 N·cm), tighten the large nut on the motor shaft just until the shaft begins to turn with the nut. Check the rotating torque again. Replace the motor assembly if the torque needed to turn the shaft is still not correct.

TESTING THE ELECTRIC MOTOR

To test the electric motor that rotates the mirror head, use the following procedure.

1. Apply the parking brake and chock the tires.
2. Disconnect the batteries.

NOTE: Most repairs to the Velvac mirrors can be made with the mirror head still mounted to the brackets on the vehicle.

3. Using pliers or a grommet tool, depress the grommet tab and remove the plastic grommet for

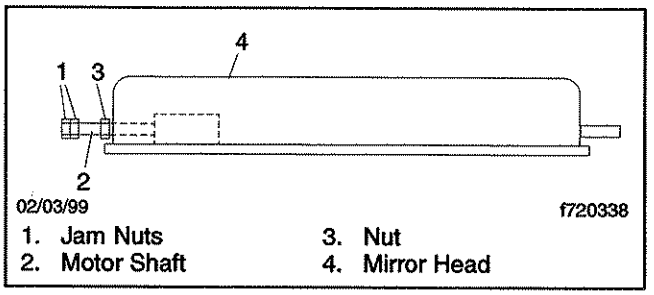


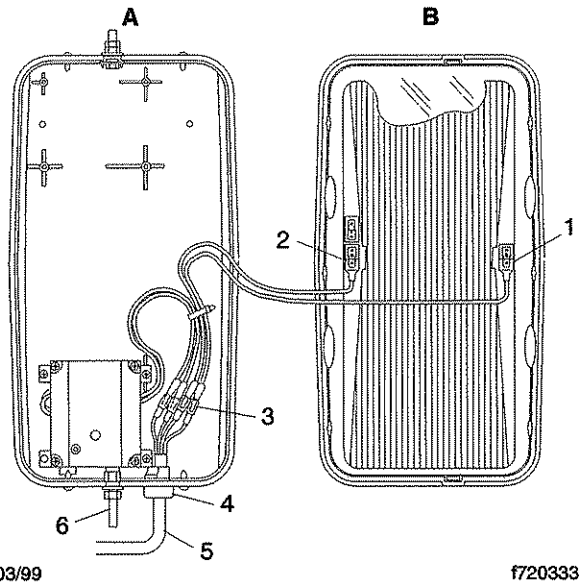
Fig. 1, Testing the Slip Clutch

the mirror wiring harness from the bottom of the mirror head. See **Fig. 2.**

4. Pull the mirror wires through the hole for the grommet so that the wire connectors are outside the mirror head. Disconnect the electrical connectors for the white and the green wires.
5. Connect a jumper wire from the battery negative post (or a good ground) to the white wire in the mirror head.

⚠ CAUTION

The mirror head will immediately start rotating when you complete the temporary circuit. Make sure that your hands and all objects are out of the way of the mirror head before starting this test. Disconnect the wires before the mirror head can hit any object. Failure to do so could cause personal injury or damage to the mirror.



02/03/99 f720333

A. Mirror Head
B. Glass/Heating Element and Bezel
1. Heating Element Power Connection
2. Heating Element Ground Connection
3. Wire Connectors
4. Grommet
5. Wire Harness
6. Motor Shaft

Fig. 2, Velvac Mirror Assembly

6. Temporarily touch a jumper wire from the battery positive post to the green wire in the mirror head. The motor should immediately start turning the mirror head in a clockwise direction (looking from the top).
7. Disconnect the white wire from the jumper wire connected to the battery negative post (or ground). Connect the grounded jumper to the green wire in the mirror.
8. With your hands away from the mirror head, temporarily touch a jumper wire from the battery positive post to the white wire in the mirror head. The motor should immediately start turning the mirror head in a counter-clockwise direction (looking from the top).
9. Replace the motor if it does not operate as stated above. See **Subject 110** for the motor replacement procedure.
10. Remove the jumper wires and connect the batteries.
11. Remove the chocks from the tires.

TESTING THE HEATER

To test the electric heating element in the mirror head, use the following procedure.

1. Apply the parking brake, and chock the tires.
2. Disconnect the batteries.
3. Using pliers or a grommet tool, depress the grommet tab and remove the plastic grommet for the mirror wiring harness from the bottom of the mirror head. See **Fig. 2.**
4. Pull the mirror wires through the hole for the grommet so that the wire connectors are outside the mirror head. Disconnect the electrical connectors for the black and the red wires.
5. Test for continuity in the heater circuit by connecting one probe of an ohmmeter to the black wire from the mirror and the other probe to the red wire. The ohmmeter must indicate continuity. Replace the mirror glass/heating element if the ohmmeter indicates an open circuit.
6. Connect a jumper wire from the battery negative post (or a good ground) to the black wire in the mirror head.

Troubleshooting

7. Connect a jumper wire from the battery positive post to the red wire in the mirror head. The heating element will make the mirror glass warm to the touch within 5 minutes.
8. Replace the mirror glass and heating element assembly if it does not operate as stated above. See **Subject 120** for the heating element replacement procedure.
9. Remove the jumper wires and connect the batteries.
10. Remove the chocks from the tires.

Rear Side Windows, Extended Cab 60.03

Contents

Subject	Subject Number
General Information	050
Service Operations	
Side Window Removal and Installation	100
Specifications	400

General Information

The extended cab version of the Business Class truck or tractor includes a side window opening in each side of the cab extension. **See Fig. 1.** The window opening may contain a piece of tinted, fixed, solid tempered glass, a moveable (tip out) window assembly, or an aluminum plate. A one-piece rubber seal is used to hold the side window in the cab opening.

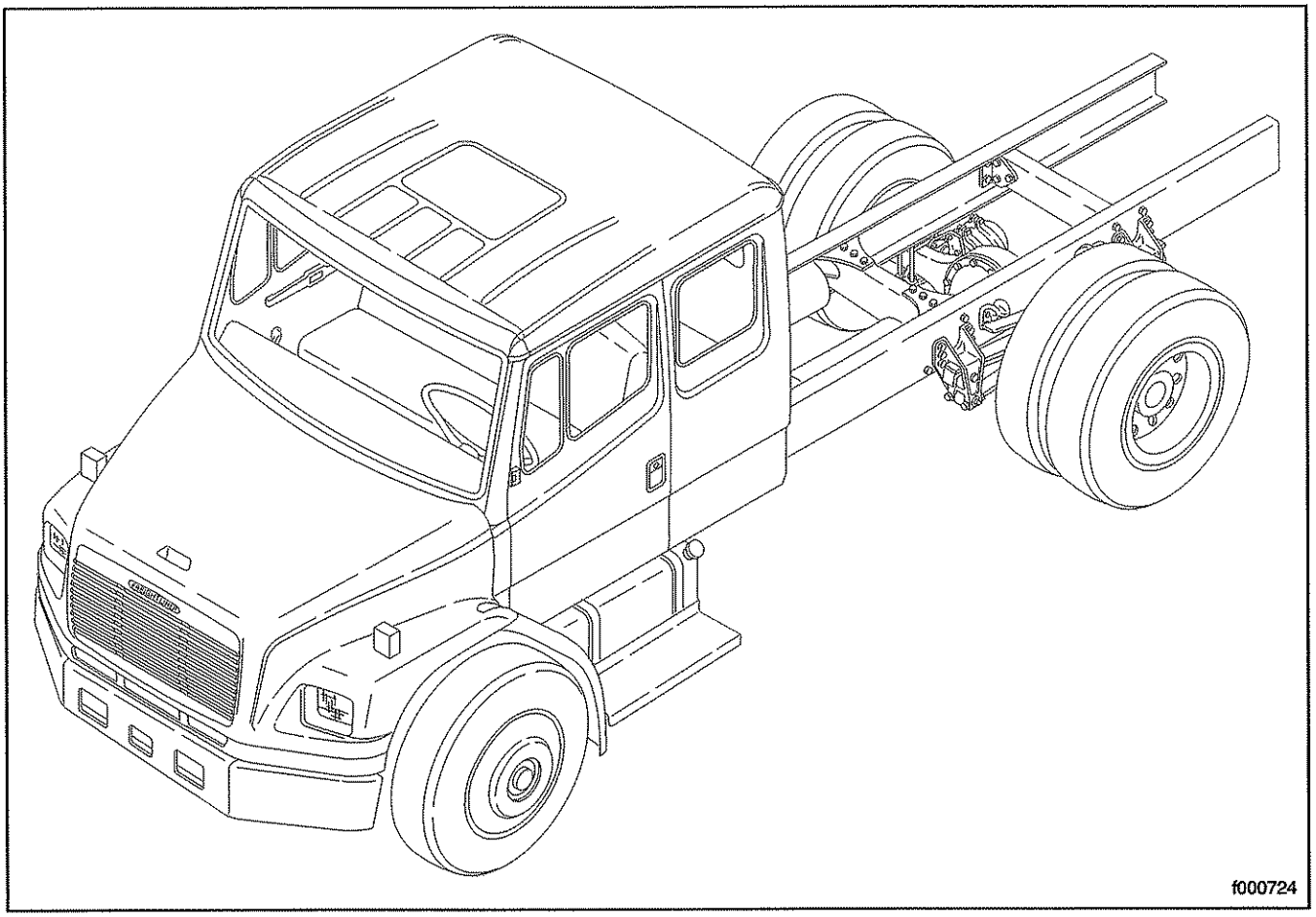


Fig. 1, Extended Cab, With Rear Side Windows

Side Window Removal and Installation

Removal and installation procedures are the same for both types of side windows: fixed, solid tempered glass, and moveable (tip out) window, as well as for the aluminum blanking plate.

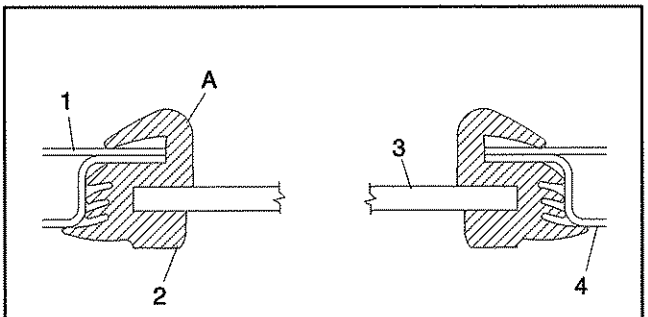
The side window is retained in the cab opening by a reuseable rubber seal. **See Fig. 1.** No sealants or adhesives are used.

Side Window Removal

NOTE: Use an assistant to help you remove the side window. This will make the job easier, as well as reduce the possibility of accidental window breakage.

1. Protect the paint finish by taping paper around the side window opening.
2. Position your assistant outside the cab, and instruct him to apply constant, light hand pressure to the window. This will reduce the possibility of sudden window movement and dropping the window.
3. Remove the window.
   - 3.1 If the window seal will be replaced with a new seal, carefully cut the seal lip away from inside the cab. **See Fig. 1,** Ref. A.

     With the seal lip cut away, push the window and seal out of the cab opening.
   - 3.2 If the window seal will be re-used, use a windshield pick **(see Fig. 2)** to bend the seal lip away from the cab inner panel while pushing outward on the window. Start at a corner and work your way around the window until it can be pushed out of the cab opening.
4. Separate the seal from the glass.



A. Cut this lip away from inside the cab if the seal will be replaced.

1. Cab Inner Skin
2. Window Seal
3. Side Window Glass
4. Cab Outer Skin

Fig. 1, Window Installation View

Side Window Installation

⚠ WARNING

WARNING: When handling side window glass, wear protective gloves to protect your hands from sharp edges and to allow a better grip. Not wearing protective gloves when handling glass could result in personal injury.

1. Clean the cab side window opening area using glass cleaner or a soap-and-water solution.
2. Lubricate the rubber window seal thoroughly with a soap-and-water solution. Make sure that all grooves in the seal are wetted.

NOTE: Before installing the window seal on the window glass or frame, be sure to position the seal splice at the middle of the forward facing edge of the window. **See Fig. 3.**

3. Stretch the rubber seal around the outside of the glass, window frame, or blanking plate.
4. Install two cords in the outside seal groove **(see Fig. 4)** as shown in **Fig. 5.** Leave the loose ends of the cords at the front and rear edges of the window.

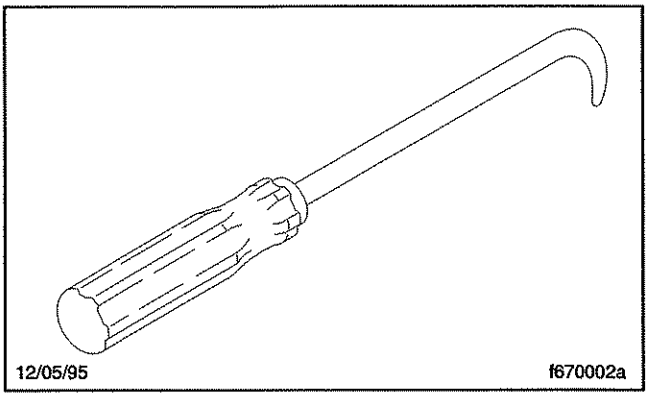
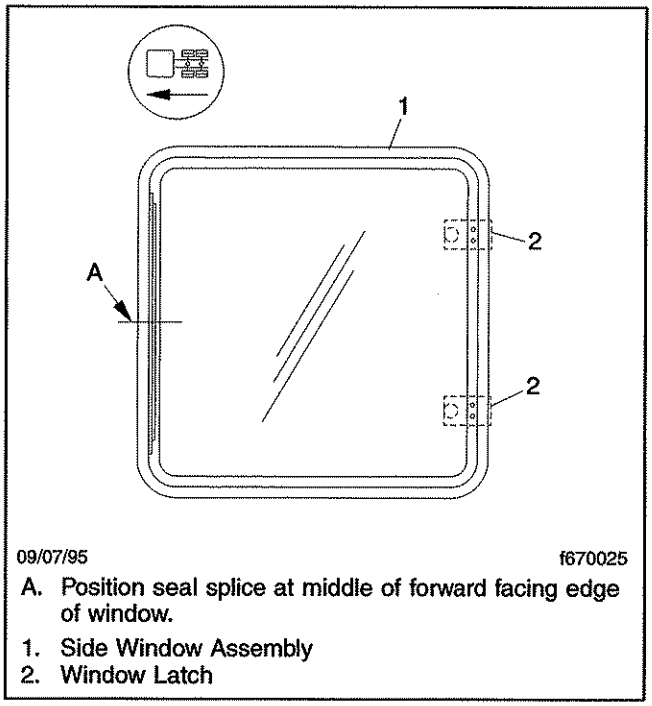


Fig. 2, Typical Windshield Pick

Side Window Removal and Installation



A. Position seal splice at middle of forward facing edge of window.
1. Side Window Assembly
2. Window Latch

Fig. 3, Seal Splice Location

NOTE: The cord should be a braided cotton cord (trade size number 5 minimum to number 8 maximum) with a reinforced core.

5. Lubricate the window seal and the cord with a soap-and-water solution; then, wet the cab skin with plain clear water just before installing the window.

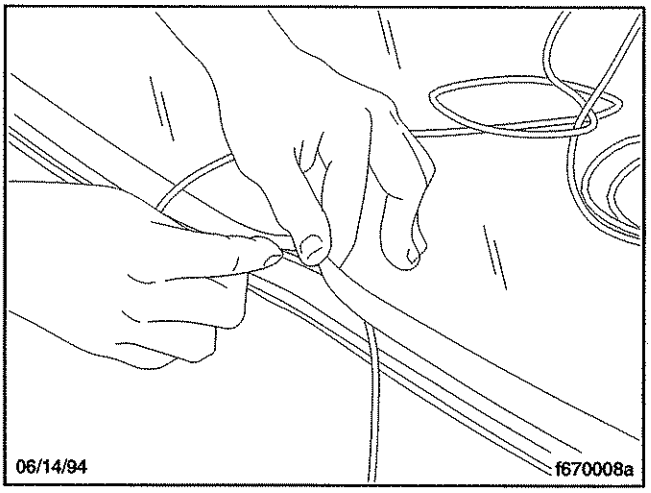


Fig. 4, Inserting Cord in Window Seal

6. Have your assistant hold the window assembly in position against the cab window opening using light pressure. From inside the cab, pull one of the cord ends around a lower corner of the window, across the bottom, and up the other side.
7. With the assistant maintaining pressure against the window, repeat the procedure with the other cord, going across the top of the window.
8. Using a sandbag, finish seating the glass by tapping on the glass until the glass and seal are correctly positioned. **See Fig. 1.**
9. Remove any protective paper and tape.

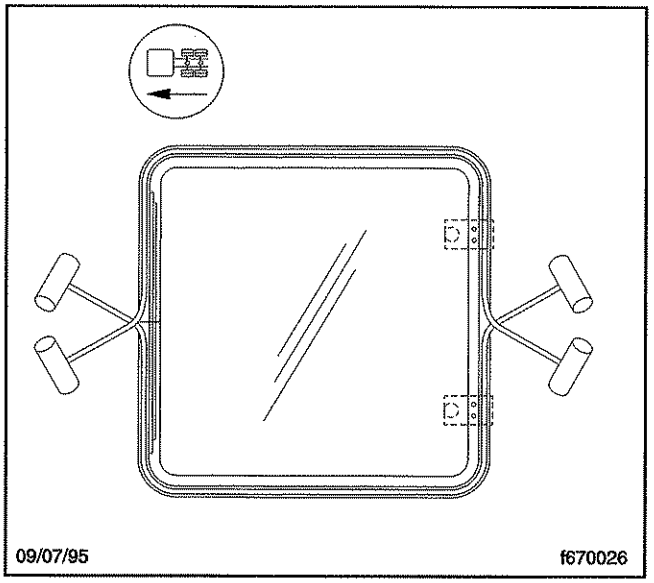


Fig. 5, Cord Installed in Window Seal

Specifications

The tool shown in **Fig. 1**, and others, can be purchased from the following distributors:

Sommer & Maca
5501 West Ogden Avenue
Chicago, IL 60650
1–800–323–9200

C.R. Laurence Co., Inc.
P.O. Box 21345
Los Angeles, CA 90021-0345
1–800–421–6144

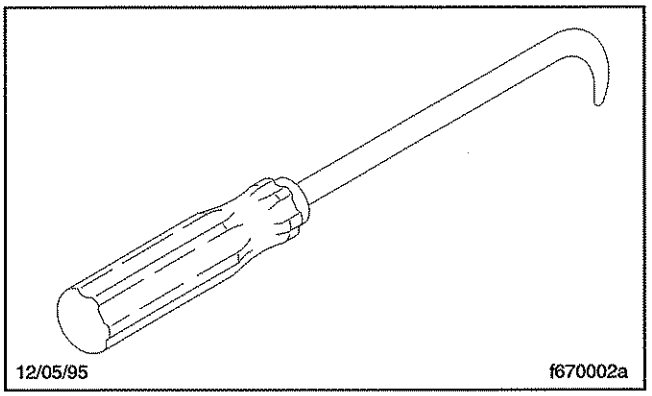


Fig. 1, Windshield Pick

Contents

Subject	Subject Number
Service Operations	
Air Horn Valve Removal and Installation	100

Air Horn Valve Removal and Installation

Removal

1. Park the vehicle. Set the parking brake. Shut down the engine and chock the tires.
2. Disconnect the electrical supply.
3. Remove the left-side A-pillar cover.
4. Remove the driver's sun visor.
5. Remove the left-side speaker, or remove the speaker plug, if necessary.

NOTE: Removing the speaker or speaker plug allows access to the air horn valve and attached air lines and cables.

6. Disconnect the antenna cable, and move it aside.
7. Disconnect the air lines attached to the air horn valve. Mark the air lines for later reference.
8. Remove the fasteners that attach the air horn valve to the mounting bracket.
9. Disconnect the air horn control cable from the headliner and from the air horn valve.
10. Remove the air horn valve.

NOTE: It may be necessary to loosen the headliner above the door to allow for easier removal of the air horn valve.

Installation

1. Position the air horn valve.
2. Connect the air horn valve control cable to the air horn valve and to the headliner.
3. Attach the air horn valve to the mounting bracket.
4. Connect the air lines to the air horn valve.

⚠ CAUTION

CAUTION: Do not overtighten the air line fittings. Hand-tighten the fittings 1/2-turn after tightening begins.

5. Connect the antenna cable.
6. Install the speaker, or the speaker plug.
7. Install the sun visor, and the headliner, if loosened.
8. Install the A-pillar cover.
9. Connect the electrical supply.
10. Remove the chocks from the tires.

Cab Rear Air Suspension, Freightliner 60.05

Contents

Subject	Subject Number
General Description and Principles of Operation	050
Service Operations	
Leveling Valve Checks	100
Leveling Valve Adjustment	110
Leveling Valve Replacement	120
Shock Absorber Replacement	130
Air Spring Replacement	140
Transverse Torque Arm Replacement	150
Troubleshooting	300

General Description and Principles of Operation

Freightliner designed and manufactured cab rear air-suspension systems are standard equipment on extended cab vehicles and FL112 day cabs. They are optional equipment on other day cab-equipped Business Class trucks.

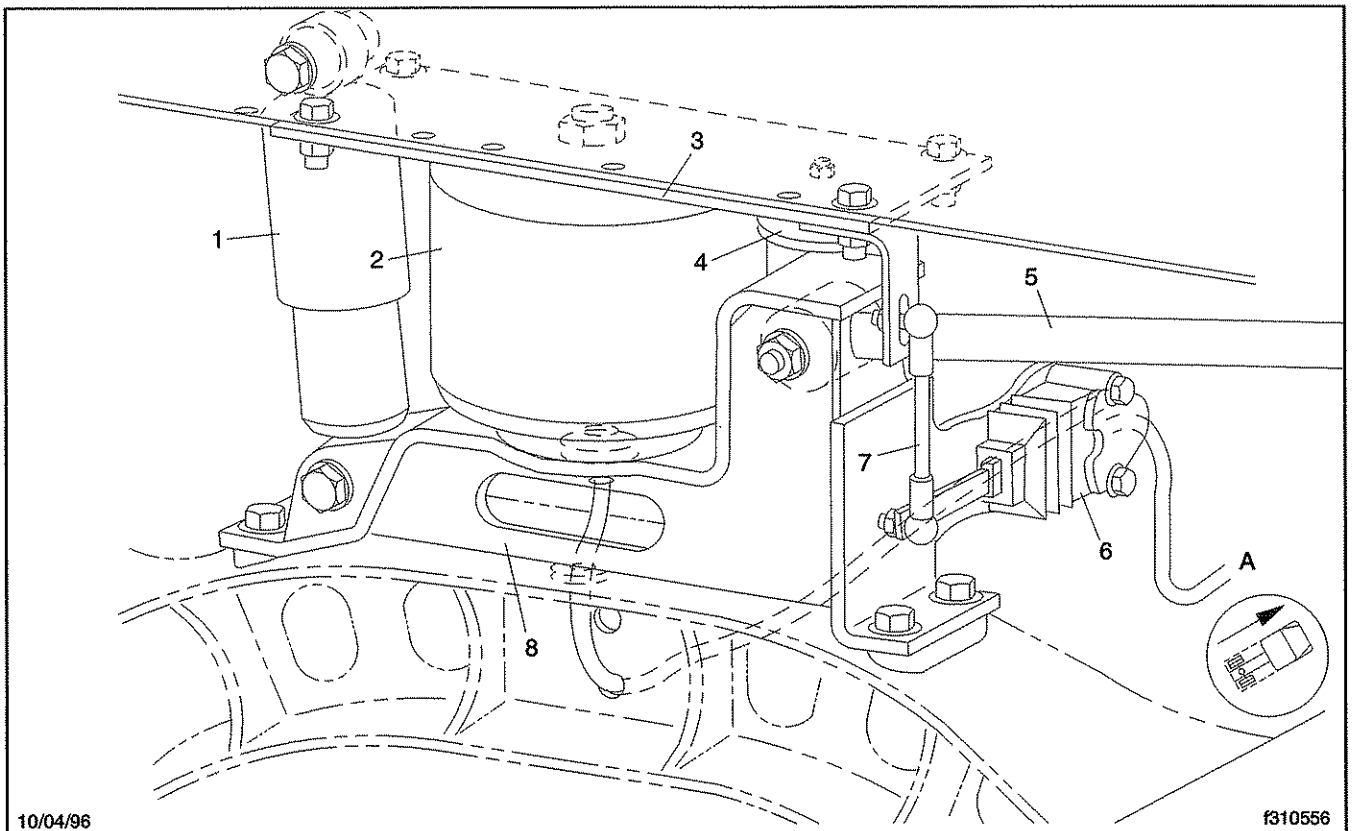
The Freightliner system installed on FL112 day cab equipped vehicles mounts on top of a frame crossmember (see **Fig. 1**). The system installed on all other Business Class trucks mounts to a frame crossmember web (see **Fig. 2**).

The cab air-suspension system absorbs road shocks and compensates for changing cab loads. Both Freightliner cab air-suspension systems have the same basic parts: an air spring, a leveling valve, a shock absorber, a transverse torque arm, and top and bottom units. See **Fig. 1** and **Fig. 2**.

TOP AND BOTTOM UNITS

Both Freightliner systems are similar in design and operation. The main difference between the two systems is that the FL112 bottom unit mounts on top of a frame crossmember, while the bottom unit for other vehicles mounts to the back (web) of a frame crossmember.

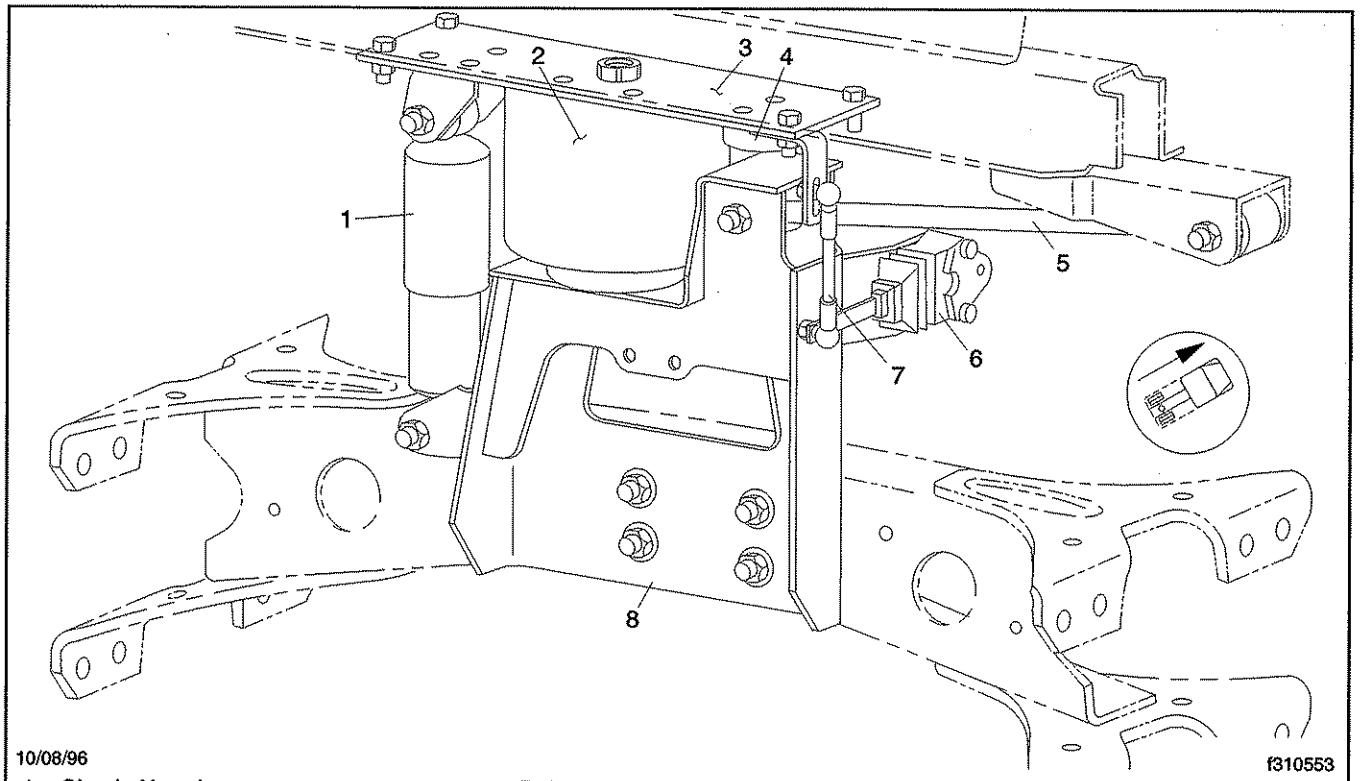
For both systems, the top unit is secured to the cab rear crossmember by four bolts, and the bottom unit is secured to a frame crossmember by four bolts. See **Fig. 1** and **Fig. 2**. A transverse torque arm, which connects the bottom unit to a cab crosmember, prevents top-unit-to-bottom-unit side-to-side misalignment.



1. Shock Absorber
2. Air Spring
3. Top Unit
4. Rubber Bumper
5. Transverse Torque Arm
6. Leveling Valve
7. Leveling Valve Link
8. Bottom Unit

Fig. 1, FL112 Day Cab Air Suspension System

General Description and Principles of Operation



1. Shock Absorber
2. Air Spring
3. Top Unit
4. Rubber Bumper
5. Transverse Torque Arm
6. Leveling Valve
7. Leveling Valve Link
8. Bottom Unit

Fig. 2, Day Cab (except FL112) and Extended Cab Air Suspension System

AIR SPRINGS

For both Freightliner systems, the top of the air spring has a stud which is secured to the top unit by a single nut; the bottom of the air spring is attached to the bottom unit by a single fastener as well.

Together with the leveling valve, the air spring compensates for changes in cab load by maintaining the correct distance between the rear of the cab and the frame rails.

LEVELING VALVE

All of the air in the cab air-suspension system is admitted through or exhausted from the leveling valve (**Fig. 1**, Ref. 6, and **Fig. 2**, Ref. 6). The leveling valve mounts on a bracket attached to the bottom unit. A horizontal arm connects the leveling valve control shaft to the vertical link attached to the top unit.

The same leveling valve (WABCO) is used on both Freightliner systems.

CAB-MOUNT STOP ASSEMBLY

The cab-mount stop assembly consists of a rubber bumper (**Fig. 1**, Ref. 4, and **Fig. 2**, Ref. 4), attached to the top unit. The bumper limits downward movement of the cab by contacting the bottom unit. If a leak occurs in the cab air-suspension system, the bumper supports the cab until the leak can be repaired.

NOTE: If a leak occurs in the cab air-suspension system, a pressure protection valve (located in the air supply line to the leveling valve) will maintain at least 65 psi (450 kPa) in the vehicle secondary air system.

SHOCK ABSORBER

On both cab air-suspension systems, a single shock absorber attaches to the cab rear crossmember at the top, and to the bottom unit at the bottom. In addition to damping cab oscillations, the shock absorber limits upward movement of the rear of the cab.

SYSTEM OPERATION

When cab load increases, the distance between the top and bottom units decreases, causing the vertical link to push down on the leveling valve horizontal arm. This rotates the leveling valve control shaft, which activates an intake valve core inside the leveling valve. Air flows through the valve and tubing into the air spring, until increasing pressure in the spring raises the cab to the correct height. As the cab reaches the correct height, the horizontal arm and the control shaft return to their neutral positions, closing the intake valve, and stopping the flow of air into the air spring.

When cab load decreases, the rear of the cab rises, causing the vertical link to pull up on the end of the horizontal arm. Rotating the leveling valve control shaft in this direction activates an exhaust valve core. Air is exhausted from the spring until the cab lowers to the correct height. Again, the horizontal arm and control shaft return to their neutral positions as the cab reaches the correct height, and air exhausting is stopped.

When the vehicle is moving, small and abrupt movements of the cab will occur, resulting in movements of the leveling valve horizontal arm. Small movements of the arm do not activate the leveling valve because of a built-in free-travel range: a gap between the leveling valve control shaft and both of the valve cores (intake and exhaust). Abrupt movements do not activate the leveling valve because it is filled with a silicone fluid, which delays the opening of one valve core for as long as five seconds after the closing of the other.

Changes in load which result in larger movements of the horizontal arm (beyond the free-travel range) for more than five seconds will activate the leveling valve. Such changes in load occur when occupants or heavy items are added to, or removed from, the cab. Also, when the vehicle is moving forward at high speed or in a strong headwind, a major change in load occurs from the downward force applied by an optional air shield or air fairing. When these changes in load occur, the cab air-suspension system will adjust the height at the rear of the cab.

Checks

To keep the cab air-suspension system operating reliably, the air system must be kept free of oil, moisture, and other foreign material. Regularly inspect and maintain the vehicle air system components. See **Group 42** of the *Business Class Trucks Maintenance Manual.*

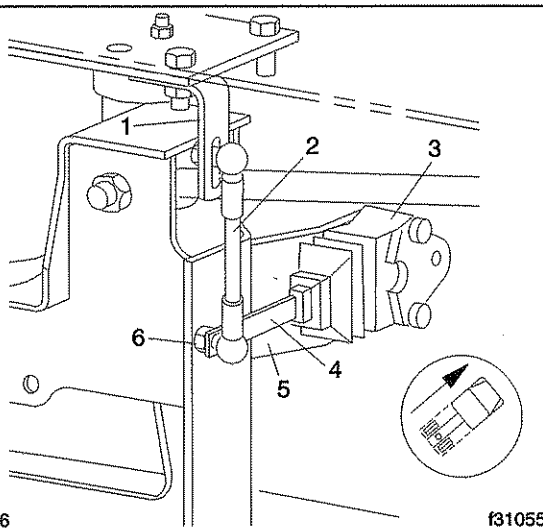
⚠ CAUTION

Failure to take precautions against the entry of oil, moisture, and other foreign material into the cab air-suspension system could eventually lead to sludge forming in the air system. Sludge could adversely affect the operation of the cab air-suspension system and other air system components.

Before replacing the leveling valve, do the following steps to see if the valve is actually damaged, or is merely out of adjustment. These steps apply to both Freightliner systems.

1. Run the engine to build up vehicle air pressure to at least 100 psi (690 kPa). Shut down the engine.
2. Chock the tires to prevent the vehicle from moving.
3. Remove the hex nut and washer securing the vertical link (lower end) to the leveling valve horizontal arm. See **Fig. 1**.
4. Push the arm down about 45 degrees for 6 to 8 seconds. If air passes through the valve and inflates the air spring, that section of the valve is okay.
5. Return the lever to the neutral position. Air should stop flowing. If so, that section of the valve is okay.
6. Pull the lever up about 45 degrees for 6 to 8 seconds. If air exhausts from the air spring, that section of the valve is okay.
7. Return the lever to the neutral position. If the air stops again in the neutral position, the valve is working correctly.
8. If the valve works as stated in all of the above steps, no further checking is needed. Connect the vertical link to the horizontal arm.

   If the valve doesn't work as stated in all of the above steps, replace it. Refer to **Subject 120** for instructions.
9. If adjustment of the leveling valve is needed, refer to **Subject 110**.



1. Slotted Mounting Tab
2. Vertical Link
3. Leveling Valve
4. Leveling Valve Horizontal Arm
5. Leveling Valve Mounting Bracket
6. Hex Nut

Fig. 1, WABCO Leveling Valve and Linkage

Leveling Valve Adjustment

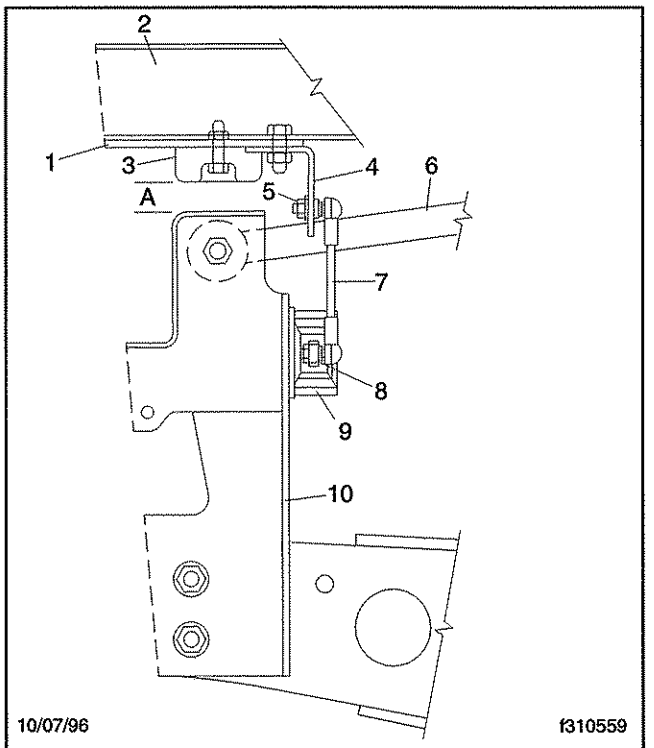
Adjustment

The leveling valve adjustment procedure is identical for both Freightliner cab rear air suspension systems.

1. Park the vehicle on a level surface and apply the parking brakes.
2. Run the engine to build up vehicle air pressure to at least 100 psi (690 kPa). Shut down the engine.
3. Chock the front tires to prevent the vehicle from moving.

IMPORTANT: Before checking leveling valve adjustment, make sure that the rubber bumper (see **Fig. 1**, Ref. 3) is present on the cab rear air suspension upper unit. If the rubber bumper is missing or in poor condition, replace it.

4. Check the leveling valve adjustment.
   - 4.1 Measure the distance from the bottom of the rubber bumper to the top of the bottom unit. It should be 3/4 to 1-1/8 inch (19 to 29 mm). **See Fig. 1**, Ref. A.
   - 4.2 If the distance is within specifications, no adjustment is needed. If it isn't, go to the next step.
5. Perform the leveling valve adjustment.
   - 5.1 Remove the hex nut (Ref. 5) securing the leveling valve control rod vertical link (upper end) to the slotted cab-mounting tab.
   - 5.2 Raise the rear of the cab by pushing down on the leveling valve horizontal arm.
   - 5.3 Insert a 7/8 inch (22 mm) spacer between the rubber bumper and the bottom unit.
   - 5.4 Lower the cab by pivoting the leveling valve lever upward until the rubber bumper contacts the spacer.
   - 5.5 Lift the flap on the side of the lever boot to expose the hole in the valve body and move the lever up and down slightly near the valve neutral position (lever horizontal) until the hole in the valve arm aligns with the hole in the valve body.
   - 5.6 Lock the leveling valve arm in the neutral position by inserting a 5/32" (4mm) pin or drill bit through the holes in the valve body and valve arm.
   - 5.7 Using a scribe or permanent ink marker, mark the vertical link upper stud centerline position on the slotted mounting tab.
   - 5.8 Remove the pin or drill bit previously inserted into the leveling valve.
   - 5.9 Push down on the leveling valve arm until enough air enters the air spring to lift the rubber bumper off the spacer.



A. 3/4 to 1-1/8 inch (19 to 29 mm)
1. Top Unit
2. Cab Rear Crossmember
3. Rubber Bumper
4. Slotted Mounting Tab
5. Hex Nut
6. Torque Arm
7. Vertical Link
8. Leveling Valve Horizontal Arm
9. Leveling Valve
10. Bottom Unit

Fig. 1, Freightliner Cab Rear Air Suspension Ride Height Measurement

Leveling Valve Adjustment

5.10 Remove the spacer, then raise the leveling valve arm until enough air exhausts from the air spring for the rubber bumper to contact the bottom unit.

5.11 Insert the vertical link upper stud in the slotted tab and align the stud with the mark made on the tab. Let the system raise the cab, allowing about 5 seconds for the valve delay time.

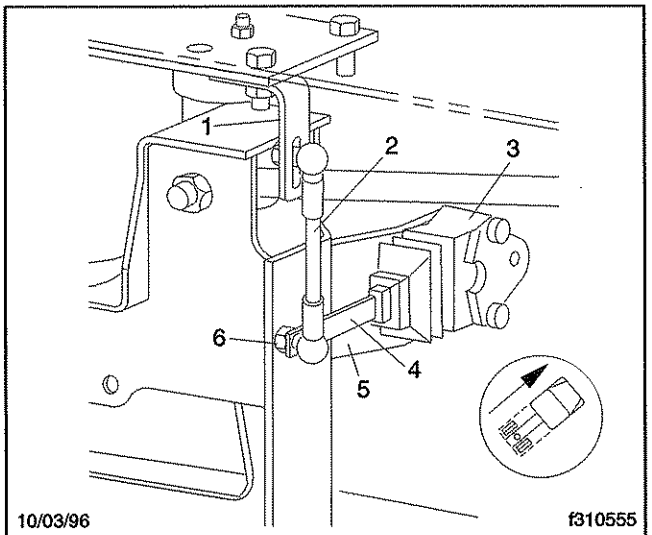
5.12 Measure the distance between the rubber bumper and the bottom unit to ensure that it is between 3/4 and 1-1/8 inch (19 and 29 mm). If it is, install the vertical link hex nut and tighten it firmly. If it isn't, repeat the leveling valve adjustment procedure.

Leveling Valve Replacement

Replacement

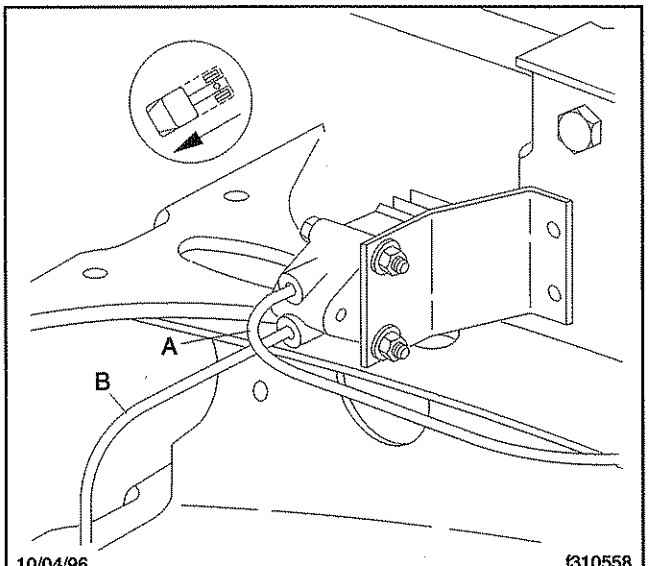
NOTE: Before replacing the leveling valve, do the steps in **Subject 100** to see if the valve is actually damaged, or is merely out of adjustment.

1. Chock the tires to prevent the vehicle from moving.
2. Remove the leveling valve.
   - 2.1 Remove the hex nut and washer securing the leveling valve control rod vertical link (lower end) to the leveling valve horizontal arm and disconnect the arm from the link. See **Fig. 1**. Save the nut and washer for attaching the link to the new valve.
   - 2.2 Raise the leveling valve arm, and hold it there to exhaust all air from the air spring.
   - 2.3 Disconnect the air lines from the fittings on the leveling valve. See **Fig. 2**. Mark the lines for assembly reference. Cover the open ends of the air lines to prevent dirt or other foreign material from entering the system.
   - 2.4 Remove the leveling valve mounting fasteners; then, remove the valve from its mounting bracket.
3. Install the new leveling valve.
   - 3.1 Mount the new valve on the bracket. Tighten the hexhead capscrews 18 lbf·ft (24 N·m).
   - 3.2 Connect the valve horizontal arm to the vertical link. Tighten the nut securely.
   - 3.3 Remove the covers from the air lines. Connect the air lines to the leveling valve as marked earlier or as shown in **Fig. 2**. Tighten the fitting nuts finger-tight; then, tighten them two more turns or until no threads show on the fitting body.
4. Close the drain cocks on all air reservoirs. Run the engine to build up vehicle air pressure to at least 100 psi (690 kPa).
5. Check the operation of the new leveling valve. For instructions, refer to **Subject 100**.
6. Check all air lines and connections for leaks; eliminate any found.



1. Slotted Mounting Tab
2. Vertical Link
3. Leveling Valve
4. Leveling Valve Horizontal Arm
5. Leveling Valve Mounting Bracket
6. Hex Nut

Fig. 1, WABCO Leveling Valve and Linkage



A. to air supply
B. to air spring

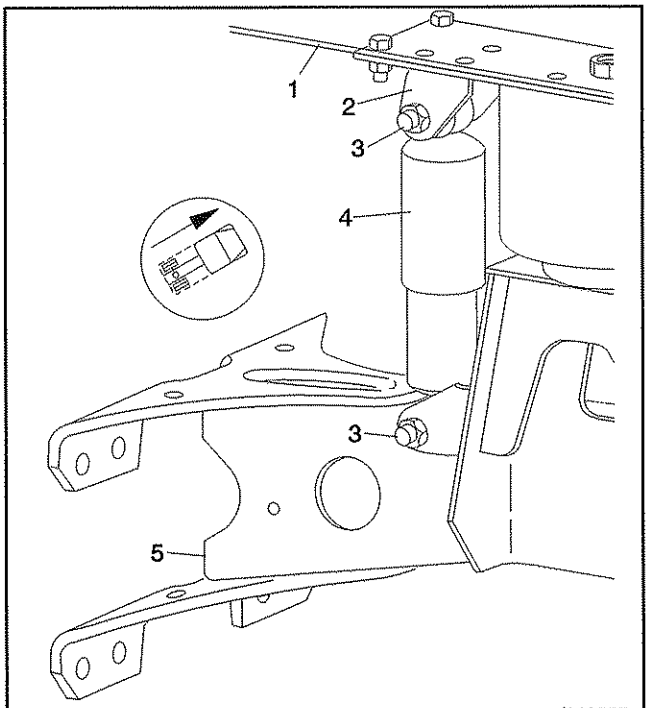
Fig. 2, Air Line Connections, WABCO Leveling Valve

Leveling Valve Replacement

7. Adjust the leveling valve. Refer to **Subject 110** for instructions.

Replacement

1. Chock the front tires to prevent vehicle movement.
2. Remove the locknuts from the shock absorber upper and lower mounting bolts. See **Fig. 1**.
3. Remove the bolts and pull the shock absorber out of the mounting brackets.
4. Install the replacement shock absorber in the mounting brackets, and secure it with the bolts and locknuts.
5. Tighten the locknuts 45 lbf·ft (61 N·m).
6. Remove the chocks from the front tires.



1. Cab Rear Crossmember
2. Shock Absorber Upper Bracket
3. Mounting Nut, Bolt
4. Shock Absorber
5. Frame Crossmember

Fig. 1, Shock Absorber Mounting

Air Spring Replacement

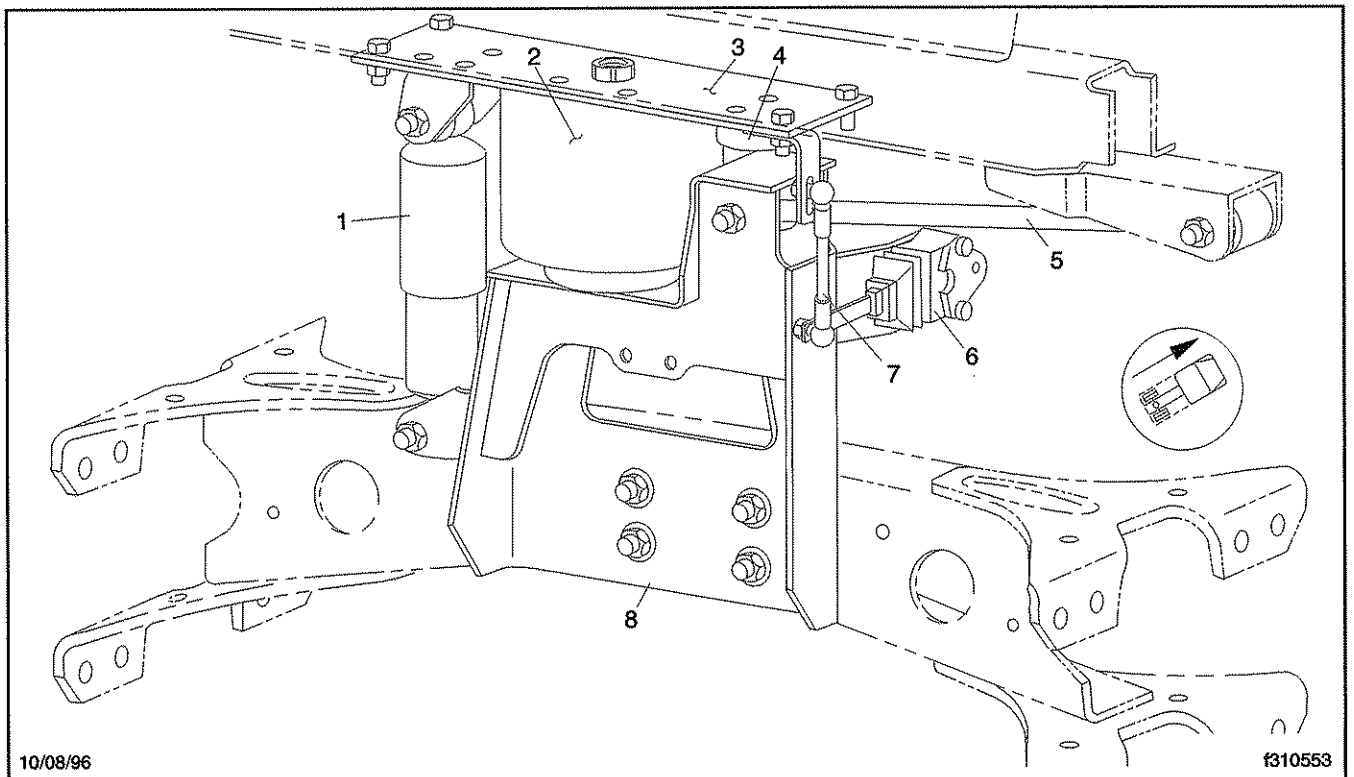
Replacement

1. Chock the front tires to prevent the vehicle from moving.
2. Drain the vehicle air system. For instructions, see **Group 42** of the *Business Class Trucks Maintenance Manual.*
3. Remove the four bolts securing the cab air-suspension top unit to the cab rear crossmember. The right rear bolt also secures the leveling valve linkage slotted mounting tab to the cab. See **Fig. 1**.
4. Using a hydraulic bottle jack and blocks of wood (for spacers, if necessary), raise the rear of the cab until the cab suspension system shock absorber reaches its end stop.

⚠ DANGER

Before doing the work below, block the raised cab securely. Failure to block the cab while working on the cab rear air suspension system could allow the cab to fall, possibly resulting in serious injury or death.

5. With the cab raised, place blocks of wood between the frame rails and the cab rear crossmember on both sides of the vehicle. Then, lower the bottle jack and allow the cab to rest on the blocks of wood.
6. Remove the air spring.
   - 6.1 Raise the slotted mounting tab, vertical link, and leveling valve horizontal arm and hold it up until all air exhausts from the air spring.
   - 6.2 Disconnect the air spring air supply hose from the fitting on the bottom of the air



1. Shock Absorber
2. Air Spring
3. Top Unit
4. Rubber Bumper
5. Transverse Torque Arm
6. Leveling Valve
7. Vertical Link
8. Bottom Unit

Fig. 1, Cab Rear Air-Suspension System

Air Spring Replacement

spring. Cover the end of the hose to keep out dirt, moisture, etc.

6.3 Remove the fitting from the air spring being replaced.

6.4 Remove the nuts from the air spring upper and lower mounting bosses.

6.5 Remove the air spring.

7. Install a new air spring.

7.1 With the new air spring in its installed position, install the retaining nut on the air spring lower mounting boss and tighten it 60 lbf·in (700 N·cm).

7.2 Position the top unit over the air spring, making sure that the rubber bumper is on the right-hand side of the vehicle. Install the retaining nut on the air spring upper mounting boss and tighten it 60 lbf·in (700 N·cm).

7.3 Position the leveling valve slotted mounting tab (with vertical link and leveling valve horizontal arm atteched) at the right-hand rear corner of the upper unit, then install the four bolts securing the upper unit to the cab rear crossmember. Tighten the bolts 60 lbf·ft (81 N·m)

7.4 Install the air hose fitting in the air spring. Tighten it finger-tight plus one turn. Do not apply Teflon® tape to the fitting threads.

7.5 Remove the cover from the air spring supply line and attach the line to the air spring fitting. Tighten the air line nut finger-tight plus two turns or until no threads show on the fitting.

8. Using the hydraulic bottle jack, raise the rear end of the cab just enough to remove the wooden support blocks.

9. Lower the cab and remove the jack.

10. Start the engine and build vehicle air pressure to at least 100 psi (690 kPa).

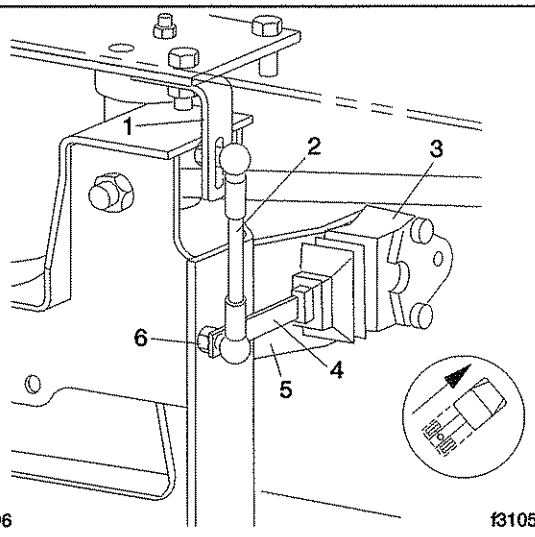
11. Check for air leaks at the air spring and at the leveling valve. Tighten the fittings or replace the parts, if necessary.

12. Remove the chocks from the front tires.

Transverse Torque Arm Replacement

Replacement

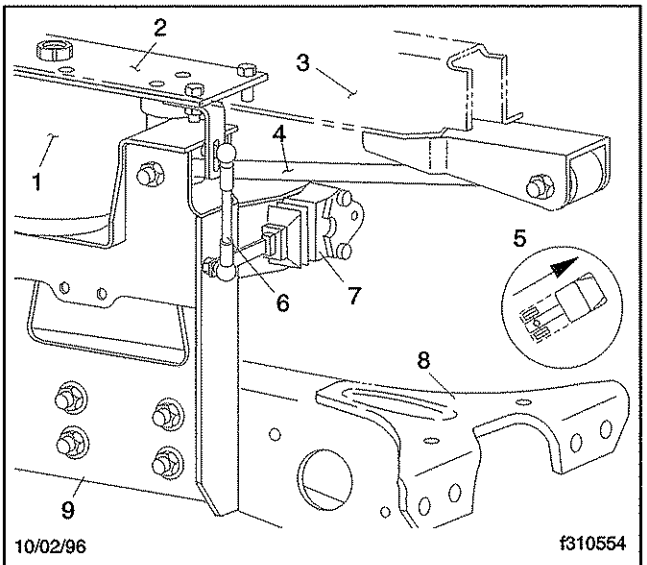
1. Chock the front tires to prevent the vehicle from moving.
2. Remove the hex nut securing the leveling valve arm to the vertical link. See **Fig. 1.**
3. Separate the leveling valve arm from the vertical link and raise the arm until the cab lowers onto its bottom stop.
4. With the cab lowered, lower the leveling valve arm to its neutral position and lock the arm there by inserting a 5/32" (4 mm) pin or drill through the hole in the valve body.
5. Remove the torque arm nuts. See **Fig. 2.**
6. Remove the torque arm bolts, then remove the torque arm from its mounting brackets.
7. Install the new torque arm in the mounting brackets and secure it with the mounting bolts and nuts.
8. Tighten the locknuts 45 lbf·ft (61 N·m).
9. Connect the leveling valve arm to the vertical link and install the hex nut.



1. Slotted Mounting Tab
2. Vertical Link
3. Leveling Valve
4. Leveling Valve Horizontal Arm
5. Leveling Valve Mounting Bracket
6. Hex Nut

Fig. 1, WABCO Leveling Valve and Linkage

10. Tighten the hex nut securely.
11. Remove the chocks from the front tires.



1. Air Spring
2. Top Unit
3. Cab Rear Crossmember
4. Transverse Torque Arm
5. Torque Arm Fasteners
6. Vertical Link
7. Leveling Valve
8. Frame Crossmember
9. Bottom Unit

Fig. 2, Cab Rear Air-Suspension System

Troubleshooting

Problem—Air Spring Is Flat

Possible Cause	Remedy
Low air pressure in the secondary air system.	Check the air pressure gauge on the instrument panel. If secondary air pressure is low, run the engine until at least 70 psi (482 kPa) is indicated.
Air is leaking from the cab air-suspension system.	Check for leakage from fittings, air lines, air springs, and the leveling valve. Tighten loose fittings to stop leakage; replace worn or damaged parts. Do not use Teflon tape on fittings.
The leveling valve is out of adjustment.	Adjust the leveling valve.
The leveling valve is inoperative.	If downward movement of the arm on a properly adjusted valve fails to inflate the air spring, replace the leveling valve.
The leveling valve linkage is damaged.	Check for damage to the leveling valve vertical link and arm Repair or replace damaged linkage parts.
The air spring is punctured.	Replace the air spring. Check the area around the damaged air spring for contact with other components. Correct the problem areas as needed.
The air spring is leaking due to continual or repeated over-extension.	Check the height of the air spring. Make sure the correct height is maintained. Adjust if needed. Check for a broken shock absorber or shock bracket; replace if broken.

Problem—Air Bags Deflate Rapidly When the Engine Is Not Running

Possible Cause	Remedy
Air is leaking from the cab air-suspension system.	Check for leakage from fittings, air lines, the air spring, and the leveling valve. Tighten loose fittings to stop leakage; replace worn or damaged parts. Do not use Teflon tape on fittings.

Problem—Rear of Cab Rides Too High or Too Low

Possible Cause	Remedy
The leveling valve is out of adjustment.	Adjust the leveling valve.

Problem—Bouncy Ride

Possible Cause	Remedy
The cab air suspension shock absorber is leaking or worn out.	Replace the shock absorber.

Cab Rear Air Suspension, Link CabMate® 60.06

Contents

Subject	Subject Number
General Description and Principles of Operation	050
Service Operations	
Height Control Valve Checks	100
Height Control Valve Adjustment	110
Height Control Valve Replacement	120
Shock Absorber Replacement	130
Air Spring Replacement	140
Lateral Control Rod Replacement	150
Troubleshooting	300
Specifications	400

General Description

The Link Cabmate® cab rear air-suspension system is standard equipment on Crew Cab-equipped vehicles.

The cab rear air-suspension system absorbs road shocks and compensates for changing cab loads. The cab air suspension system consists of: an air spring, a height control valve, a shock absorber, a lateral control rod, top and bottom units, and left and right outrigger-style auxiliary jounce travel limiters. See **Fig. 1.**

FL106 models equipped with the Crew Cab also use a spacer between the top unit and the cab crossmember, but do not have the auxiliary jounce travel limiters. See **Fig. 2.**

TOP AND BOTTOM UNITS

The top unit is secured to the cab rear crossmember by five bolts; the bottom unit is secured to a frame crossmember by four bolts. A lateral control rod, which connects the top and bottom units, prevents side-to-side misalignment. See **Fig. 1** and **Fig. 2.**

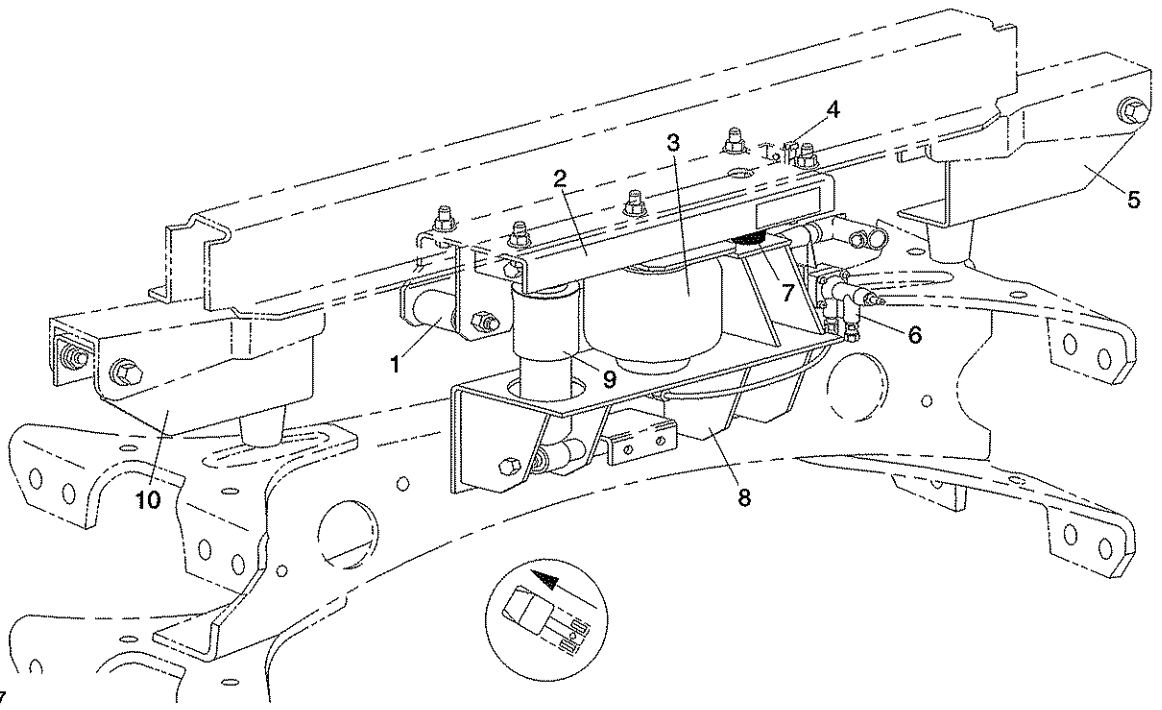
AIR SPRING

The top of the air spring has a threaded hole which mates with a stud welded to the top unit; the bottom of the air spring has a threaded stud and is attached to the bottom unit by a nut.

Together with the height control valve, the air spring compensates for changes in cab load by maintaining the correct distance between the rear of the cab and the frame rails.

HEIGHT CONTROL VALVE

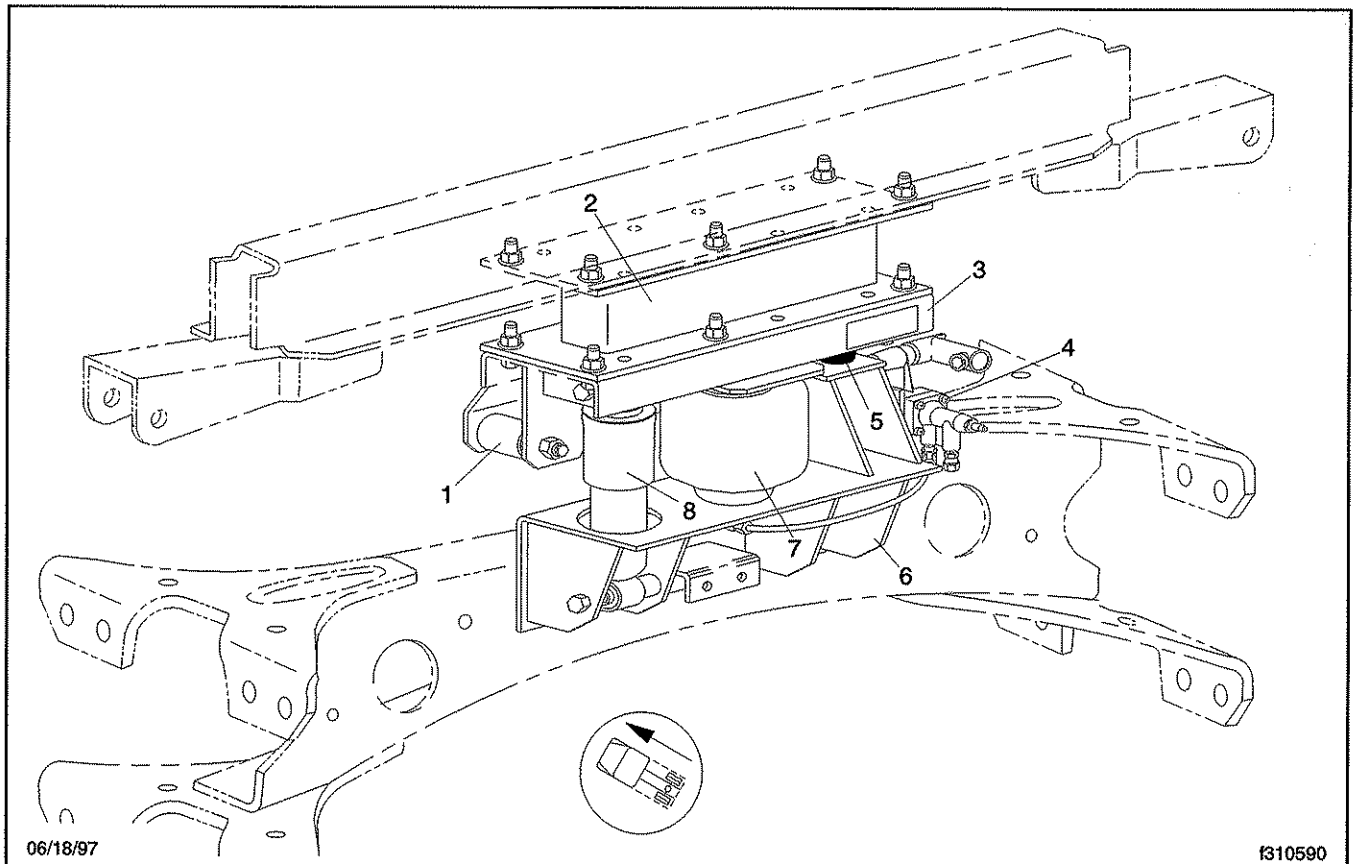
All of the air in the cab air-suspension system is admitted through or exhausted from the height control valve (**Fig. 1**, Ref. 6 or **Fig. 2**, Ref. 4). The height control valve mounts on a bracket attached to the bottom unit. A horizontal arm connects the valve



1. Lateral Control Rod
2. Top Unit
3. Air Spring
4. Height Control Valve Link
5. Right Auxiliary Jounce Travel Limiter
6. Height Control Valve
7. Rubber Bumper
8. Bottom Unit
9. Shock Absorber
10. Left Auxiliary Jounce Travel Limiter

Fig. 1, Link Cabmate Cab Air Suspension System (All models except FL106)

General Description and Principles of Operation



1. Lateral Control Rod
2. Spacer
3. Top Unit
4. Height Control Valve
5. Rubber Bumper
6. Bottom Unit
7. Air Spring
8. Shock Absorber

Fig. 2, Link Cabmate Cab Air Suspension System (FL106 models only)

control shaft to the vertical linkage attached to the top unit.

CAB-MOUNT STOP ASSEMBLY

The cab-mount stop assembly consists of a rubber bumper (see **Fig. 1**, Ref. 7 or **Fig. 2**, Ref. 5) attached to the top unit. The bumper limits downward movement of the cab by contacting the bottom unit. If a leak occurs in the cab air-suspension system, the bumper supports the cab until the leak can be repaired.

NOTE: If a leak occurs in the cab air-suspension system, a pressure protection valve (located in the air supply line to the leveling valve) will maintain at least 65 psi (450 kPa) in the vehicle secondary air system.

SHOCK ABSORBER

A single shock absorber attaches to both the top and bottom units. In addition to damping cab movement, the shock absorber limits upward movement of the rear of the cab.

AUXILIARY JOUNCE TRAVEL LIMITERS

On all models except the FL106, auxiliary jounce travel limiters (see **Fig. 1**, Refs. 5 and 10) are attached to the cab rear crossmember. Each travel limiter is fitted with a rubber bumper, which contacts the top of a frame crossmember to prevent excessive cab lean.

Principles of Operation

When cab load increases, the distance between the top and bottom units decreases, causing the vertical linkage to push down on the height control valve arm. This rotates the valve control shaft, which activates an intake valve core inside the valve. Air flows through the valve and tubing into the air spring, until increasing pressure in the spring raises the cab to the correct height. As the cab reaches the correct height, the horizontal arm and the control shaft return to their neutral positions, closing the intake valve core, and stopping the flow of air into the air spring.

When cab load decreases, the rear of the cab rises, causing the vertical linkage to pull up on the end of the horizontal arm. Rotating the height control valve control shaft in this direction activates an exhaust valve core. Air is exhausted from the spring until the cab lowers to the correct height. Again, the horizontal arm and control shaft return to their neutral positions as the cab reaches the correct height, and air exhausting is stopped.

When the vehicle is moving, small and abrupt movements of the cab will occur, resulting in movements of the height control valve arm. Small movements of the arm do not activate the valve because of a built-in free-travel range: a gap between the height control valve control shaft and both of the valve cores (intake and exhaust). Abrupt movements do not activate the valve because it is filled with a silicone fluid, which delays the opening of one valve core for as long as five seconds after the closing of the other.

Changes in load which result in larger movements of the horizontal arm (beyond the free-travel range) for more than five seconds will activate the height control valve. Such changes in load occur when occupants or heavy items are added to, or removed from, the cab. Also, when the vehicle is moving forward at high speed or in a strong headwind, a major change in load occurs from the downward force applied by an optional air shield or air fairing. When these changes in load occur, the cab air-suspension system will adjust the height at the rear of the cab.

Checks

To keep the cab air-suspension system operating reliably, the air system must be kept free of oil, moisture, and other foreign material. Regularly inspect and maintain the vehicle air system components. For instructions, see **Group 42** of the *Business Class Trucks Maintenance Manual.*

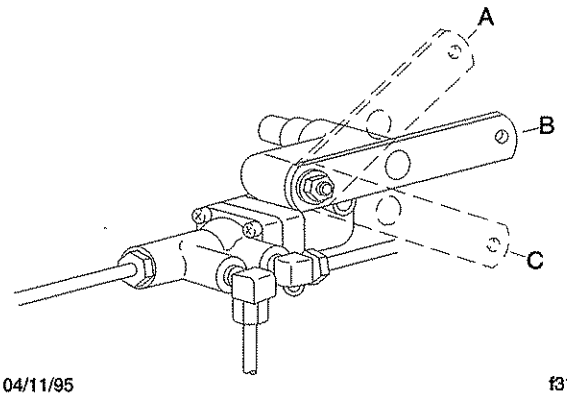
⚠ CAUTION

Failure to take precautions against the entry of oil, moisture, and other foreign material into the cab air-suspension system could eventually lead to sludge forming in the air system. Sludge could adversely affect the operation of the cab air-suspension system and other air system components.

Before replacing the height control valve, do the following steps to see if the valve is actually damaged, or is merely out of adjustment.

1. Chock the tires. Run the engine to build up vehicle air pressure to at least 100 psi (690 kPa).
2. Using a screwdriver, snap the vertical linkage off the horizontal arm attached to the height control valve.
3. Check the operation of the valve.
   - 3.1 Push the arm down about 45 degrees for 6 to 8 seconds. See **Fig. 1**, Ref. C. Air should pass through the valve and inflate the air spring.
   - 3.2 Return the arm to the neutral position. See **Fig. 1**, Ref. B. Air should stop flowing.
   - 3.3 Pull the arm up about 45 degrees for 6 to 8 seconds. See **Fig. 1**, Ref. A. Air should exhaust from the valve.
   - 3.4 Return the arm to the neutral position. The air should stops exhausting in the neutral position.
   - 3.5 If the valve works as stated in all of the above checks, no further checking is needed. Connect the vertical linkage to the valve horizontal arm.

     If the valve doesn't work as stated in all of the above checks, replace it. See **Subject 120** for instructions.
4. If adjustment of the leveling valve is needed, see **Subject 110.**



A. Air Exhausts From Valve
B. Air Stops Flowing From Valve
C. Air Passes through Valve

Fig. 1, Height Control Valve

Height Control Valve Adjustment

Adjustment

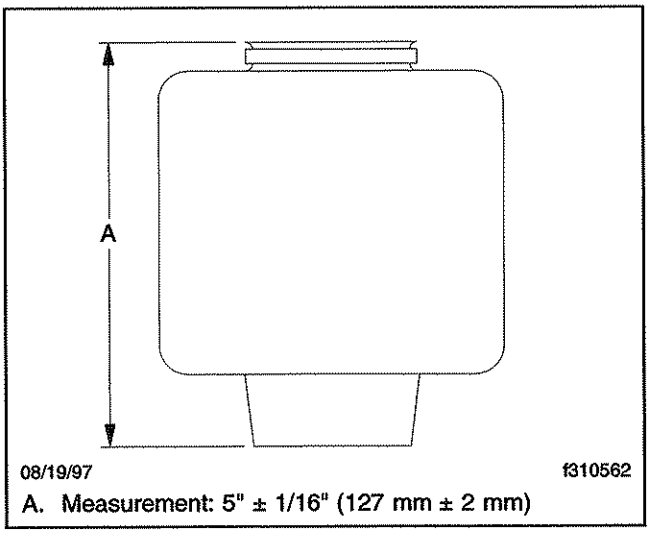
1. Park the vehicle on a level surface and apply the parking brakes.
2. Chock the front tires to prevent the vehicle from moving.
3. Run the engine to build up vehicle pressure to at least 100 psi (690 kPa).
4. Check the height control valve adjustment.
   - 4.1 Measure the height of the air spring (see **Fig. 1**). It should be 5 inches ± 1/16 inch (127 mm ± 2 mm).
   - 4.2 If the height is within specifications, no adjustment is needed. If it is not within specifications, go to the next step.

NOTE: If the air spring height is out of specification by more than 1/4 inch (6 mm), perform the coarse adjustment procedure. If design height is out of specification by less than 1/4 inch (6 mm), skip to the fine adjustment procedure.

5. Coarse adjustment is obtained by changing the position of the height control valve shaft, relative to the horizontal arm position.
   - 5.1 Loosen the retaining nut (see **Fig. 2**, Ref. 3) which secures the horizontal arm to the valve shaft.
   - 5.2 Move the height control valve shaft up or down, relative to the arm, until air spring height is within 1/4 inch (6 mm) of specifications.
   - 5.3 Using care to avoid moving the valve shaft, tighten the nut securing the horizontal arm to the valve shaft.
6. When the required adjustment is less than 1/4 inch (6 mm), do the height control valve fine adjustment.
   - 6.1 Loosen the locknuts (**Fig. 2**, Ref. 5) securing the linkage ball sockets to the threaded rod.
   - 6.2 Lengthen or shorten the linkage as necessary by rotating the threaded rod in or out until the air spring design height is within specifications.
   - 6.3 Tighten the ball socket locknuts and recheck the air spring height. Make any corrections as needed.

IMPORTANT: Because of a built-in delay in the height control valve, it may take as long as five seconds after making adjustments before the air spring height changes.

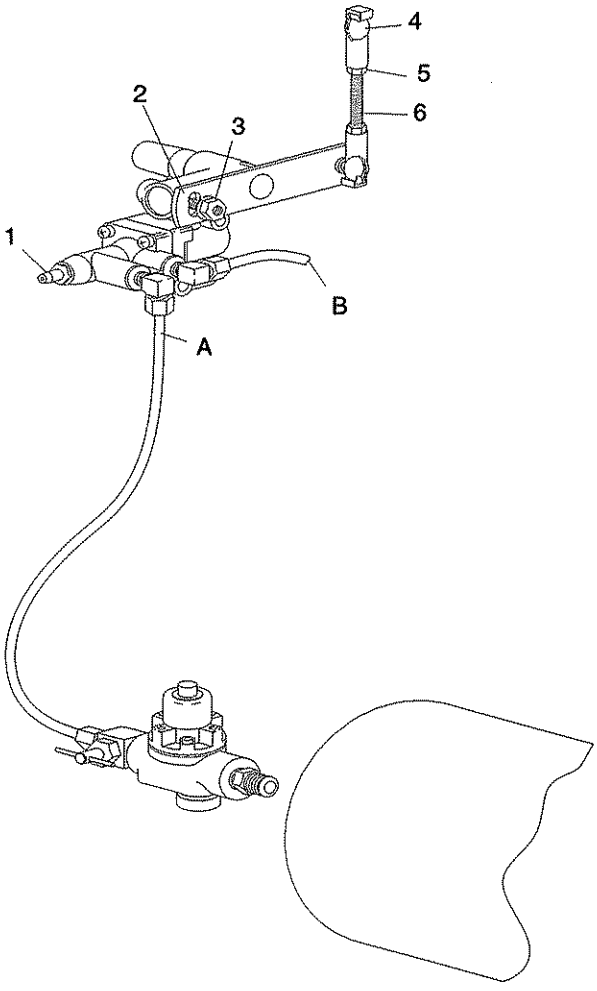
7. Remove the chocks from the front tires.



A. Measurement: 5" ± 1/16" (127 mm ± 2 mm)

Fig. 1, Air Spring Height

Height Control Valve Adjustment



A. From air supply
B. To air spring
1. Exhaust Port
2. Horizontal Arm
3. Arm Retaining Nut
4. Ball Socket
5. Locknut
6. Threaded Rod

Fig. 2, Height Control Valve and Linkage

Height Control Valve Replacement

Replacement

NOTE: Before replacing the height control valve, do the steps in **Subject 100** to see if the valve is actually damaged, or is merely out of adjustment.

1. Park the vehicle on a level surface and apply the parking brakes.
2. Chock the front tires to prevent the vehicle from moving.
3. Drain the vehicle air system.
4. Remove the height control valve.
   - 4.1 Using a screwdriver, disconnect the vertical linkage ball socket from the height control valve horizontal arm. See **Fig. 1**, Ref. 4. Move the arm down, and hold it there to exhaust all air from the air spring.
   - 4.2 Remove the retaining nut (Ref. 3) that attaches the horizontal arm to the stud on the height control valve. Remove the arm, and save it for installation on the new valve.
   - 4.3 Disconnect the air lines from the fittings at the height control valve ports. Mark the lines for assembly reference. Cover the open ends of the air lines to prevent dirt or other foreign material from entering.
   - 4.4 Remove the height control valve mounting fasteners; then, remove the valve from its mounting plate.
5. Install the new height control valve.
   - 5.1 Mount the new valve on the plate. Tighten the hexhead capscrews 120 lbf·in (1350 N·cm).
   - 5.2 Mount the horizontal arm on the valve stud and tighten the locknut.
   - 5.3 Remove the covers from the air lines. Connect the air lines to the height control valve as marked earlier or as shown in **Fig. 1**. Tighten the fitting nuts hand-tight; then, tighten them one more turn or until no threads show on the fitting body.
6. Run the engine to build up vehicle air pressure to at least 100 psi (690 kPa).
7. Check the operation of the new height control valve. For instructions, see **Subject 100**.
8. Check all air lines and connections for leaks; repair as needed.
9. Adjust the height control valve. See **Subject 110** for instructions.
10. Remove the chocks from the front tires.

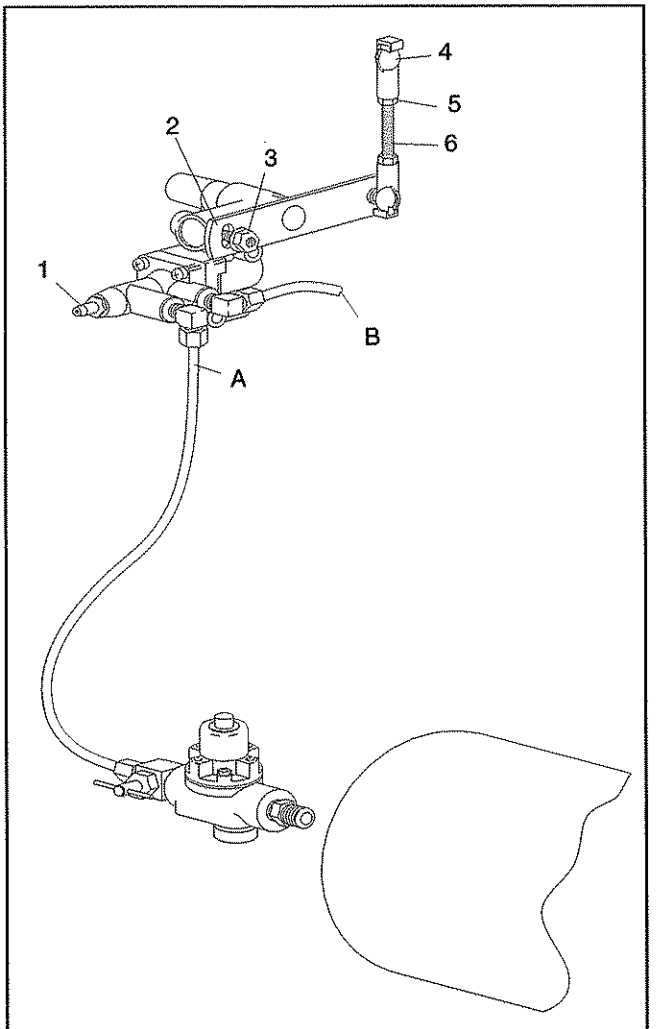


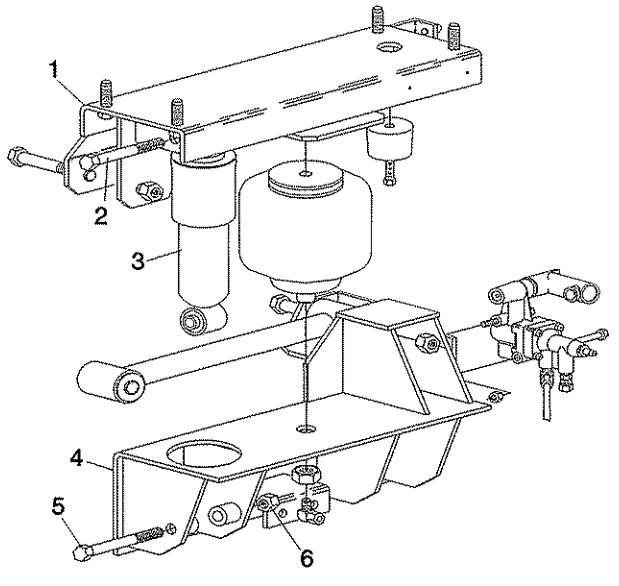
Fig. 1, Height Control Valve and Linkage

Replacement (See 1)

1. Park the vehicle on a level surface and apply the parking brakes.
2. Chock the front tires to prevent vehicle movement.
3. Remove the locknuts from the shock absorber upper and lower mounting bolts. Remove the bolts. Pull the shock absorber out of the mounting brackets.
4. Install the replacement shock absorber in the mounting brackets, and secure it with the bolts and locknuts.

NOTE: The longer bolt is used at the bottom of the shock absorber.

5. Tighten the locknuts 45 lbf·ft (61 N·m).
6. Remove the chocks from the front tires.



08/19/97 f310615

1. Top Unit
2. Upper Mounting Bolt
3. Shock Absorber
4. Bottom Unit
5. Lower Mounting Bolt
6. Locknut

Fig. 1, Shock Absorber Mounting

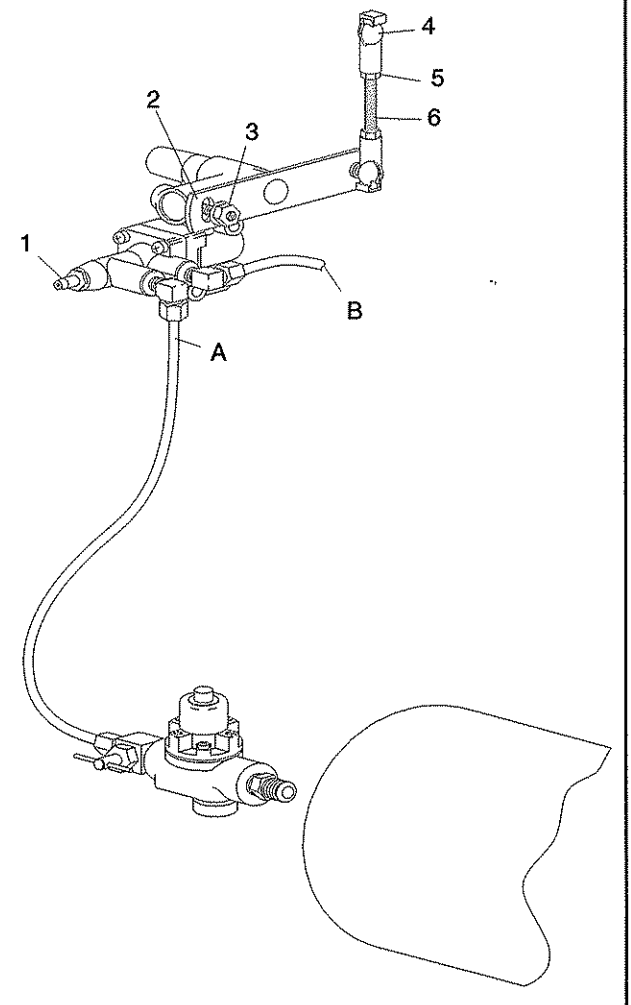
Replacement

1. Park the vehicle on a level surface and apply the parking brakes.
2. Chock the front tires to prevent the vehicle from moving.
3. Drain the vehicle air system.
4. Using a hydraulic bottle jack and blocks of wood (for spacers, if necessary), raise the rear of the cab until the cab suspension system shock absorber reaches its end stop.

⚠ DANGER

Before doing the work below, block the raised cab securely. Failure to block the cab while working on the cab rear air suspension system could result in serious injury or death.

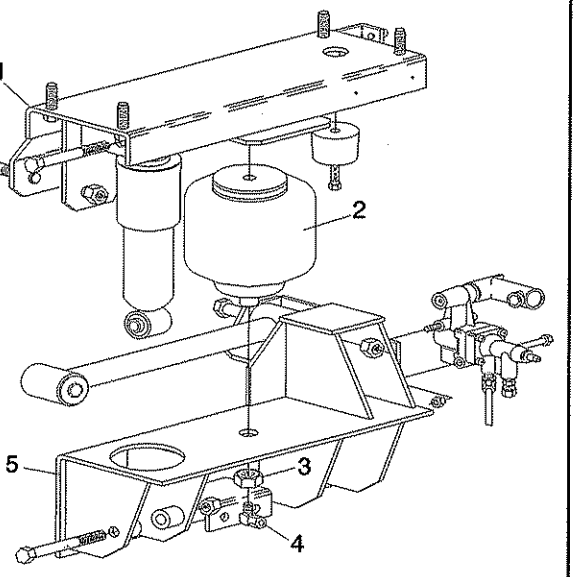
5. With the cab raised, place blocks of wood between the frame rails and the cab rear crossmember on both sides of the vehicle. Then, lower the jack and allow the cab to rest on the blocks of wood.
6. Remove the air spring.
   - 6.1 Using a screwdriver, disconnect the ball socket (see **Fig. 1**, Ref. 4) from the height control valve arm. Move the arm up and hold it there until all air exhausts from the air spring.
   - 6.2 Disconnect the air supply hose from the fitting on the bottom of the air spring. See **Fig. 2**, Ref. 4. Cover the end of the hose to keep out dirt, moisture, etc.
   - 6.3 Unscrew the air fitting (Ref. 4) from the air spring.
   - 6.4 Remove the nut (Ref 3) securing the air spring to the bottom unit.
   - 6.5 Using both hands, grasp the air spring firmly and unscrew it from the stud on the top unit.
7. Install a new air spring.
   - 7.1 Position the new air spring under the top unit and screw it onto the top unit stud. Tighten the air spring finger-tight.
   - 7.2 Squeeze the air spring to extend it and insert its bottom stud through the mounting hole in the bottom unit. Install the lower mounting nut and tighten it finger-tight. Using a wrench, tighten one more turn.
   - 7.3 Install the air hose fitting (Ref. 4) in the air spring bottom stud. Tighten it finger-tight. Use a wrench to position the fitting so it



A. From air supply
B. To air spring
1. Exhaust Port
2. Horizontal Arm
3. Arm Retaining Nut
4. Ball Socket
5. Locknut
6. Threaded Rod

Fig. 1, Height Control Valve and Linkage

Air Spring Replacement



08/22/97 f310617

1. Top Unit
2. Air Spring
3. Lower Mounting Nut
4. Air Fitting
5. Bottom Unit

Fig. 2, Air Spring Mounting

faces rearward. Do not apply Teflon® tape to the fitting threads.

7.4 Remove the cover from the air spring supply line and attach the line to the air spring fitting. Tighten the air line nut finger-tight. Using a wrench, tighten one more turn.

8. Using the hydraulic bottle jack, raise the rear end of the cab just enough to remove the wooden support blocks.
9. Lower the cab and remove the jack.
10. Start the engine and build vehicle air pressure to at least 100 psi (690 kPa).
11. Check for air leaks at the air spring and at the height control valve. Tighten the fittings or replace the parts, if necessary.
12. Remove the chocks from the front tires.

Lateral Control Rod Replacement

Replacement

1. Park the vehicle on a level surface and apply the parking brakes.
2. Chock the front tires to prevent vehicle movement.
3. Drain the vehicle air system.
4. Using a screwdriver, disconnect the ball socket (see **Fig. 1**, Ref 4) from the height control valve arm.
5. Move the arm upward until all air exhausts from the air spring and the rubber bumper attached to the top unit contacts the bottom unit.
6. Remove the locknuts from the lateral control rod mounting bolts and remove the bolts. Pull the control rod out of the mounting brackets. See **Fig. 2**.
7. Install the replacement control rod in the mounting brackets, and secure it with the bolts and locknuts.

NOTE: The longer bolt is used to attach the control rod to the cab suspension top unit.

8. Tighten the locknuts 40 lbf·ft (54 N·m).
9. Connect the vertical linkage to the height control valve arm.
10. Start the engine and build vehicle air pressure to at least 100 psi (690 kPa).
11. Remove the chocks from the front tires.

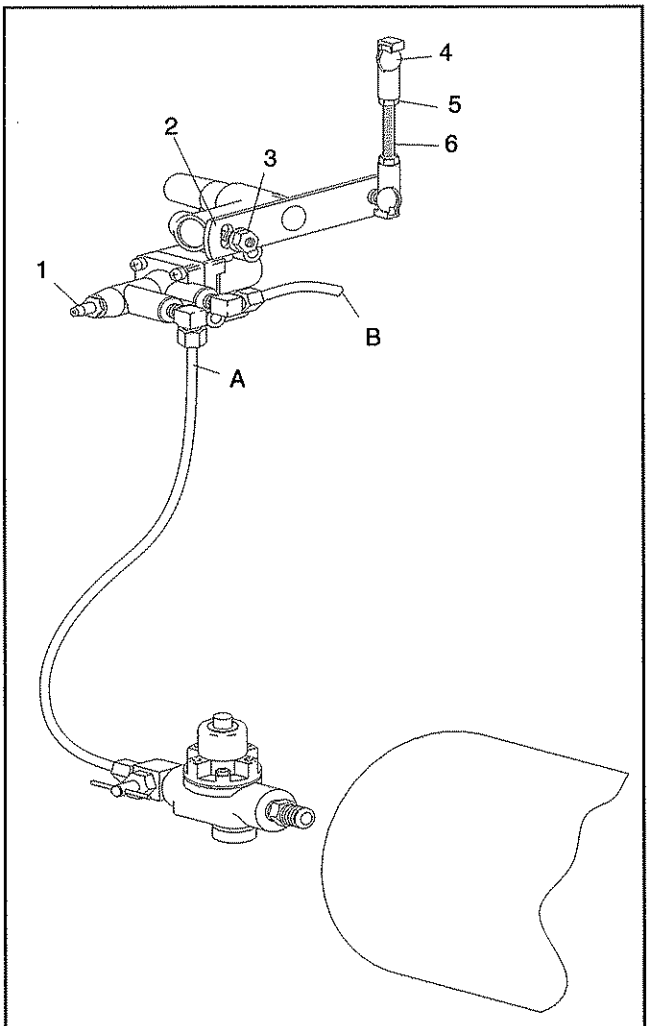
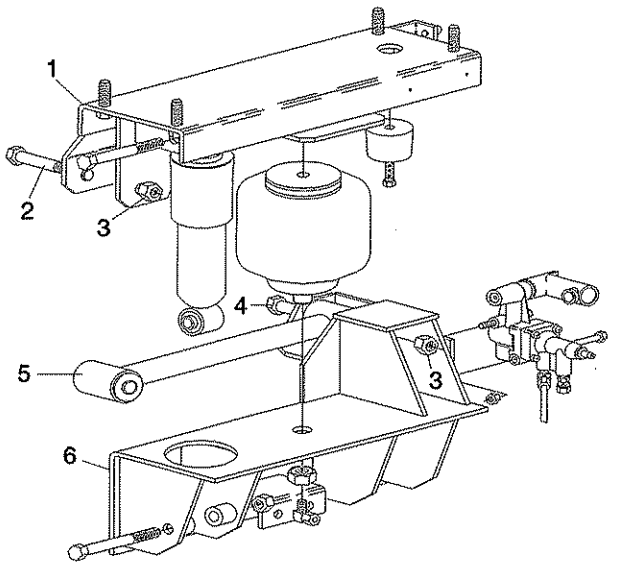


Fig. 1, Height Control Valve and Linkage

Lateral Control Rod Replacement



08/19/97 f310616

1. Top Unit
2. Upper Mounting Bolt
3. Locknut
4. Lower Mounting Bolt
5. Lateral Control Rod
6. Bottom Unit

Fig. 2, Lateral Control Rod Mounting

Troubleshooting Tables

Problem—Air Spring Is Flat

Possible Cause	Remedy
Low air pressure in the secondary air system.	Check the air pressure gauge on the instrument panel. If secondary air pressure is low, run the engine until at least 70 psi (482 kPa) is indicated.
Air is leaking from the cab air-suspension system.	Check for leakage from fittings, air lines, air spring, and the height control valve. Tighten loose fittings to stop leakage; replace worn or damaged parts. Do not use Teflon tape on fittings.
The height control valve is out of adjustment.	Adjust the height control valve.
The height control valve is inoperative.	If upward movement of the arm on a properly adjusted valve fails to inflate the air springs, replace the height control valve.
The height control valve linkage is damaged.	Check for damage to the height control valve linkage and the arm. Repair or replace damaged linkage parts.

Problem—Air Spring Deflates Rapidly When the Engine Is Not Running

Possible Cause	Remedy
Air is leaking from the cab air-suspension system.	Check for leakage from fittings, air lines, air springs, and the height control valve. Tighten loose fittings to stop leakage; replace worn or damaged parts. Do not use Teflon tape on fittings.

Problem—Rear of Cab Rides Too High or Too Low

Possible Cause	Remedy
The height control valve is out of adjustment.	Adjust the height control valve.

Problem—Collapsed Air Spring

Possible Cause	Remedy
An air spring is punctured.	Replace the air spring. Check the area around the damaged air spring for contact with other components. Correct the problem areas as needed.
The air spring is continually or repeatedly over-extended.	Check the height of the air spring. Make sure the correct height is maintained. Adjust if needed. Check for a broken shock absorber or shock bracket; replace if broken.

Problem—Bouncy Ride

Possible Cause	Remedy
The cab air suspension shock absorber is leaking or worn out.	Replace the shock absorber.

Specifications

Tightening Torques		
Description	**Size**	**Torque**
Air Line Fitting Nuts	—	finger-tight + one turn
Air Spring Air Fitting Nut (Plastic Fitting)	—	finger-tight + one turn
Height Control Valve Cover Screws	—	30 lbf.in (340 N.cm)
Height Control Valve Mounting Bolts	1/4 x 2 UNC	120 lbf.in (1350 N.cm)
Lateral Control Rod Mounting Bolts:	1/2 x 3-1/4 UNF (Gr. 8)	
Upper		40 lbf.ft (54 N.m)
Lower	1/2 x 3 UNF (Gr. 8)	40 lbf.ft (54 N.m)
Shock Absorber Mounting Bolts:	7/16 x 3-1/4 UNF	
Upper		45 lbf.ft (61 N.m)
Lower	7/16 x 3-3/4 UNF	45 lbf.ft (61 N.m)
Valve Arm Retaining Nut	1/4 UNC	84 lbf.in (940 N.cm)

Table 1, Tightening Torques