Section 9 Suspension and Frame

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SUSPENSION SYSTEM DESCRIPTION

The suspension system on the HUMMER delivers double A-arm independent suspension at all four wheels. This suspension system provides for a smoother ride and allows for more positive control of the vehicle. The system consists of a heavy-duty coil spring, a heavy-duty hydraulic shock absorber, and an upper and lower control arm at each wheel. The shock absorber controls wheel travel and dampens spring compression (jounce) and extensions (rebound) (Figure 9-1). When the wheel strikes a bump, it is driven upward. This causes the upper and lower control arms to pivot upward, which compresses the spring and shock absorber.

Ball joints allow the control arms and geared hubs to change angles for smooth steering during turns. A stabilizer bar is located on the front suspension to aid in stabilizing the vehicle when it is turning. Each end of the stabilizer bar is attached to the lower control arms. If one end of the vehicle's frame attempts to tip, one end of the bar is down while the other is up. This results in a twisting force within the stabilizer bar which causes it to resist the tipping action.

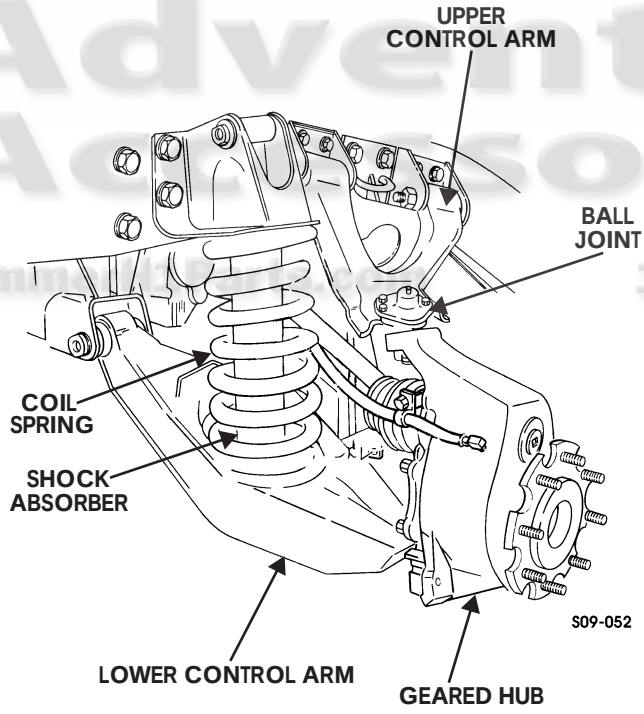

Figure 9-1: Suspension System

STABILIZER BAR REPLACEMENT

Removal

NOTE: Stabilizer bar must be removed from bar links at each end of lower control arms.

1. Remove two locknuts, three washers, and pin securing bar link to stabilizer bar. Discard locknuts (Figure 9-2).
2. Remove two locknuts, washers, clamp, and stabilizer bar from frame bracket. Discard locknuts.
3. Remove bushing from stabilizer bar.

Installation

1. Install bushing on stabilizer bar (Figure 9-2).
2. Install stabilizer bar on frame bracket with clamp, two washers, and locknuts. Tighten locknuts to 60 lb-ft (81 N•m).
3. Install stabilizer bar on bar link with pin, three washers, and two locknuts. Tighten locknuts to 75 lb-ft (102 N•m).

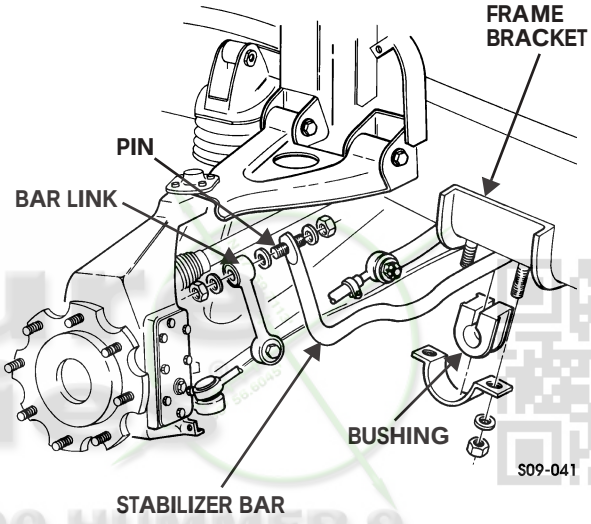

Figure 9-2: Stabilizer Bar

STABILIZER BAR LINK REPLACEMENT

Removal

1. Remove locknut and two washers securing bar link to stabilizer bar. Discard locknut (Figure 9-3).
2. Remove capscrew, two washers, and bar link from lower control arm.

Installation

1. Apply thread-locking compound to threads of capscrew. Install bar link to lower control arm with two washers and capscrew. Tighten capscrew to 70 lb-ft (95 N•m) (Figure 9-3).
2. Install bar link on stabilizer bar with two washers and locknut. Tighten locknut to 75 lb-ft (102 N•m).

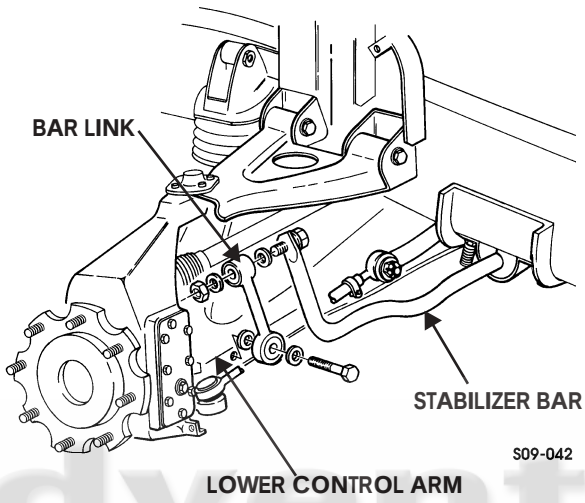

Figure 9-3: Stabilizer Bar Link

RADIUS ROD REPLACEMENT

Removal

1. Remove wheel (Section 6).
2. Remove cotter pin, slotted nut, and washer securing radius rod to geared hub. Discard cotter pin (Figure 9-4).
3. Using puller, separate radius rod from geared hub.
4. Remove locknut, washer, capscrew, washer, and radius rod from bracket. Discard locknut.

Installation

1. Install radius rod on bracket with washer, capscrew, washer, and locknut. Tighten locknut to 260 lb-ft (353 N•m) (Figure 9-4).

CAUTION: *Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.*

2. Install radius rod on geared hub with washer and slotted nut. Tighten slotted nut to 70 lb-ft (95 N•m). Install cotter pin in slotted nut.
3. Install wheel (Section 6).

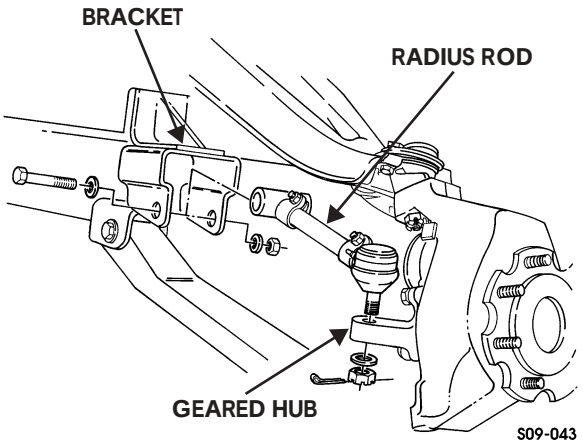

Figure 9-4: Radius Rod

UPPER BALL JOINT REPLACEMENT

Removal

1. Remove wheel (Section 6).
2. Raise and support lower control arm.
3. Remove cotter pin and slotted nut from upper ball joint. Discard cotter pin (Figure 9-5).
4. Remove four locknuts, washers, capscrews, washers, and upper ball joint from upper control arm. Discard locknuts.
5. Using puller, separate upper ball joint from geared hub and remove ball joint.

Installation

1. Position upper ball joint on upper control arm, ensuring upper ball joint is placed above upper control arm (Figure 9-6).

NOTE: Check upper ball joint torque 15 minutes after initial installation. Adjust if necessary.

2. Install upper ball joint on upper control arm with four washers, capscrews, washers, and locknuts. Tighten locknuts to 37 lb-ft (50 N•m).

CAUTION: *Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.*

3. Install upper ball joint on geared hub with slotted nut. Using crowfoot and adapter, tighten slotted nut to 65 lb-ft (88 N•m). Install cotter pin in slotted nut.
4. Lubricate upper ball joint (Section 1).
5. Install wheel (Section 6).

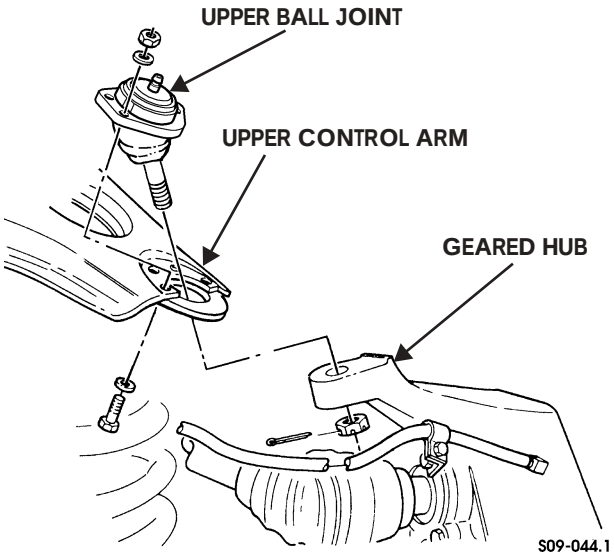

Figure 9-5: Upper Ball Joint

LOWER BALL JOINT REPLACEMENT

Removal

1. Remove wheel (Section 6).
2. Raise and support lower control arm (Figure 9-6).
3. Remove cotter pin and slotted nut from lower ball joint. Discard cotter pin.
4. Remove four locknuts, washers, capscrews, washers, and lower ball joint from lower control arm. Discard locknuts.
5. Using puller, separate lower ball joint from geared hub and remove lower ball joint.

Installation

1. Install lower ball joint on lower control arm, ensuring lower ball joint is placed below lower control arm and secure with four washers, capscrews, washers, and locknuts. Tighten front locknuts to 37 lb-ft (50 N•m) and rear locknuts to 70 lb-ft (95 N•m) (Figure 9-6).

CAUTION: *Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.*

2. Install ball joint on geared hub with slotted nut. Tighten slotted nut to 73 lb-ft (99 N•m) and install cotter pin in slotted nut.
3. Lubricate lower ball joint (Section 1).
4. Install wheel (Section 6).

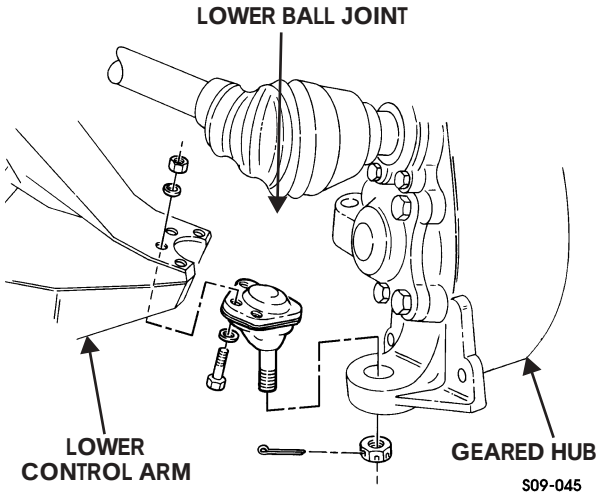

Figure 9-6: Lower Ball Joint

UPPER CONTROL ARM REPLACEMENT

NOTE: The procedure for removing and installing the front and rear upper control arms is basically the same. This procedure covers the left front upper control arm.

Removal

1. Remove wheel (Section 6).
2. Remove capscrew and washer securing vent line bracket to geared hub (Figure 9-7).
3. Disconnect vent line from fitting.
4. Remove capscrew, bracket, and vent line from upper control arm (Figure 9-8).
5. Remove four locknuts, washers, capscrews, and washers securing upper ball joint to upper control arm. Discard locknuts.
6. Remove cotter pin and slotted nut from upper ball joint. Discard cotter pin.
7. Using puller, separate upper ball joint from geared hub, and remove upper ball joint.
8. Remove two locknuts, washers, capscrews, washers, and upper control arm from brackets and remove upper control arm. Discard locknuts.

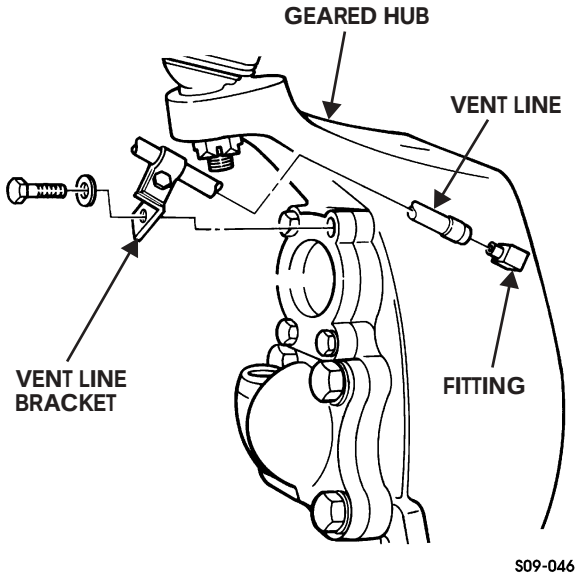

Figure 9-7: Vent Line Connection

Installation

NOTE: On front upper control arms, capscrew heads are toward rear of vehicle. On rear upper control arms, capscrew heads are toward front of vehicle.

1. Install upper control arm on brackets with two washers, capscrews, washers, and locknuts. Do not tighten locknuts (Figure 9-8).
2. Secure upper ball joint to upper control arm with four washers, capscrews, washers, and locknuts. Tighten locknuts to 37lb-ft (50 N•m).

CAUTION: *Do not loosen slotted nut to install cotter pin. Doing this may result in damage to equipment.*

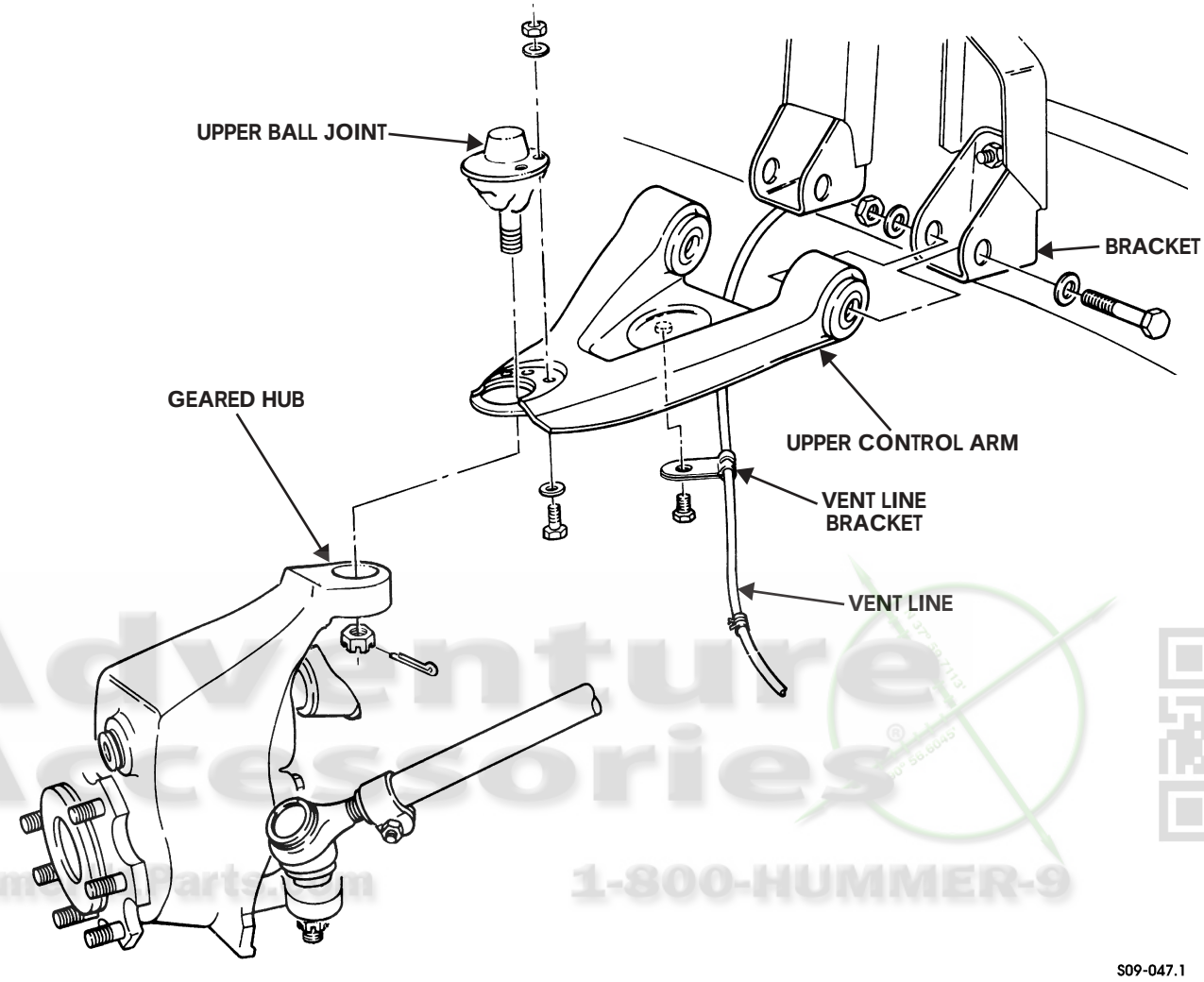

Figure 9-8: Upper Control Arm Assembly

3. Install upper ball joint on geared hub with slotted nut. Using crowfoot and adapter, tighten slotted nut to 65 lb-ft (88 N•m). Install cotter pin in slotted nut.
4. Tighten locknuts on brackets to 260 lb-ft (353 N•m).
5. Install bracket and vent line on upper control arm with capscrew.
6. Connect vent line to fitting (Figure 9-7).
7. Secure vent line bracket to geared hub with clamp, washer, and capscrew. Tighten capscrew to 37 lb-ft (50 N•m).
8. Install wheel (Section 6).

LOWER CONTROL ARM REPLACEMENT

NOTE: The procedure for removing and installing the front and rear lower control arms is basically the same. This procedure covers the left front lower control arm.

Removal

WARNING: Lower control arm must be supported during removal and installation. Failure to support lower control arm may cause personal injury or damage to equipment.

1. Remove wheel (Section 6).
2. Remove shock absorber.
3. Remove capscrew, two washers, and bar link (front only) from lower control arm (Figure 9-9).
4. Remove four locknuts, washers, capscrews, and washers from lower ball joint and lower control arm. Discard locknuts (Figure 9-10).
5. Raise and support lower control arm, and remove lower ball joint from arm.
6. Lower the lower control arm and remove coil spring.
7. Remove two locknuts, washers, capscrews, washers, and lower control arm from brackets. Discard locknuts.

NOTE: Removing the lower ball joint from the geared hub will ease installation.

8. Remove cotter pin and slotted nut from lower ball joint. Discard cotter pin.
9. Using puller, separate lower ball joint from geared hub and remove lower ball joint.

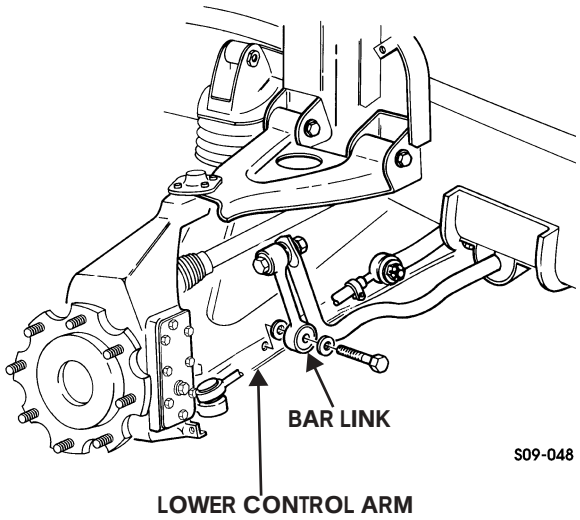

Figure 9-9: Bar Link

Installation

WARNING: Lower control arm must be supported during removal and installation. Failure to support lower control arm may cause personal injury or damage to equipment.

NOTE: On lower control arms, capscrew heads are toward front of vehicle.

1. Install lower control arm on brackets with two washers, capscrews, washers, and locknuts. Do not tighten locknuts (Figure 9-10).

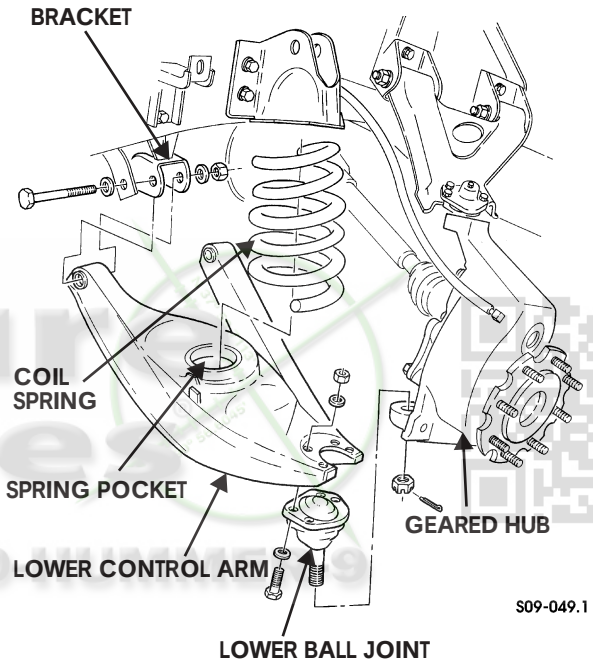

Figure 9-10: Lower Control Arm

2. Install coil spring on lower control arm ensuring end of coil spring fits in spring pocket of lower control arm.
3. Install lower ball joint on lower control arm, ensuring ball joint is placed below lower control arm.
4. Secure lower ball joint to lower control arm with four washers, capscrews, washers, and locknuts. Tighten front locknuts to 37 lb-ft (50 N•m) and rear locknuts to 70 lb-ft (95 N•m).
5. Install lower ball joint on geared hub with slotted nut. Tighten slotted nut to 73 lb-ft (99 N•m), and install cotter pin in slotted nut.
6. Tighten locknuts on brackets to 260 lb-ft (353 N•m).
7. Apply thread-locking compound to threads of capscrew. Install bar link on lower control arm with two washers and capscrew. Tighten capscrew to 70 lb-ft (95 N•m) (Figure 9-9).
8. Install shock absorber.
9. Install wheel (Section 6).

COIL SPRING REPLACEMENT

NOTE: The procedure for removing and installing all four coil springs is basically the same. This procedure covers the left front coil spring.

Removal

1. Remove wheel (Section 6).
2. Remove capscrew, two washers, and bar link from lower control arm (Figure 9-8).
3. Remove four locknuts, washers, capscrews, washers, lower ball joint, and geared hub from lower control arm. Discard locknuts.
4. Place jack under lower control arm and raise lower control arm slightly to relieve tension on shock pin.
5. Remove locknut, shock pin, washer, and shock absorber from spring seat and collapse shock absorber. Discard locknut.

NOTE: It may be necessary to loosen lower control arm capscrews to allow lower control arm to be lowered.

6. Pull geared hub and lower ball joint away from lower control arm and remove coil spring from lower control arm and shock absorber.

Installation

NOTE: Index coil spring in spring pocket for a slight gap (1/16 - 1/8 in. (1.59 - 3.18 mm) when spring is in position.

1. Install coil spring over shock absorber and onto lower control arm ensuring end of coil spring fits in spring pocket of lower control arm (Figure 9-11).
2. Ensure coil spring is aligned with spring seat flange, and raise lower control arm.
3. Extend shock absorber into spring seat and install with washer, shock pin, and locknut. Tighten locknut to 300 lb-ft (407 N•m).
4. Install lower ball joint and geared hub on lower control arm ensuring lower ball joint is placed below lower control arm. Secure lower ball joint to lower control arm with four washers, capscrews, washers, and locknuts. Tighten front locknuts to 37-lb-ft (50 N•m) and rear locknuts to 70 lb-ft. (95 N•m).
5. Apply thread-locking compound to threads of capscrew. Install bar link on lower control arm with two washers and capscrew. Tighten capscrew to 70 lb-ft (95 N•m).
6. Install wheel (Section 6).

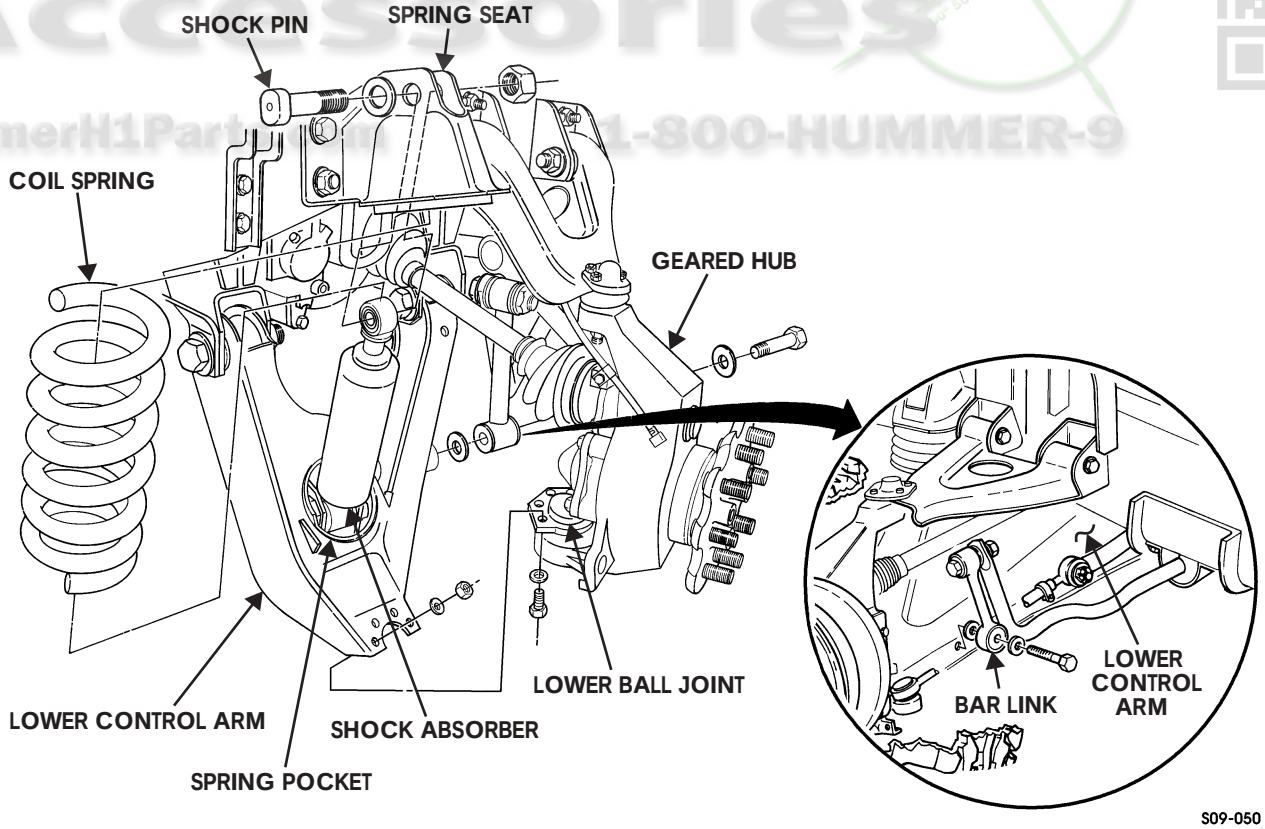

Figure 9-11: Coil Spring

SHOCK ABSORBER REPLACEMENT

NOTE: The procedure for removing and installing all shock absorbers is the same, except rear lower shock pins must be installed with head of pin facing rearward. This procedure covers the left front shock absorber.

NOTE: Do not jack up vehicle with shock absorber removed.

Removal

1. Remove two capscrews, lockwashers, washers, shock absorber, and bracket from lower control arm. Discard lockwashers (Figure 9-12).
2. Remove locknut, shock pin, washer, and shock absorber from spring seat. Note position of pin for installation. Discard locknut.
3. Compress shock absorber and remove shock absorber and bracket.

NOTE: Note alignment of shock absorber and bracket for installation reference.

4. Position shock absorber in vise and remove locknut, pin, washer, and bracket from shock absorber. Discard locknut.

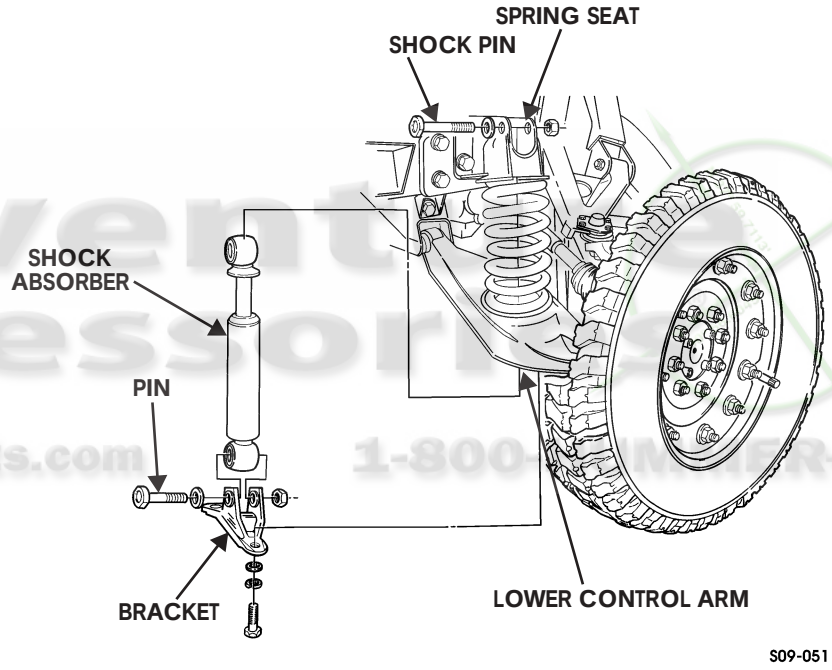

Figure 9-12: Shock Absorber

Installation

NOTE: It may be necessary to spread spring seat to allow installation of shock absorber.

1. Position shock absorber in vise, and install bracket on shock absorber with washer, pin, and locknut. Tighten locknut to 300 lb-ft (407 N•m) (Figure 9-12).

CAUTION: *Do not pry or use sharp tools on shock absorber piston rod. A damaged rod will cause shock failure.*

2. Install shock absorber and bracket through lower control arm.
3. Extend shock absorber and secure piston rod end of shock absorber to spring seat with washer, shock pin, and locknut. Tighten locknut to 300 lb-ft (407 N•m).
4. Install bracket on lower control arm with two washers, lockwashers, and capscrews. Tighten capscrews to 178 lb-ft (241 N•m).

FRONT BUMPER AND TOWING BRACKETS REPLACEMENT (VEHICLES WITHOUT WINCH)

Removal

1. Remove brushguard, if installed (Section 10).
2. Remove four locknuts, washers, capscrews, washers, two towing brackets, and front bumper from mounting brackets. Discard locknuts (Figure 9-13).

Installation

1. Install front bumper and two towing brackets on mounting brackets with four washers, capscrews, washers, and locknuts. Tighten capscrews to 90 lb-ft (122 N•m) (Figure 9-13).
2. Install brushguard, if removed (Section 10).

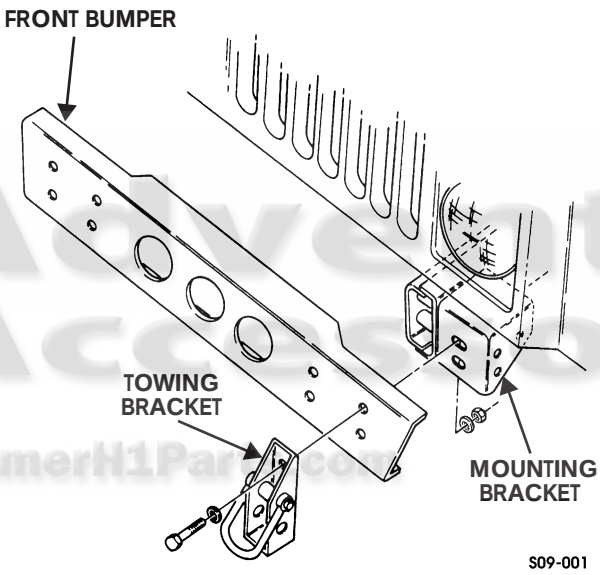

Figure 9-13: Front Bumper and Towing Brackets for Vehicles Without Winch

FRONT BUMPER AND TOWING BRACKETS REPLACEMENT (VEHICLES WITH WINCH)

Removal

CAUTION: *Winch must be supported prior to performing step 1. Failure to observe this caution will result in damage to equipment.*

1. Remove four capscrews and washers securing winch to front bumper (Figure 9-14).
2. Remove four locknuts, washers, capscrews, washers, and two towing brackets from front bumper and frame extensions. Discard locknuts.
3. Remove five locknuts, washers, six capscrews, washers, and front bumper from frame extensions. Discard locknuts.

Installation

1. Install front bumper on frame extensions with six washers, capscrews, five washers, and locknuts. Tighten capscrews to 90 lb-ft (122 N•m) (Figure 9-14).
2. Install two towing brackets on front bumper and frame extensions with four washers, capscrews, washers, and locknuts. Tighten capscrews to 90 lb-ft (122 N•m).
3. Install four capscrews and washers securing front bumper to winch. Tighten capscrews to 60 lb-ft (81 N•m).

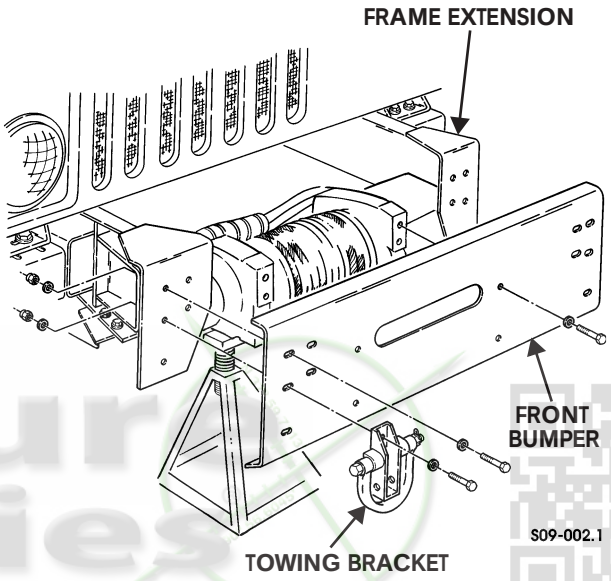

Figure 9-14: Front Bumper and Towing Brackets for Vehicles With Winch

FRONT BUMPER MOUNTING BRACKET REPLACEMENT

Removal

NOTE: Mark location of capscrews for installation.

1. Support hood in position with jacks.
2. Remove three locknuts, washers, capscrews, and washers securing mounting bracket to frame rail. Discard locknuts (Figure 9-15).
3. Remove two locknuts and plate securing mounting bracket to hinge. Discard locknuts.
4. Remove two locknuts, washers, capscrews, washers, towing bracket, and mounting bracket from front bumper. Discard locknuts.

Installation

1. Install mounting bracket and towing bracket on front bumper with two washers, capscrews, washers, and locknuts. Do not tighten locknuts (Figure 9-15).
2. Install mounting bracket on frame rail with three washers, capscrews, washers, and locknuts. Do not tighten locknuts.
3. Install mounting bracket on hinge with plate and two locknuts.
4. Tighten hinge locknuts to 28 lb-ft (38 N•m), front bumper locknuts to 90 lb-ft (122 N•m), and frame rail locknuts to 178 lb-ft (241 N•m).
5. Remove jacks supporting hood.

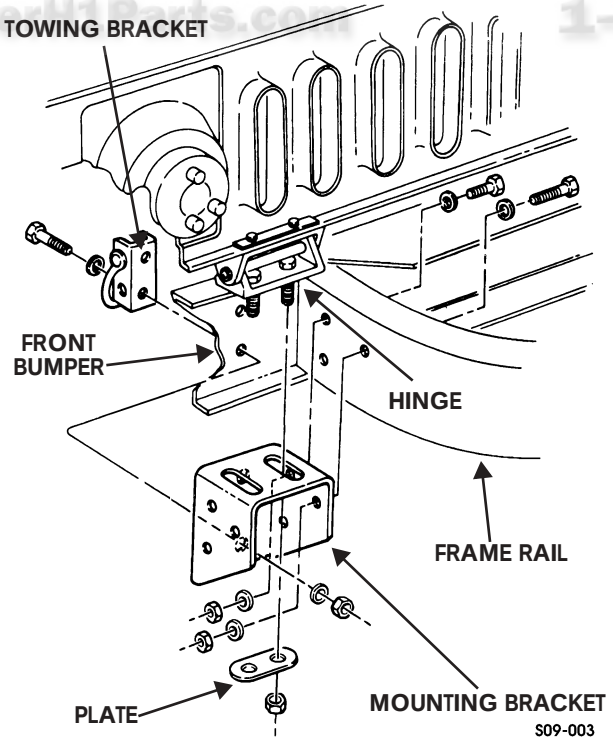

Figure 9-15: Front Bumper Mounting Bracket

RADIATOR FRONT MOUNT BRACKET REPLACEMENT

Removal

1. Remove locknut, washer, capscrew, washer, and spacer securing radiator to front mount bracket. Discard locknut (Figure 9-16).
2. Remove two locknuts, washers, capscrews, washers, and front mount bracket from suspension crossmember. Discard locknuts.
3. Remove mount from front mount bracket.

Installation

1. Install mount in front mount bracket. (Figure 9-16).
2. Install front mount bracket on suspension crossmember with two washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m).
3. Install radiator on front mount bracket with spacer, washer, capscrew, washer, and locknut. Tighten locknut to 30 lb-ft (41 N•m).

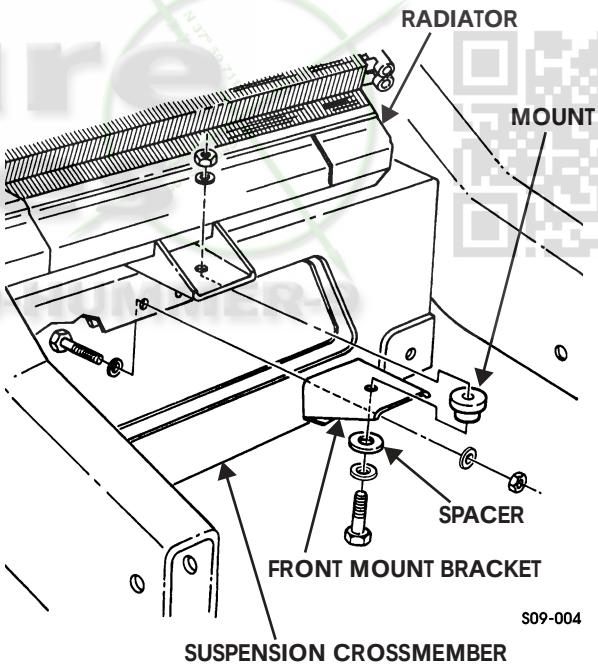

Figure 9-16: Radiator Front Mount Bracket

LIFTING SHACKLE REPLACEMENT

Removal

Remove cotter pin, slotted nut, capscrew, spring washer, and shackle from tiedown bracket. Discard cotter pin (Figure 9-17).

Installation

1. Install shackle on tiedown bracket with spring washer, capscrew, and slotted nut. Tighten slotted nut enough to allow movement of shackle (Figure 9-17).
2. Install cotter pin in slotted nut.

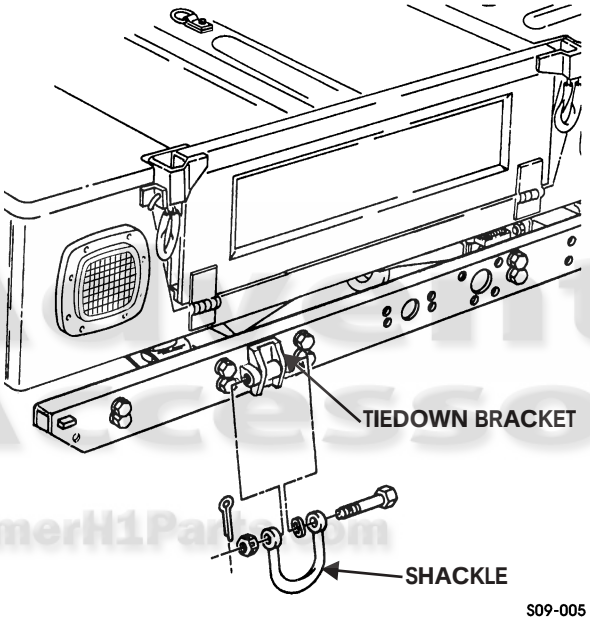

Figure 9-17: Lifting Shackle

FRAME EXTENSION REPLACEMENT

Removal

1. Remove front bumper.
2. Remove hood and hinge (Section 10).
3. Remove two locknuts, washers, capscrews, and washers securing front suspension brace to frame extension (Figure 9-18).

NOTE: Note position of winch cable bracket for installation.

4. Remove three locknuts, washers, capscrews, and washers securing winch cable bracket, frame extension, and bumper mounting bracket to frame. Discard locknuts.

Installation

1. Install bumper mounting bracket, frame extension, and winch cable bracket on frame with three washers, capscrews, washers, and locknuts. Do not tighten locknuts (Figure 9-18).
2. Secure front suspension brace to frame extension with two washers, capscrews, washers, and locknuts.
3. Tighten all locknuts to 178 lb-ft (241 N•m).
4. Install hinge and hood (Section 10).
5. Install front bumper.

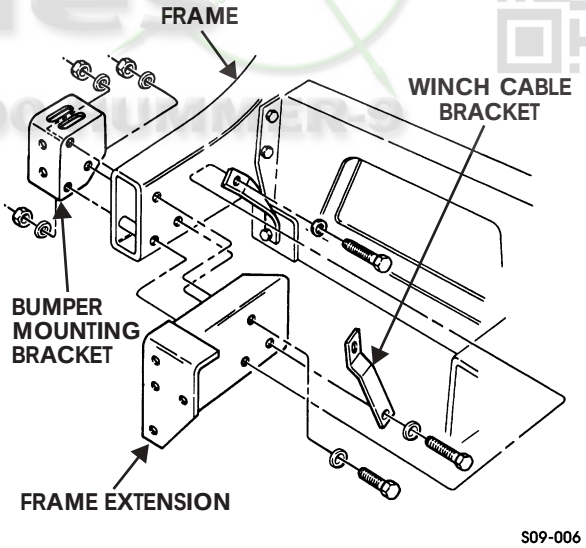

Figure 9-18: Frame Extension

LEFT AIRLIFT BRACKET AND FRONT UPPER CONTROL ARM BRACKETS REPLACEMENT

Removal

1. Remove left engine splash shield (Section 10).
2. Raise and support front of vehicle.
3. Remove three screws and clamps securing harness to airlift bracket (Figure 9-19).
4. Remove two locknuts, washers, and capscrews securing radiator support to airlift bracket. Discard locknuts.

WARNING: To avoid personal injury or equipment damage, support lower control arm during removal and installation.

5. Remove two locknuts, washers, capscrews, washers, and upper control arm from two control arm brackets. Discard locknuts.

NOTE: Note direction of capscrews for installation.

NOTE: Mark location and number of shims for installation.

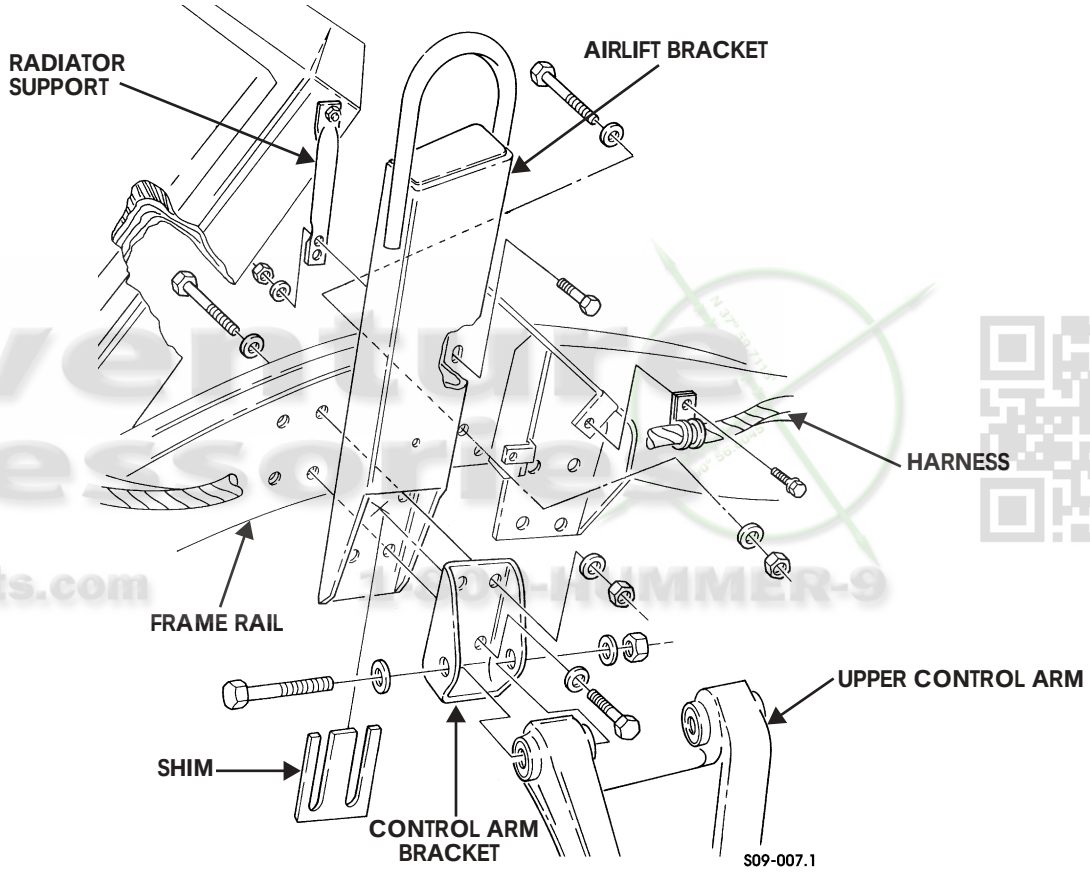

Figure 9-19: Left Airlift Bracket and Front Upper Control Arm Brackets

6. Remove eight locknuts, washers, capscrews, washers, two control arm brackets, and shim(s) from airlift bracket. Discard locknuts.
7. Remove two capscrews, washers, and airlift bracket from frame rail.

Installation

1. Install airlift bracket, shim(s), and two control arm brackets on frame rail with eight washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-19).
2. Apply thread-locking compound to two capscrew holes and secure airlift bracket and control arm brackets to frame rail with two washers and capscrews. Tighten capscrews to 90 lb-ft (122 N•m).
3. Install upper control arm on control arm brackets with two washers, capscrews, washers, and locknuts. Tighten locknuts to 260 lb-ft (353 N•m).
4. Secure radiator support to airlift bracket with two capscrews, washers, and locknuts. Tighten locknuts to 37 lb-ft (50 N•m).
5. Secure harness to airlift bracket with three clamps and screws.
6. Lower front of vehicle.
7. Install left engine splash shield (Section 10).

RIGHT AIRLIFT BRACKET AND FRONT UPPER CONTROL ARM BRACKETS REPLACEMENT

Removal

1. Remove battery tray (Section 12).
2. Raise and support front of vehicle.
3. Remove two locknuts, washers, and capscrews securing radiator support to airlift bracket. Discard locknuts (Figure 9-20).

WARNING: To avoid personal injury or equipment damage, support lower control arm during removal and installation

4. Remove two locknuts, washers, capscrews, washers, and upper control arm from two control arm brackets. Discard locknuts.

NOTE: Note direction of capscrews for installation.

5. Remove ten locknuts, washers, capscrews, and washers securing control arm brackets, cooler line bracket, and airlift bracket to frame rail. Discard locknuts.

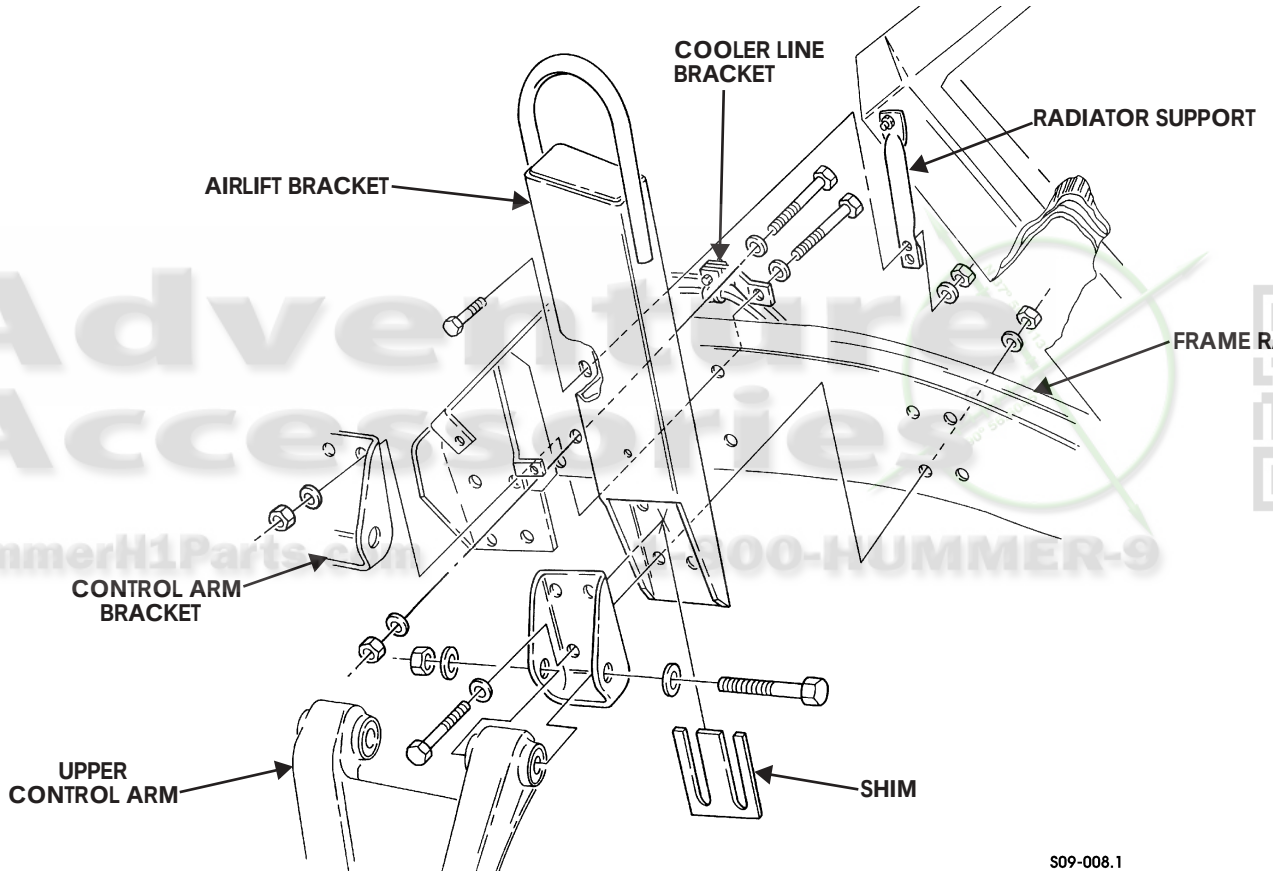

Figure 9-20: Right Airlift Bracket and Front Upper Control Arm Brackets

NOTE: Mark location and number of shims for installation.

6. Remove two control arm brackets, shim(s), and airlift bracket from frame rail.

Installation

1. Install airlift bracket, shim(s) two control arm brackets, and cooler line bracket on frame rail with ten washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-20).
2. Secure upper control arm to two control arm brackets with two washers, capscrews, washers, and locknuts. Tighten locknuts to 260 lb-ft (353 N•m).
3. Install radiator support on airlift bracket with two capscrews, washers, and locknuts. Tighten locknuts to 37 lb-ft (50 N•m).
4. Lower front of vehicle.
5. Install battery tray (Section 12).

FRONT SUSPENSION BRACE REPLACEMENT (VEHICLES WITHOUT WINCH)

Removal

WARNING: To avoid personal injury or equipment damage, support lower control arm during removal and installation.

1. Remove locknut, washer, capscrew, and washer securing brace to frame rail. Discard locknut (Figure 9-21).
2. Remove locknut, washer, capscrew, washer, and brace from crossmember and lower control arm. Discard locknut.

Installation

1. Install brace on crossmember and lower control arm with washer, capscrew, washer, and locknut. Do not tighten locknuts (Figure 9-21).
2. Install brace on frame rail with washer, capscrew, washer, and locknut.
3. Tighten crossmember locknut to 261 lb-ft (354 N•m) and frame rail locknut to 178 lb-ft (241 N•m).

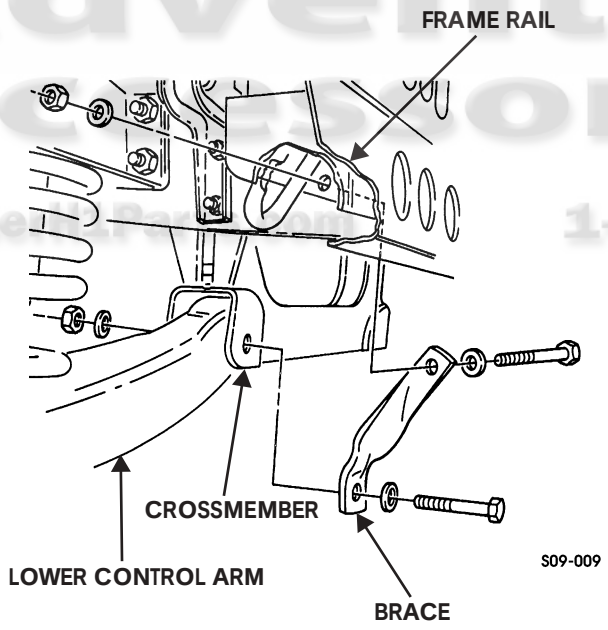

Figure 9-21: Front Suspension Brace for Vehicles Without Winch

FRONT SUSPENSION BRACE REPLACEMENT (VEHICLES WITH WINCH)

Removal

WARNING: To avoid personal injury or equipment damage, support lower control arm during removal and installation.

NOTE: The left and right front suspension braces are replaced basically the same. This procedure covers the left front suspension brace.

1. Remove two locknuts, washers, capscrews, and washers securing front suspension brace to frame extension. Discard locknuts (Figure 9-22).
2. Remove locknut, washer, capscrew, washer, and brace from crossmember and lower control arm. Discard locknut.

Installation

1. Install brace on crossmember and lower control arm with washer, capscrew, washer, and locknut. Do not tighten locknut (Figure 9-22).
2. Secure brace to frame extension with two washers, capscrews, washers, and locknuts.
3. Tighten crossmember locknut to 261 lb-ft (354 N•m) and frame extension locknuts to 178 lb-ft (241 N•m).

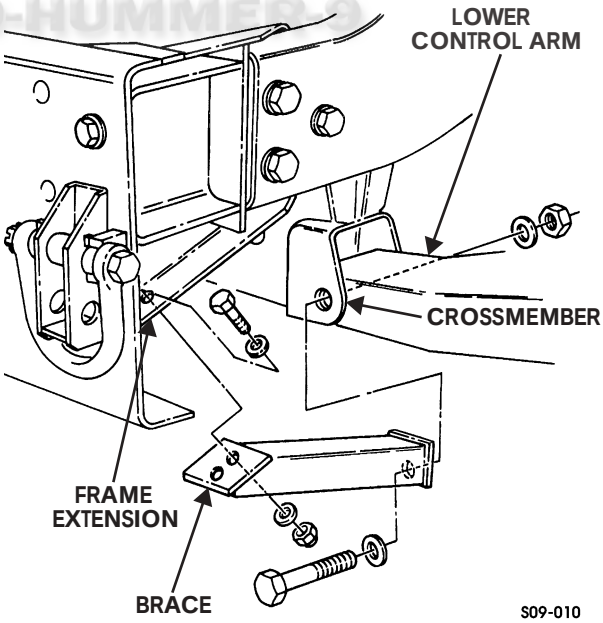

Figure 9-22: Front Suspension Brace for Vehicles With Winch

SPLASH SHIELD SUPPORT BRACKET REPLACEMENT

Removal

1. Remove locknut, washer, capscrew, and washer securing splash shield to bracket. Discard locknut (Figure 9-23).

NOTE: Note direction of capscrews for installation.

2. Remove two locknuts, washers, capscrews, washers, and bracket from frame rail. Discard locknuts.

Installation

1. Install bracket on frame rail with two washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-23).
2. Install splash shield on bracket with washer, capscrew, washer, and locknut. Tighten capscrew to 15 lb-ft (20 N•m).

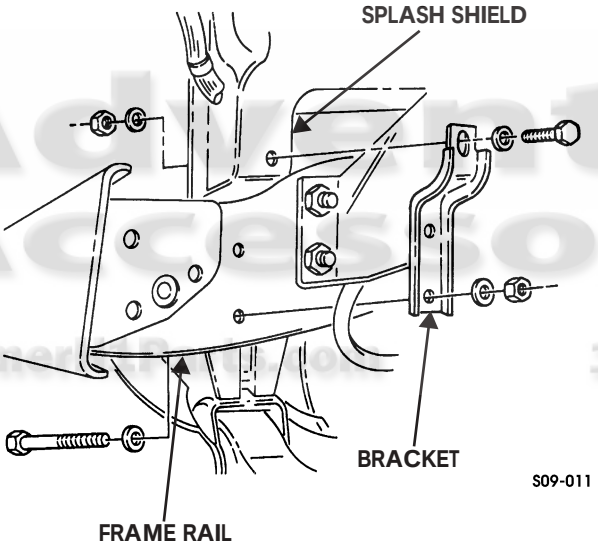

Figure 9-23: Splash Shield Support Bracket

REAR BUMPER REPLACEMENT

Removal

1. Remove swing-away spare tire carrier, if equipped (Section 6).
2. Remove rear license plate bracket (Section 10).
3. Remove trailer hitch, if equipped (Section 13).
4. Remove two locknuts, washers, capscrews, and washers securing trailer harness to rear bumper. Discard locknuts (Figure 9-24).
5. Disconnect trailer harness from body harness, and pull trailer harness through hole in rear bumper.
6. Remove four locknuts, washers, capscrews, and washers securing two tiedown brackets to rear bumper, two mounting brackets, and outer mounting brackets. Discard locknuts.

NOTE: Perform step 7 only if the vehicle is equipped with a swing-away spare tire carrier.

7. Remove two locknuts, washers, capscrews, and washers securing rear bumper to outer brace. Discard locknuts.

NOTE: Perform step 8 only if the vehicle is not equipped with a trailer hitch.

8. Remove four locknuts, washers, capscrews, and washers securing rear bumper to two inner braces. Discard locknuts.
9. Remove eight capscrews, washers, and rear bumper from two mounting brackets.

Installation

1. Install rear bumper on two mounting brackets and secure with eight washers and capscrews. Do not tighten capscrews (Figure 9-24).

NOTE: Perform step 2 only if the vehicle is not equipped with a trailer hitch.

2. Secure rear bumper to two inner braces with four washers, capscrews, washers, and locknuts. Do not tighten locknuts.

NOTE: Perform step 3 only if the vehicle is equipped with a swing-away spare tire carrier.

3. Secure rear bumper to outer brace with two washers, capscrews, washers, and locknuts. Do not tighten locknuts.
4. Install two tiedown brackets on rear bumper, two mounting brackets, and outer mounting brackets, with four washers, capscrews, washers, and locknuts. Do not tighten locknuts.
5. Tighten capscrews installed in step 1 and locknuts installed in steps 2, 3, and 4 to 90 lb-ft (122 N•m).
6. Insert trailer harness through hole in rear bumper and connect trailer harness to body harness.
7. Secure trailer harness to rear bumper with two washers, capscrews, washers, and locknuts.
8. Install trailer hitch, if removed (section 13).
9. Install rear license plate bracket (Section 10).
10. Install swing-away spare tire carrier, if removed (Section 6).

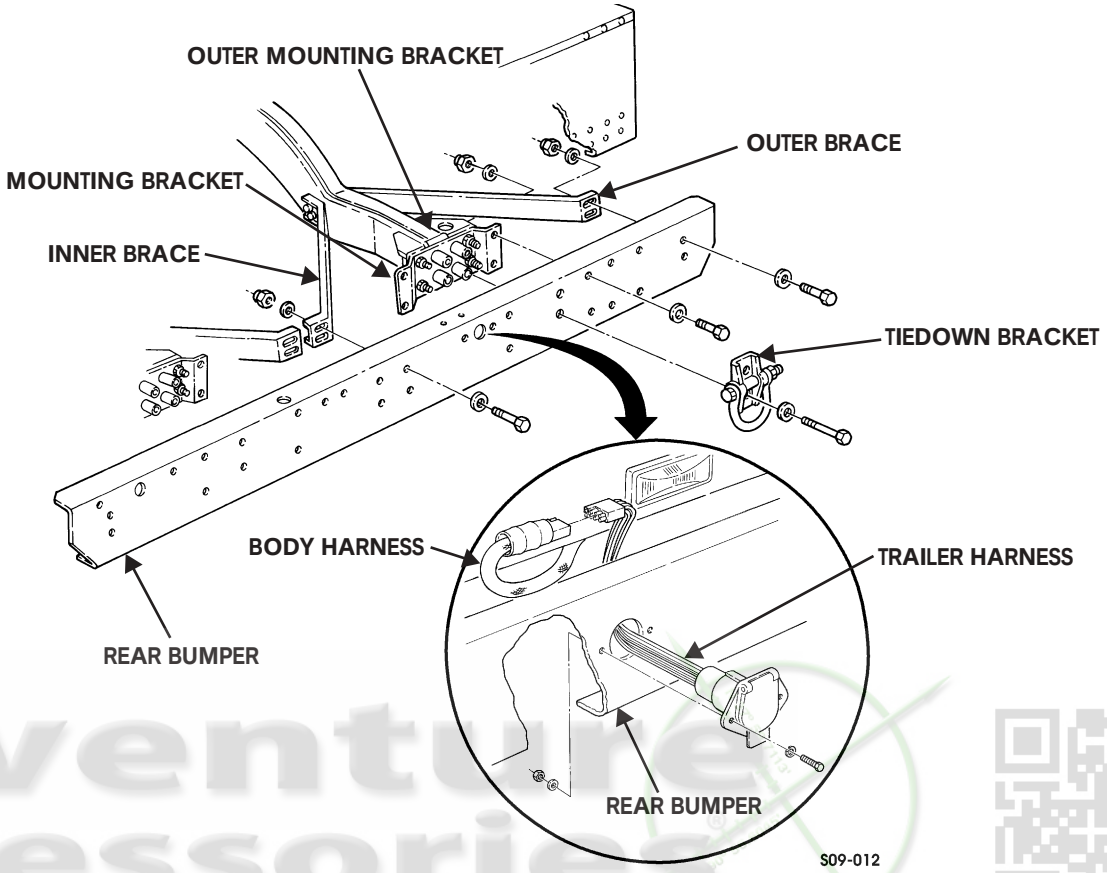

Figure 9-24: Rear Bumper

REAR BUMPER INNER MOUNTING BRACKET REPLACEMENT

Removal

1. Remove two capscrews and washers securing inner mounting bracket to mounting bracket (Figure 9-25).
2. Remove four locknuts, washers, capscrews, washers, inner mounting bracket, and spacer from frame rail and outer mounting bracket. Discard locknuts.

Installation

NOTE: Ensure spacer on outer side of frame rail is in position before installing spacer and inner mounting bracket.

1. Install spacer and inner mounting bracket on frame rail and outer mounting bracket and secure with four washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-25).
2. Secure inner mounting bracket to mounting bracket with two washers and capscrews. Tighten capscrews to 90 lb-ft (122 N•m).

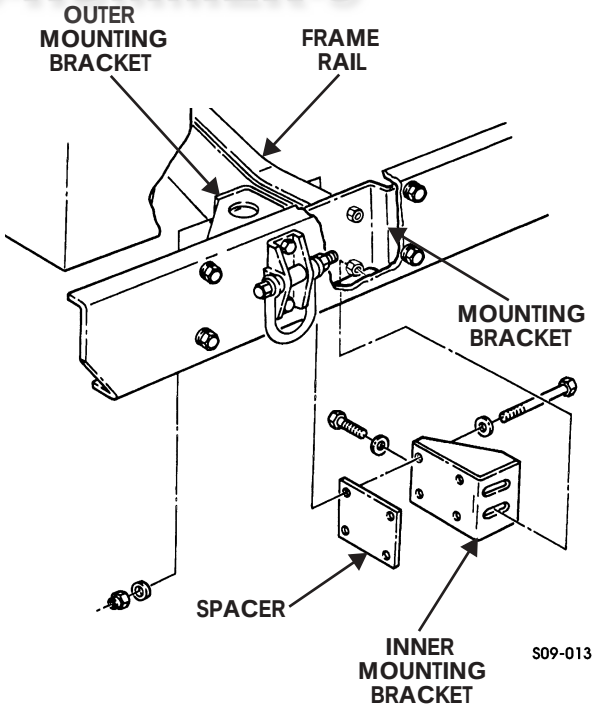

Figure 9-25: Rear Bumper Mounting Bracket

SPRING SEAT REPLACEMENT

NOTE: Replacement of the four spring seats is basically the same. This procedure covers the right front spring seat.

Removal

1. Remove coil spring.
2. Remove four locknuts, washers, capscrews, washers, spring bracket, and front spring seat from frame rail. Discard locknuts (Figure 9-26).

Installation

1. Install spring bracket and front spring seat on frame rail with four washers, capscrews, washers, and locknuts. Tighten locknuts to 261 lb-ft (354 N•m) (Figure 9-26).
2. Install coil spring.

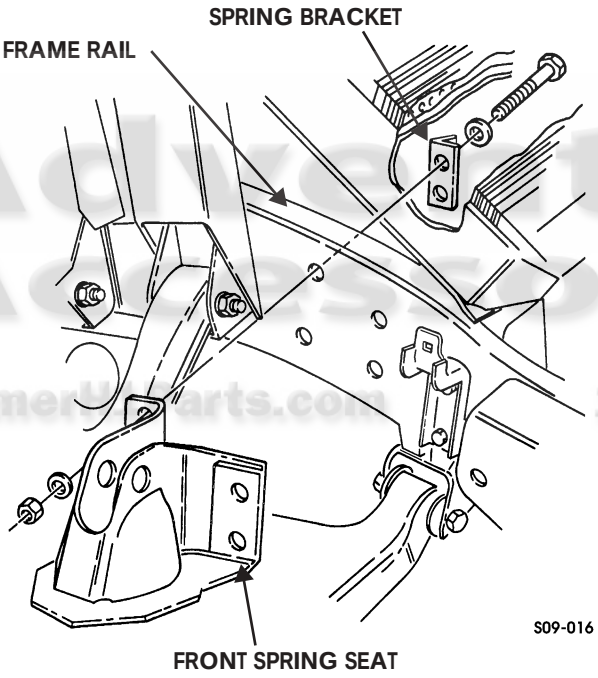

Figure 9-26: Front Spring Seat

REAR BUMPER OUTER MOUNTING BRACKET AND TIEDOWN BRACKET REPLACEMENT

Removal

1. Remove rear body mount (Section 10).
2. Remove two locknuts, washers, capscrews, and washers securing tiedown bracket and outer mounting bracket to mounting bracket and rear bumper. Discard locknuts (Figure 9-27).
3. Remove two capscrews and washers securing outer mounting bracket to mounting bracket.
4. Remove four locknuts, washers, capscrews, washers, outer mounting bracket, and spacer from frame rail and inner mounting bracket. Discard locknuts.

Installation

NOTE: Ensure spacer on inner side of frame rail is in position before installing spacer and outer mounting bracket.

1. Install spacer and outer mounting bracket on frame rail and inner mounting bracket with four washers, capscrews, washers, and locknuts. Do not tighten locknuts (Figure 9-27).
2. Secure outer mounting bracket to mounting bracket with two washers and capscrews. Do not tighten capscrews.
3. Install tiedown bracket on rear bumper and secure tiedown bracket and outer mounting bracket to mounting bracket and rear bumper with two washers, capscrews, washers, and locknuts.
4. Tighten all locknuts and capscrews to 90 lb-ft (122 N•m).
5. Install rear body mount (Section 10).

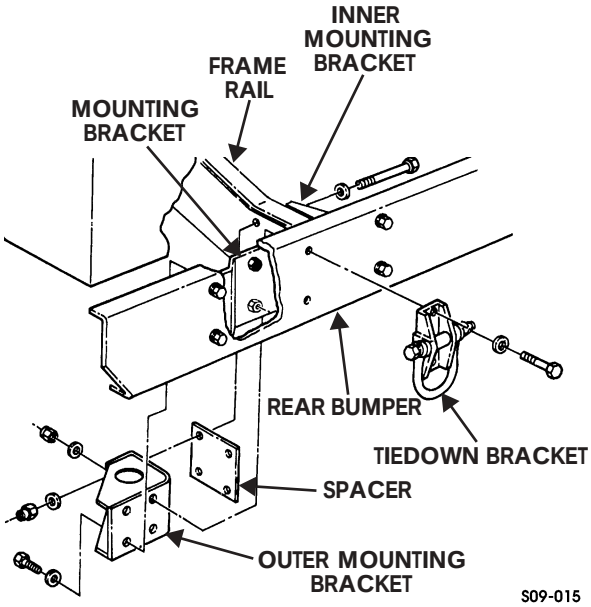

Figure 9-27: Rear Bumper Mounting Bracket

REAR BUMPER BRACE REPLACEMENT

NOTE: Replacement of the inner and outer rear bumper brace is basically the same. The outer rear bumper brace is found only on vehicles equipped with a swing-away spare tire carrier and only on the right side of the rear bumper.

Removal

1. Remove locknut, washer, capscrew, and washer securing rear bumper brace to frame rail. Discard locknut (Figure 9-28).
2. Remove two locknuts, washers, capscrews, washers, and rear bumper brace from rear bumper. Discard locknuts.

Installation

1. Install rear bumper brace on rear bumper with two washers, capscrews, washers, and locknuts. Do not tighten locknuts (Figure 9-28).
2. Secure rear bumper brace to frame rail with washer, capscrew, washer, and locknut.
3. Tighten all locknuts to 90 lb-ft (122 N•m).

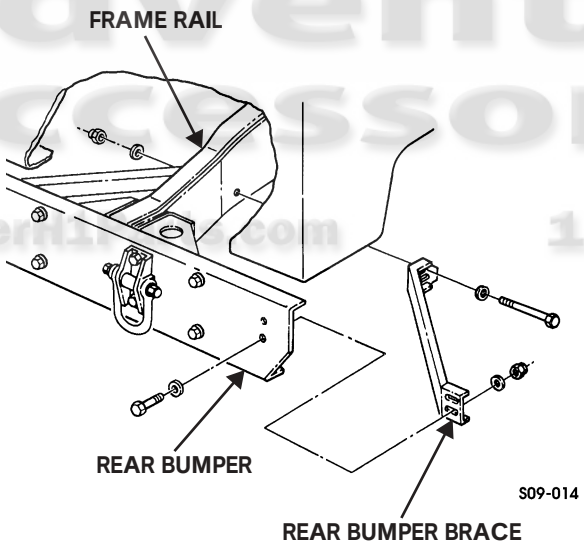

Figure 9-28: Rear Bumper Brace

LEFT ENGINE MOUNT BRACKET REPLACEMENT

Removal

1. Remove two capscrews securing brake line and oil line clamps to engine mount bracket (Figure 9-29).
2. Remove two locknuts and washers securing engine mount bracket to insulator. Discard locknuts.

***CAUTION**: To avoid engine oil pan damage, wood block must completely cover bottom of oil pan.*

3. Support engine under engine oil pan with wood block and jack stand (Figure 9-30).
4. Remove four locknuts, washers, capscrews, washers, and engine mount bracket from frame rail. Discard locknuts (Figure 9-29).

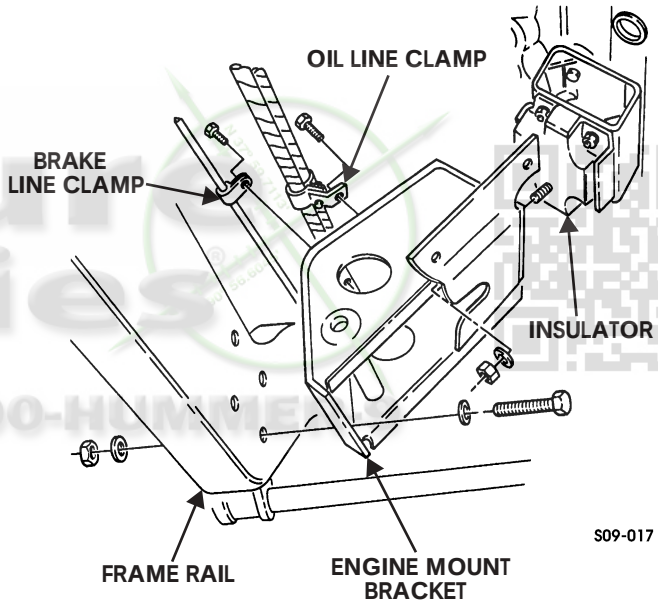

Figure 9-29: Left Engine Mount Bracket

Installation

1. Install engine mount bracket on frame rail with four washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-29).
2. Remove wood block and jack stand from under engine oil pan (Figure 9-30).
3. Secure engine mount bracket to insulator with two washers and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-29).
4. Secure brake line and oil line clamps to engine mount bracket with two capscrews.

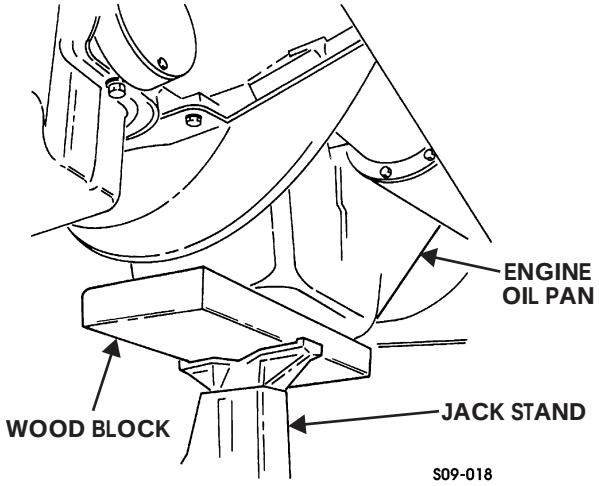

Figure 9-30: Engine Oil Pan

RIGHT ENGINE MOUNT BRACKET REPLACEMENT

Removal

1. Remove right engine mount and insulator (Section 2).
2. Remove two locknuts, washers, capscrews, and washers securing support bracket to engine mount bracket. Discard locknuts (Figure 9-31).
3. Remove capscrew securing vent tube clamp to engine mount bracket.
4. Remove three locknuts, washers, capscrews, washers, support bracket, and engine mount bracket from frame rail. Discard locknuts.

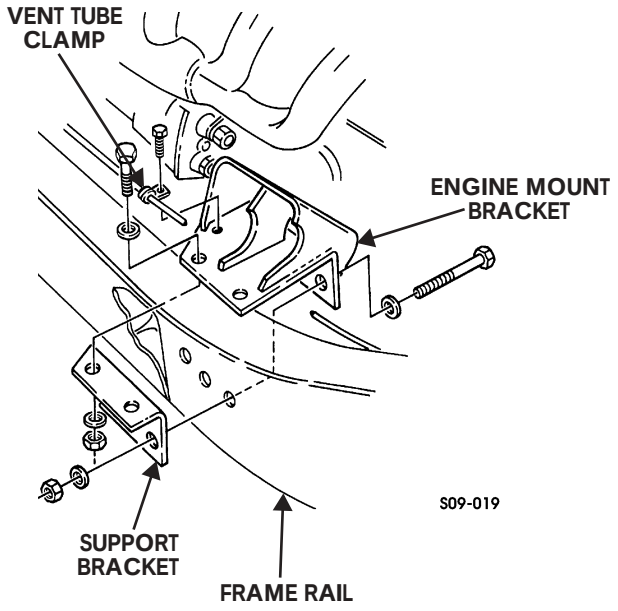

Figure 9-31: Right Engine Mount Bracket

Installation

1. Install support bracket and engine mount bracket on frame rail with three washers, capscrews, washers, and locknuts (Figure 9-31).
2. Install support bracket on engine mount bracket with two washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m).
3. Install vent tube clamp on engine mount bracket with capscrew.
4. Install right engine mount and insulator (Section 2).

RIGHT FRONT BODY MOUNT BRACKET REPLACEMENT

Removal

1. Remove right front body mount (Section 10).
2. Remove three locknuts, washers, capscrews, washers, and right front body mount bracket from frame rail. Discard locknuts (Figure 9-32).

Installation

1. Install right front body mount bracket on frame rail with three washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-32).
2. Install right front body mount (Section 10).

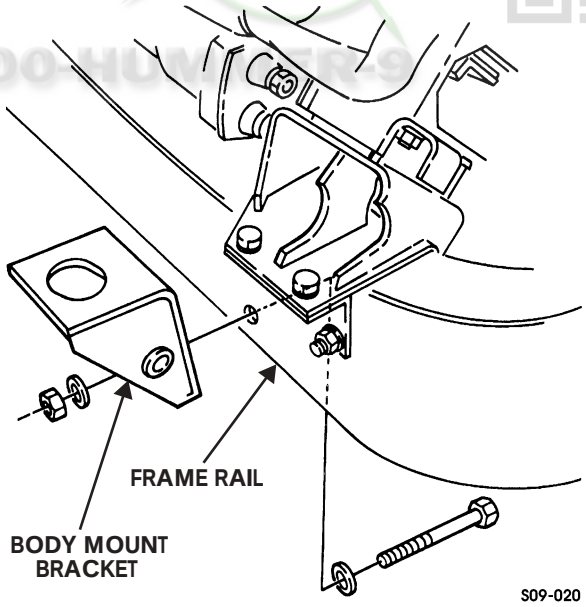

Figure 9-32: Right Front Body Mount Bracket

TRANSMISSION MOUNT CROSSMEMBER REPLACEMENT

Removal

CAUTION: *To prevent equipment damage during removal and installation of transmission mount crossmember, transmission must be supported.*

1. Place support under transmission and remove two locknuts, washers, capscrews, and washers securing transmission mount crossmember to two transmission support brackets. Discard locknuts (Figure 9-33).
2. Remove two locknuts, washers, and transmission mount crossmember from transmission mount. Discard locknuts.

Installation

1. Install transmission mount crossmember on two transmission support brackets with two washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-33).
2. Install crossmember on transmission mount with two washers and locknuts. Tighten locknuts to 28 lb-ft (38 N•m).
3. Remove support.

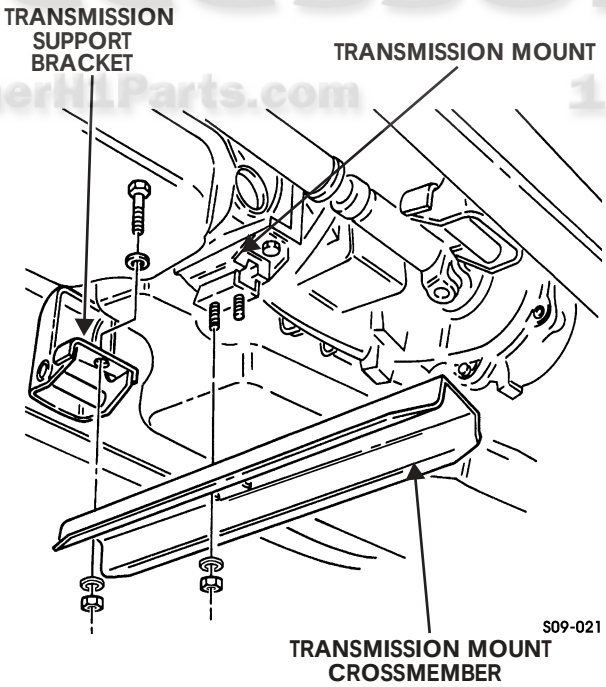

Figure 9-33: Transmission Mount Crossmember

TRANSMISSION MOUNT REPLACEMENT

Removal

1. Remove transmission mount crossmember.
2. Remove two capscrews, lockwashers, and transmission mount from adapter. Discard lockwashers (Figure 9-34).

Installation

1. Install transmission mount on adapter with two lockwashers and capscrews. Tighten capscrews to 65 lb-ft (88 N•m) (Figure 9-33).
2. Install transmission mount crossmember.

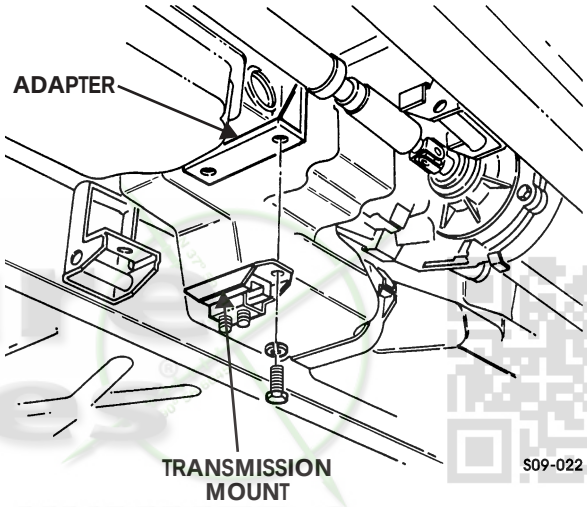

Figure 9-34: Transmission Mount Replacement

TRANSMISSION CROSSMEMBER SUPPORT BRACKET REPLACEMENT

Removal

1. Remove transmission mount crossmember.
2. Remove two locknuts and washers securing transmission crossmember support bracket to frame rail. Discard locknuts (Figure 9-35).

Installation

1. Install transmission crossmember support bracket on two capscrews and frame rail with two washers and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-35).
2. Install transmission mount crossmember.

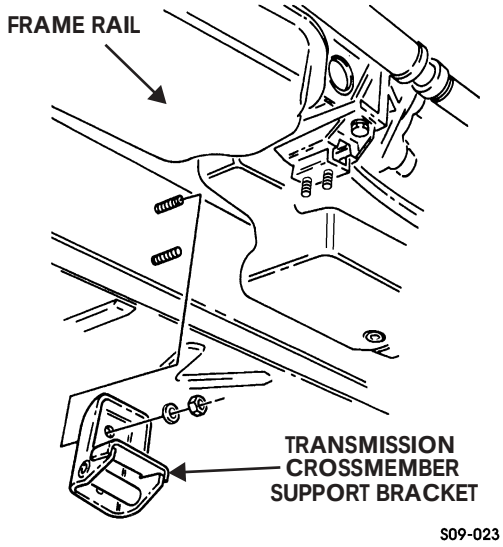

Figure 9-35: Transmission Crossmember Support Bracket

RIGHT INTERMEDIATE BODY MOUNT BRACKET REPLACEMENT

Removal

1. Remove right intermediate body mount (Section 10).
2. Remove three capscrews, washers, and body mount bracket from frame rail (Figure 9-36).

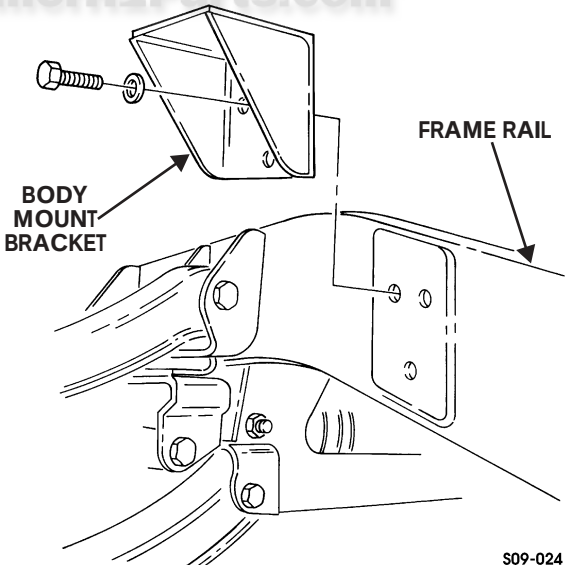

Figure 9-36: Right Intermediate Body Mount Bracket

Installation

1. Apply thread-locking compound to three capscrews and install body mount bracket on frame rail with three washers and capscrews. Tighten capscrews to 90 lb-ft (122 N•m) (Figure 9-36).
2. Install right intermediate body mount (Section 10).

LEFT INTERMEDIATE BODY MOUNT BRACKET REPLACEMENT

Removal

1. Remove left intermediate body mount (Section 10).
2. Remove tailpipe hanger (Section 11).
3. Remove three locknuts, washers, and body mount bracket from frame rail. Discard locknuts (Figure 9-37).

Installation

1. Install body mount bracket on three capscrews and frame rail with three washers and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-37).
2. Install tailpipe hanger (Section 11).
3. Install left intermediate body mount (Section 10).

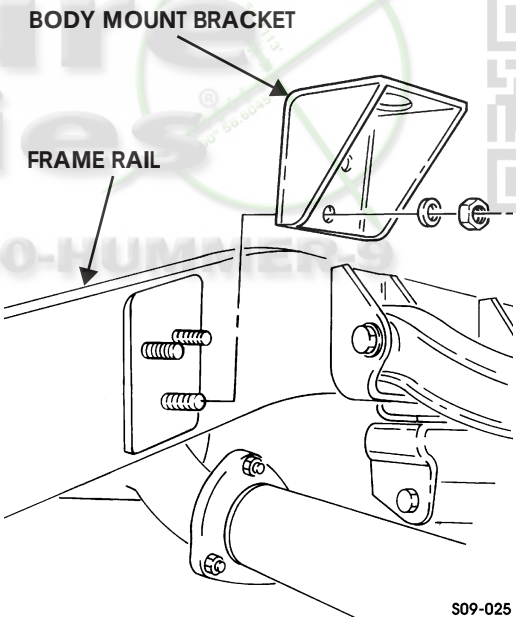

Figure 9-37: Left Intermediate Body Mount Bracket

REAR-REAR TIEDOWN BRACKET REPLACEMENT

Removal

Remove two locknuts, washers, capscrews, washers, and tiedown bracket from frame rail. Discard locknuts (Figure 9-38).

Installation

Install tiedown bracket on frame rail with two washers, capscrews, washers, and locknuts. Tighten locknuts to 261 lb-ft (354 N•m) (Figure 9-38).

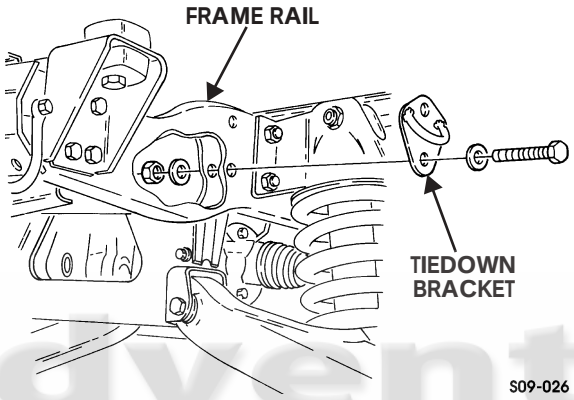

Figure 9-38: Tiedown Bracket

REAR UPPER CONTROL ARM BRACKET REPLACEMENT

NOTE: The procedure for removing and installing the four rear upper control arm brackets is basically the same. This procedure covers the right rear upper control arm front bracket.

Removal

1. Remove wheel (Section 6).
2. Remove capscrew, clamp, and vent line from bracket, and disconnect vent line from fitting (Figure 9-39).
3. Remove two locknuts, washers, capscrews, washers, and upper control arm from two control arm brackets. Discard locknuts (Figure 9-40).
4. Remove four locknuts, washers, capscrews, washers, spacer, shim(s), if present, vent line mounting bracket, and control arm bracket from frame rail. Discard locknuts.

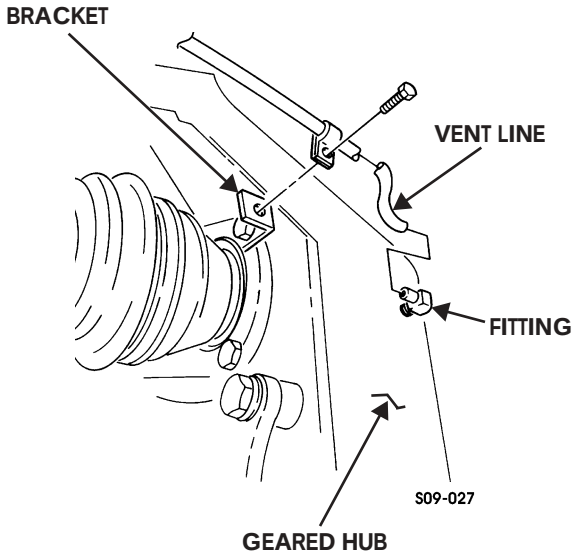

Figure 9-39: Rear Upper Control Arm Vent Line

Installation

1. Install spacer, shim(s), if present, control arm bracket, and vent line mounting bracket on frame rail with four washers, capscrews, washers, and locknuts. Tighten locknuts to 172 lb-ft (233 N•m) (Figure 9-40).
2. Attach upper control arm to two upper control arm brackets with two washers, capscrews, washers, and locknuts. Tighten locknuts to 260 lb-ft (353 N•m).
3. Connect vent line to fitting and secure clamp and vent line to bracket with capscrew (Figure 9-39).
4. Install wheel (Section 6).

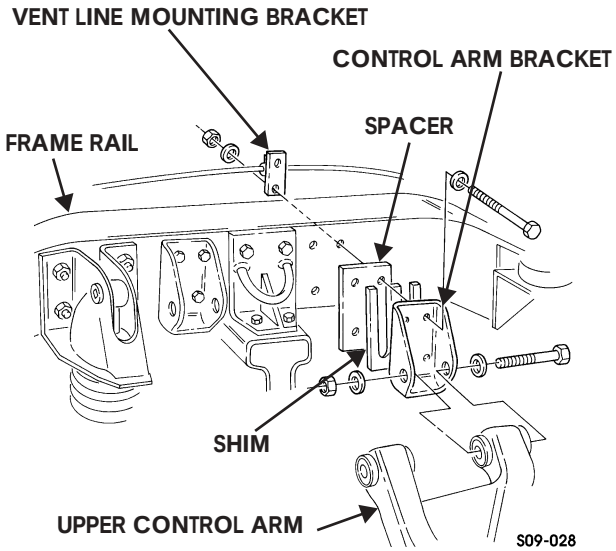

Figure 9-40: Rear Upper Control Arm Bracket

REAR-FRONT TIEDOWN BRACKET REPLACEMENT

Removal

1. Remove wheel (Section 6).
2. Remove four locknuts, washers, capscrews, washers, and tiedown bracket from frame rail. Discard locknuts (Figure 9-41).
3. Remove two locknuts, washers, capscrews, washers, vent tube mounting bracket, and tiedown bracket from rear suspension front crossmember mounting bracket. Discard locknuts.

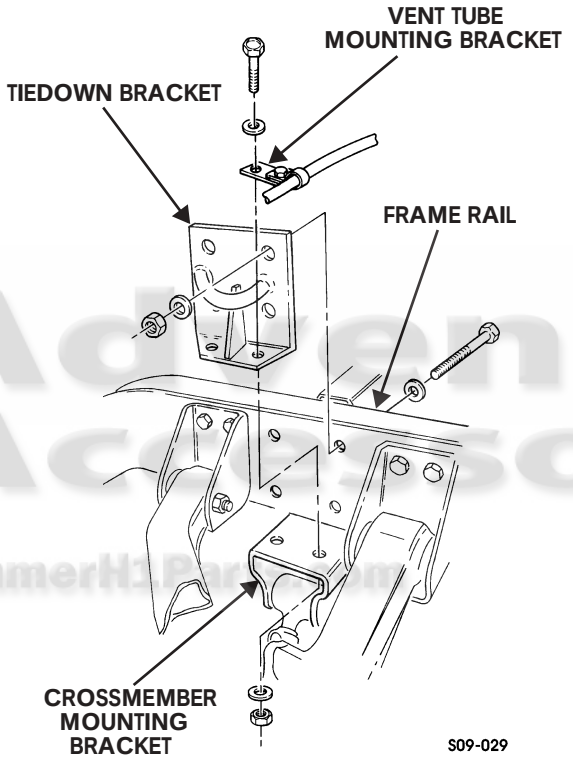

Figure 9-41: Rear-Front Tiedown Bracket

Installation

1. Install tiedown bracket and vent tube mounting bracket on rear suspension front crossmember mounting bracket with two washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-41).
2. Install tiedown bracket on frame rail with four washers, capscrews, washers, and locknuts. Tighten locknuts to 261 lb-ft (354 N•m).
3. Install wheel (Section 6).

AXLE SUPPORT BRACKET AND SIDE MOUNTING BRACKET REPLACEMENT

Removal

1. Remove service brake rotor (Section 7).
2. Remove locknut, seal washer, and output flange from output shaft. Discard seal washer and locknut (Figure 9-42).
3. Remove two capscrews and brake adapter from axle.
4. Remove two capscrews and washers securing side mounting bracket to axle (Figure 9-43).
5. Remove two locknuts, washers, capscrews, washers, support bracket, and side mounting bracket from crossmember. Discard locknuts.
6. Remove two locknuts, washers, capscrews, washers, and side mounting bracket from support bracket. Discard locknuts (Figure 9-44).

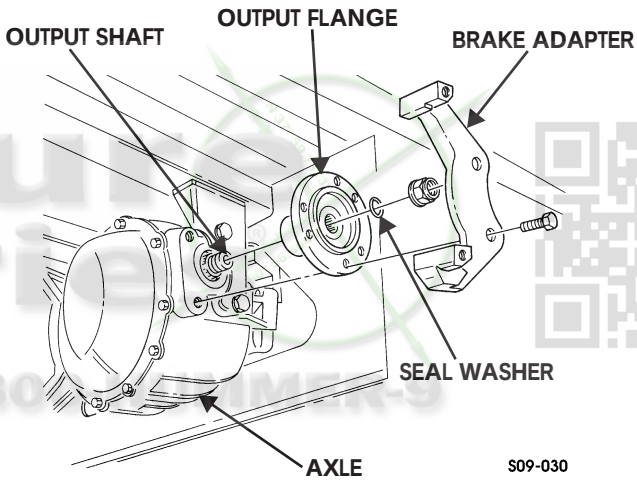

Figure 9-42: Brake Adapter and Output Flange

Installation

1. Install side mounting bracket on support bracket with two washers, capscrews, washers, and locknuts (Figure 9-44).
2. Install support bracket and side mounting bracket on crossmember with two washers, capscrews, washers, and locknuts (Figure 9-43). Do not tighten capscrews.
3. Apply thread-locking compound to tapped holes of axle and install two washers, capscrews, and side mounting bracket on axle. Tighten side mounting bracket capscrews to 110-139 lb-ft (149-189 N•m) and support bracket capscrews to 90 lb-ft (122 N•m).
4. Apply thread-locking compound to tapped holes of axle and install brake adapter on axle with two capscrews. Tighten capscrews to 110-139 lb-ft (149-189 N•m) (Figure 9-42).
5. Install output flange on output shaft with seal washer and locknut. Tighten locknut to 170 lb-ft (231 N•m).
6. Install service brake rotor (Section 7).

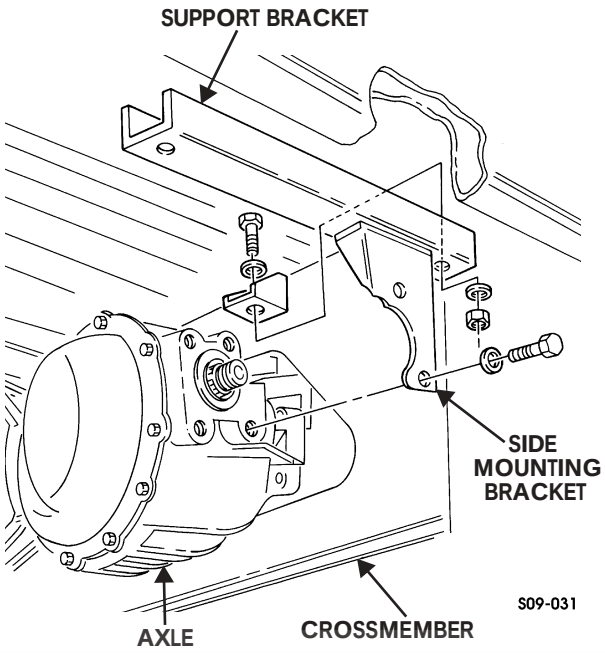

Figure 9-43: Side Mounting Bracket Removal

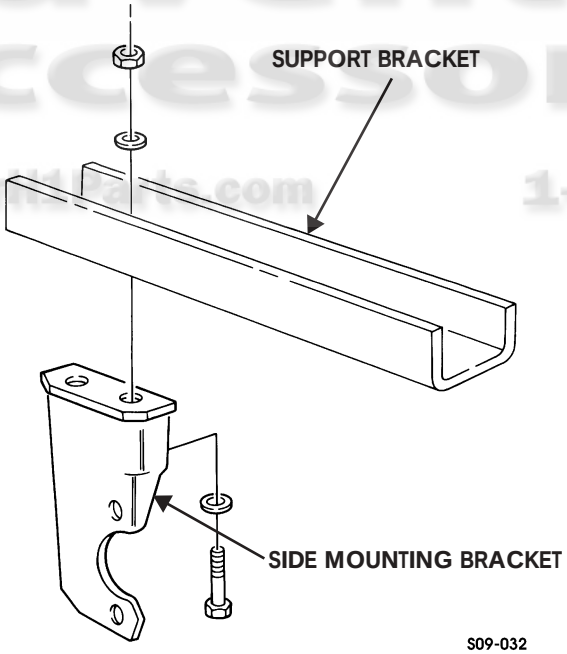

Figure 9-44: Support Bracket

FRONT SUSPENSION FRONT CROSSMEMBER REPLACEMENT

Removal

1. Remove front lower control arms.
2. Remove lower radiator hose (Section 4).
3. Remove horn (Section 10).
4. Remove radiator front mounting bracket.
5. Remove two nuts, washers, capscrews, and washers securing front crossmember to support bracket (Figure 9-43).

NOTE: Note direction of capscrews for installation.

6. Remove four locknuts, washers, capscrews, and washers securing two splash shield brackets to frame rails. Discard locknuts (Figure 9-45).

WARNING: To avoid injury, support crossmember during removal.

7. Remove capscrew and clamp securing harness to front crossmember (Figure 9-46).
8. Remove four locknuts, washers, capscrews, and washers securing crossmember mounting brackets to frame rails. Discard locknuts.
9. Slide crossmember and mounting brackets down and out from under vehicle.
10. Remove six locknuts, washers, capscrews, washers, and left and right mounting brackets from crossmember. Discard locknuts.

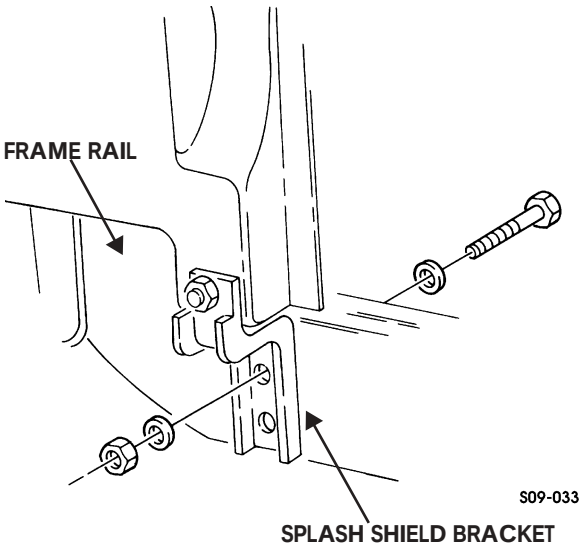

Figure 9-45: Splash Shield

Installation

1. Position left and right crossmember mounting brackets on crossmember (Figure 9-46).
2. Install crossmember and mounting brackets on frame rails with four washers, capscrews, washers, and locknuts. Do not tighten locknuts.
3. Install left and right mounting brackets on crossmember with six washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m).
4. Tighten mounting bracket-to-frame rail locknuts to 261 lb-ft (354 N•m).
5. Secure harness to crossmember with clamp and capscrew.
6. Install four washers, capscrews, washers, locknuts, and two splash shield brackets on frame rails. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-45).
7. Secure front crossmember to support bracket with two washers, capscrews, washers, and nuts (Figure 9-43).
8. Install horn (section 10).
9. Install lower radiator hose (Section 4).
10. Install radiator front mounting bracket.
11. Install front lower control arms.

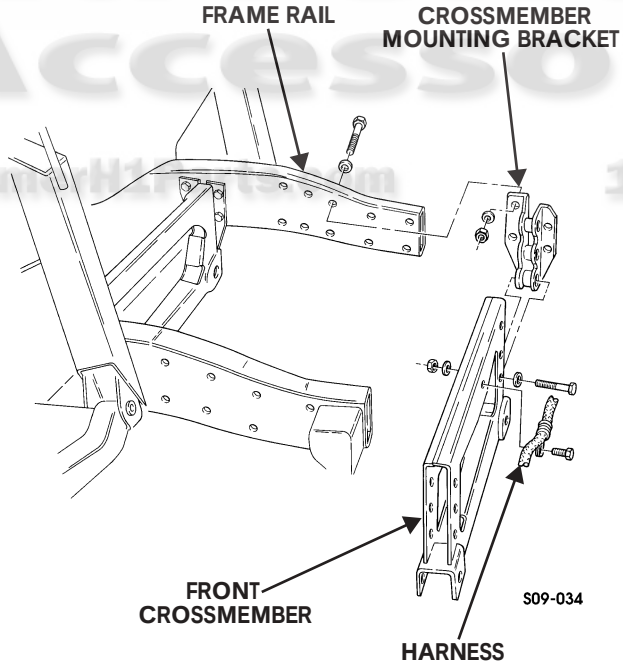

Figure 9-46: Front Crossmember

FRONT SUSPENSION REAR CROSSMEMBER REPLACEMENT

Removal

1. Remove radiator (Section 4).
2. Remove right front upper control arm.
3. Remove lower radiator tube (Section 4).
4. Remove right front caliper-to-tee brake line (Section 7).
5. Remove lower control arms.
6. Remove axle (Section 6).
7. Remove axle support brackets and side mounting brackets.
8. Remove three capscrews, lockwashers, and washers and pull steering gear away from left frame rail. Discard lockwashers (Figure 9-47).
9. Remove three capscrews and clamps from two vent line brackets and crossmember (Figure 9-48).

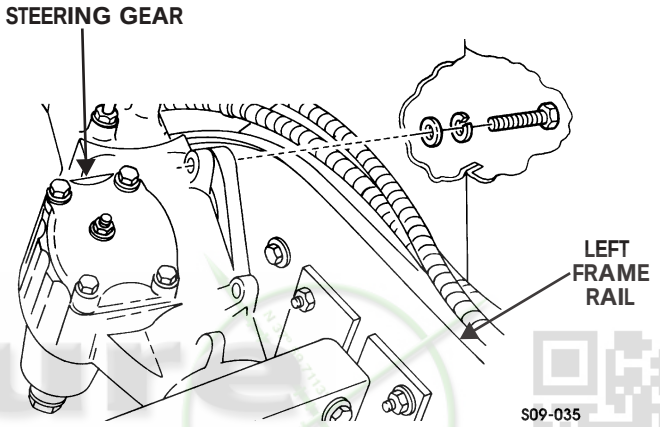

Figure 9-47: Steering Gear and Left Frame Rail

WARNING: To avoid injury, support crossmember during removal.

NOTE: Note direction of capscrews for installation.

10. Remove four locknuts, washers, capscrews, washers, and vent line bracket securing rear crossmember to right frame rail. Discard locknuts.
11. Remove three locknuts, washers, capscrews, washers, and vent line bracket securing rear crossmember to left frame rail. Discard locknuts.
12. Remove capscrew and washer securing rear crossmember to left frame rail.
13. Remove six locknuts, washers, capscrews, and washers securing rear crossmember to left and right rear crossmember mounting brackets. Discard locknuts.
14. Slide rear crossmember and mounting brackets down and out from under vehicle.
15. Remove mounting brackets from rear crossmember.

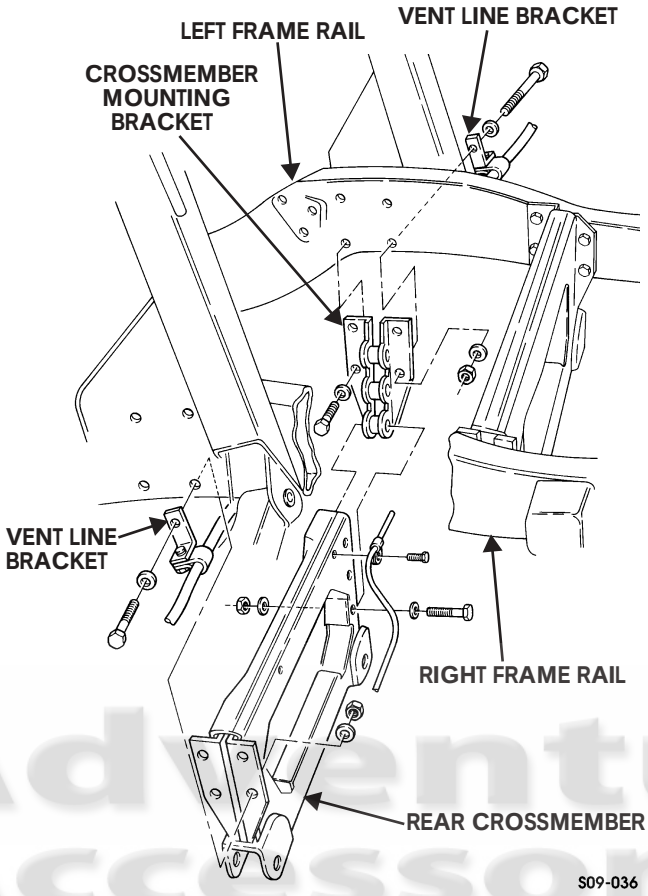

Figure 9-48: Rear Crossmember

Installation

1. Install left and right rear crossmember mounting brackets on rear crossmember (Figure 9-48).
2. Install rear crossmember and mounting brackets on frame rails.
3. Apply thread-locking compound to hole and secure crossmember mounting bracket to left frame rail with washer and capscrew. Tighten capscrew to 65-78 lb-ft (88-106 N•m).
4. Secure crossmember mounting bracket to left frame rail with vent line bracket, three washers, capscrews, washers, and locknuts. Do not tighten capscrews.
5. Secure crossmember mounting bracket to right frame rail with vent line bracket, four washers, capscrews, washers, and locknuts. Do not tighten capscrews.
6. Install six washers, capscrews, washers, and locknuts securing rear crossmember to left and right mounting brackets. Tighten capscrews to 90 lb-ft (122 N•m).
7. Tighten three capscrews on mounting bracket and left frame rail to 90 lb-ft (122 N•m).
8. Tighten four capscrews on mounting bracket and right frame rail to 90 lb-ft (122 N•m).
9. Secure vent line to rear crossmember and two vent line brackets with three clamps and capscrews.
10. Secure steering gear to left frame rail with three washers, lockwashers, and capscrews. Tighten capscrews to 60 lb-ft (81 N•m) (Figure 9-47).
11. Install axle support brackets and side mounting brackets.
12. Install axle (Section 6).
13. Install lower control arms.
14. Install right front caliper-to-tee brake line (Section 7).
15. Install right front upper control arm.
16. Install lower radiator tube (Section 4).
17. Install radiator (Section 4).

REAR SUSPENSION FRONT CROSSMEMBER REPLACEMENT

Removal

1. Remove rear-front tiedown brackets.
2. Remove axle (Section 6).
3. Remove axle support brackets and side mounting brackets.
4. Remove rear lower control arms.
5. Remove three capscrews and clamps securing brake line and two vent lines to front crossmember (Figures 9-49 and 9-50).
6. Remove brake line from tee and tube coupling.

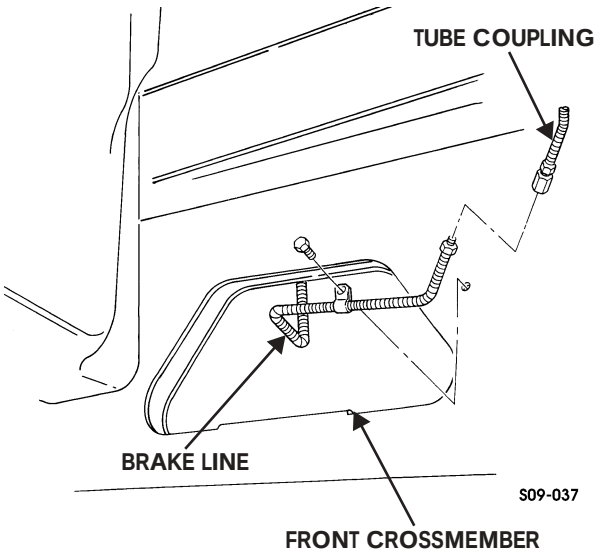

Figure 9-49: Brake Line and Tube Coupling

7. Remove two locknuts, washers, capscrews, washers, and two radius rods from crossmember mounting brackets. Discard locknuts (Figure 9-51).

WARNING: To avoid injury, support crossmember during removal.

8. Loosen six locknuts securing front crossmember to crossmember mounting brackets.
9. Slide front crossmember down and out from under vehicle.
10. Remove six locknuts, washers, capscrews, washers, and two crossmember mounting brackets from front crossmember. Discard locknuts.

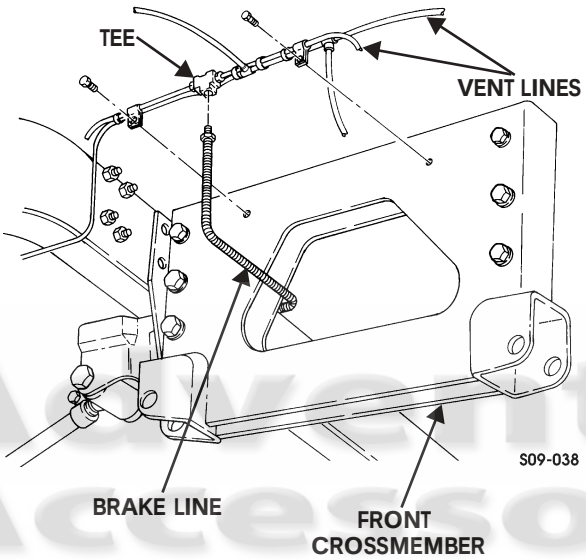

Figure 9-50: Brake Line and Vent Lines

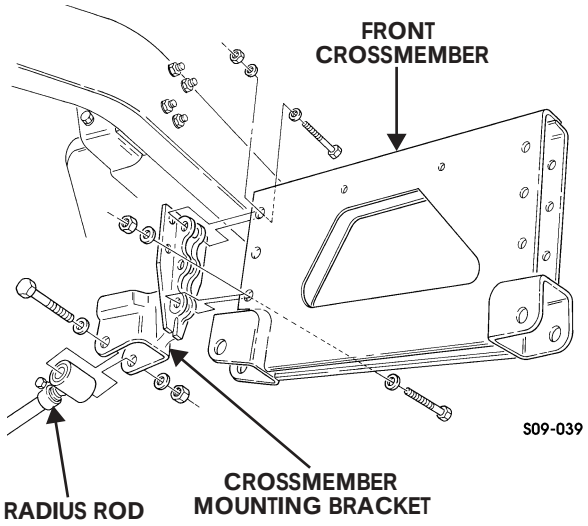

Figure 9-51: Front Crossmember Assembly

Installation

1. Install two crossmember mounting brackets on front crossmember with six washers, capscrews, washers, and locknuts. Tighten locknuts to 90 lb-ft (122 N•m) (Figure 9-51).
2. Install front crossmember on frame rails.
3. Install rear-front tiedown brackets.
4. Install radius rods in crossmember mounting brackets with two washers, capscrews, washers, and locknuts. Tighten locknuts to 260 lb-ft (353 N•m).
5. Install brake line on tee and tube coupling (Figure 9-49) and (Figure 9-50).
6. Secure brake line and two vent lines to front crossmember with three clamps and capscrews.
7. Install axle support brackets and side mounting brackets.
8. Install axle (Section 6).
9. Install rear lower control arms.
10. Bleed rear brakes (Section 7).

When it is necessary to replace the front springs on a vehicle, refer to the following chart to determine the appropriate part number. The chart is applicable to all model years. Front springs must be changed as a set. Any front spring upgrade will be done at the customer's expense.

Coil Spring Replacement Chart

Diesel

Model	Front Axle Weight (+/-100 lb)	954 lb/in-13.36 in. Free Length 12338316-1 Wire Diameter .904 (Yellow Tie Wrap)	954 lb/in-14.0 in. Free Length 6005787 Wire Diameter .925 (Red Tie Wrap)	1250 lb/in-13.36 in. Free Length 6005786 Wire Diameter .980 (Orange Tie Wrap)
2-Door	3200	X		
2-Door w/Winch	3550		X	
4-Door Soft Top	3400		X	
4-Door Soft Top w/Winch	3750			X
4-Door Hard Top	3450		X	
4-Door Hard Top w/Winch	3800			X
Station Wagon	3400		X	
Station Wagon w/Winch	3750			X

Gasoline

Model	Front Axle Weight (+/-100 lbs)	954 lb/in-13.36 in. Free Length 12338316-1 Wire Diameter .904 (Yellow Tie Wrap)	954 lb/in-14.06 in. Free Length 6005787 Wire Diameter .925 (Red Tie Wrap)	1250 lb/in-13.36 in. Free Length 6005786 Wire Diameter .980 (Orange Tie Wrap)
2-Door	2900	X		
2-Door w/Winch	3250	X		
4-Door Soft Top	3100	X		
4-Door Soft Top w/Winch	3450		X	
4-Door Hard Top	3150	X		
4-Door Hard Top w/Winch	3500		X	
Station Wagon	3100	X		
Station Wagon w/Winch	3450		X	

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