

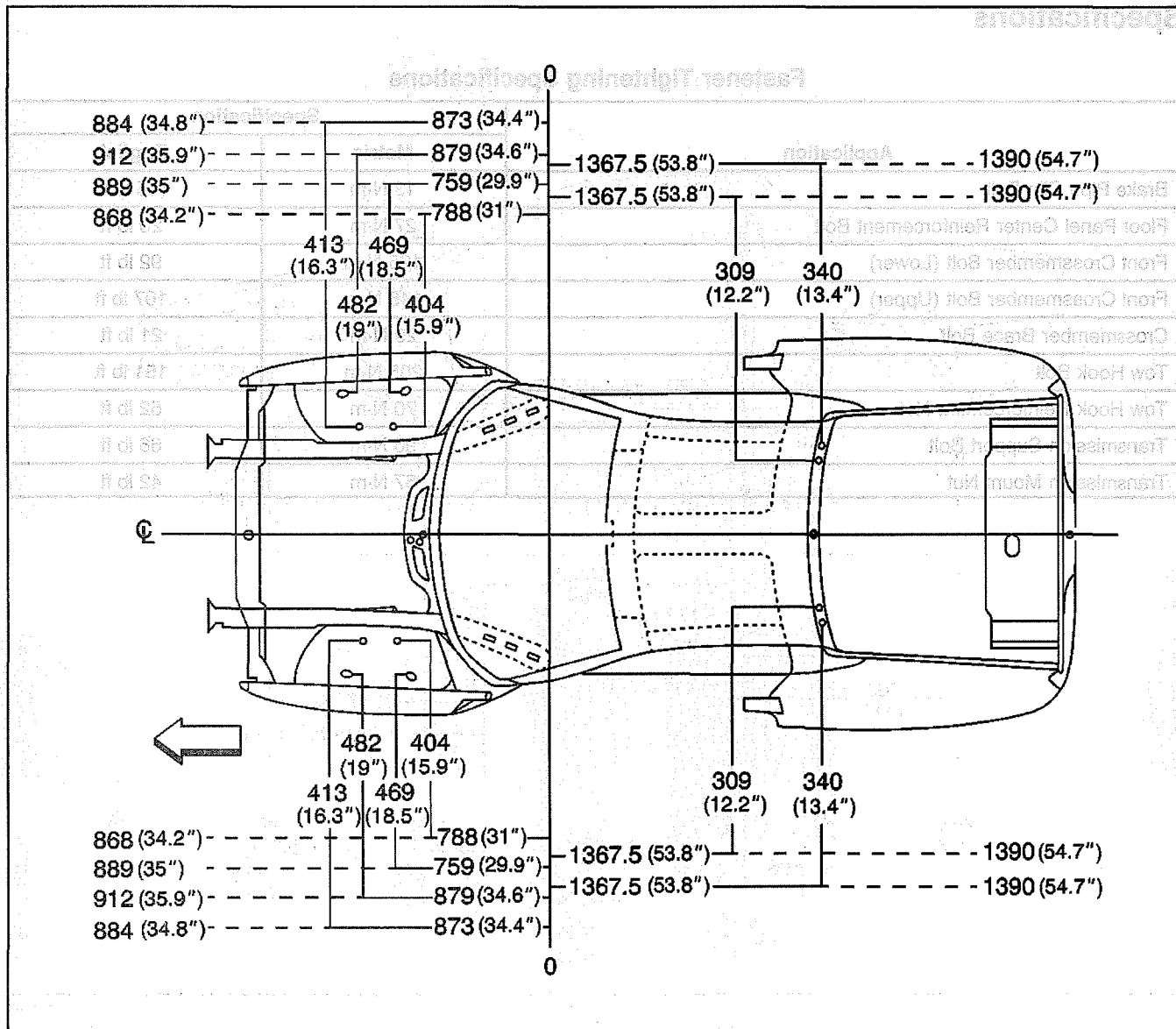
Frame and Underbody

Specifications

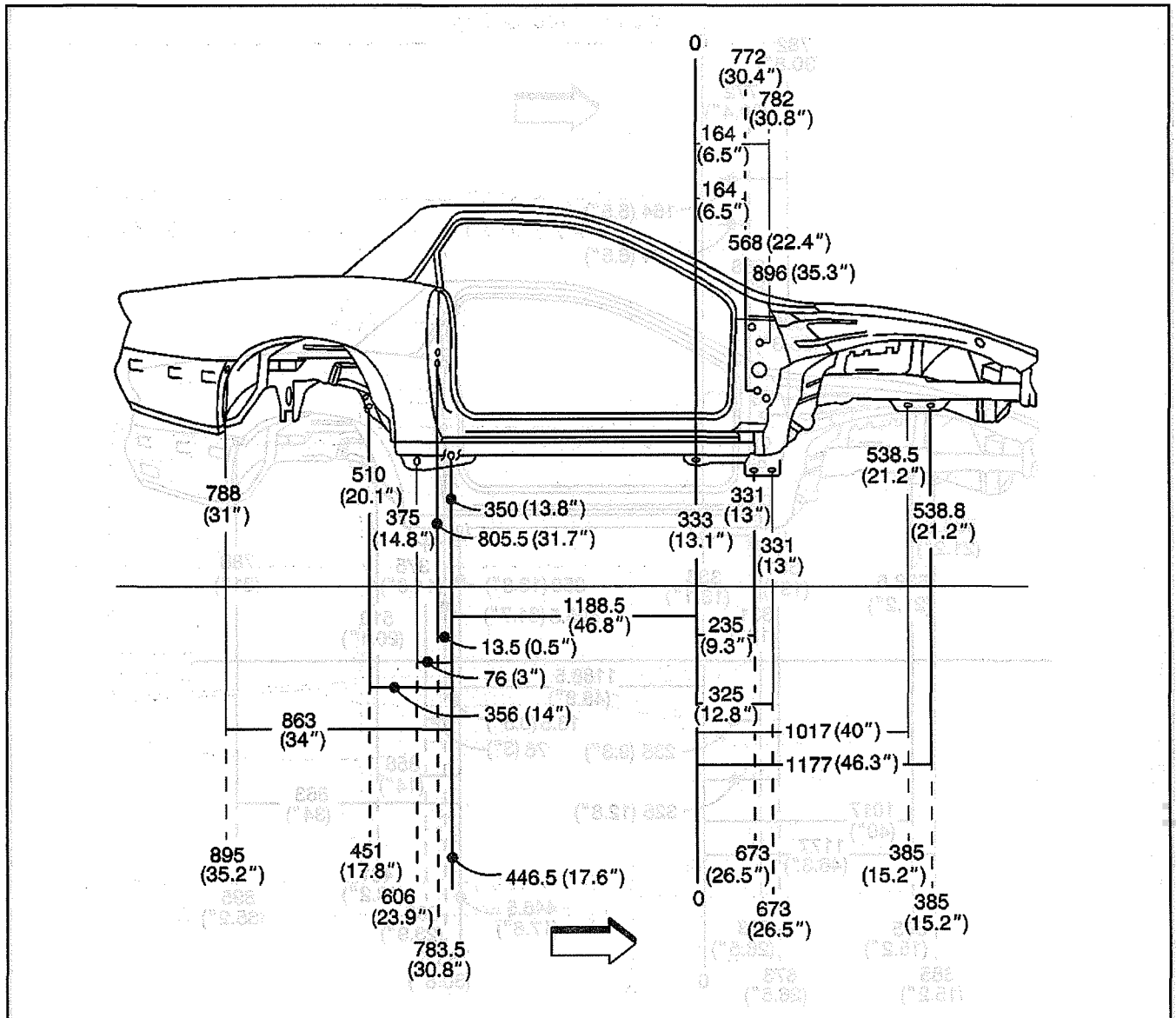
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pipe Clip Bolt	13 N·m	115 lb in
Floor Panel Center Reinforcement Bolt	27 N·m	20 lb ft
Front Crossmember Bolt (Lower)	125 N·m	92 lb ft
Front Crossmember Bolt (Upper)	145 N·m	107 lb ft
Crossmember Brace Bolt	29 N·m	21 lb ft
Tow Hook Bolt	205 N·m	151 lb ft
Tow Hook Reinforcement Nut	70 N·m	52 lb ft
Transmission Support Bolt	90 N·m	66 lb ft
Transmission Mount Nut	57 N·m	42 lb ft

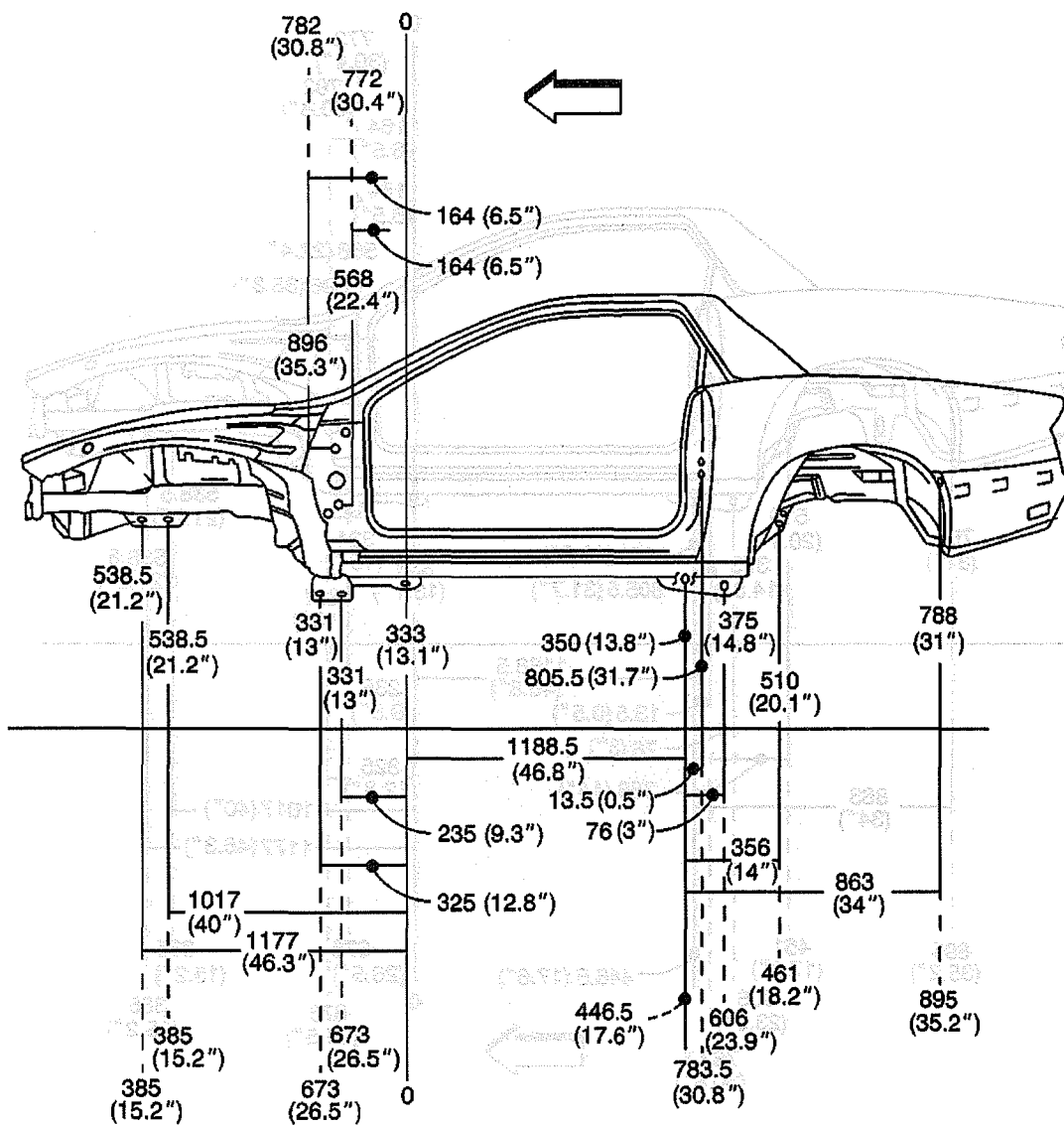
Body Dimensions-Top



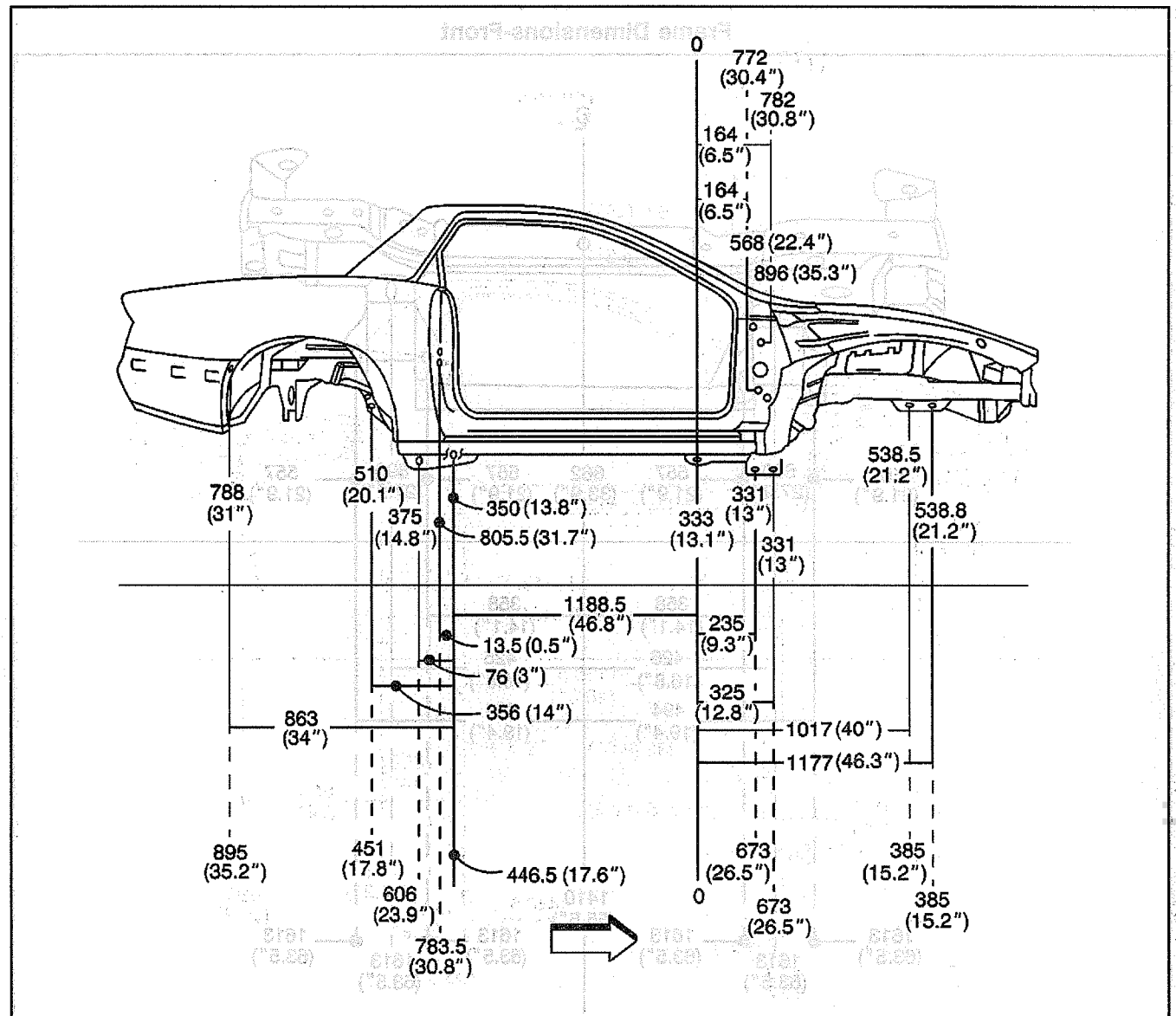
Body Dimensions-Right Side



Body Dimensions-Left Side

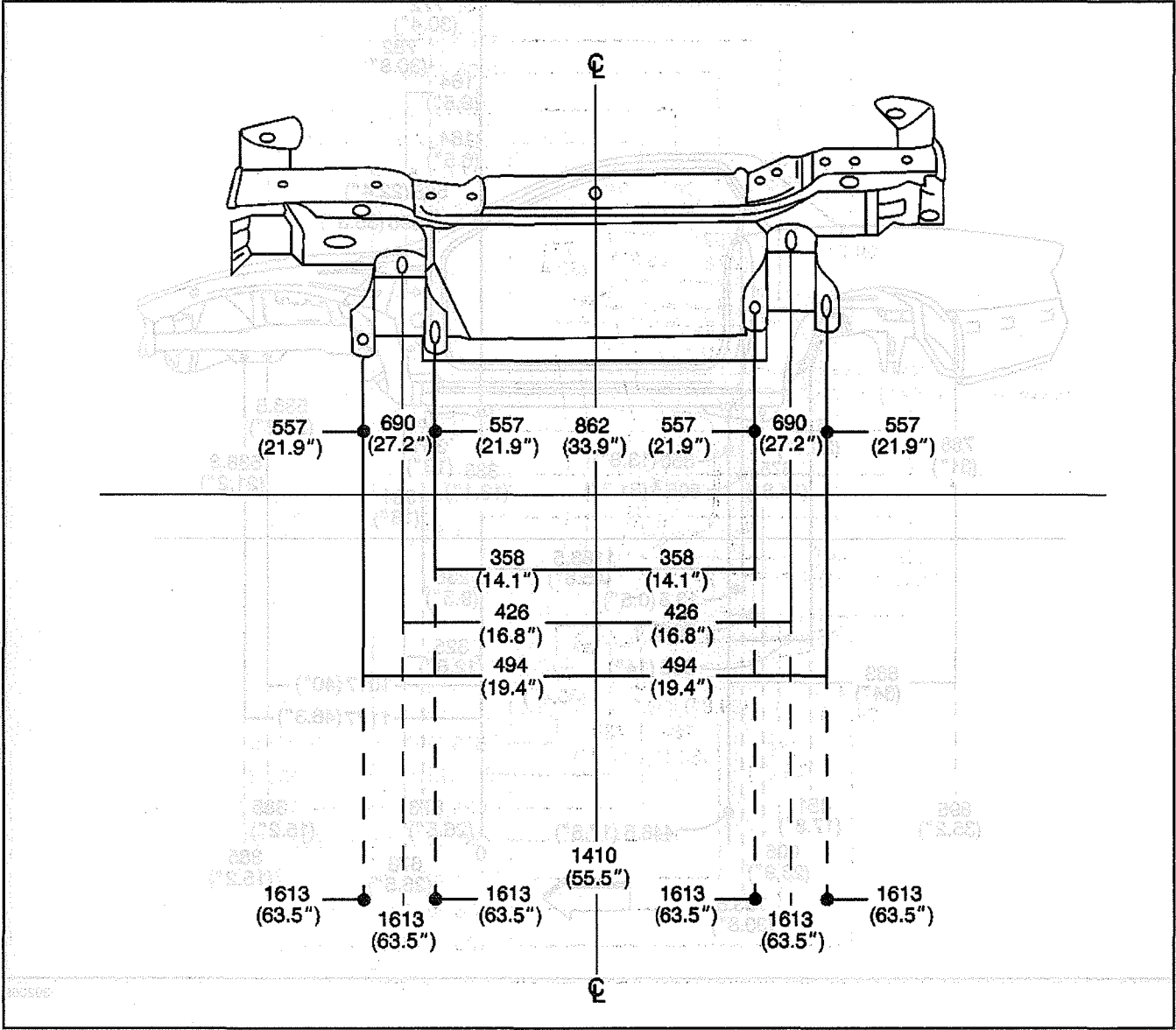


Body Dimensions-Right Side

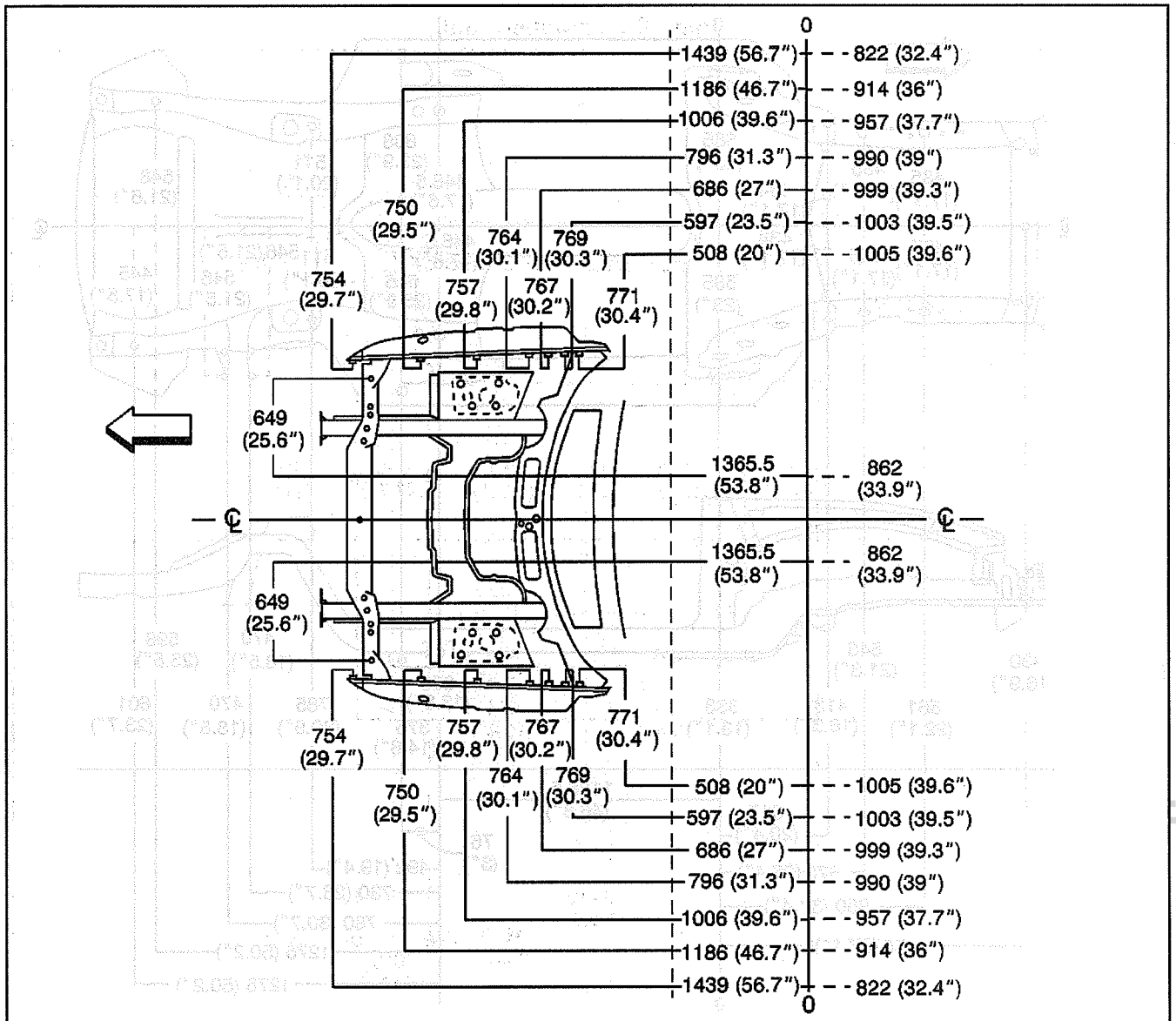


Dimensions - Frame

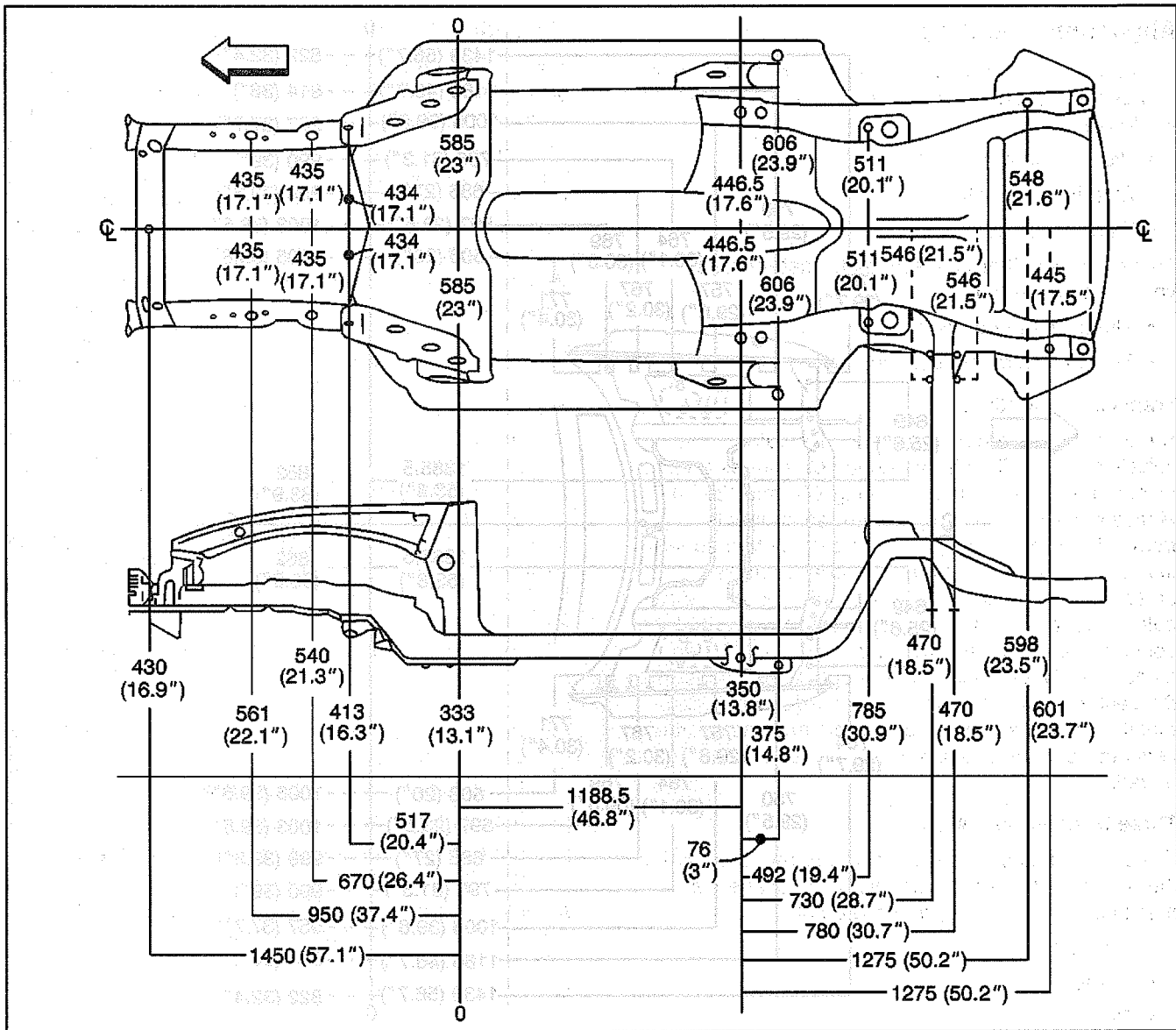
Frame Dimensions-Front



Frame Dimensions-Front/Top



Frame Dimensions-Underbody



Reference Points - Symmetrical

Symmetrical reference points are two corresponding points on opposite sides of the centerline that have equal specifications in length and height. Symmetrical reference points are used in order to make quick inspections in order to determine underbody structural damage. All measurements provided in the dimensions charts are symmetrical unless otherwise noted.

Reference Points - Asymmetrical

When two corresponding reference points have different measurements, the measurements are asymmetrical. If you perform a quick cross-check and the measurements are unequal, use the dimensions charts in order to verify if the measuring points are symmetrical or asymmetrical.

Diagnostic Information and Procedures

Alignment Checking

If a vehicle is involved in an accident that may result in a bent or sprung frame, inspect the vehicle for the following conditions:

- Proper frame alignment
- Steering geometry
- Wheel alignment

There are two different methods for determining vehicle measurements:

- The tram gauge method
- The three-dimensional method

Tram Gauge Method

A tram gauge is a quick reference for determining vehicle damage. The tram gauge set requires a vertical pointer that is capable of reaching 914 mm (36 in). Measure the engine compartment components from point to point using the vertical pointers equally set. Use the vertical pointers in order to make other measurements on the horizontal plane of the datum line, parallel to the underbody. Ensure that the pointers are set as specified for each point. When measuring dimensions to the gauge holes, measure to the center of the holes flush to the adjacent surface metal. Cross-check the diagonal dimensions in order to verify the dimensional accuracy of the vehicle underbody.

Three-Dimensional Method

If you are measuring the structural repair, ensure that the repair equipment is capable of simultaneously measuring the following multiple points:

- The height
- The length
- The width

Measure the vehicle body in order to obtain accurate comparisons to the vehicle structure. Universal measuring systems combine the use of equipment and techniques in order to make underbody and upperbody three dimensional measurements. The universal system provides accurate simultaneous measurements of the following items:

- Height
- Length
- Width

Checking Frame to Body Alignment

A misaligned frame may move up or down or to the side of where the rail should be. These possibilities must be checked.

The easiest way to check body alignment is with tramping gauges and universal measuring systems made for this purpose. Detailed instructions are normally supplied at the time of purchase. Instructions for equipment usage are not given in this manual.

Whether alignment is checked with or without gauges, the vehicle must be parked on a level section of floor. Certain conditions call for preliminary inspections before actually inspecting the frame. Suspension problems may make it appear that the vehicle frame is out of alignment. A weak spring may make the vehicle appear to have a twisted frame.

A visual inspection of the top and the bottom flanges of each rail may reveal the specific area where sag or buckle exists. In the case of sag, wrinkles may appear on the top of the upper flange. Wrinkles on the bottom of the lower flange are definite evidence of buckle. To inspect the frame to body alignment perform the following:

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Inspect the suspension for worn or damaged components.
3. Inspect for floor pan for damage.
4. Inspect for frame damage.
5. If the frame can not be re-aligned, replacement may be necessary.

Inspect the frame to body alignment by inserting a 19 mm (0.75 in) diameter guide pin or drill bit into the frame to body bolt holes.

Repair Instructions

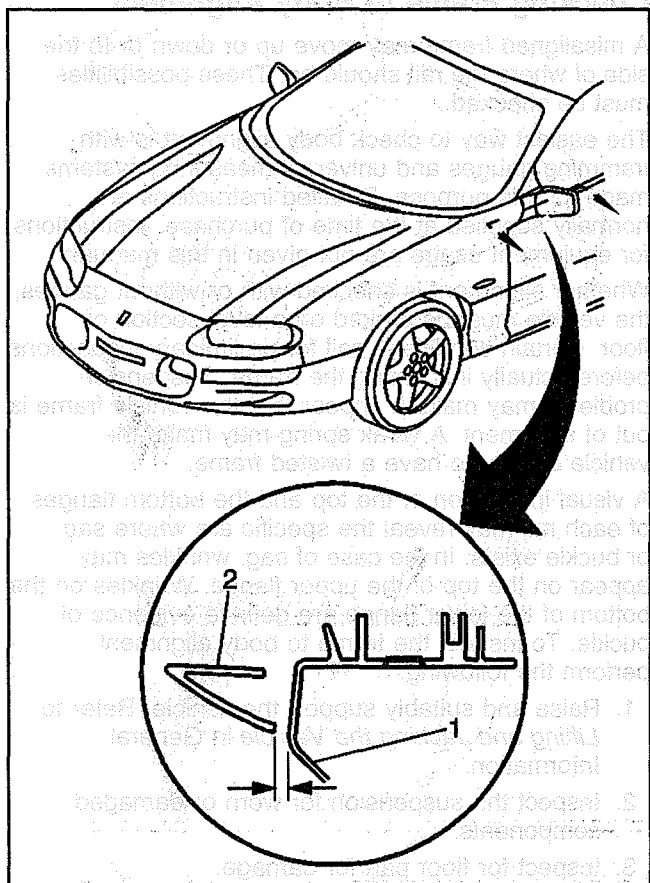
Measurements - Body (Body Front End)

Below are the body front end fit requirements for Chevrolet and Pontiac, all specifications apply to both vehicles unless otherwise specified.

1. Measure the gap between the outside rearview mirror (1) and the front fender (2). (Chevrolet only)

Specification

Gap specification is 10.7 mm (+/- 3.0 mm),
0.42 in (+/- 0.12 in).

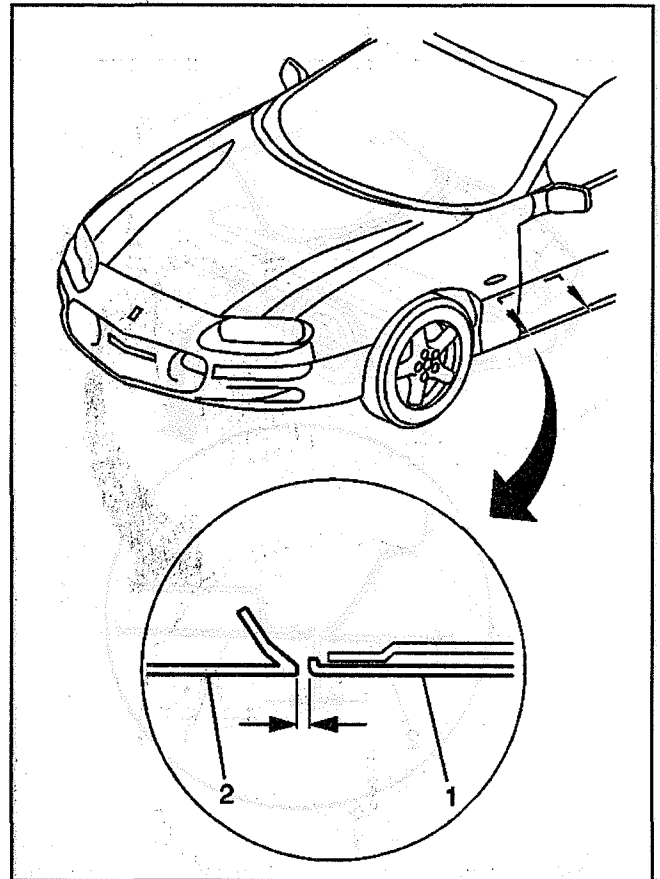


392196

2. Measure the gap between the door (1) and the front fender (2). (Chevrolet only)

Specification

Gap specification is 5.0 mm (+/- 1.5 mm),
0.197 in (+/- 0.06 in).

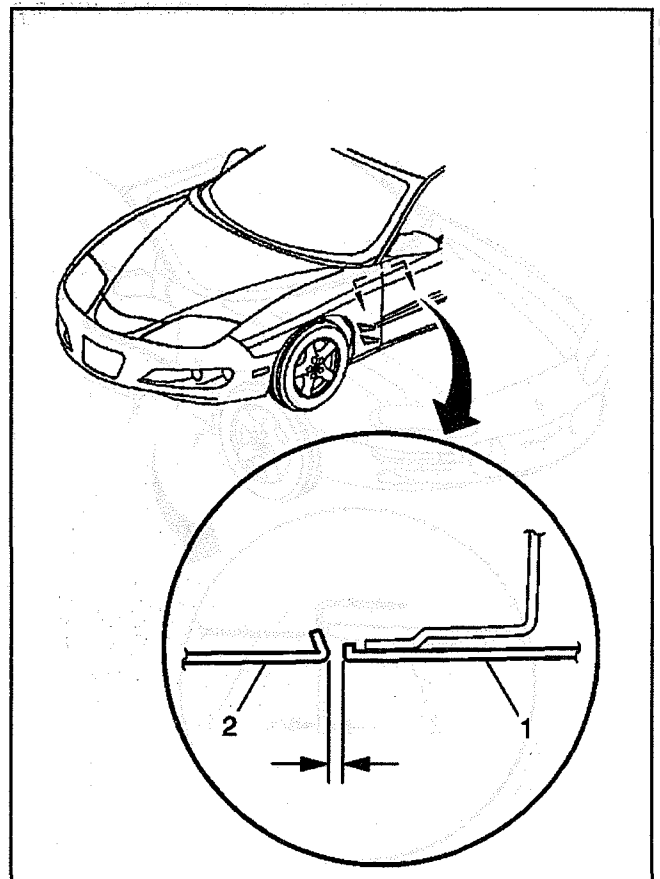


392200

3. Measure the gap between the door (1) and the front fender (2). (Pontiac only)

Specification

Gap specification is 7.0 mm (+/- 5.0 mm),
0.276 in (+/- 0.197 in).

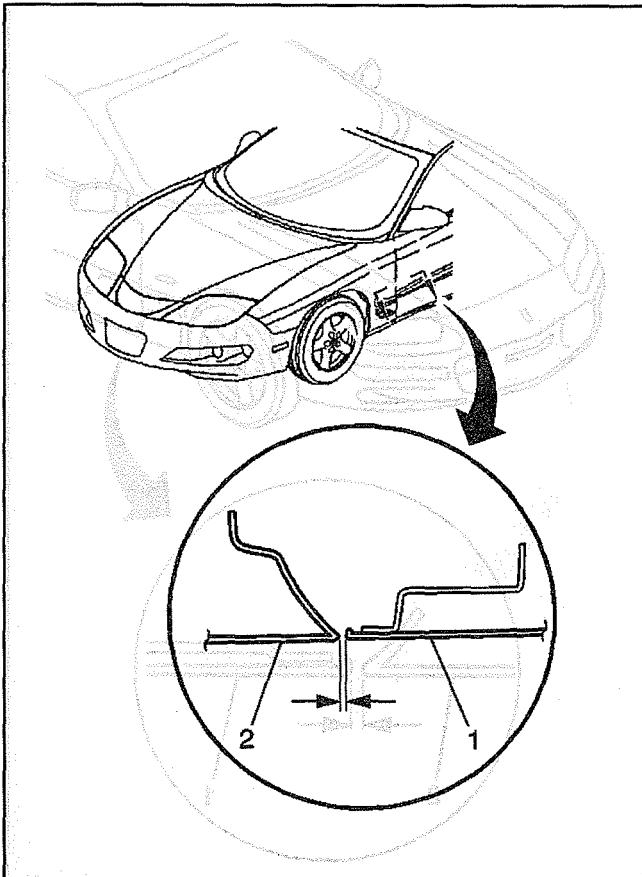


392203

4. Measure the gap specification between the door (1) and the front fender (2). (Pontiac only)

Specification

Gap specification is 5.0 mm (+/- 1.5 mm),
0.197 in (+/- 0.06 in).

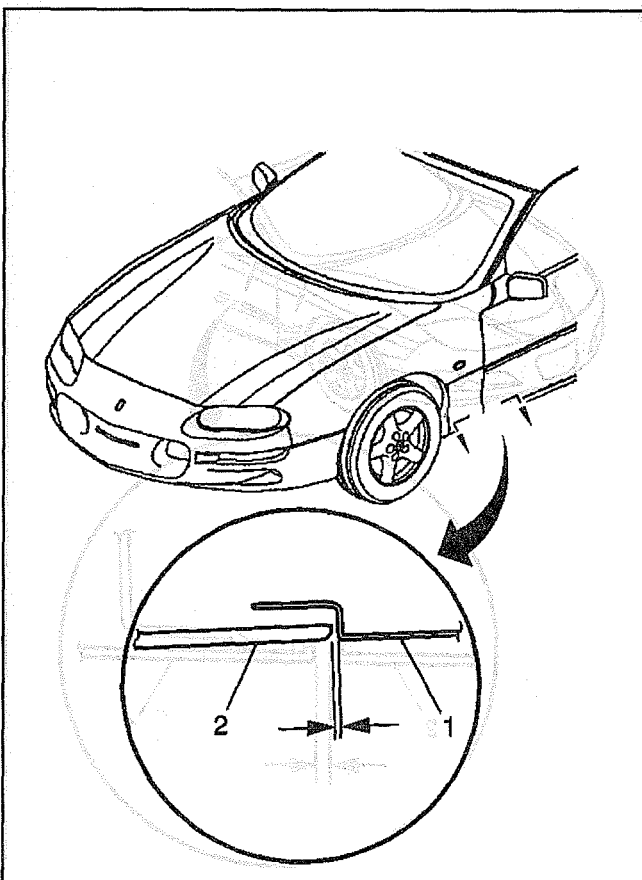


392204

5. Measure the gap between the rocker panel (1) and the front fender (2). (Pontiac only)

Specification

Gap specification is 2.5 mm (+/- 2.5 mm),
0.098 in (+/- 0.098 in).

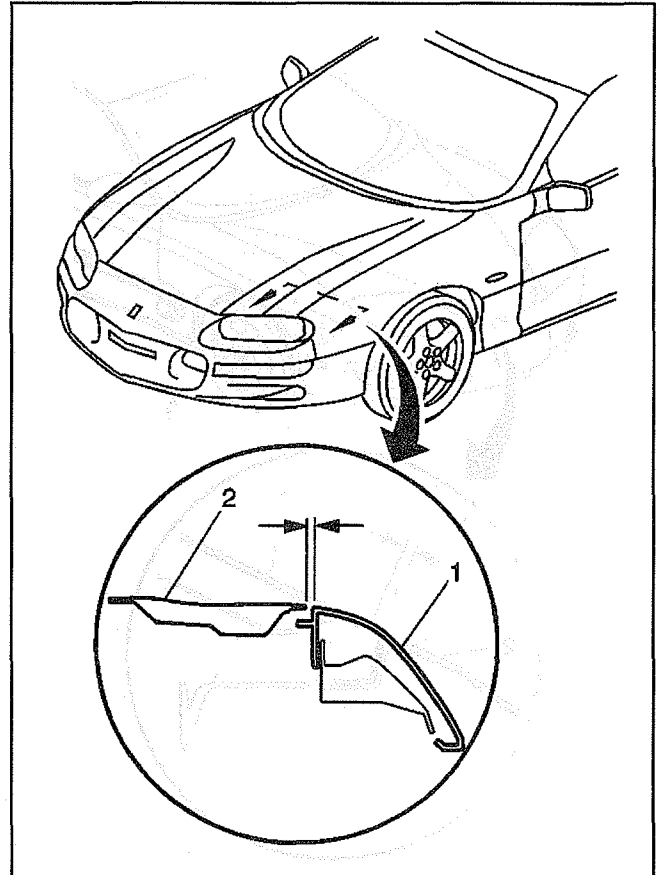


392207

6. Measure the gap between the front fender (1) and the hood (2).

Specification

Gap specification is 4.0 mm (+/- 1.5 mm),
0.158 in (+/- 0.06 in).

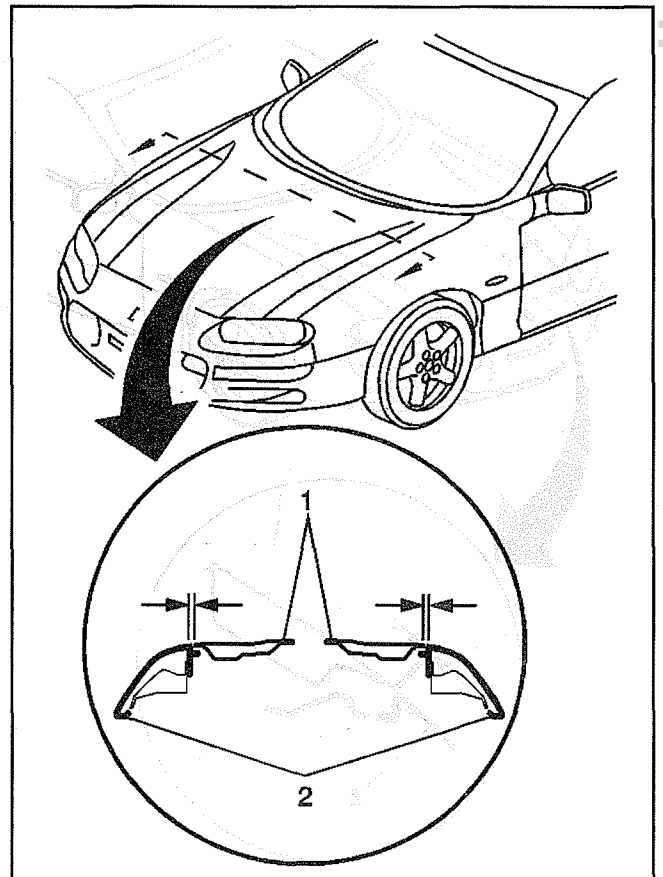


392210

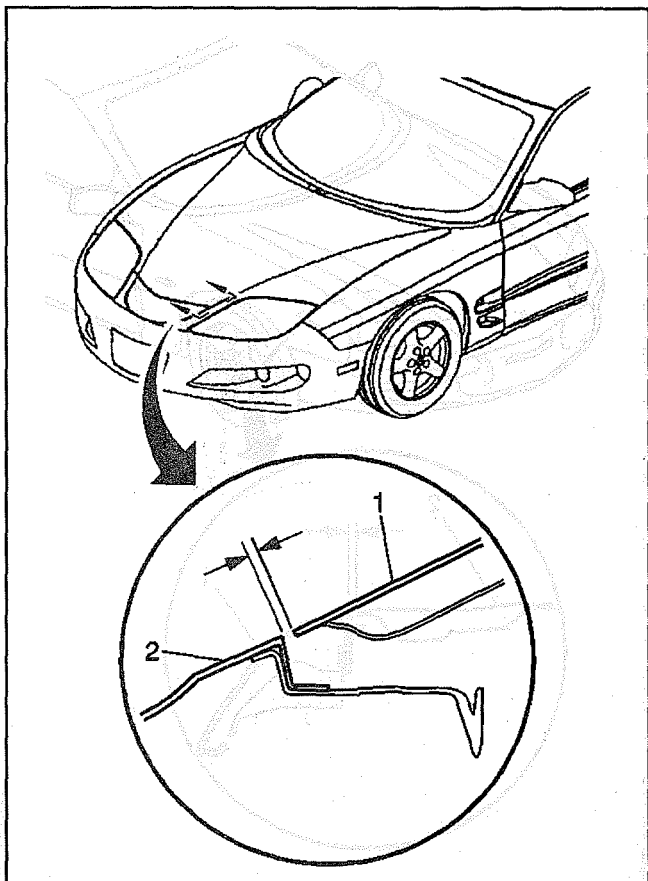
7. Measure the cross-car gap between the hood (1) and the front fenders (2).

Specification

Gap cross-car side to side specification within
1.5 mm (0.06 in).



392212

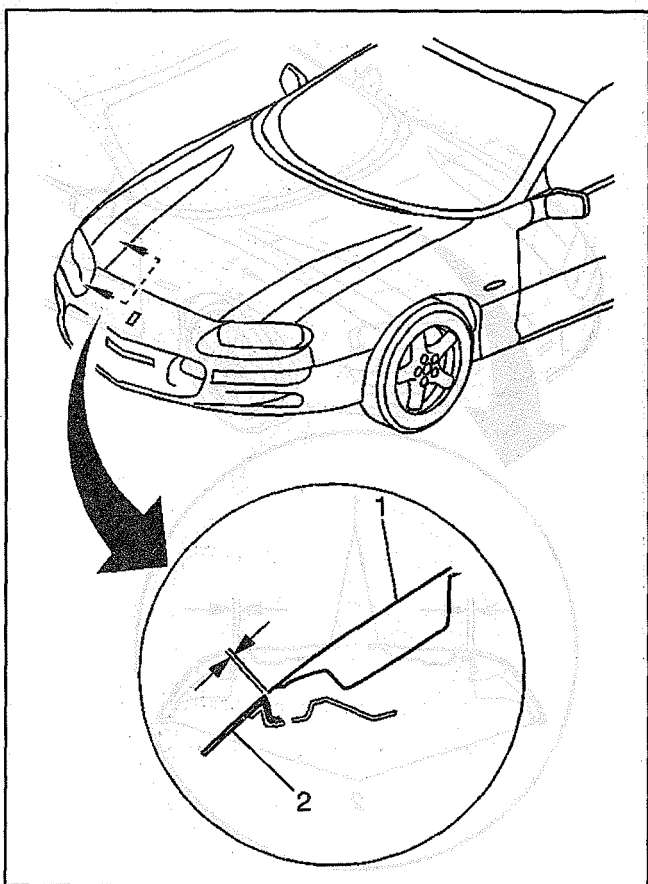


392216

8. Measure the gap between the hood (1) and the front fascia (2). (Pontiac only)

Specification

Gap specification is 4.6 mm (+/- 1.5 mm),
0.18 in (+/- 0.06 in).



392217

9. Measure the gap between the hood (1) and the front fascia (2). (Chevrolet only)

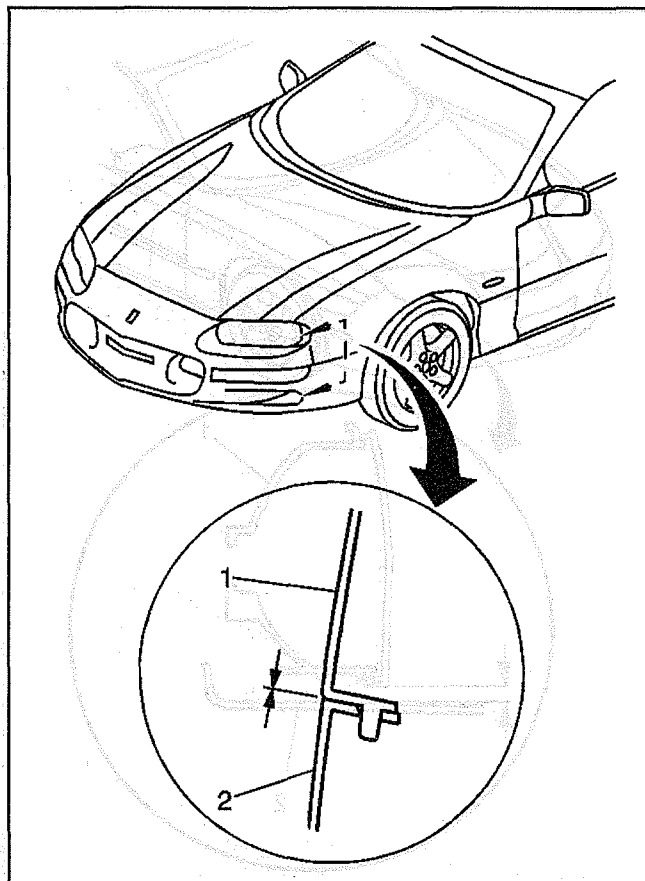
Specification

Gap specification is 4.0 mm (+/- 1.5 mm),
0.158 in (+/- 0.06 in).

10. Measure the gap between the front fender (1) and the front fascia (2).

Specification

Gap specification is 0.00 mm (+ 0.50 / - 0.00 in).

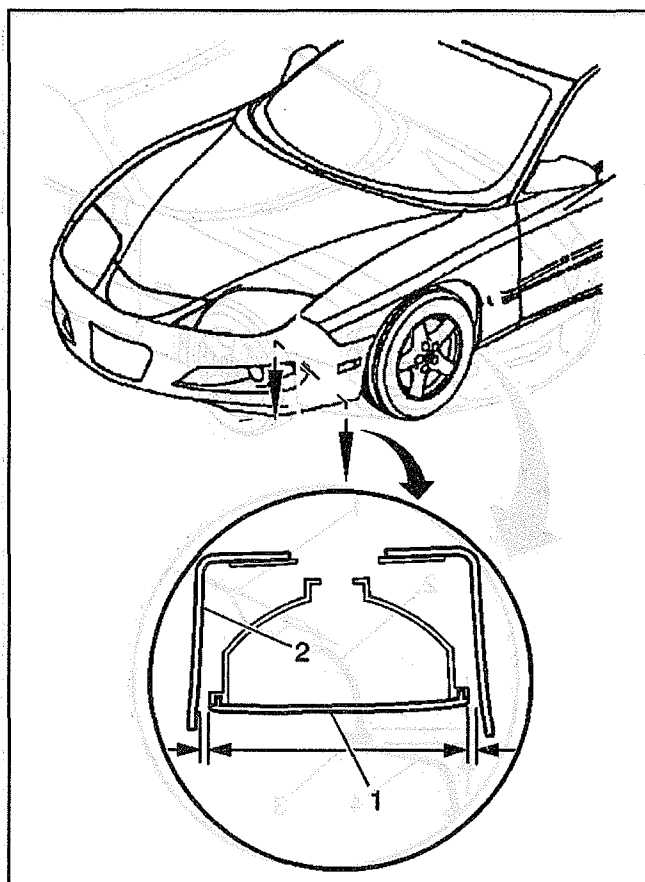


392219

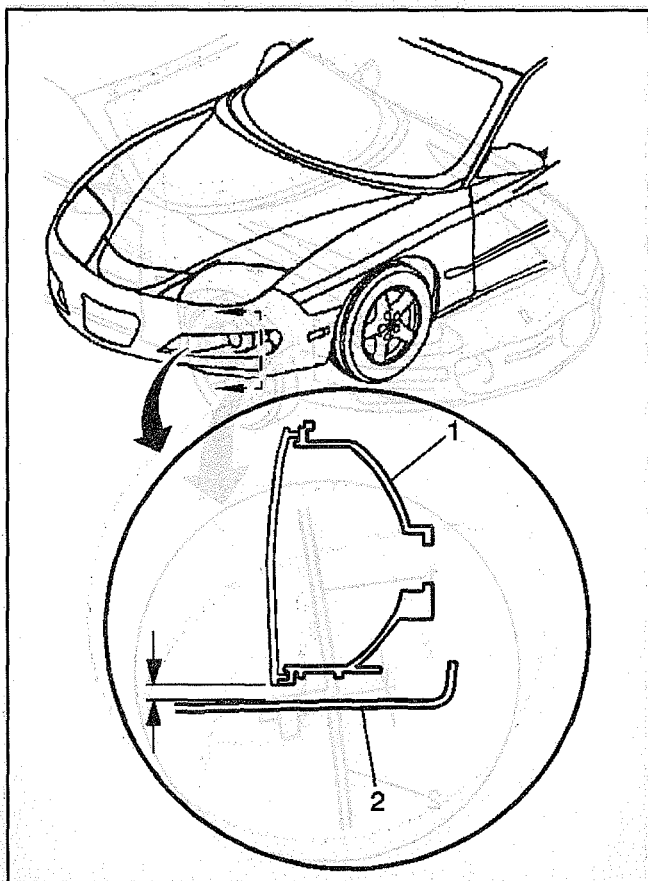
11. Measure the cross-car side to side gap between the fog lamp (1) and the front fascia (2). (Pontiac only)

Specification

Gap cross-car side to side specification within 2.0 mm (0.079 in).



392222

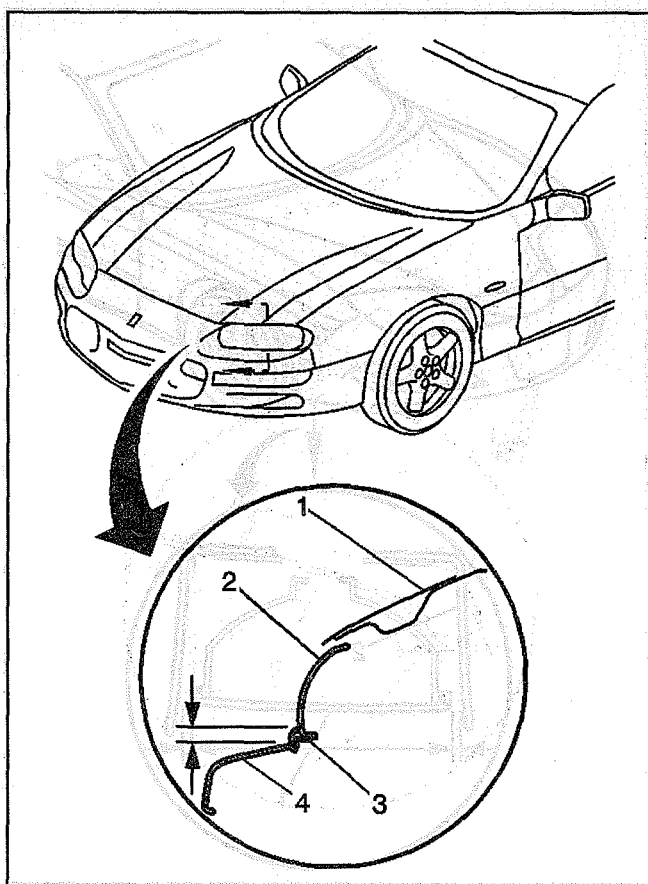


392227

12. Measure the gap between the fog lamp (1) and the front fascia (2). (Pontiac only)

Specification

Gap specification is 5.0 mm (+/- 2.0 mm), 0.197 in (+/- 0.79 in).



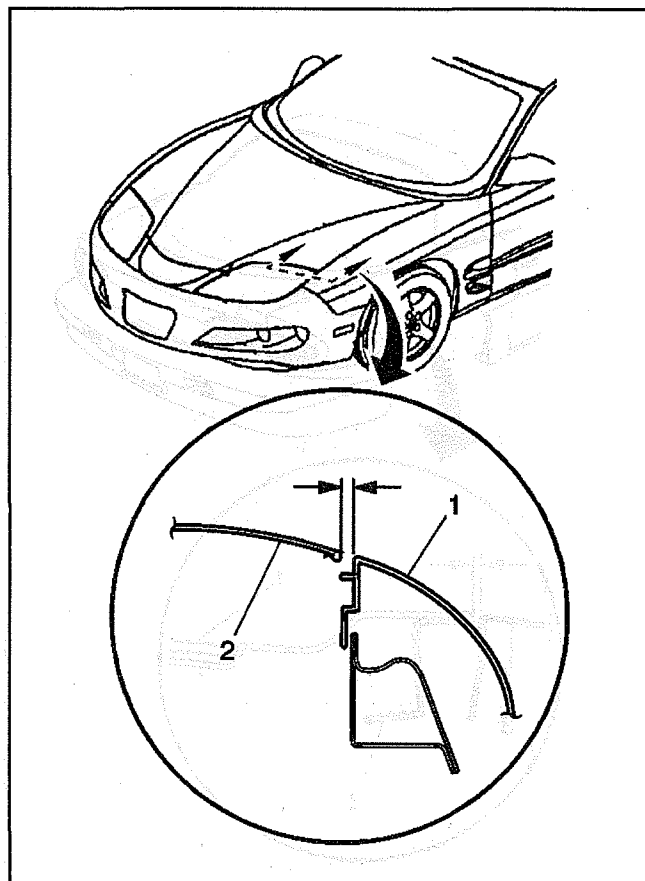
392230

13. There is no gap permissible between the headlamp seal (3) and the front fascia (4). (Chevrolet only)

14. Measure the gap between the headlamp door (1) and the front fender (2). (Pontiac only)

Specification

Gap specification is 4.0 mm (+/- 1.5 mm),
0.158 in (+/- 0.06 in).

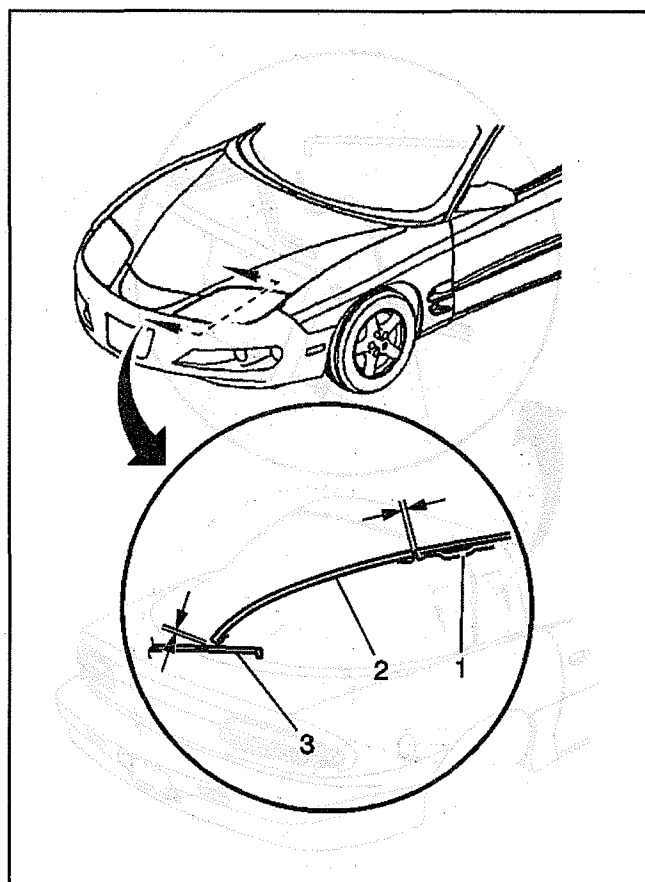


392231

15. Measure the gap between the hood (1) and the headlamp door (2). (Pontiac only)

Specification

Gap specification is 4.0 mm (+/- 1.5 mm),
0.158 in (+/- 0.06 in).



392234

392234

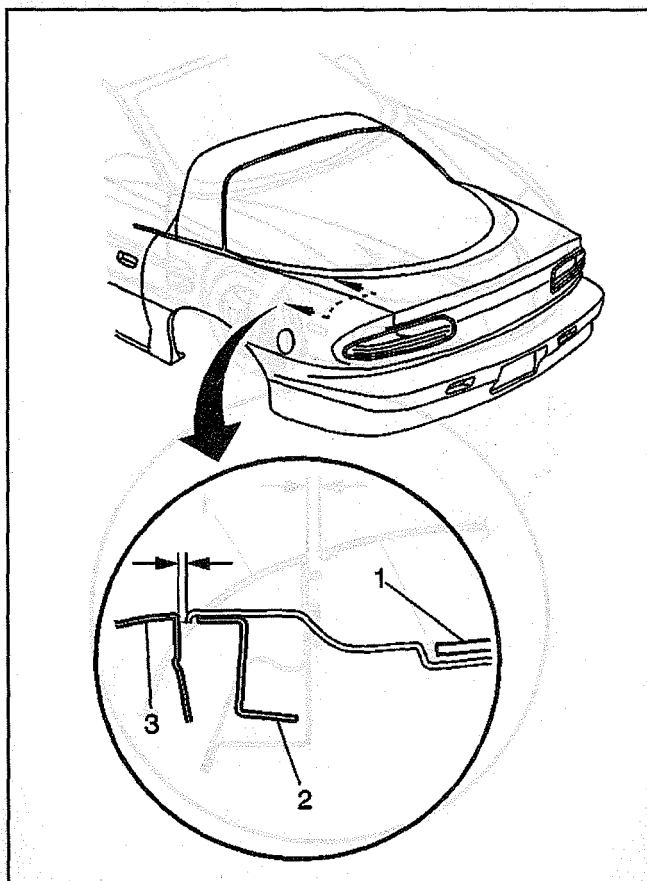
Measurements - Body (Body Rear End)

Below are the body rear end fit requirements for Chevrolet and Pontiac, all specifications apply to both vehicles unless otherwise specified.

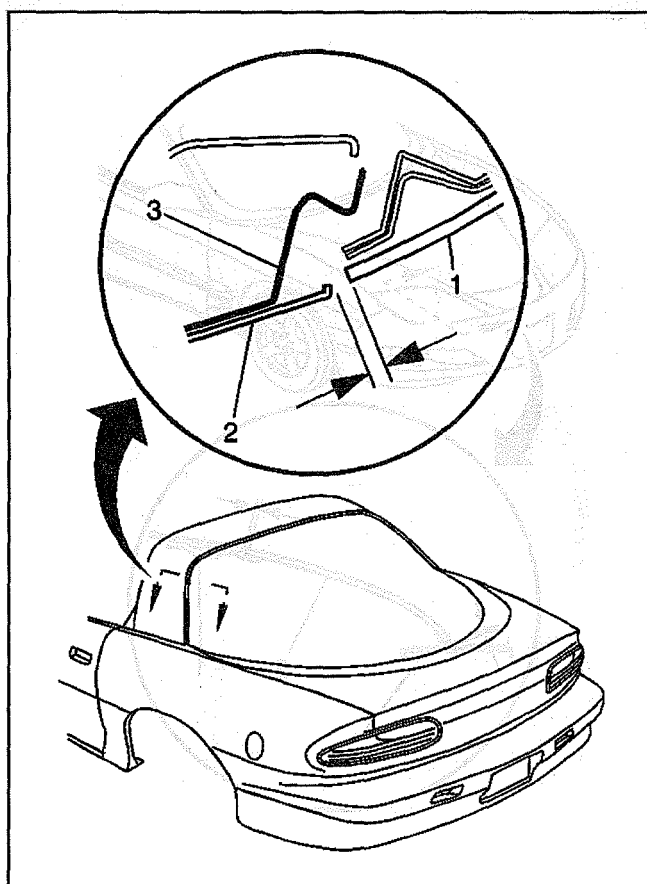
1. Measure the gap between the rear compartment lift window (2) and the quarter panel (3).

Specification

Gap specification is 5.0 mm (+/- 1.5 mm),
0.197 in (+/- 0.06 in).



392241



392244

2. Measure the rear compartment lift window (1) to roof outer sail panel (2).

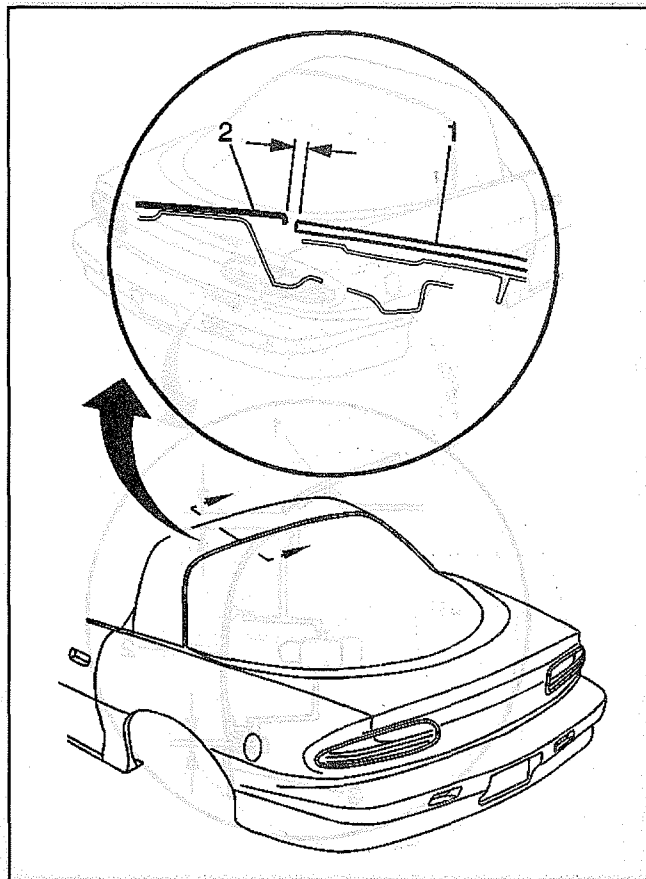
Specification

Gap specification is 8.0 mm (+/- 2.0 mm),
0.315 in (+/- 0.79 in).

3. Measure the gap between the rear compartment lift window (1) and the roof (2).

Specification

Gap specification is 8.0 mm (+/- 2.0 mm),
0.315 in (+/- 0.79 in).

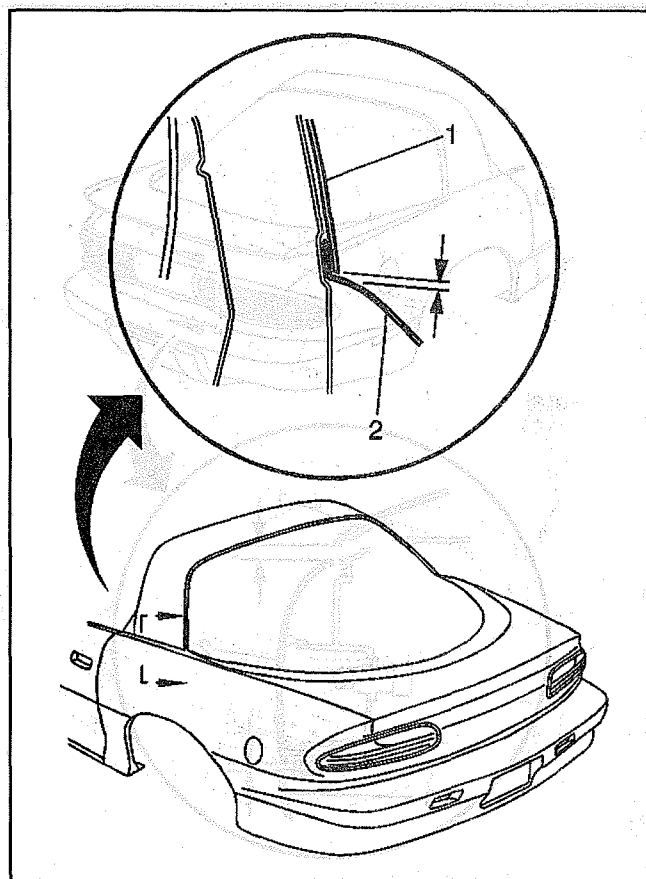


392246

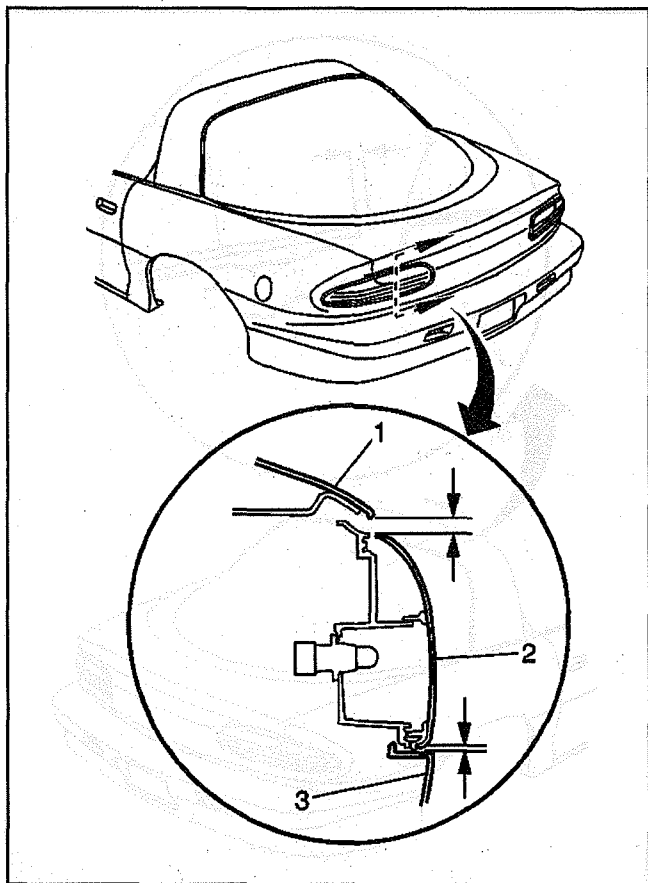
4. Measure the gap between the roof outer panel (1) and the quarter outer panel (2).

Specification

Gap specification is 4.0 mm (+/- 1.5 mm),
0.158 in (+/- 0.06 in).



392247

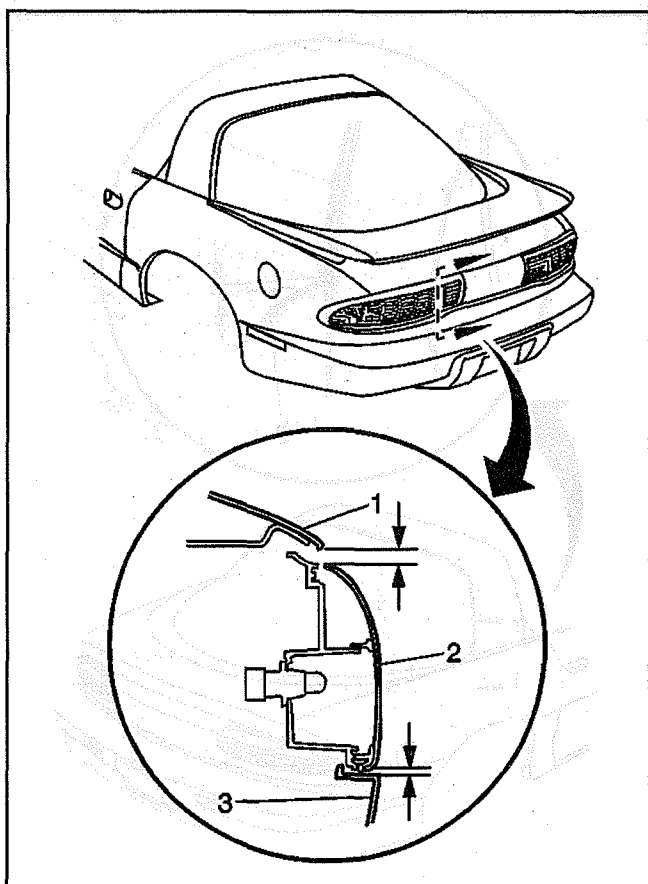


392248

5. Measure the gap between the rear compartment lift window panel (1) and the taillight lens (2). (Chevrolet only)
6. Measure the gap between the taillight lens (2) and the rear end finish panel (3). (Chevrolet only)

Specification

- Gap specification between the lift window panel (1) and the lens (2) is 10.5 mm (+/- 3.0 mm), 0.413 in (+/- 0.118 in).
- Gap specification between the lens (2) and the finish panel (3) is 2.0 mm (+/- 2.0 mm), 0.79 in (+/- 0.79 in).



392250

7. Measure the gap between the rear compartment lift window panel (1) and the taillight lens (2). (Pontiac only)
8. Measure the gap between the taillight lens (2) and the rear end finish panel (3). (Pontiac only)

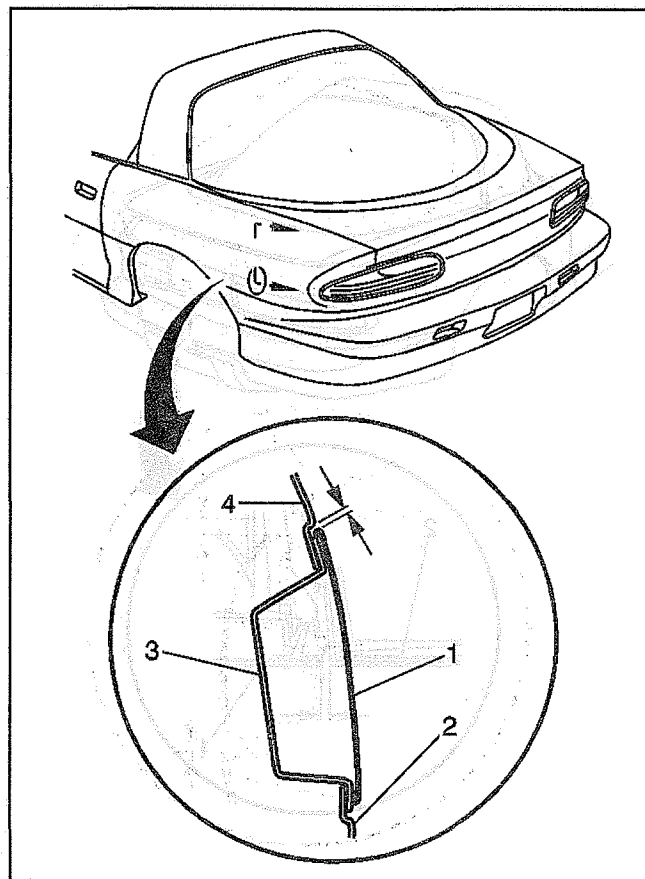
Specification

- Gap specification between the lift window panel (1) and the lens (2) is 5.0 mm (+/- 3.0 mm), 0.197 in (+/- 0.118 in).
- Gap specification between the lens (2) and the finish panel (3) is 4.0 mm (+/- 2.0 mm), 0.158 in (+/- 0.79 in).

9. Measure the gap between the fuel filler door (1) to the rear quarter panel (4).

Specification

Gap specification is 3.0 mm (+/- 1.0 mm),
0.118 in (+/- 0.349 in).

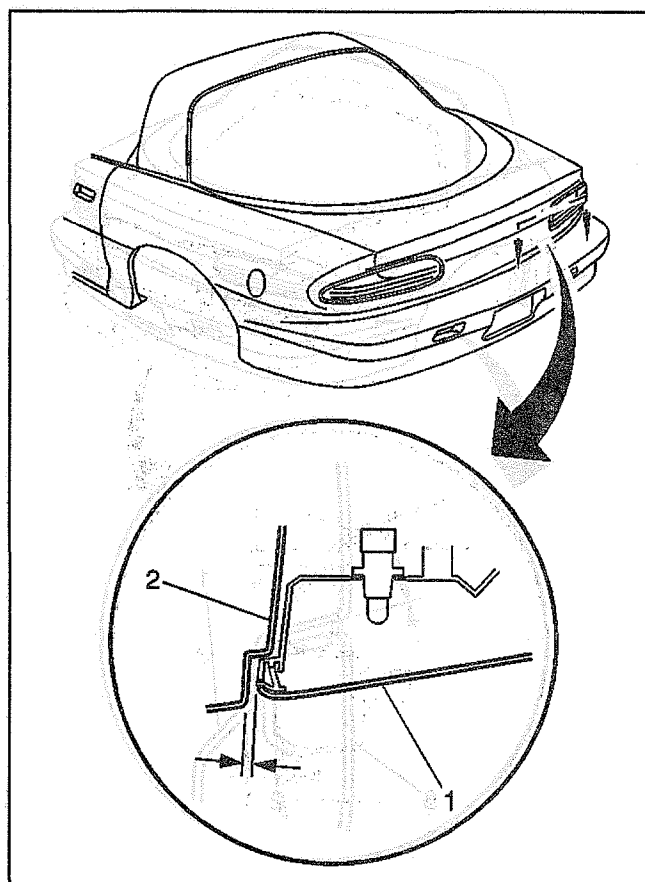


392257

10. Measure the gap between the taillight lens (1) to the rear end finish panel (2). (Chevrolet only)

Specification

Gap specification is 2.0 mm (+/- 2.0 mm),
0.79 in (+/- 0.79 in).

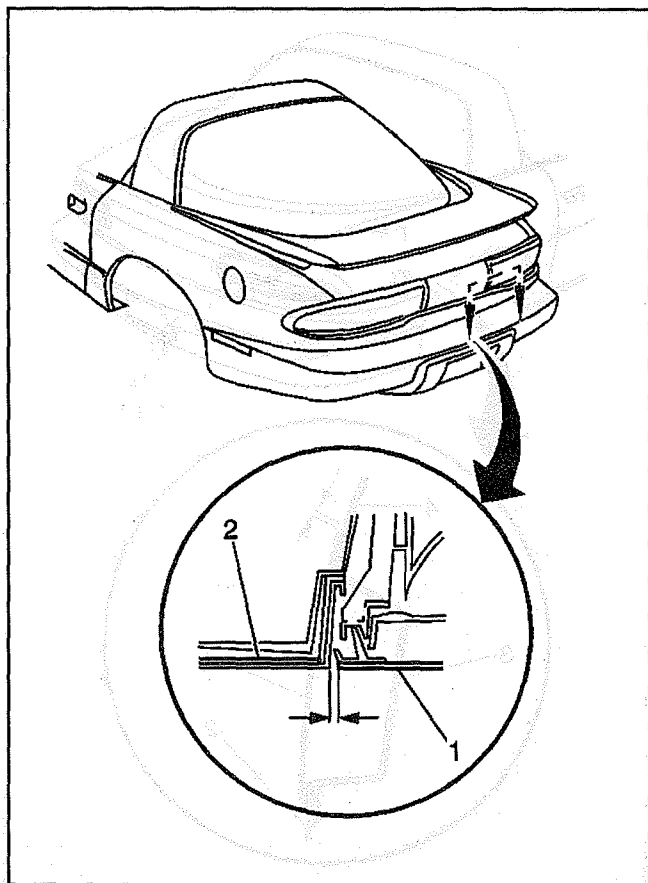


392260

11. Measure the gap between the taillight lens (1) and the rear end finish panel (2). (Pontiac only)

Specification

Gap specification is 4.0 mm (+/- 2.0 mm),
0.158 in (+/- 0.79 in).

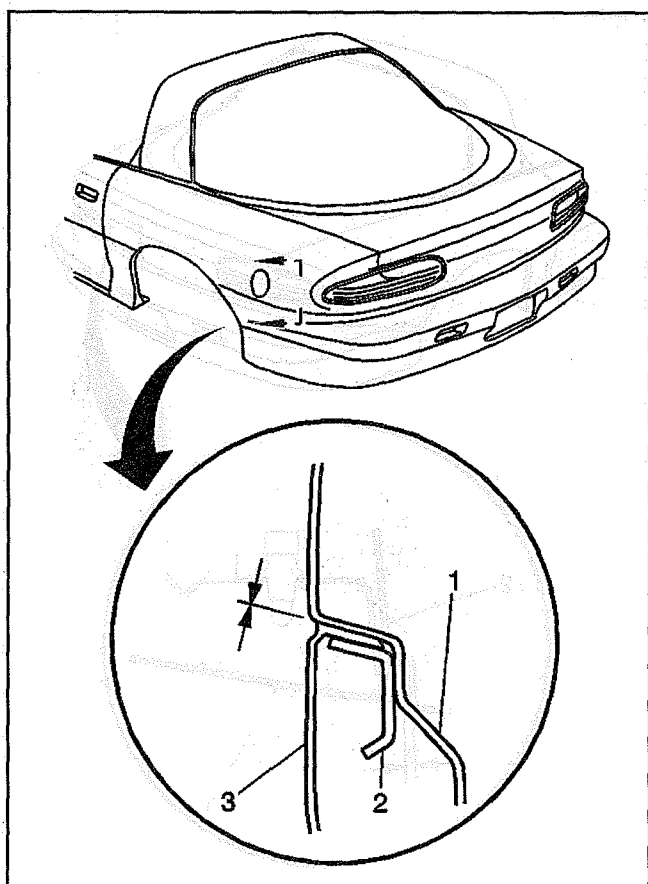


392267

12. Measure the gap between the rear quarter panel (1) and the rear fascia (3).

Specification

Gap specification is 0.00 mm (+ 0.50 / -0.00 mm).

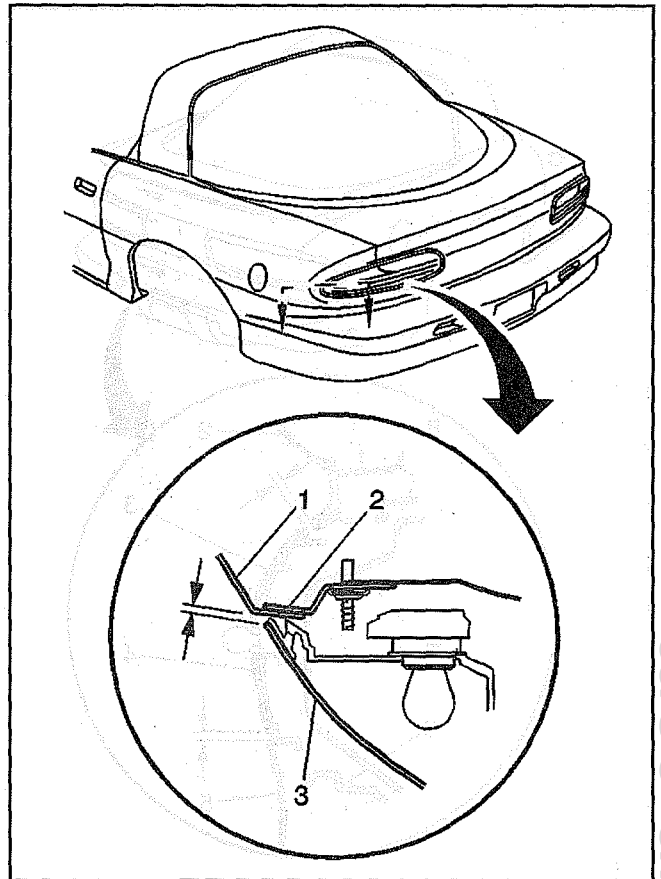


392268

13. Measure the gap between the rear quarter panel (1) and the taillight lens (3).

Specification

Gap specification is 2.0 mm (+/- 1.5 mm),
0.079 in (+/- 0.06 in).



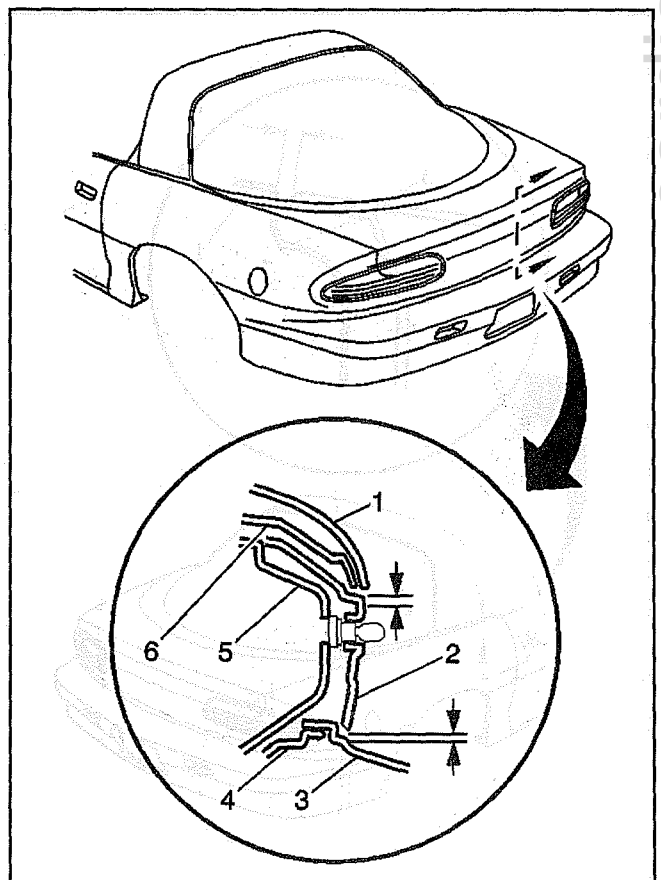
392271

14. Measure the gap between the rear compartment deck lid (1) and the rear end finish panel (2). (Chevrolet only)

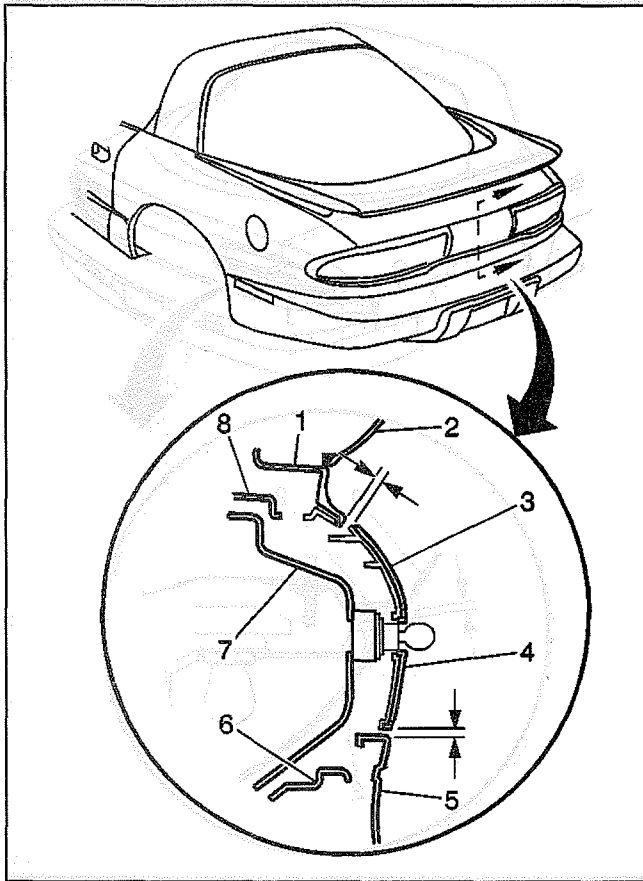
15. Measure the gap between the rear end finish panel (2) and the rear bumper fascia (3). (Chevrolet only)

Specification

- Gap specification between the deck lid (1) and the finish panel (2) is 8.5 mm (+/- 3.0 mm), 0.335 in (+/- 0.118 in).
- Gap specification between the finish panel (2) and the rear bumper fascia (3) is 6.0 mm (+/- 2.0 mm), 0.236 in (+/- 0.79 in).



392273

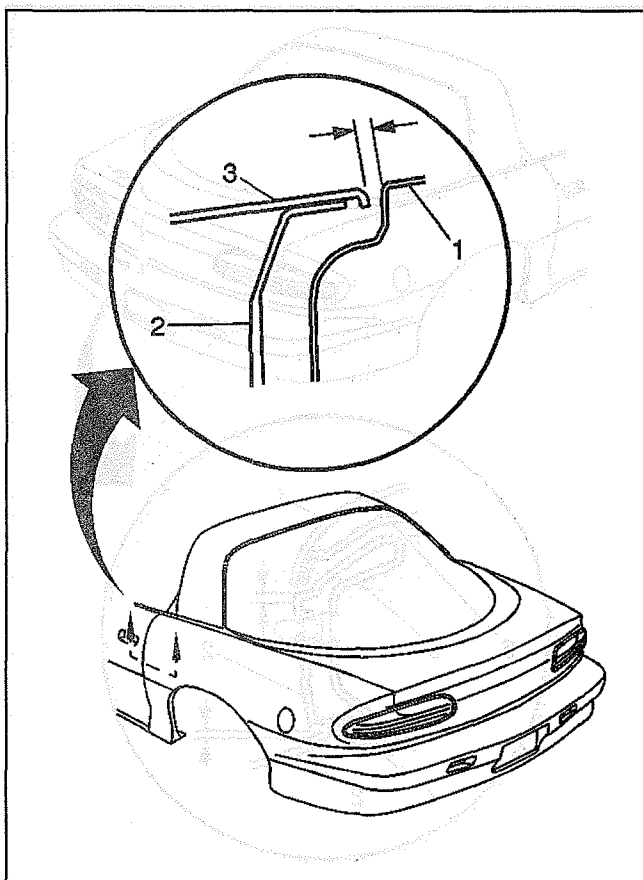


392277

16. Measure the gap between the deck lid spoiler (1) and the rear end filler (3). (Pontiac only)
17. Measure the gap between the rear end filler (3) and the rear bumper fascia (5). (Pontiac only)

Specification

- Gap specification between the deck lid spoiler (1) and the rear end filler (3) is 5.0 mm (+/- 3.0 mm), 0.197 in (+/- 0.118 in).
- Gap specification between the rear end filler (3) and the rear bumper fascia (5) is 4.0 mm (+/- 2.0 mm), 0.158 in (+/- 0.079 in).



392473

18. Measure the gap between the rear quarter panel (1) and the door (3).

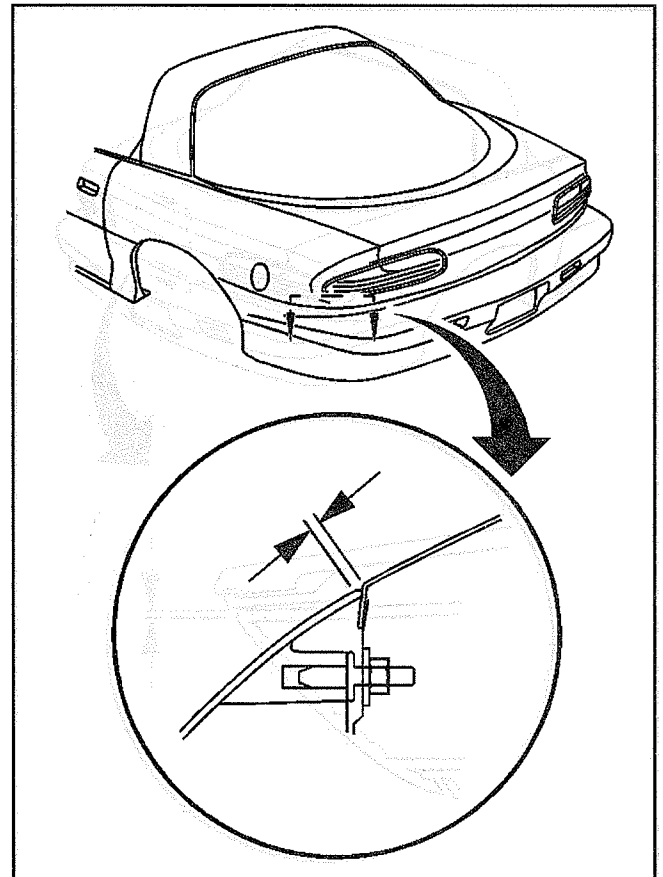
Specification

Gap specification is 5.0 mm (+/- 1.5 mm), 0.197 in (+/- 0.06 in).

19. Measure the gap between the rear end panel to the quarter panel. (Chevrolet only)

Specification

Gap specification is 2.0 mm (+/- 1.0 mm), 0.079 in (+/- 0.0394 in).



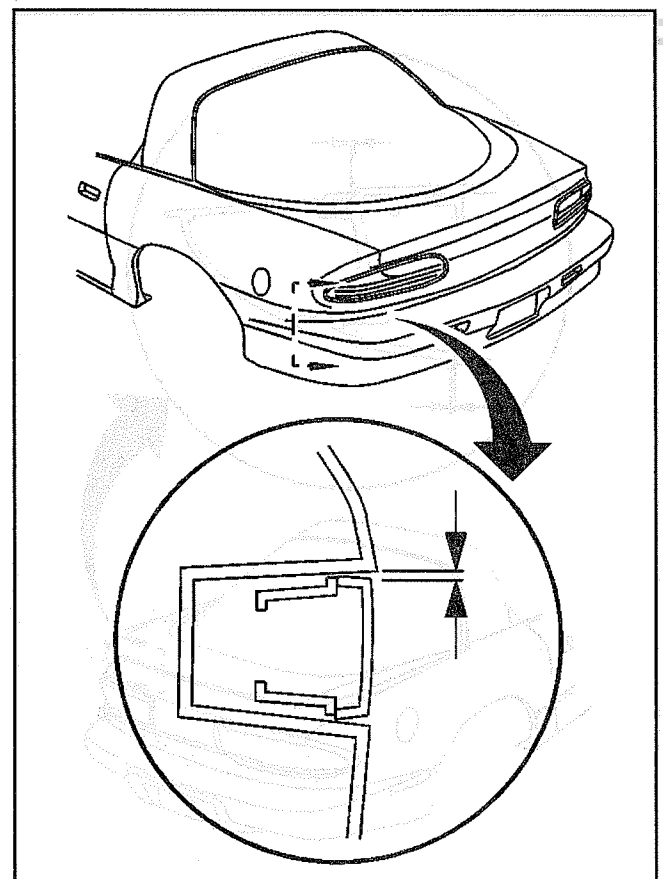
392474

392474

20. Measure the gap between the side marker lamp and the rear fascia.

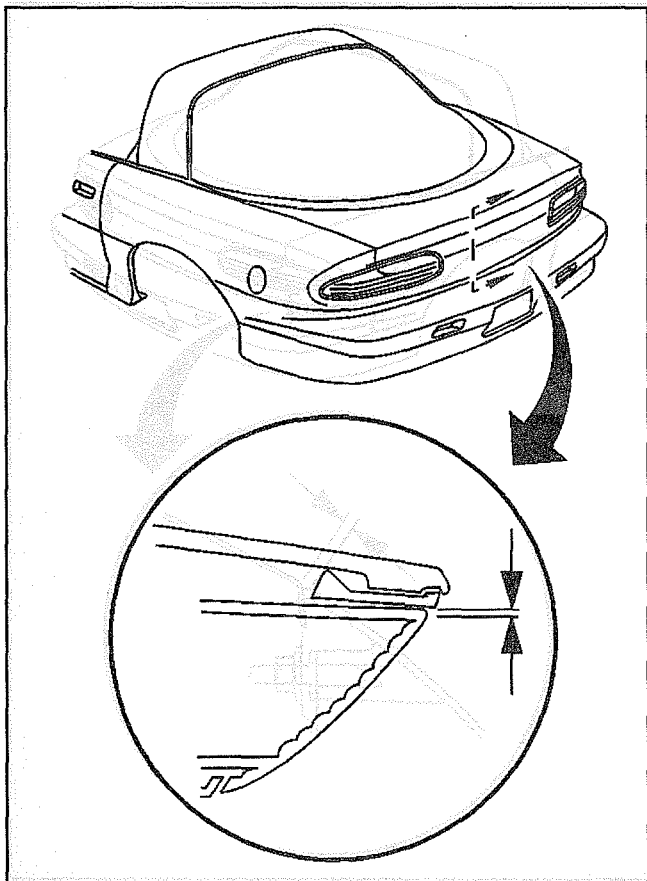
Specification

Gap specification is 1.0 mm (+/- 0.5 mm), 0.0394 in (+/- 0.0197 in).

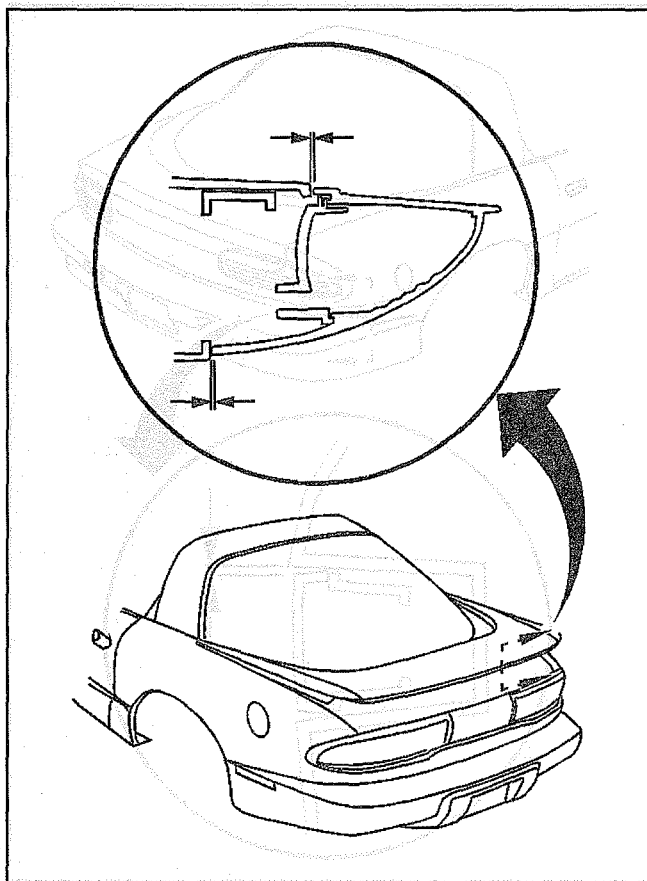


392477

392477



392478



392481

21. Measure the horizontal and vertical (not shown) gap between the center high mount stoplamp and the spoiler. (Chevrolet only)

Specification
horizontal and vertical gap specification is 1.0 mm (+/- 1.0 mm), 0.0394 in (+/- 0.0394 in).

22. Measure the top horizontal gap between the center high mount stoplamp and the spoiler. (Trans Am only)
23. Measure the vertical (not shown) gap between the center high mount stoplamp and the spoiler. (Trans Am only)
24. Measure the bottom horizontal gap between the center high mount stoplamp and the spoiler. (Trans Am only).

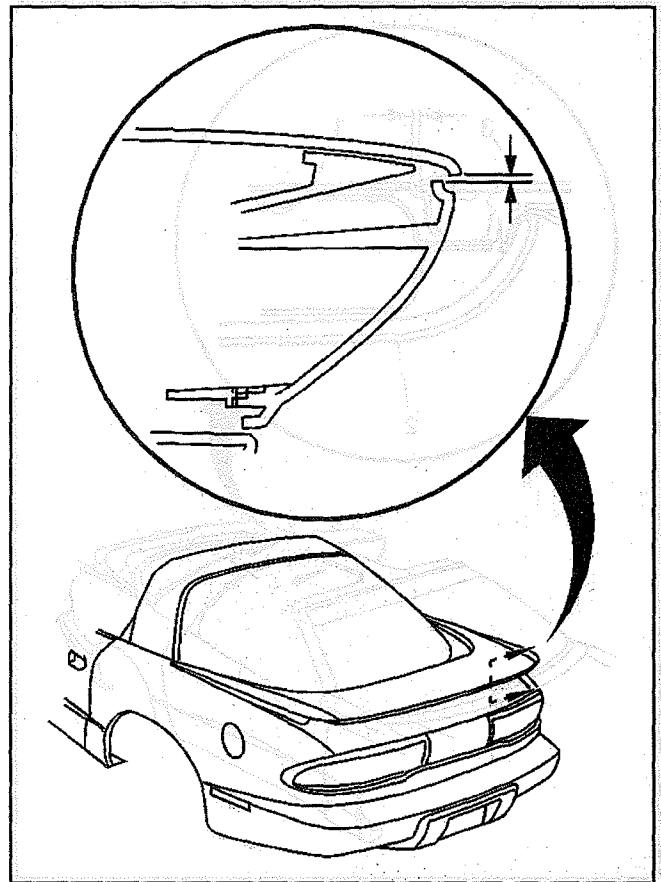
Specification

- Top horizontal gap specification is 0.5 mm (+/- 0.5 mm), 0.0197 in (+/- 0.0197 in).
- Vertical gap specification is 1.5 mm (+/- 1.0 mm), 0.059 in (+/- 0.0394 in).
- Bottom horizontal gap specification is 1.5 mm (+/- 1.0 mm), 0.059 in (+/- 0.0394 in).

25. Measure the horizontal gap between the center high mount stoplamp and the spoiler.
(Firebird only)
26. Measure the vertical (not shown) gap between the center high mount stoplamp and the spoiler.
(Firebird only)

Specification

- horizontal gap specification is
1.0 mm (+/- 1.0 mm), 0.0394 in (+/- 0.0394 in).
- Vertical gap specification is
1.5 mm (+/- 1.0 mm), 0.059 in (+/- 0.0394 in).



392485

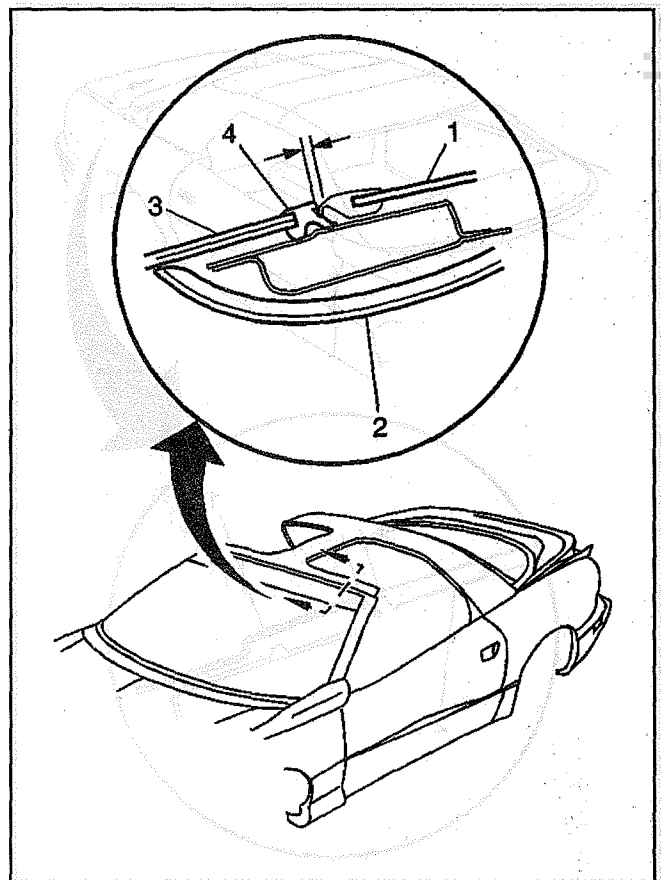
Measurements - Body (Roof and Upper Body)

Below are the roof and upper body fit requirements for Chevrolet and Pontiac, all specifications apply to both vehicles unless otherwise specified.

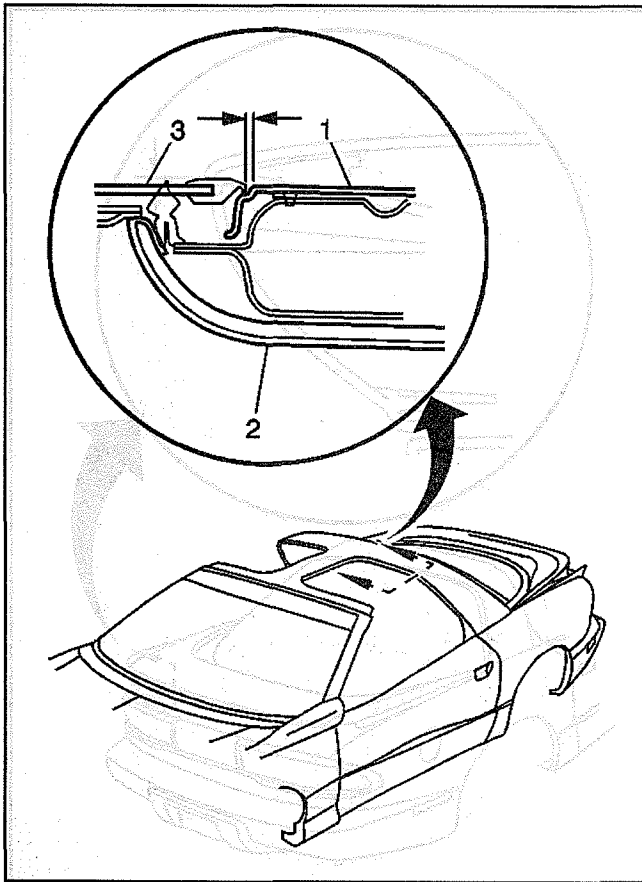
1. Measure the gap between the roof lift off window (1) and the windshield reveal molding (4).

Specification

Gap specification is 2.0 mm (+/- 1.0 mm),
0.079 in (+/- 0.0394 in).



392490

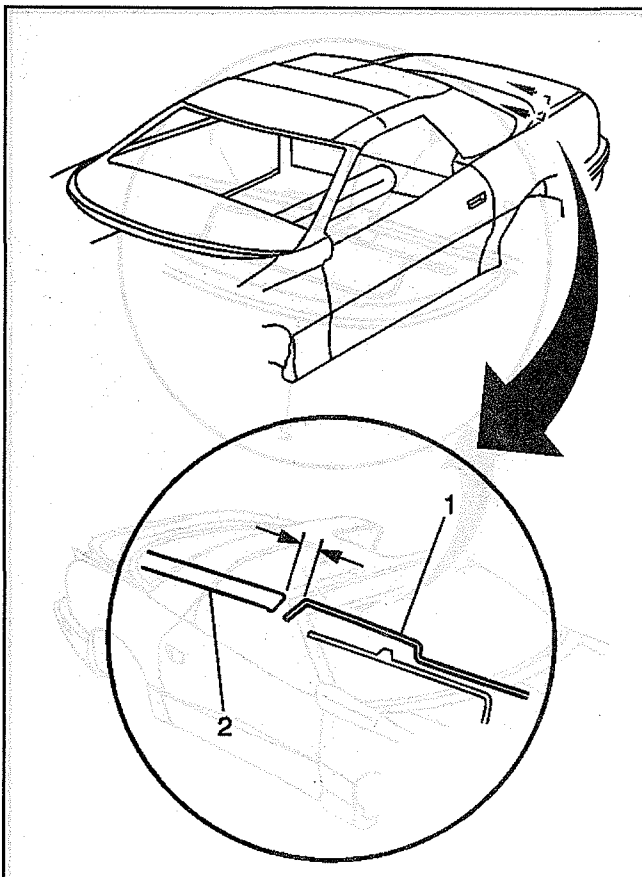


392495

2. Measure the gap between the roof (1) and the roof lift off window (3).

Specification

Gap specification is 2.0 mm (+/- 1.0 mm),
0.079 in (+/- 0.0394 in).



392497

3. Measure the gap between the deck lid (1) and the quarter belt reveal molding (2).

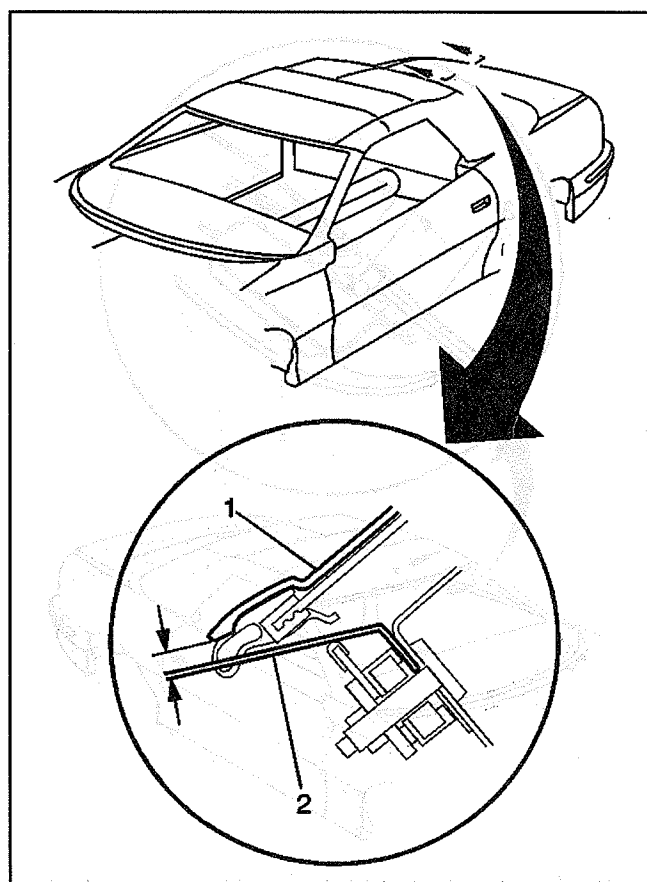
Specification

Gap specification is 5.0 mm (+/- 2.0 mm),
0.197 in (+/- 0.079 in).

4. Measure the gap between the deck lid back belt (1) and the folding top (2).

Specification

Gap specification is 15.0 mm (+/- 3.0 mm),
0.591 in (+/- 0.119 in).



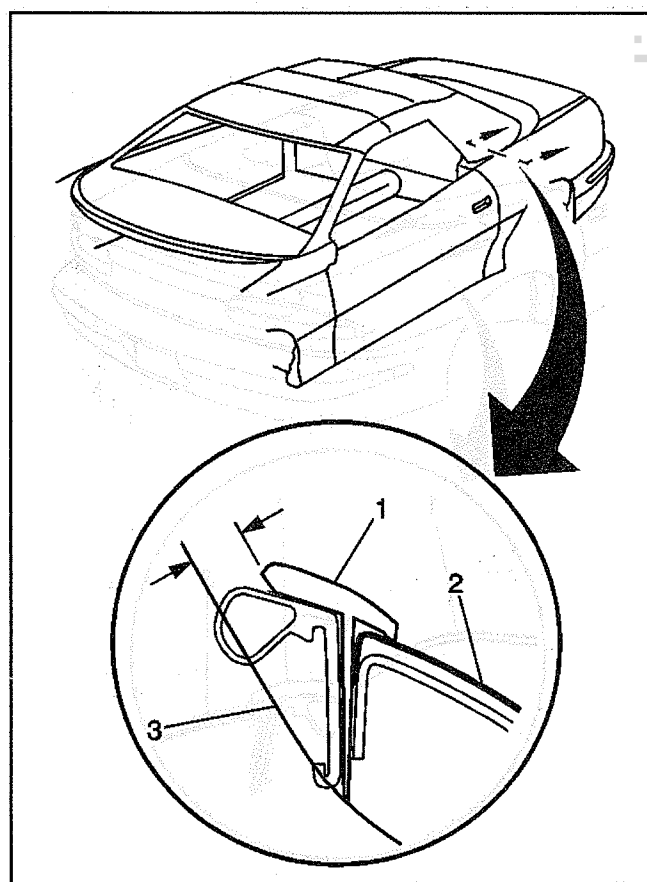
392498

392498

5. Measure the gap between the quarter belt molding (1) and the folding top (3).

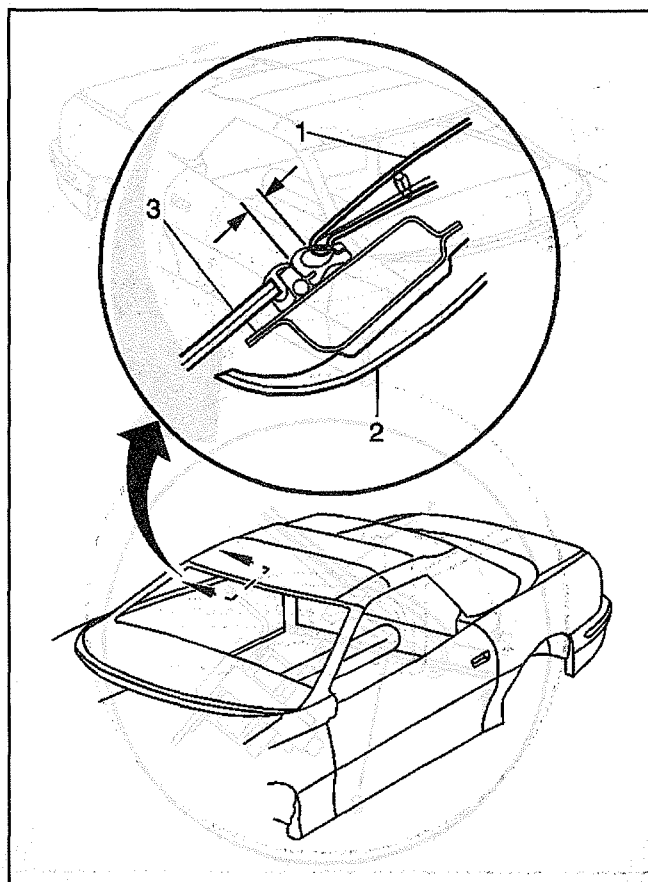
Specification

Gap specification is 15.0 mm (+/- 3.0 mm),
0.591 in (+/- 0.119 in).



392499

392499

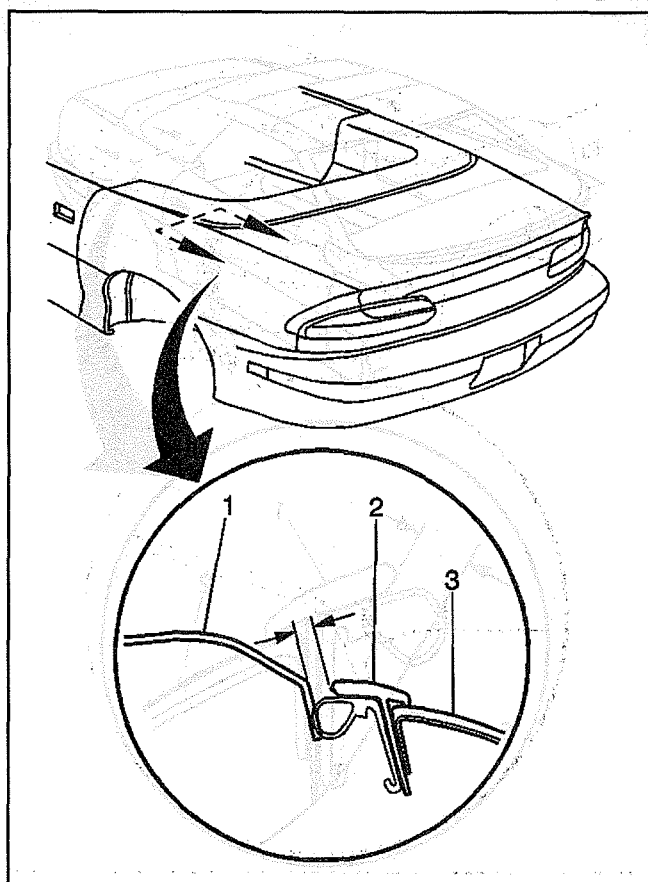


392502

6. Measure the gap between the folding top (1) and the windshield (3).

Specification

Gap specification is 8.0 mm (+/- 2.0 mm),
0.315 in (+/- 0.079 in).



392506

7. Measure the gap between the folding top storage compartment extension (1) and the quarter belt molding (2).

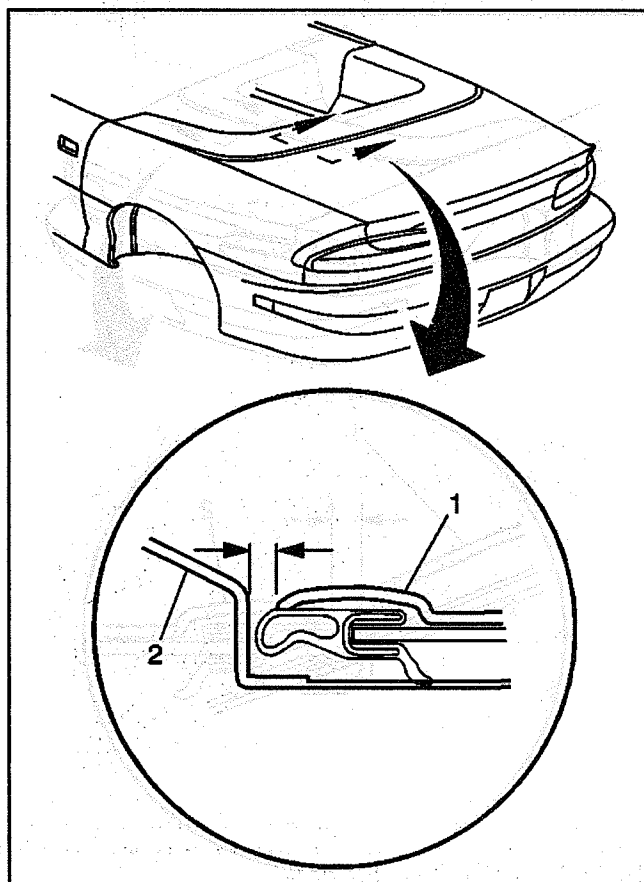
Specification

Gap specification is 6.0 mm (+/- 3.0 mm),
0.24 in (+/- 0.119 in).

8. Measure the gap between the deck lid (1) and the folding top stowage compartment extension (2).

Specification

Gap specification is 7.5 mm (+/- 3.0 mm), 0.295 in (+/- 0.119 in).



392509

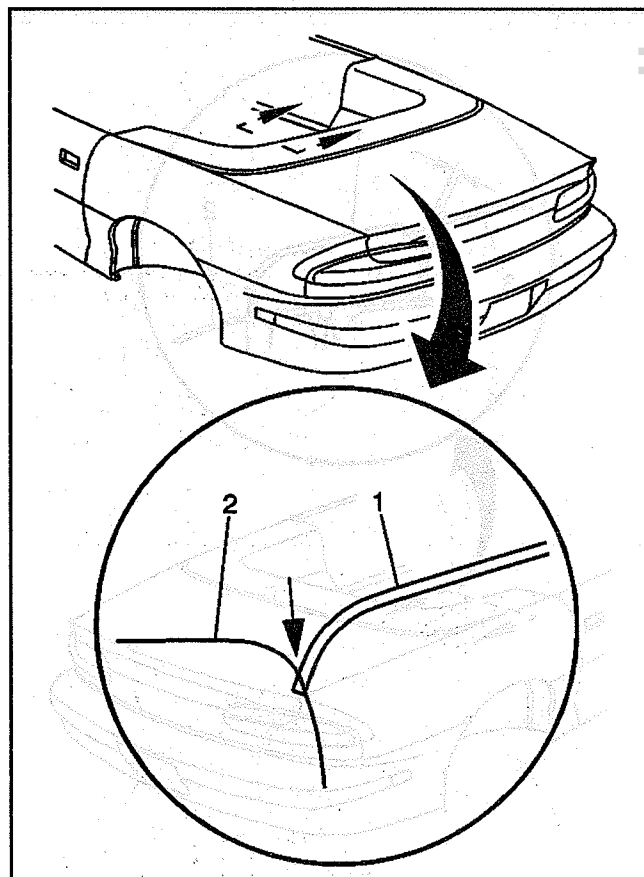
9. Measure the gap between the folding top stowage compartment cover (1) and the rear seat back (2).

Specification

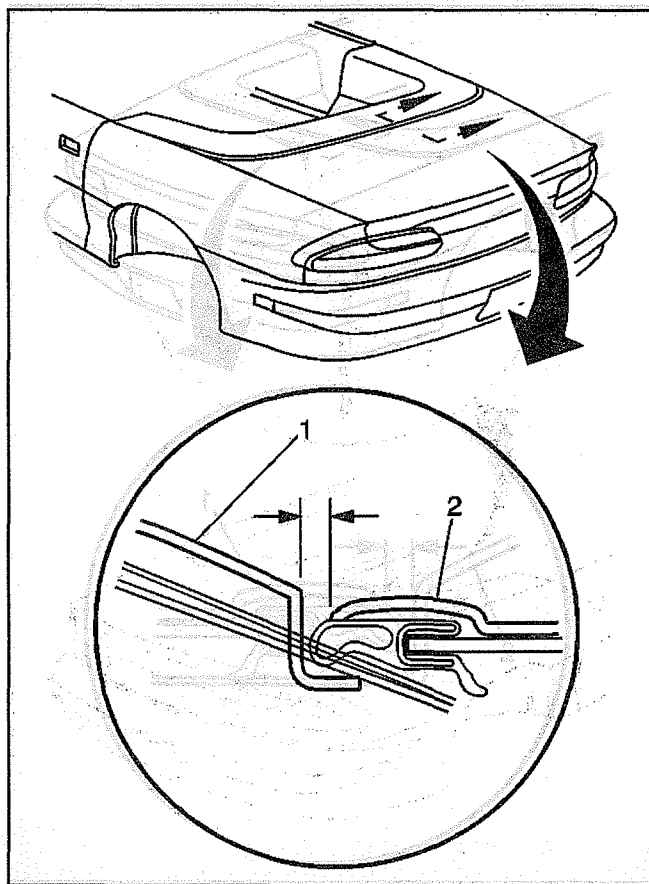
Gap specification is 0.0 mm (+3.0 in/ -0.0 in).

(mm 0.5 -+) mm 0.5 ei noitsiloeq qeS

(ni 0%0.0 -+) mm 0%5.0



392515

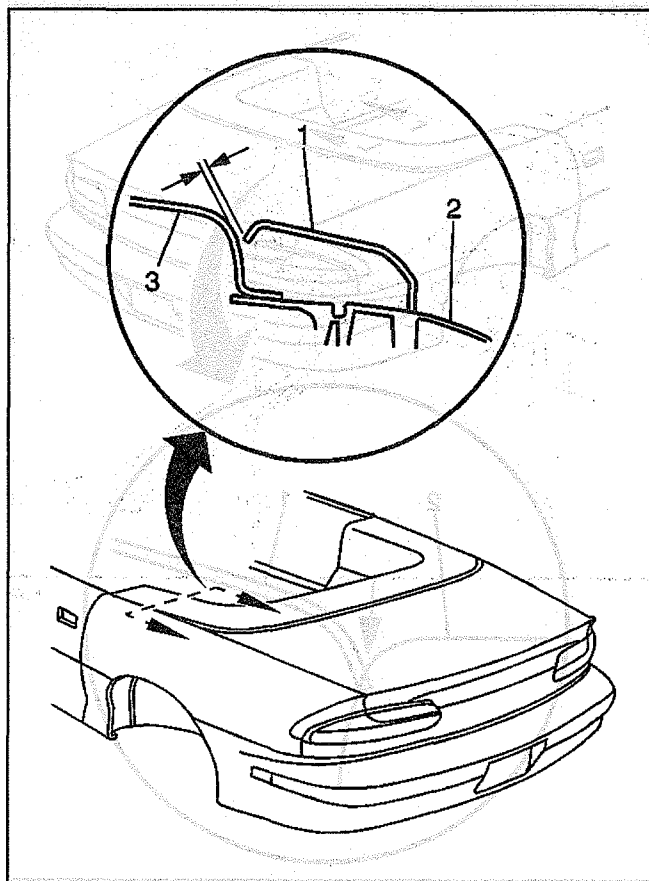


392519

10. Measure the gap between the folding top stowage compartment cover (1) and the deck lid (2).

Specification

- Gap specification is 5.0 mm (+/- 3.0 mm), 0.197 in (+/- 0.119 in).



317525

392525

11. Measure the gap between the quarter trim extension (1) and the folding top stowage compartment extension (3).

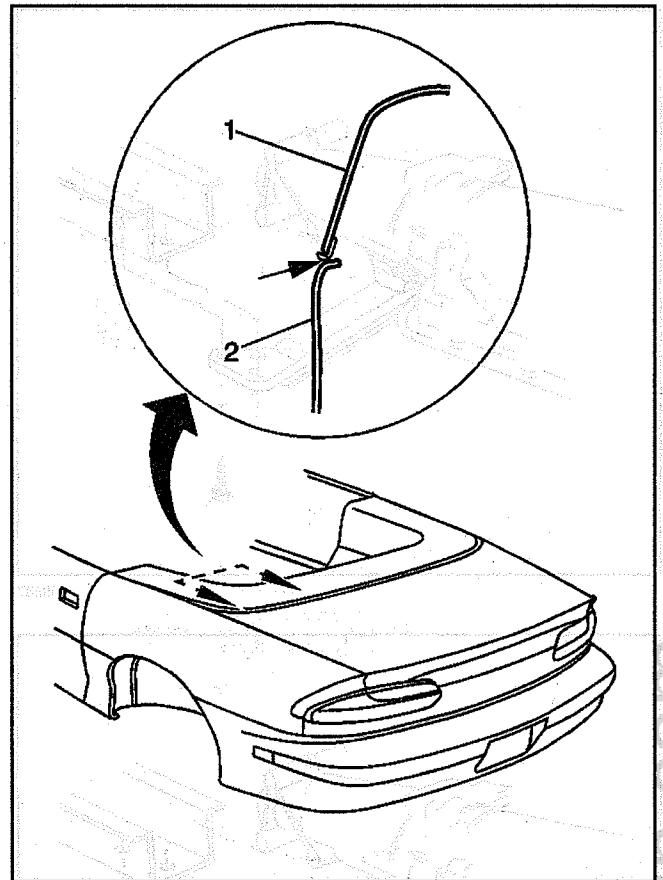
Specification

- Gap specification is 3.0 mm (+/- 2.0 mm), 0.119 mm (+/- 0.079 in).

12. Measure the gap between the folding top stowage compartment extension (1) and the quarter trim panel (2).

Specification

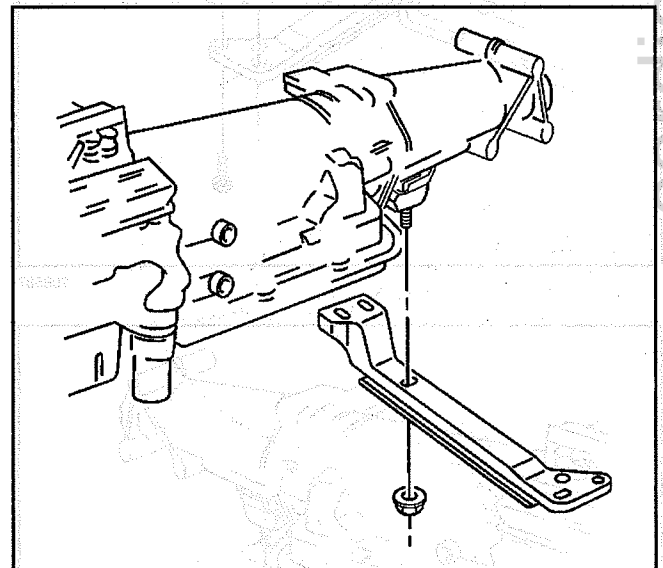
Gap specification is 0.0 mm (+3.0 in/ -0.0 in).



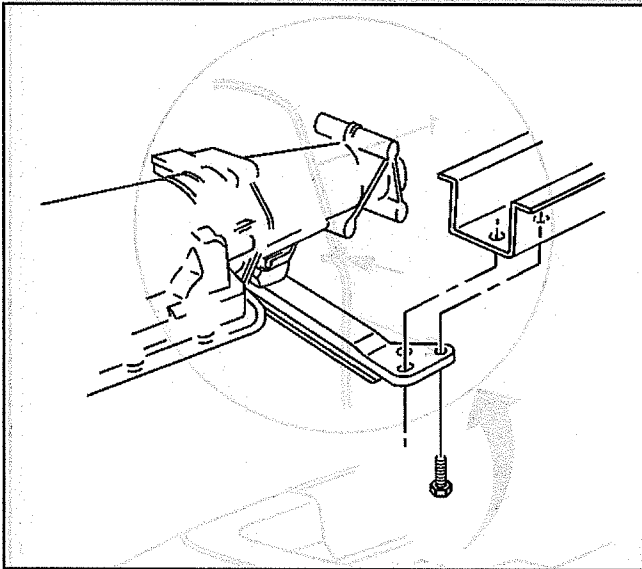
392529

Transmission Support Replacement**Removal Procedure**

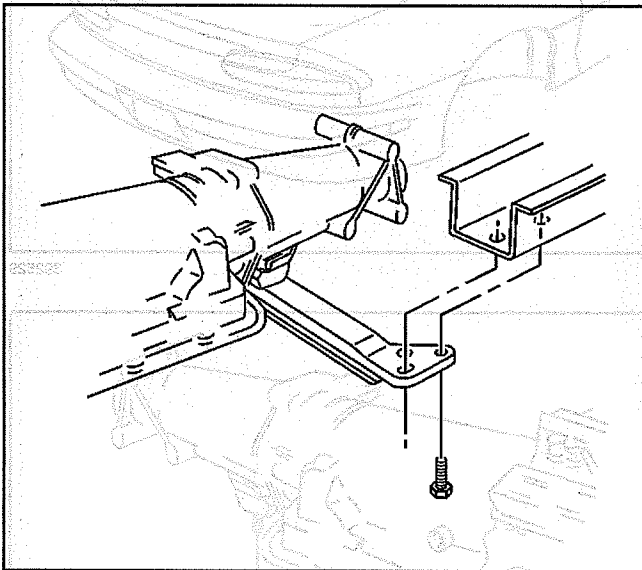
1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Support the transmission using a transmission jack.
3. Remove the transmission mount nut.



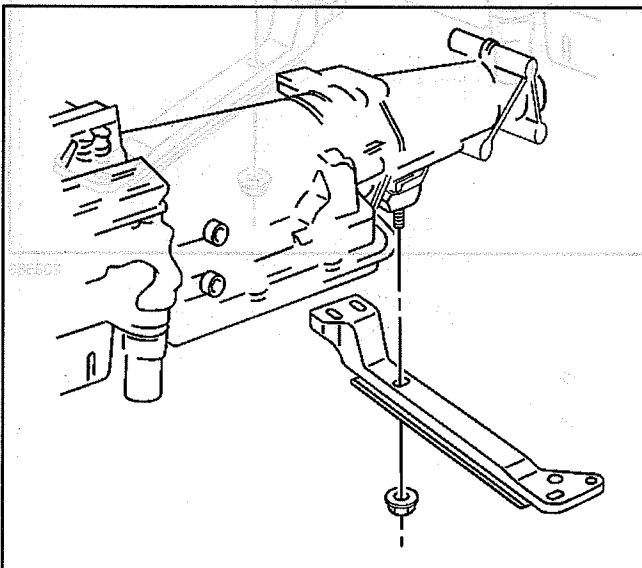
208583



208587



208587



208583

4. Remove the transmission support bolts.
5. Remove the transmission support.

Installation Procedure

1. Install the transmission support.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the transmission support bolts.

Tighten

Tighten the transmission support bolts to 90 N·m (66 lb ft).

3. Install the transmission mount nut.

Tighten

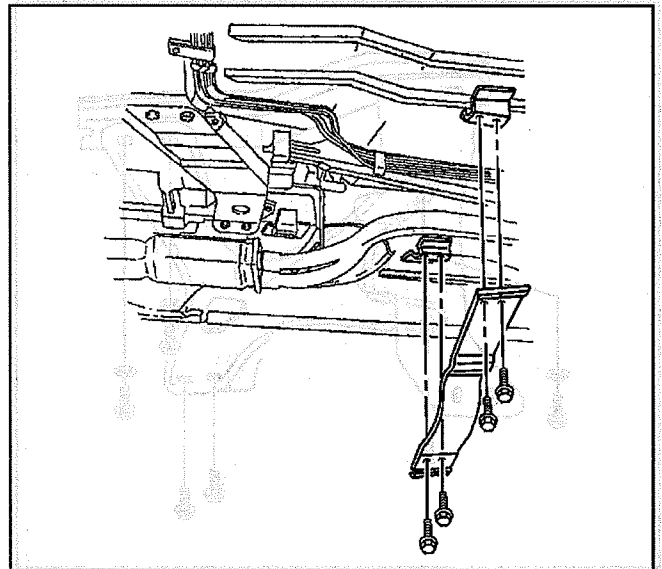
Tighten the transmission mount nut to 57 N·m (42 lb ft).

4. Remove the transmission support jack.
5. Lower the vehicle.

Floor Panel Reinforcement Replacement (V6 and V8 w/6 SPD)

Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the floor panel center reinforcement bolts.
3. Remove the floor panel center reinforcement.



368319

Installation Procedure

1. Install the floor panel center reinforcement.

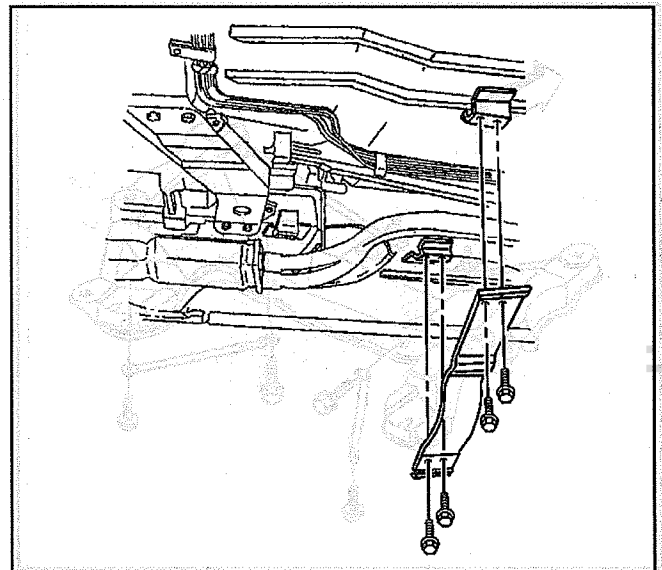
Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the floor panel center reinforcement bolts.

Tighten

Tighten the floor panel center reinforcement bolts to 27 N·m (20 lb ft).

3. Lower the vehicle.



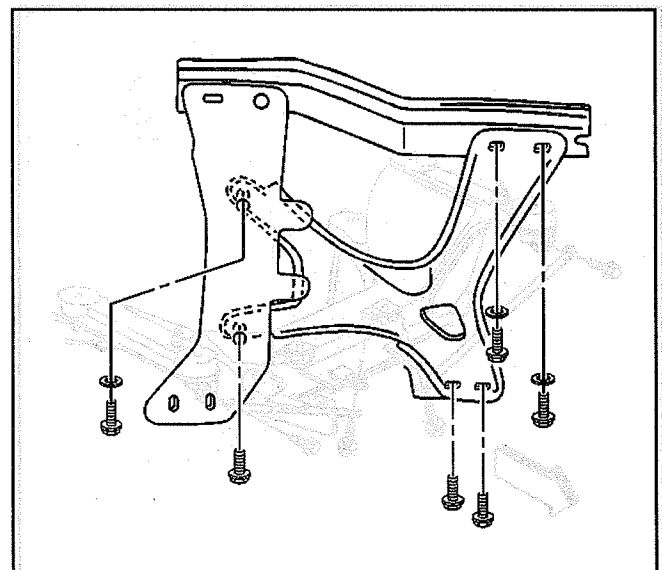
368320

368319

Floor Panel Reinforcement Replacement (V8)

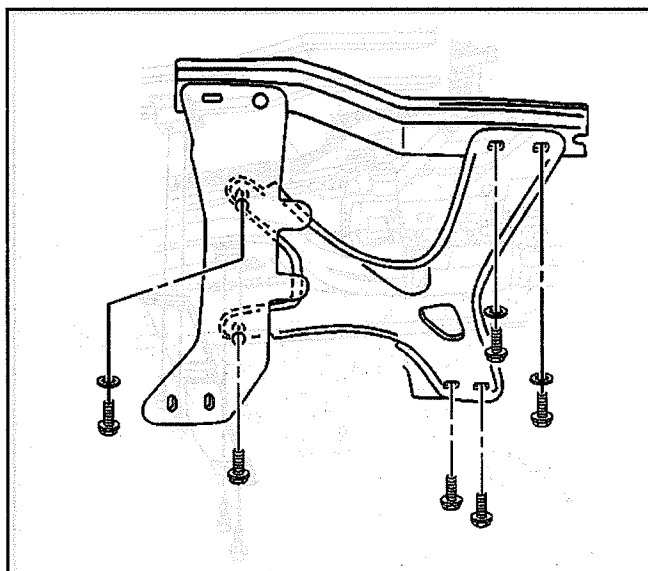
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the floor panel center reinforcement bolts and washers from the transmission support.
3. Remove the floor panel center reinforcement bolts and washers at the underbody.
4. Remove the floor panel center reinforcement.



368321

368321



368321

368321

Installation Procedure

1. Install the floor panel center reinforcement.
2. Install the floor panel center reinforcement bolts and washers at the underbody.

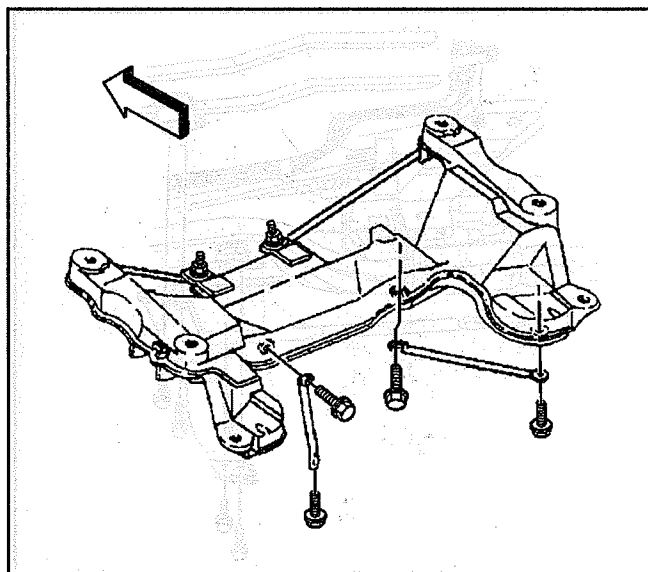
Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Install the floor panel center reinforcement bolts and washers to the transmission support.

Tighten

Tighten the floor panel center reinforcement bolts to 27 N·m (20 lb ft).

4. Lower the vehicle.



296199

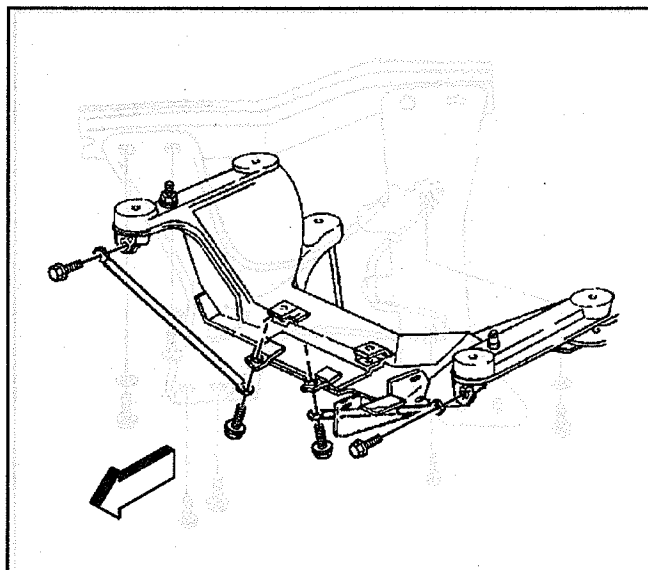
296199

Crossmember Brace Replacement - Front

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the bolts that attach the braces to the front crossmember.

Tighten the floor panel center reinforcement bolts to 27 N·m (20 lb ft).

3. Remove the braces from the front crossmember.



296199

296199

Installation Procedure

1. Connect the braces to the front crossmember.

Tools Required

- J 41044 Engine Support Adapters
- J 42451 Engine Support Adapter Kit
- J 28487-2 Universal Support Fixture
- J 33482-A Engine Support Adapter

1. Remove the lower control arms. Refer to Lower Control Arm Replacement in Front Suspension.
2. Using the J 41044, J 42451, J 28487-2, and J 33482-A support the engine.
3. Remove the steering gear. Refer to Power Steering Gear Replacement (V6) or Power Steering Gear Replacement (V8) in Power Steering.
4. Remove the engine mount. Refer to Engine Mount Replacement and Engine Mount Replacement (Left) and Engine Mount Replacement (Right) in Engine Replacement.
5. Remove the brake pipe clip bolt (1) from the passenger side of the crossmember (1).

Notice: Refer to **Fastener Notice** in Cautions and Notices.

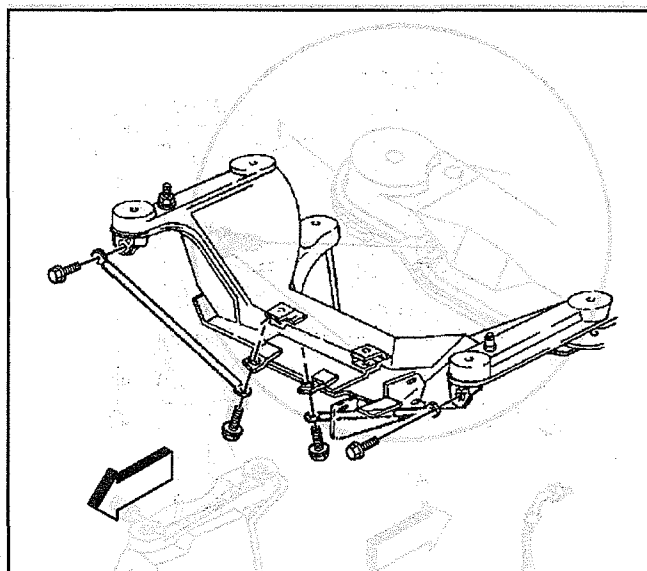
2. Install the bolts that attach the braces to the front crossmember.

Tighten

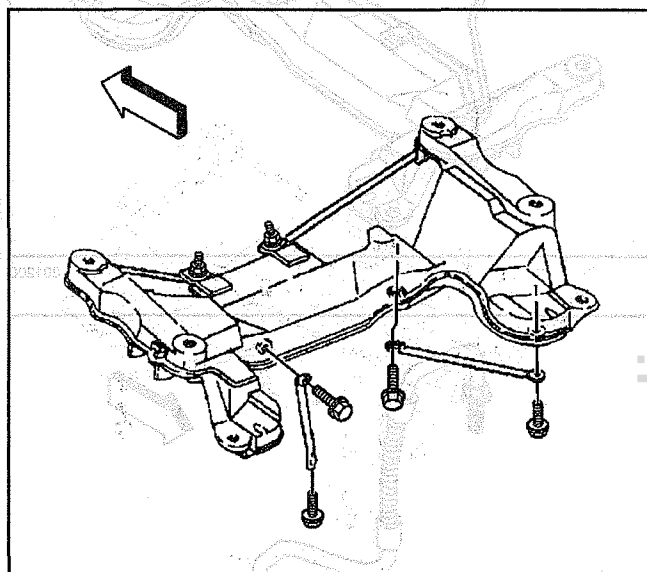
Tighten the crossmember brace bolts to 29 N·m (21 lb ft).

3. Lower the vehicle.

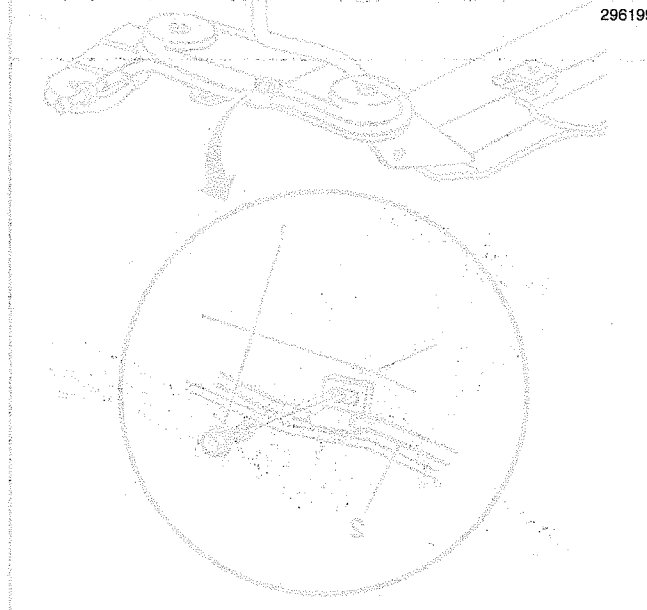
5. Remove the brake pipe clip bolt (1) from the driver side of the crossmember.



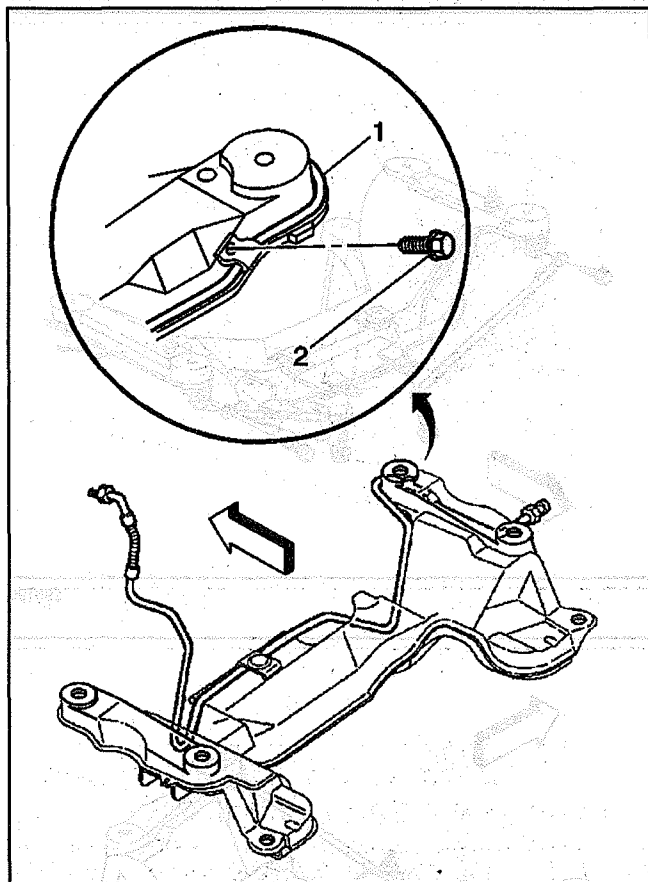
296196



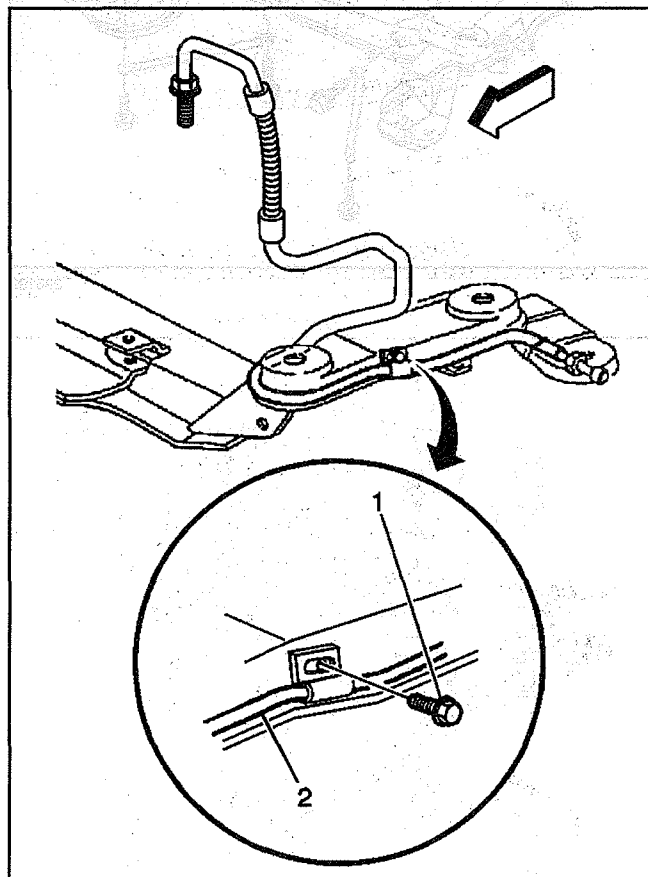
296199



F03700



391200



391201

Crossmember Replacement

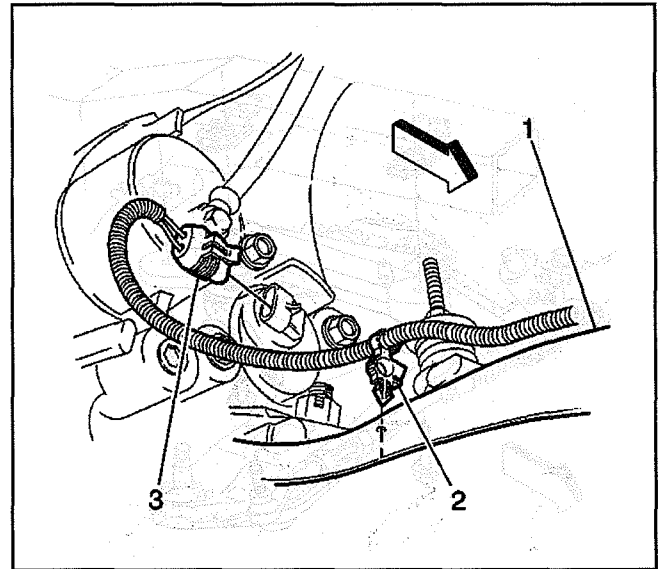
Removal Procedure

Tools Required

- J 41044 Engine Support Adapters
- J 42451 Engine Support Adapter Kit
- J 28467-B Universal Support Fixture
- J 36462-A Engine Support Adapter

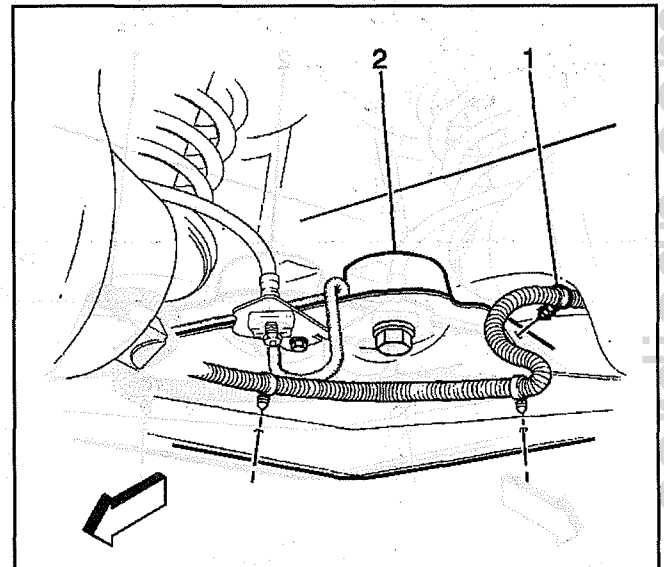
1. Remove the lower control arms. Refer to *Lower Control Arm Replacement* in Front Suspension.
2. Using the J 41044, J 42451, J 28467-B, and J 36462-A support/raise the engine.
3. Remove the steering gear. Refer to *Power Steering Gear Replacement (V6)* or *Power Steering Gear Replacement (V8)* in Power Steering.
4. Remove the engine mounts. Refer to *Engine Mount Replacement* and *Engine Mount Replacement (Left)* and *Engine Mount Replacement (Right)* in Engine Mechanical.
5. Remove the brake pipe clip bolt (2) from the passenger side of the crossmember (1).
6. Remove the brake pipe clip bolt (1) from the driver side of the crossmember.

7. Disconnect the wheel speed sensor electrical connector (3).
8. Remove the harness clip (2) from the crossmember (1).



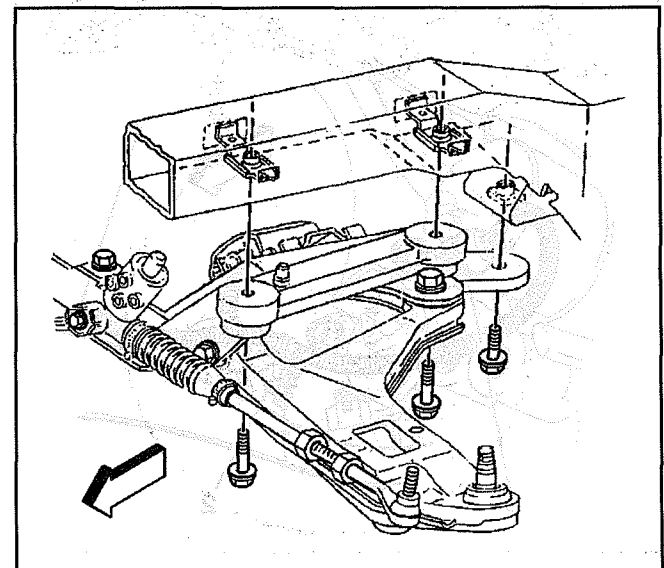
391199

9. Remove the harness clips (1) from the crossmember (2).



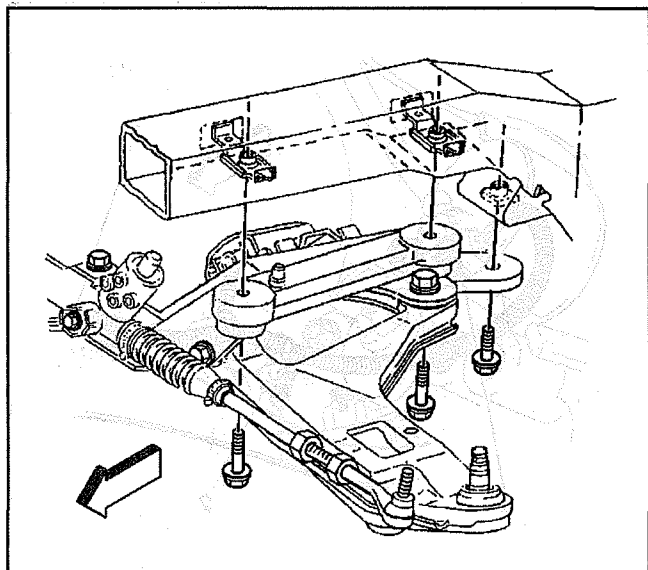
391198

10. Remove the crossmember bolts.
11. Slide the brake pipes from the crossmember.
12. Remove the crossmember from the vehicle.

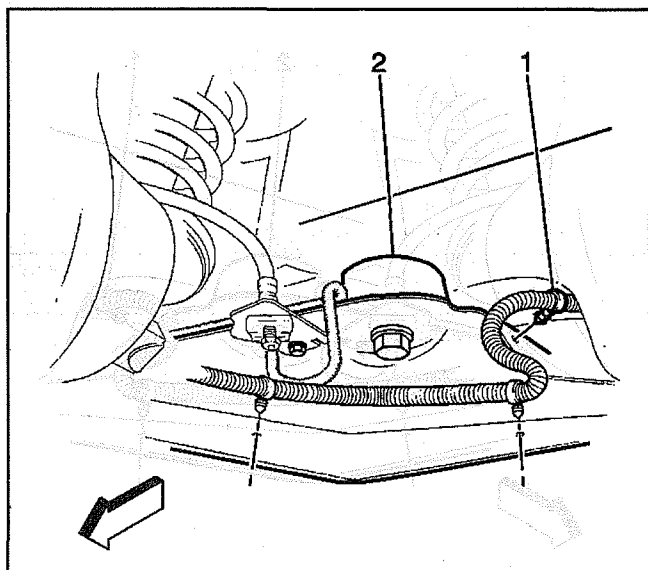


296194

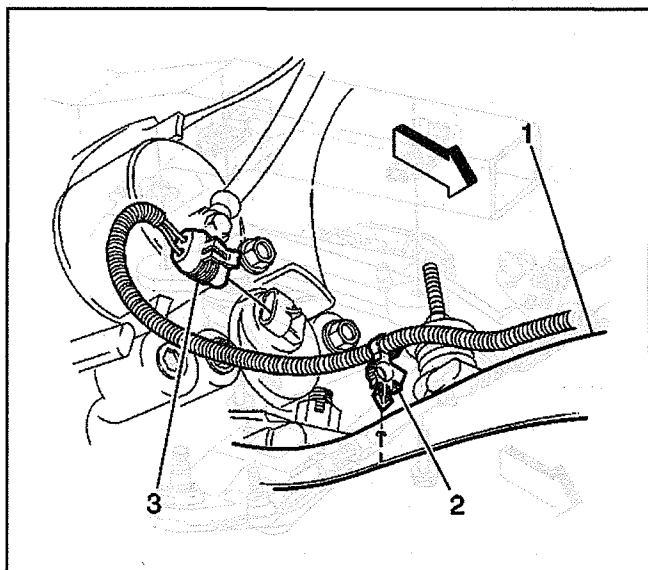
296194



296194



391198



391199

Installation Procedure

1. Install the crossmember to the vehicle.
2. Slide the brake pipes onto the crossmember.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Install the crossmember bolts.

Tighten

- Tighten the lower crossmember bolts to 125 N·m (92 lb ft).
- Tighten the upper crossmember bolts to 145 N·m (107 lb ft).

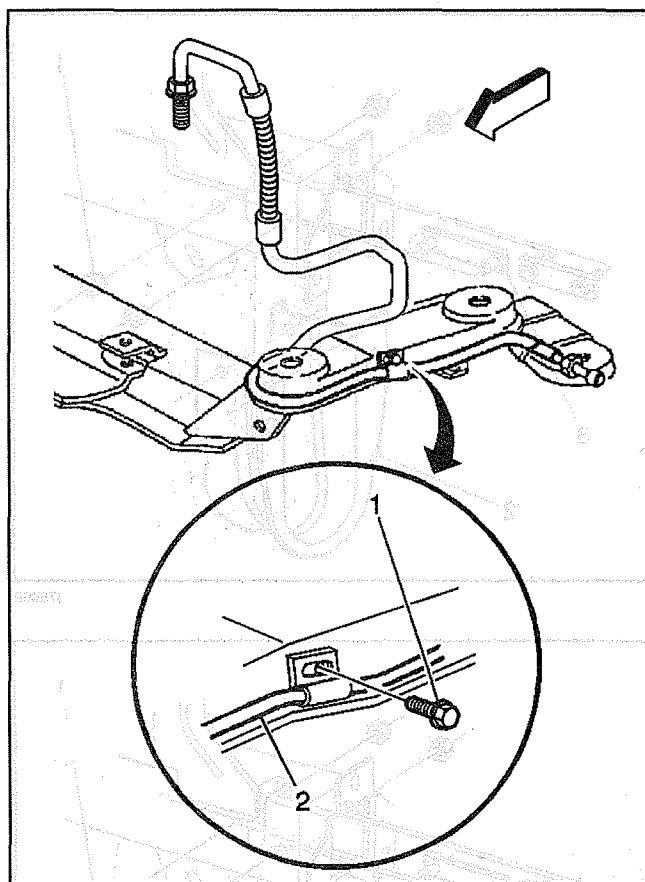
4. Install the harness clips (1) to the crossmember (2).

5. Connect the wheel speed sensor electrical connector (3).
6. Install the harness clip (2) from the crossmember (1).

7. Install the brake pipe clip bolt (1) from the driver side of the crossmember.

Tighten

Tighten the brake pipe clip bolt (1) to 13 N·m (115 lb in).



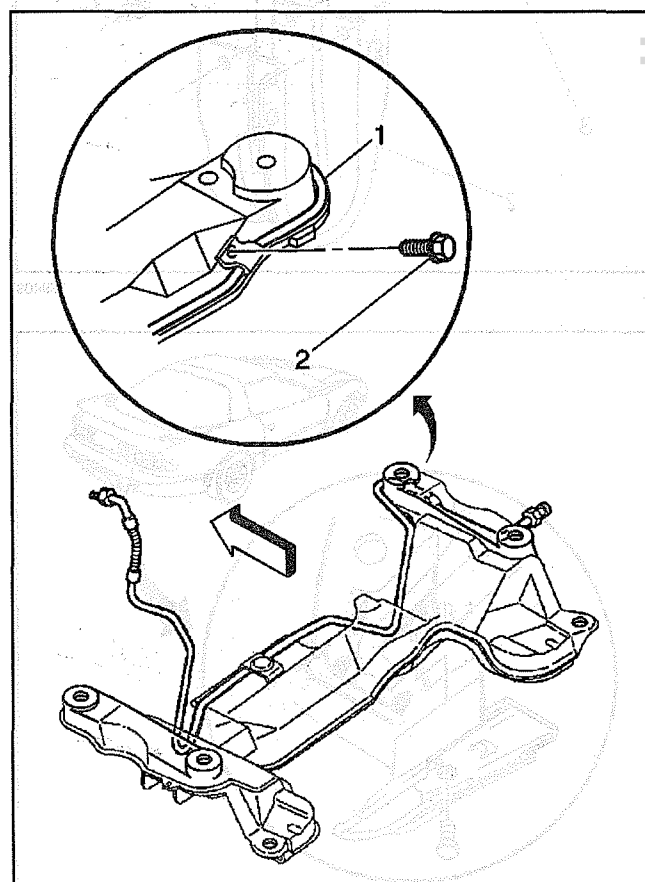
391201

8. Remove the brake pipe clip bolt (2) from the passenger side of the crossmember (1).

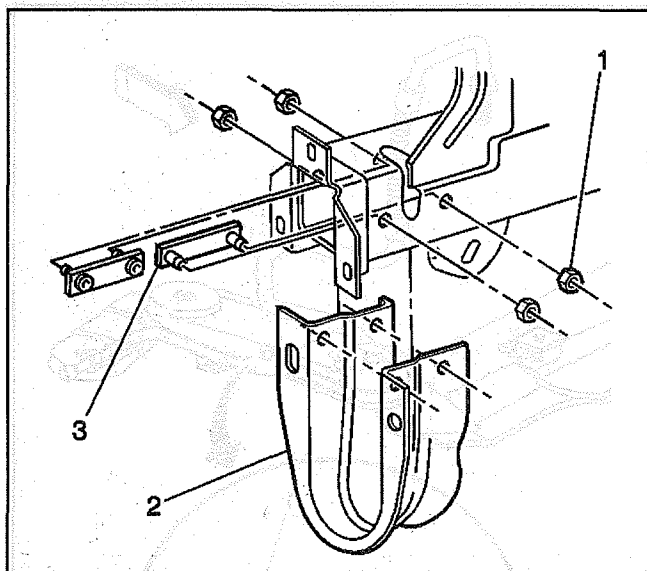
Tighten

Tighten the brake pipe clip bolt (2) to 13 N·m (115 lb in).

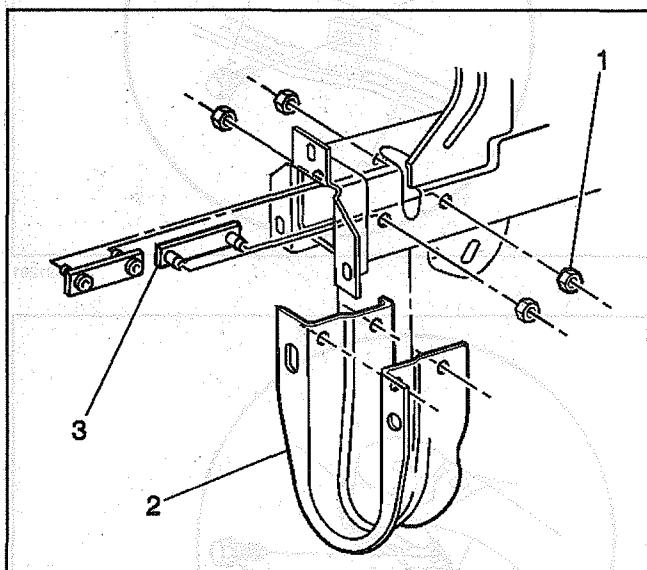
9. Install the steering gear. Refer to *Power Steering Gear Replacement (V6)* and *Power Steering Gear Replacement (V8)* in Power Steering.
10. Install the engine mounts. Refer to *Engine Mount Replacement* and *Engine Mount Replacement (Left)* and *Engine Mount Replacement (Right)* in Engine Mechanical.
11. Remove the J 41044, J 42451, J 28467-B, and J 36462-A.
12. Install the lower control arms. Refer to *Lower Control Arm Replacement* in Front Suspension.



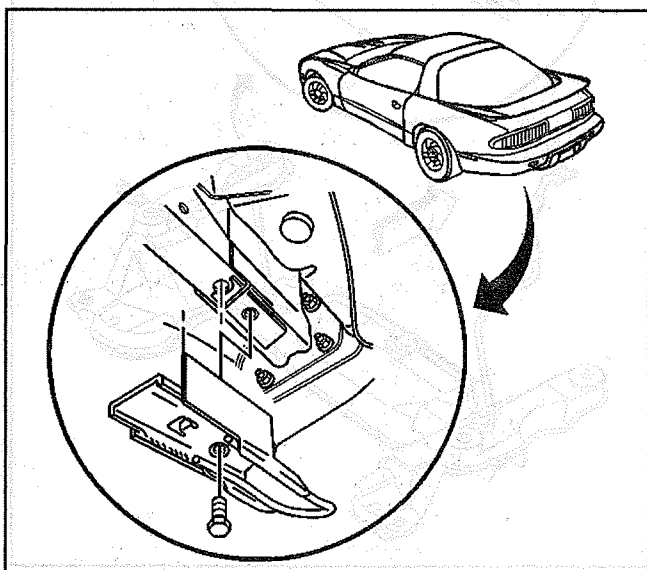
391200



379409



379409



379411

Tow Hook Replacement (Front (Export))

Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the front bumper fascia air deflector. Refer to *Air Deflector Replacement - Front Bumper Fascia* in Bumpers.
3. Remove the horn. Refer to *Horn Replacement* in Horns.
4. Remove the tow hook reinforcement nuts (1).
5. Remove the tow hook mounting plates (3).
6. Remove the tow hook (2) from rail.

Installation Procedure

1. Install the tow hook (2) to the rail.
2. Install the tow hook mounting plates (3).

Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Install the tow hook reinforcement nuts (1).

Tighten

Tighten the tow hook reinforcement nuts (1) to 70 N·m (52 lb ft).

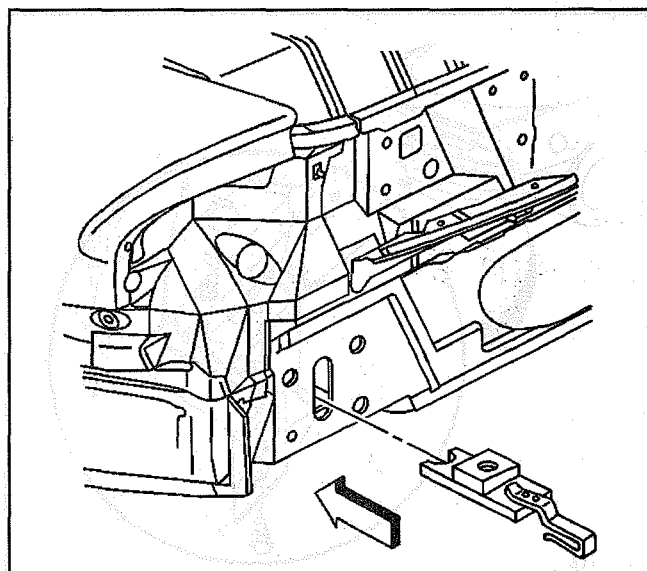
4. Install the horn. Refer to *Horn Replacement* in Horns.
5. Install the front bumper fascia air deflector. Refer to *Air Deflector Replacement - Front Bumper Fascia* in Bumpers.
6. Lower the vehicle.

Tow Hook Replacement (Rear Pontiac (Export))

Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the rear tow hook bolt.
3. Remove the rear tow hook from the vehicle.

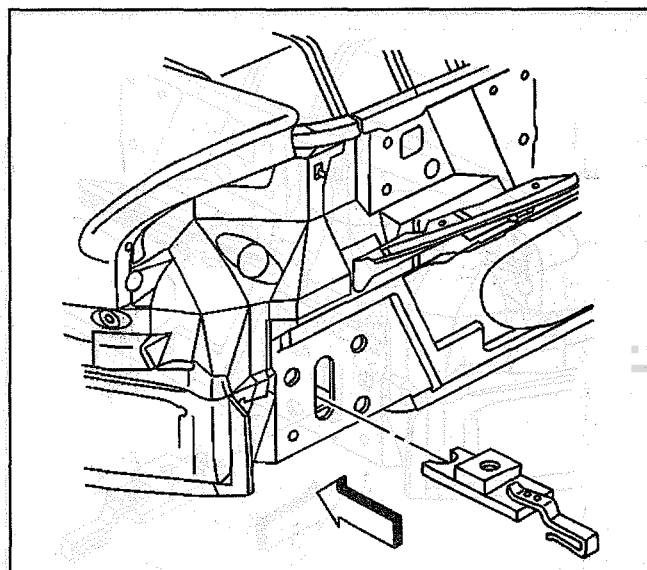
4. Remove the rear tow hook spacer, if necessary perform the following:
 - 4.1. Remove the rear bumper impact bar. Refer to *Impact Bar Replacement - Rear Bumper in Bumpers*.
 - 4.2. Unclip the spacer from the lower flange of the longitudinal rail.
 - 4.3. Rotate the spacer 90 degrees.
 - 4.4. Remove the spacer through the access slot in the rear end panel.



379410

Installation Procedure

1. Install the rear tow hook spacer, if necessary perform the following:
 - 1.1. Install the spacer through the access slot in the rear end panel.
 - 1.2. Rotate the spacer 90 degrees.
 - 1.3. Clip the spacer to the lower flange of the longitudinal rail.
 - 1.4. Install the rear bumper impact bar. Refer to *Impact Bar Replacement - Rear Bumper in Bumpers*.



379410

2. Install the rear tow hook to the vehicle.

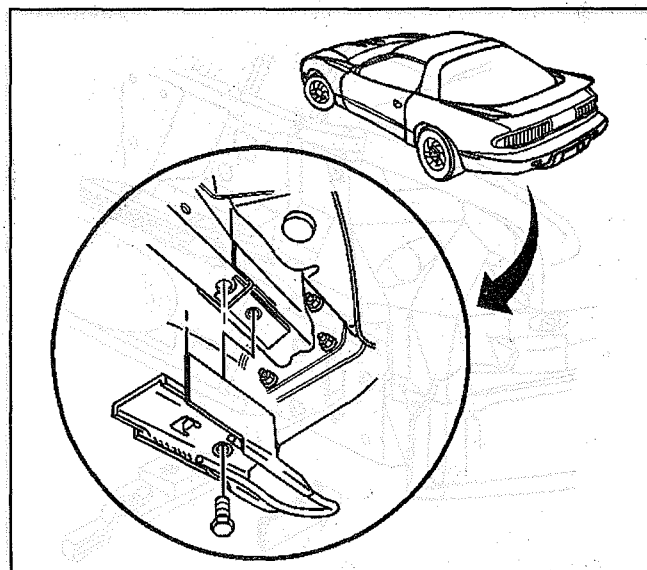
Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Install the rear tow hook bolt.

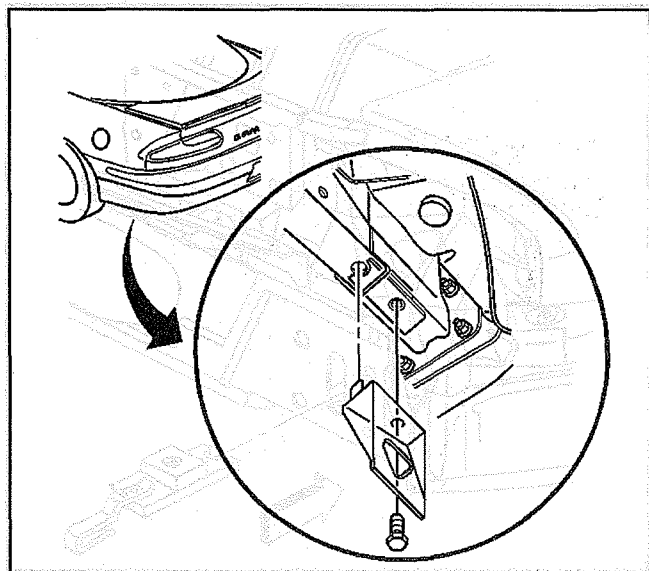
Tighten

Tighten the rear tow hook bolt to 205 N·m (151 lb ft).

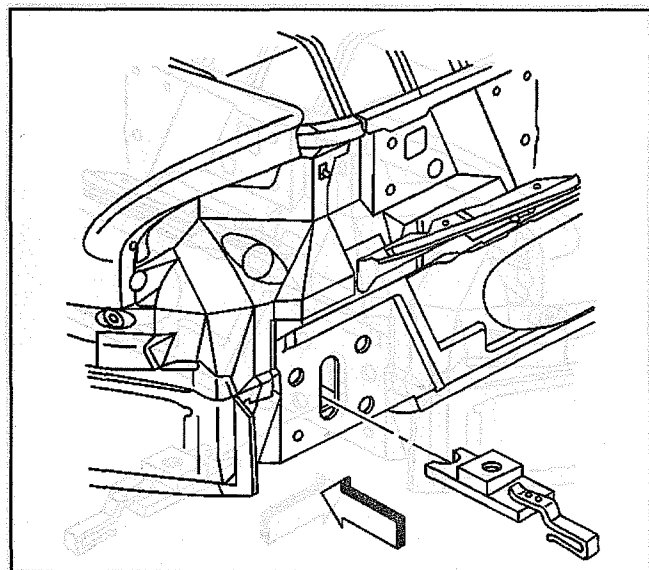
4. Lower the vehicle.



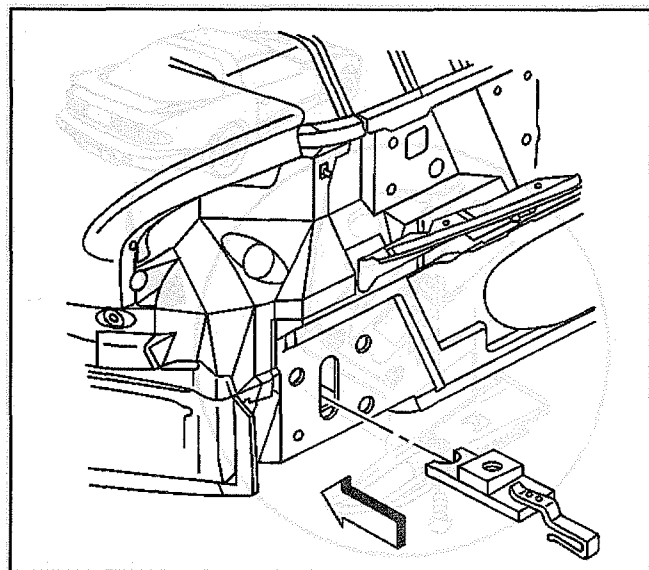
379411



379413



379410



379410

Tow Hook Replacement (Rear Chevrolet (Export))

Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the rear tow hook bolt.
3. Remove the rear tow hook from the vehicle.

4. Remove the rear tow hook spacer, if necessary perform the following:
 - 4.1. Remove the rear bumper impact bar. Refer to *Impact Bar Replacement - Rear Bumper in Bumpers*.
 - 4.2. Unclip the spacer from the lower flange of the longitudinal rail.
 - 4.3. Rotate the spacer 90 degrees.
 - 4.4. Remove the spacer through the access slot in the rear end panel.

Installation Procedure

1. Install the rear tow hook spacer, if necessary perform the following:
 - 1.1. Install the spacer through the access slot in the rear end panel.
 - 1.2. Rotate the spacer 90 degrees.
 - 1.3. Clip the spacer to the lower flange of the longitudinal rail.
 - 1.4. Install the rear bumper impact bar. Refer to *Impact Bar Replacement - Rear Bumper in Bumpers*.

2. Install the rear tow hook from the vehicle.

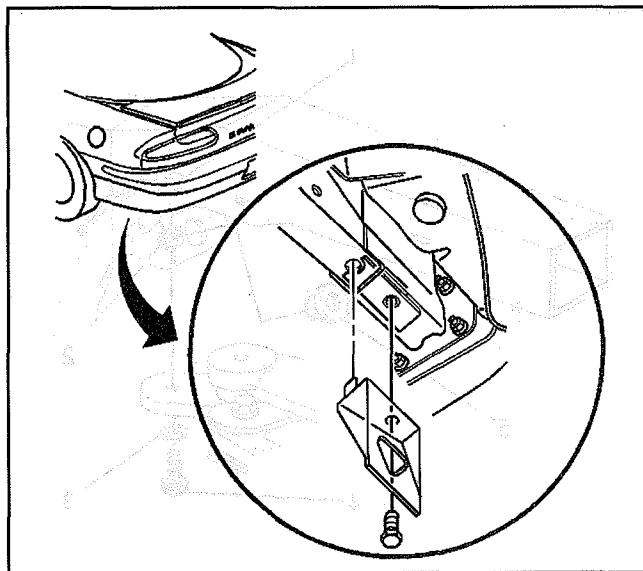
Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Install the rear tow hook bolt.

Tighten

Tighten the rear tow hook bolt to 205 N·m (151 lb ft).

4. Lower the vehicle.



379413

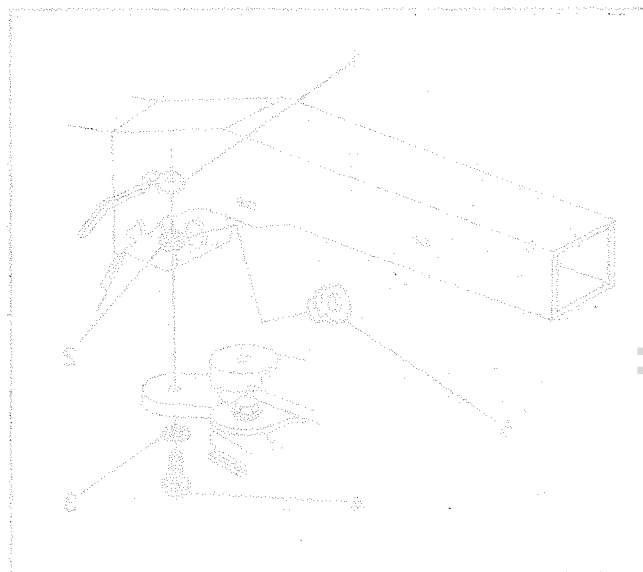
379413

Underbody Inspection

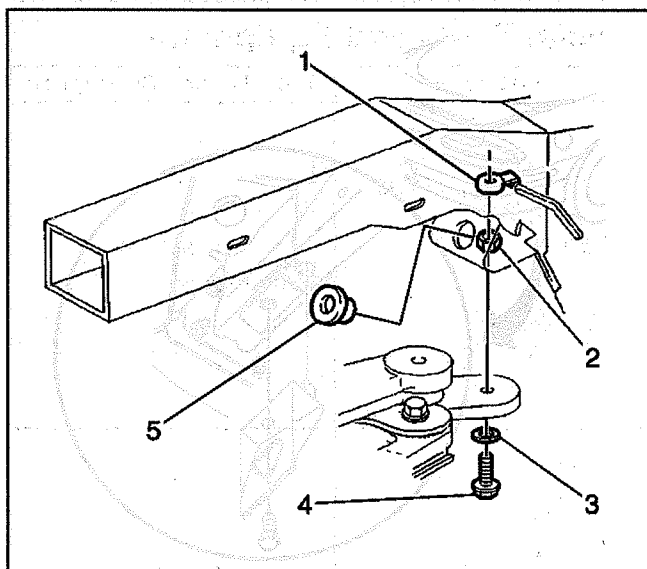
1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Check for obvious deterioration on the floor pan.
3. Check for loose dirt and corrosion around the inside of the floor pan reinforcement member access holes. This is the first indication that corrosion may exist in hidden areas.

Perform all repairs before the final cleaning and protective treatment is performed.

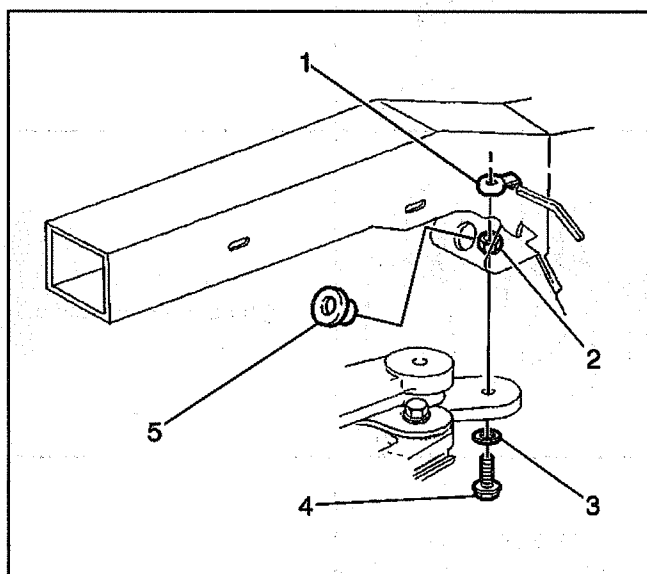
4. Using a chisel, ensure that the drain provisions in the floor pan reinforcement members are open. Open the drain holes in the body side panels using a punch and a drift.



379413



296183



296183

Damaged Cage Nut Service

Removal Procedure

1. Remove the plug (5) from the side rail.
2. Use a 13 mm drill bit in order to drill out the damaged nut (2).

Installation Procedure

1. Place an anti-rotation nut (1) on top of the drilled out nut (2).
2. Align the front crossmember to the side rail.

Notice: Refer to *Fastener Notice* in *Cautions and Notices*.

3. Finger tighten the crossmember bolt (3) and the washer (4).

Tighten

Tighten the lower crossmember bolt to 125 N·m (92 lb ft).

4. Install the plug (5) to the side rail.

Description and Operation

Datum Description

The datum line is a base line parallel to the plane of the underbody or the frame where all vertical measurements originate. A datum line is an imaginary horizontal plane that runs below and parallel to the vehicle. The height dimensions are calculated at right angles from the datum to a given control or reference point on the underbody.

The height dimensions determine the location of the datum based on the equipment being used. Therefore, different datum lines are established for the same vehicle. You can add an equal amount from all height dimensions and create a new datum line for your usage.

Centerline Description

A centerline is an imaginary vertical plane that is perpendicular to the length of the datum plane through the center of the vehicle. The centerline is any line drawn through the center of the vehicles datum plane.

Frame and Underbody Description

The following are supported by a front crossmember frame which is rigidly bolted to the body at six locations:

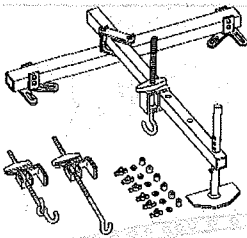
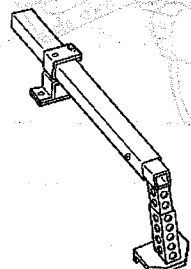
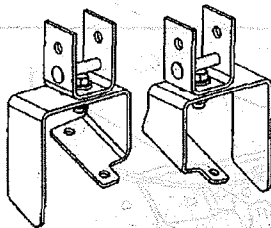
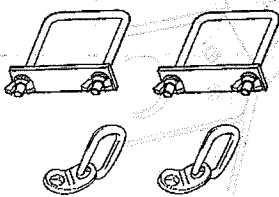
- The engine
- The front suspension lower control arms
- The steering linkage

Two rubber mounts secure the engine to the front crossmember frame. The underbody frame (cradle) must be properly aligned to maintain the correct suspension and wheel alignment.

The individual underbody components contribute directly to the overall strength of the unibody. Use proper welding techniques during service operations. Refer to Collision Repair for welding information and for vehicle preparation.

The components must be corrosion protected whenever body repair operations damage or destroy the original sealing surfaces. Use two part catalyzed primer such as PPG DP40 or equivalent when corrosion protection is needed on welded surfaces. Use GM Goodwrench Anti-Corrosion Compound P/N 12346225 or equivalent when needing a general corrosion protectant. Do not combine paint systems. refer to the paint manufacturer's recommendations.

Special Tools and Equipment

Illustration	Tool Number/ Description
 220640	J 28467-B Universal Support Fixture
 220642	J 36462-A Engine Support Adapter Leg
 220634	J 41044 Engine Support Adapters
 220638	J 42451 Engine Support Adapter Kit