

**SECTION 4C**

**FRONT DRIVING AXLE**

**CAUTION:** This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to CAUTIONS in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

**NOTICE:** Always use the correct fastener in the correct location. When you replace a fastener, use ONLY the exact part number for that application. General Motors will also call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

**CONTENTS**

<u>SUBJECT</u>	<u>PAGE</u>
General Description .....	4C-2
Diagnosis of Front Axle .....	4C-2
Front Axle Noise Diagnosis .....	4C-2
Determining The Type of Noise .....	4C-2
Diagnosis of Drive Axles (Halfshafts) .....	4C-3
Diagnosis of Four-Wheel Drive .....	4C-3
On-Vehicle Service .....	4C-4
Skid Plate Replacement .....	4C-4
Drain and Fill .....	4C-4
Indicator Switch Replacement .....	4C-5
Thermal Actuator Replacement .....	4C-5
Front Axle Vent Hose Replacement .....	4C-5
Drive Axle (Halfshaft) Replacement .....	4C-7
Axle Shaft (Output Shaft), Bearing, Seal and Tube Assembly Replacement (Right Side) .....	4C-9
Axle Shaft (Output Shaft) and Seal Replacement (Left Side) .....	4C-11
Shift Fork Replacement .....	4C-11
Differential Pilot Bearing Replacement .....	4C-11
Pinion Flange, Dust Deflector, and Oil Seal Replacement .....	4C-11
Carrier Replacement .....	4C-13
Carrier Case Bushing Replacement .....	4C-13
Unit Repair .....	4C-14
Outer CV Joint/Boot Replacement .....	4C-14
Inner CV Joint/Boot (Tripot Housing) Replacement .....	4C-17
Specifications .....	4C-19
Fastener Tightening Specifications .....	4C-19
Lubrication .....	4C-19
Special Tools .....	4C-20

## 4C-2 FRONT DRIVING AXLE

### GENERAL DESCRIPTION

The front axle on four-wheel drive model vehicles has a central disconnect feature that, under most conditions, allows shifting into and out of four-wheel drive when the vehicle is in motion. It is engaged by an electronically-activated thermal actuator.

The thermal actuator contains a coil, fluid, and a plunger. When the coil is heated, the liquid changes to a gas and extends the plunger, which engages the front axle. To disengage, the gas must cool to a liquid.

The axle uses a conventional ring and pinion gear set to transmit the driving force of the engine to the wheels. The differential allows the wheels to turn at different

rates of speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within an aluminum carrier. The axle identification number is located on a tag attached to the right axle tube.

The drive axles (halfshafts) are completely flexible assemblies consisting of inner and outer constant velocity (CV) joints protected by thermoplastic boots and connected by an axle shaft (output shaft).

### DIAGNOSIS OF FRONT AXLE

#### FRONT AXLE NOISE DIAGNOSIS

Any gear-driven unit produces a certain amount of noise that is normal and cannot be eliminated by conventional repairs or adjustment. Slight noise that is heard only at a certain speed or under unusual or remote conditions is acceptable. For example, this noise tends to reach a peak at speeds from 60 to 100 km/h (40 to 60 mph) depending upon road and load conditions, or upon gear ratio and tire size, and does not indicate trouble in the axle assembly.

When an axle is suspected of being noisy, make a thorough test to determine whether the noise originates in the tires, road surface, wheel bearings, engine, transmission, propeller shaft, or axle assembly. Raising tire pressure to eliminate tire noise (although this will not silence tread noise of mud and snow tires) and listening for the noise at varying speeds and road surfaces, in drive, float, and coast conditions will help to locate the source of noise.

#### Determining The Type of Noise

**Road Noise** - Some road surfaces, such as brick or rough-surfaced concrete, cause noise which may be mistaken for tire or axle noise. Driving on a different type of road, such as smooth asphalt or dirt, will quickly show whether the road surface is the cause of noise. Road noise usually is the same on drive or coast.

**Tire Noise** - Tire noise may easily be mistaken for axle noise. Tire noise changes with different road surfaces; axle noise does not. Temporarily inflating all tires to 345 kPa (50 psi) pressure, for test purposes only will materially alter noise caused by tires but will not affect noise caused by the axle. Axle noise usually stops when coasting at speeds under 30 miles per hour; however, tire noise continues with lower tone as the vehicle speed is reduced.

**Engine and Transmission Noises** - To determine which unit is causing the noise, take note of approximate vehicle speeds and conditions under which the noise is most pronounced, then stop the vehicle in a quiet place to stop interfering noises. With the transmission in neutral, run the engine slowly up and down the engine speeds corresponding to the vehicle speed at which the noise was most pronounced. If a similar noise

is produced with the vehicle standing still, it is caused by the engine or transmission and not the axle.

**Wheel Bearing Noise** - A brinelled wheel bearing causes a knock or click approximately every two revolutions of the wheel, since the bearing rollers do not travel at the same speed as the axle and wheel. With the wheels jacked up, spin the wheels by hand while listening at the hubs for evidence of a rough or brinelled wheel bearing or loose bearings.

**Gear Noise** - There are two basic types of gear noise. The first type is produced by broken, bent, or forcibly damaged gear teeth, which is usually quite audible over the entire speed range, and presents no difficulty in diagnosis. For example, hypoid gear tooth scoring generally results from the following: insufficient lubricant, improper break-in, wrong lubricant, insufficient gear backlash, improper ring and pinion alignment, or loss of drive pinion nut torque. The scoring will progressively lead to complete erosion of the gear tooth or gear tooth pitting and then eventual fracture if the initial scoring is not corrected (Figure 1). Another cause of hypoid gear fracture is extended overloading of the gear set, which will produce fatigue fracture, or shock loading, and can result in sudden failure.

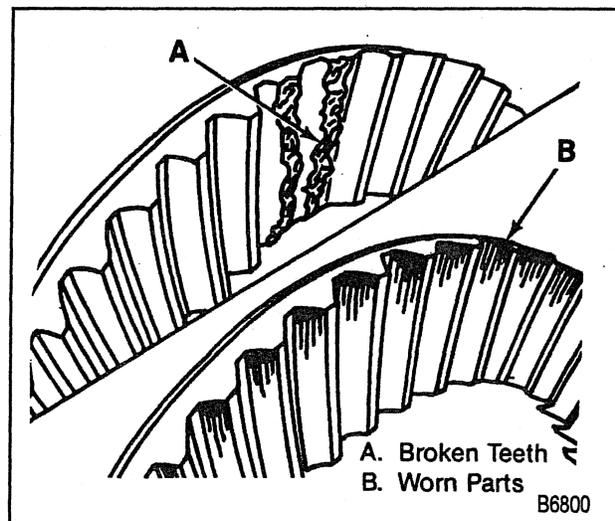


Figure 1—Causes of Gear Noise

Differential pinion and side gears are most often trouble free. Common causes of differential failure are shock loading, extended overloading, and seizure of the differential pinions to the cross shaft resulting from excessive wheel spin and consequent lubrication breakdown.

The second type of gear noise pertains to the mesh pattern of the gear teeth. This form of abnormal gear

noise can be recognized because it produces a cycling pitch (whine) and will be very pronounced in the speed range at which it occurs, appearing under either drive, float, or coast conditions. Gear noise tends to peak in a narrow speed range or ranges and will tend to remain constant in pitch. Bearing noise will vary in pitch with vehicle speeds.

**DIAGNOSIS OF DRIVE AXLES (HALFSHAFTS)**

PROBLEM	POSSIBLE CAUSE	CORRECTION
Clicking Noise in Turns	Worn out or damaged CV joint.	Replace.
"Clunk" when Accelerating from "Coast".	1. Loose CV joint to output shaft bolts. 2. Damaged inner CV joint.	1. Tighten. 2. Replace.
Shudder or Vibration during Acceleration	1. Excessive CV joint angle. 2. Worn or damaged CV joints. 3. Sticking spider assembly (inner CV joint). 4. Sticking joint assembly (outer CV joint).	1. Repair. 2. Replace. 3. Lubricate or replace. 4. Lubricate or replace.
Vibration at Highway Speeds	1. Out of balance or out of round tires. 2. Front end out of alignment.	1. Balance or replace. 2. Align.
Front Drive Axle Leaks	1. Worn differential output seals. 2. Inspect mating area between axle tube and differential housing. 3. Inspect vent hose connector.	1. Repair seals. 2. Reseal differential housing mating area with RTV sealant. 3. Replace vent hose connector.
D0012		

**DIAGNOSIS OF FOUR-WHEEL DRIVE**

PROBLEM	POSSIBLE CAUSE	CORRECTION
Four-Wheel Drive Will Not Engage	1. Blown fuse. (A/C-HTR fuse). 2. Feed wire to transfer case switch open. 3. Transfer case switch faulty. 4. Wires to front axle actuator open. 5. Front axle actuator faulty. 6. Axle damaged internally.	1. Replace. 2. Repair open wire. 3. Replace transfer case switch. 4. Repair open wiring. 5. Replace axle actuator. 6. Repair as necessary. Refer to "Unit Repair" in this section.
Four-Wheel Drive Will Not Disengage	1. Transfer case switch faulty. 2. Front axle actuator faulty. 3. Internal axle damage.	1. Replace switch. 2. Replace actuator. 3. Repair as necessary. Refer to "Unit Repair" in this section.
Four-Wheel Drive Indicator Light Will Not Turn Off	Front axle switch faulty.	Replace front axle switch.
Four-Wheel Drive Engages But Indicator Light Will Not Come On	1. Bulb burned out. 2. Front axle switch faulty.	1. Replace. 2. Replace the switch.
D0364		

## ON-VEHICLE SERVICE

### SKID PLATE REPLACEMENT

↔ Remove or Disconnect (Figure 2)

1. Bolts (116).
2. Skid Plate (115).

↔ Install or Connect (Figure 2)

1. Skid Plate (115).
2. Bolts (116).

 Tighten

- Bolts to 34 N.m (25 lb. ft.).

### DRAIN AND FILL

↔ Remove or Disconnect (Figure 3)

1. Skid Plate (115), if equipped. Refer to "Skid Plate Replacement" in this section.
2. Fill plug (26).
3. Drain plug (27) and the washer (28).
4. Drain fluid from differential.

↔ Install or Connect (Figure 3)

1. Washer (28) and drain plug (27).

 Tighten

- Plug (27) to 33 N.m (24 lb. ft.).

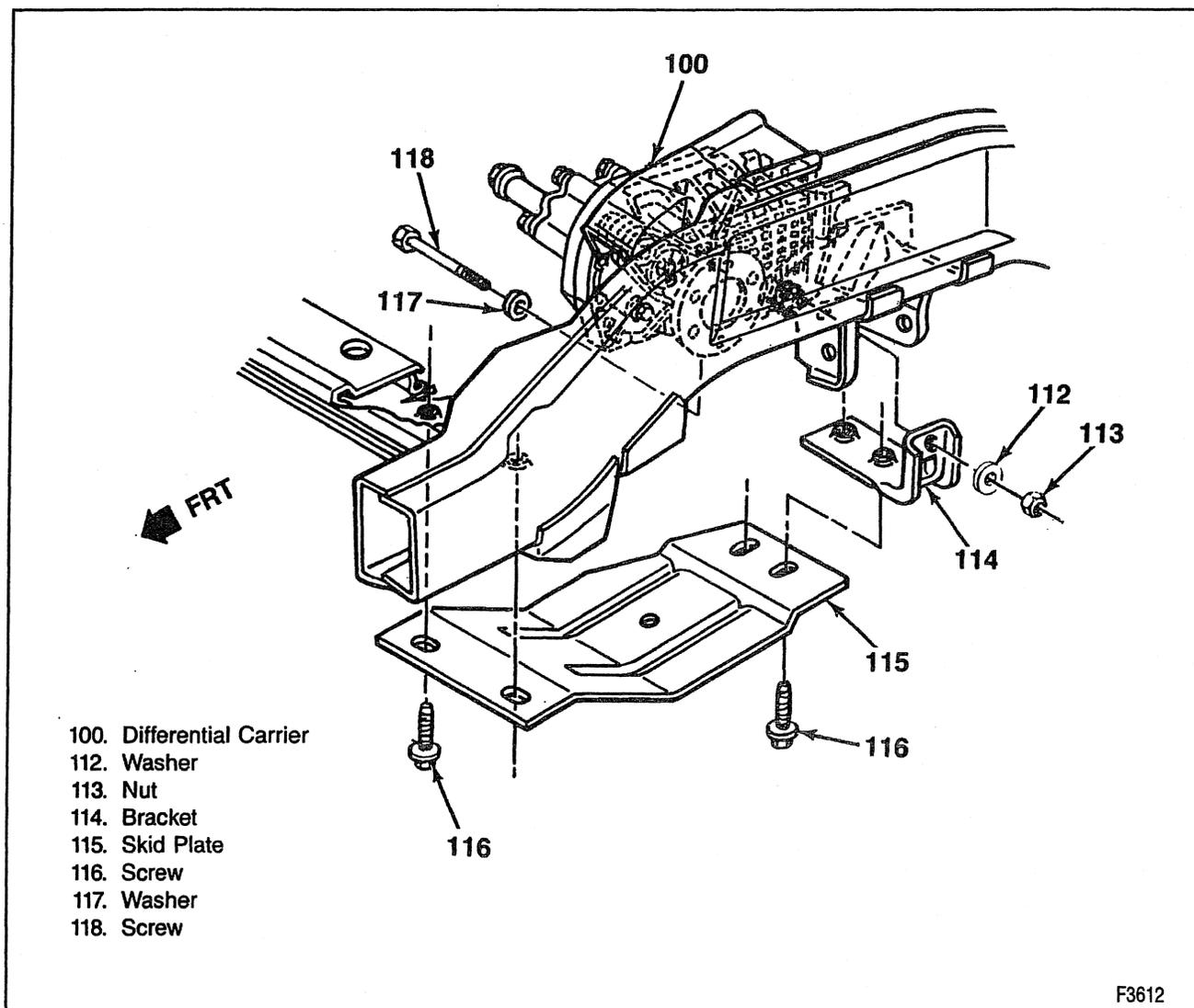
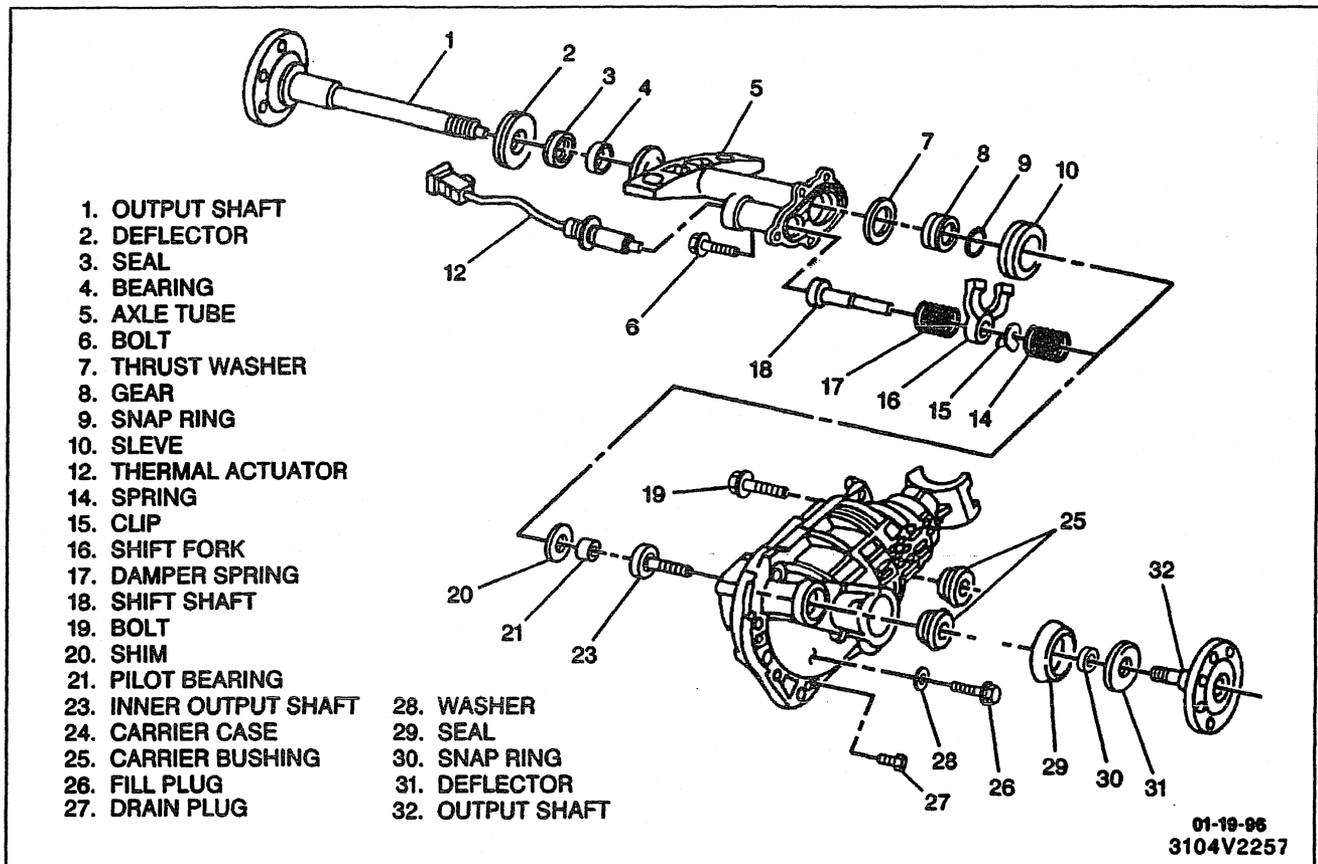


Figure 2—Skid Plate



**Figure 3—Front Axle Components**

2. Fill differential. Refer to "Specifications" in this section.
3. Fill plug (26).

 **Tighten**

- Plug (26) to 33 N·m (24 lb. ft.).

4. Skid Plate (115), if equipped. Refer to "Skid Plate Replacement" in this section.

**INDICATOR SWITCH REPLACEMENT**

 **Remove or Disconnect (Figure 3)**

1. Skid Plate (if equipped). Refer to "Skid Plate Replacement" in this section.
2. Electrical connector from the indicator switch located on the upper right side of the differential.
3. Indicator switch.

 **Install or Connect (Figure 3)**

- Coat the switch threads with sealer GM P/N 1052942 or equivalent.

1. Indicator switch.
2. Electrical connector.
3. Skid Plate (if equipped). Refer to "Skid Plate Replacement" in this section.

**THERMAL ACTUATOR REPLACEMENT**

 **Remove or Disconnect (Figure 3)**

1. Skid Plate (if equipped). Refer to "Skid Plate Replacement" in this section.
2. Electrical connector from the actuator.
3. Thermal actuator (12) by unthreading.

 **Install or Connect (Figure 3)**

1. Thermal actuator (12).
  - Coat the threads with sealant GM P/N 1052942 or equivalent.

 **Tighten**

- Actuator to 22 N·m (16 lb. ft.).
2. Electrical connector.
  3. Skid Plate (if equipped). Refer to "Skid Plate Replacement" in this section.

**FRONT AXLE VENT HOSE REPLACEMENT**

 **Remove or Disconnect (Figure 4)**

1. Skid Plate (if equipped). Refer to "Skid Plate Replacement" in this section.

## 4C-6 FRONT DRIVING AXLE

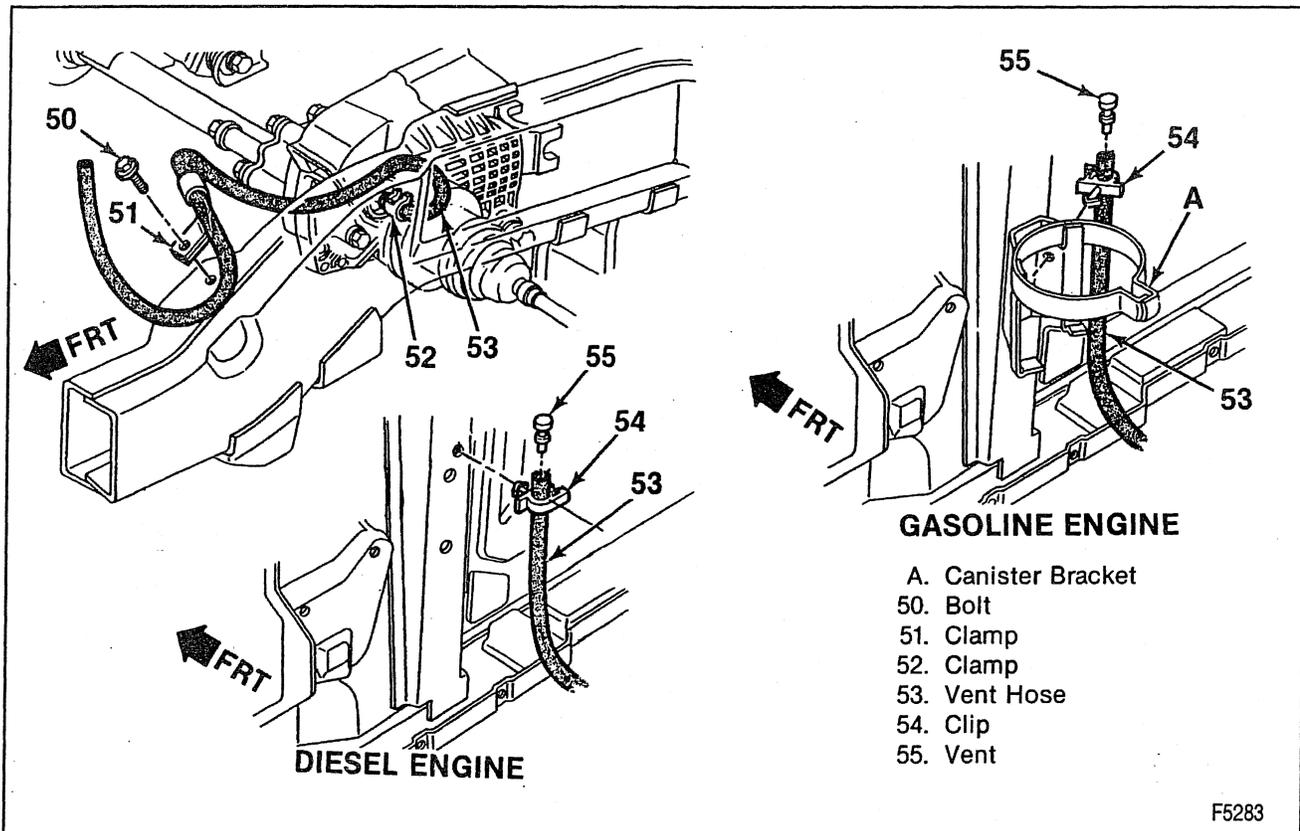


Figure 4—Vent Hose

2. Clamp (52).
3. Vent hose (53) from the axle.
  - Note routing to aid in reassembly.
4. Bolt (50).
5. Clip (54).
6. Vent hose (53).

### Install or Connect (Figure 4)

1. Hose (53) to the vehicle.
  - Route the same way as when removed.
  - Make sure it is free of kinks and is routed clear of sharp components.
  - Make sure the vent is not plugged.
2. Clip (54).
3. Bolt (50) and clamp (51).
4. Vent hose to the axle fitting.
5. Clamp (52).
6. Skid Plate (if equipped). Refer to "Skid Plate Replacement" in this section.

## DRIVE AXLE (HALFSHAFT) REPLACEMENT

Tools Required:  
 J 28733-B Axle Remover  
 J 24319-B Steering Linkage Puller  
 J 36605 Front Knuckle Seal Installer

### Remove or Disconnect (Figures 5 through 12)

- Raise vehicle and support it with safety stands.

1. Wheel and tire assembly.
  - Insert a drift or large screwdriver through the brake caliper into one of the brake rotor vanes to prevent drive axle (halfshaft) from turning (Figure 6).
2. Drive axle (halfshaft) hub nut (203) and washer (202) (Figure 5).
  - Loosen, but do not remove the 6 bolts (200) securing inboard C/V joint drive flange to the output shaft companion flange (Figure 5).
3. Wrap shop towels around both the inner and outer C/V joint boots to avoid damage to the boots during removal and installation.
4. Brake pipe support bracket from upper control arm to allow extra travel of knuckle (Figure 7).
5. Cotter pin and nut from outer tie rod.
6. Separate the outer tie rod ball stud from the steering knuckle using J 24319-B (Figure 8).

**NOTICE:** Do not disengage the joint by driving a wedge-type tool between the joint and the knuckle. This may cause seal damage.

- Push linkage to opposite side of the vehicle and secure outer tie rod up and out of the way. This will provide the needed clearance to remove the drive axle (halfshaft).
7. Lower shock mounting nut and bolt (Figure 9).
    - Collapse the shock absorber and secure if necessary.

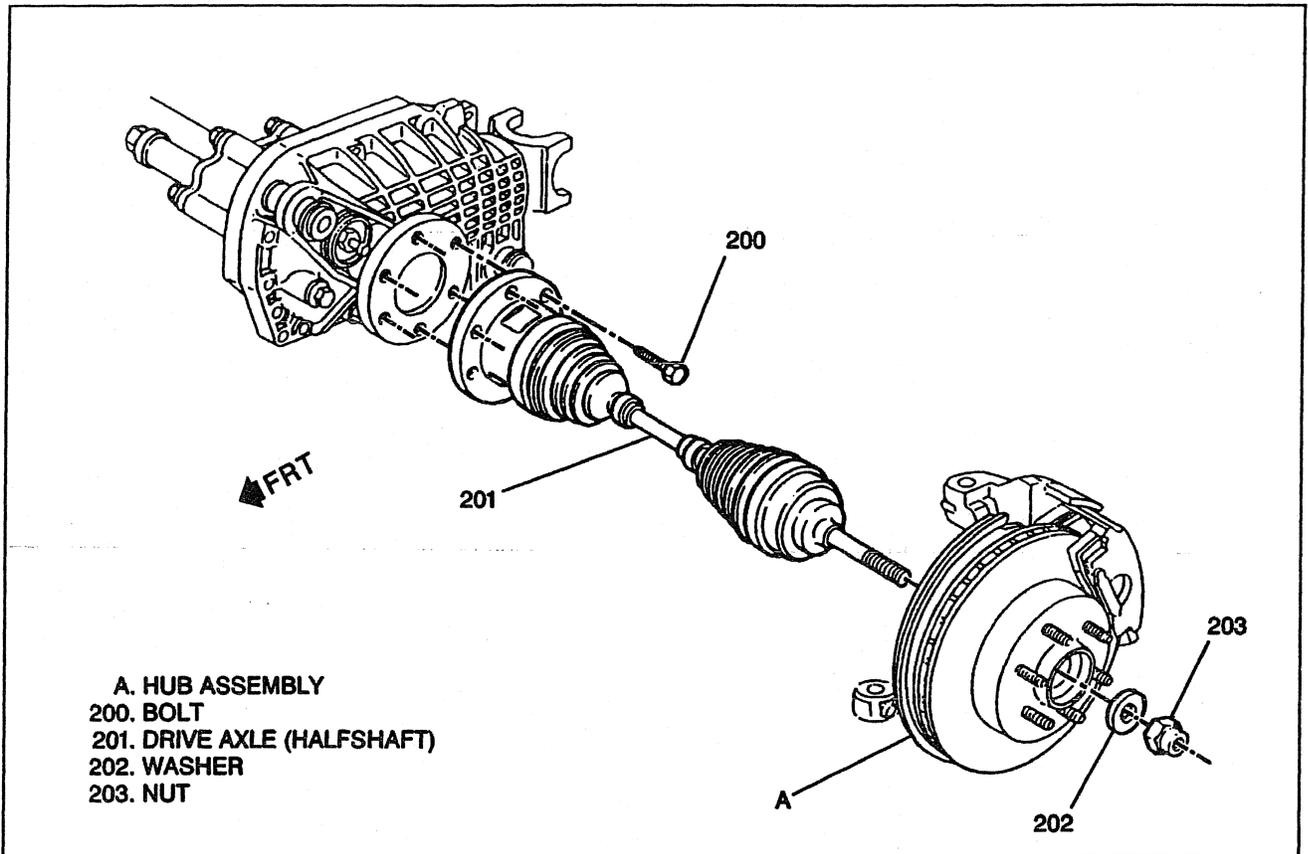


Figure 5—Drive Axle (Halfshaft)

8. Stabilizer shaft components as follows (Figure 12):
- Remove stabilizer shaft bushing and bracket.
  - Remove stabilizer shaft bolt, spacer, and nut assembly at the lower control arm.

**NOTICE:** This is required on "K" vehicles with 8050 lb. and above GVW rating to provide needed clearance for drive axle (halfshaft) removal.

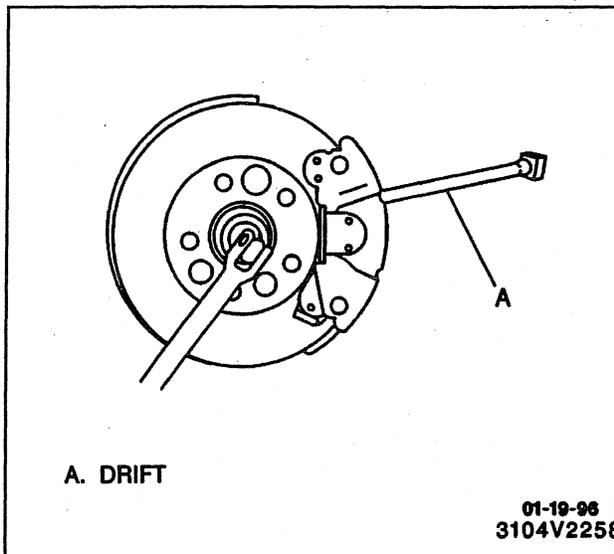


Figure 6—Holding Shaft in Place

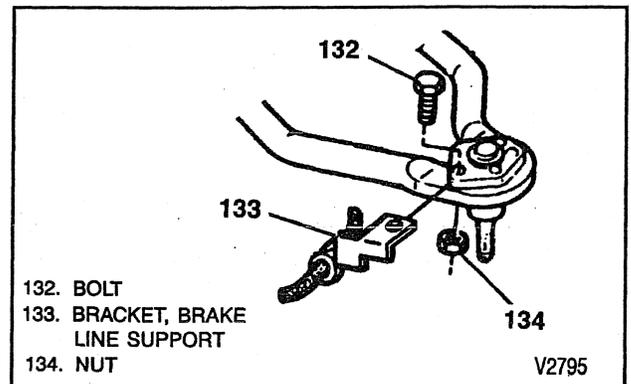


Figure 7—Brake Line Bracket Removal

9. Position floor jack or stand behind the steering knuckle.

**CAUTION:** The floor jack or stand must remain under the control arm while servicing the drive axle (halfshaft) to maintain torsion bar and control arm position. Failure to do so could result in personal injury.

10. Cotter pin (138) from the upper control arm ball joint stud.
- Loosen (do not remove at this time) the stud nut on the upper ball joint stud.
  - Loosen the stud from the knuckle.
11. Nut (139) (Figure 10).
12. Stud (137) from knuckle (Figure 10).

## 4C-8 FRONT DRIVING AXLE

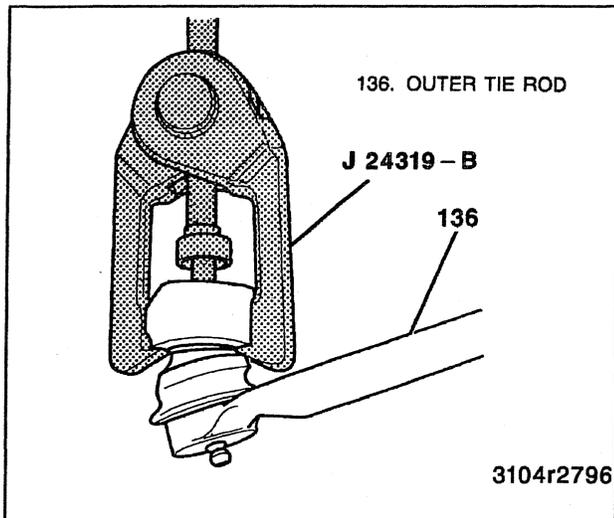


Figure 8—Disconnecting the Tie Rod

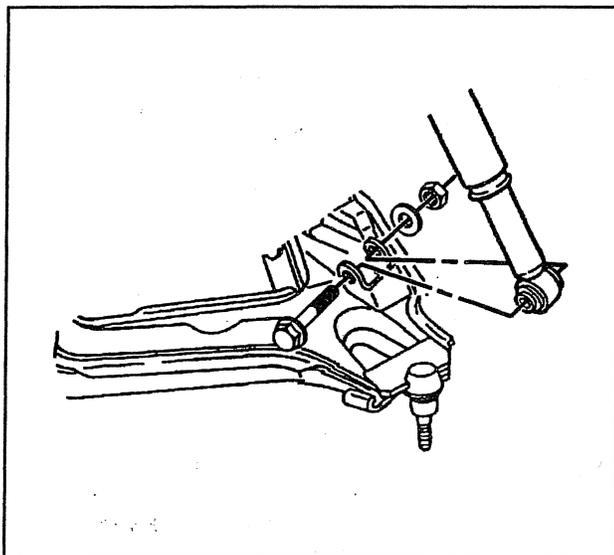


Figure 9—Disconnecting Lower Shock Mount

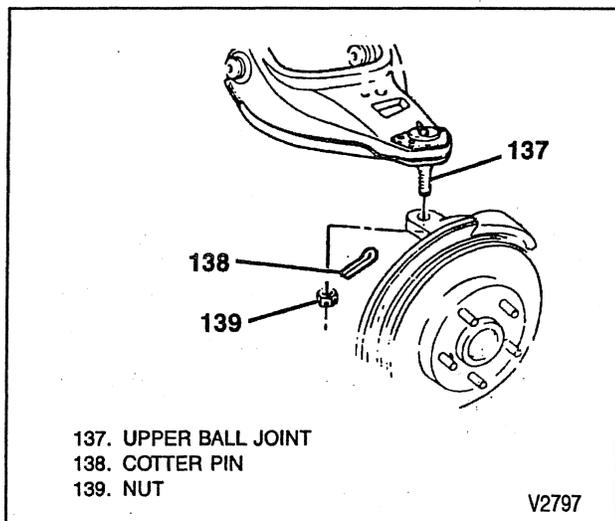


Figure 10—Ball Joint and Knuckle Separation

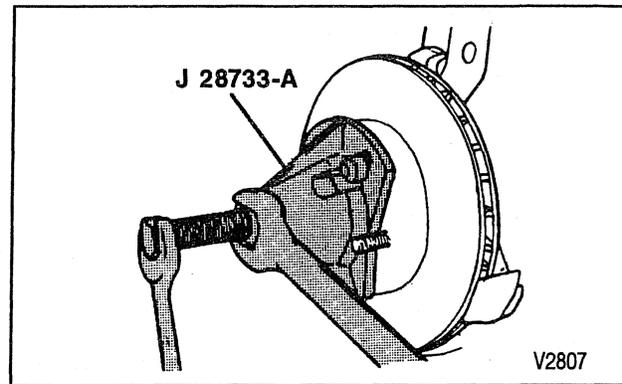


Figure 11—Splined Shank and Knuckle Separation

### ! Important

- Cover the shock mounting bracket and the ball stud on the lower control arm with a shop towel to prevent possible drive axle (halfshaft) boot damage during removal and installation.
13. Knuckle assembly using J 28733-B or equivalent and separate outer C/V joint splined shank from knuckle hub (Figure 11).
  14. Six bolts (200) from inboard joint flange (Figure 5).
    - Support inboard end of drive axle (halfshaft). Move knuckle and hub assembly outward to free splined shank from hub.
  15. Drive axle (halfshaft) from vehicle.
    - For unit repair of the drive axle (halfshaft), refer to "Unit Repair" in this section.

### ! Important

- Wipe the wheel bearing seal area on the knuckle clean.

### L Inspect

- Check the seal for cuts or tears.
16. Lubricate the seal lip.
    - If seal is cut or torn, inspect the wheel bearing for damage and replace the seal.
  17. Replace the seal as follows:
    - Pry old seal from knuckle and discard.
    - Lubricate the new seal lip.
    - Use J 36605 to install the seal in the knuckle.

### ↔ Install or Connect (Figures 5 through 12)

- Prior to drive axle (halfshaft) installation, cover the shock mounting bracket, lower control arm ball stud, and all other sharp edges with shop towels so that drive axle (halfshaft) boot is not damaged during assembly.

### ! Important

- Do not lubricate the drive axle (halfshaft) splines and knuckle with grease.
1. Insert outer C/V joint splined shank into knuckle hub and secure inboard C/V joint flange to companion flange with bolts. Do not tighten.

2. Upper ball joint to the steering knuckle.
3. Stud nut.

 **Tighten**

- Stud nut to 100 N.m (75 lb. ft.).
4. Cotter pin.
    - Lubricate the upper ball joint until grease appears at the seal.
  5. Stabilizer shaft bushing (65) and bracket (64) and bolts (63) (Figure 12).

 **Tighten**

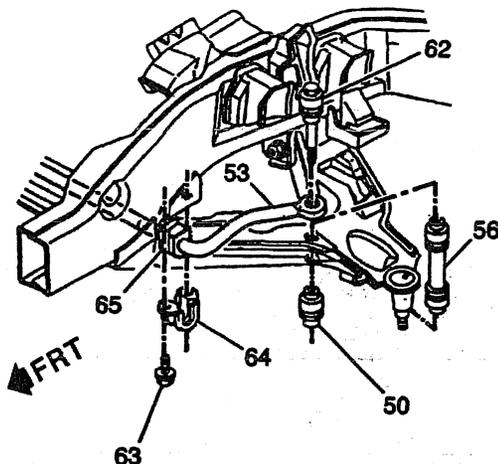
- Bolts (63) to 33 N.m (24 lb. ft.).
6. Stabilizer shaft link bolt assembly (62), spacer (56), and nut assembly (50).

 **Tighten**

- Obtain torque by running nut assembly to the unthreaded portion of the bolt, then tighten to 18 N.m (13 lb. ft.).
  - Remove floor jack or stand from beneath lower control arm.
7. Shock absorber to the lower shock mounting bracket.
  8. Shock mounting bolt washer and nut (Figure 9).

 **Tighten**

- Nut to 73 N.m (54 lb. ft.).



- 50. NUT/BUSHING ASSEMBLY
- 53. STABILIZER SHAFT
- 56. SPACER ASSEMBLY
- 62. LINK BOLT ASSEMBLY
- 63. BOLTS
- 64. BRACKETS
- 65. RUBBER BUSHING

**Figure 12—Stabilizer Bar Components**

9. Outer tie rod to steering knuckle.
10. Outer tie rod nut.

 **Tighten**

- Nut to 47 N.m (35 lb. ft.).

 **Important**

- Advance the nut to align the nut slot with the cotter pin hole. Never back the nut off to align the cotter pin hole.
11. Install new cotter pin and spread the ends to secure.
  12. Brake pipe support bracket to the upper control arm.

 **Tighten**

- Nut to 17 N.m (13 lb. ft.).

 **Important**

- Make sure that the brake hose is not twisted or kinked, or damage to the hose could result.
13. Hub nut washer (202) and nut (203). Seat shank splines in hub.
  14. Insert a drift through brake caliper to prevent drive axle (halfshaft) from turning.

 **Tighten**

- Inboard flange bolts to 78 N.m (58 lb. ft.).
15. Hub nut.

 **Tighten**

- Hub nut to 225 N.m (165 lb. ft.).
16. Remove drift and install wheels.
  17. Remove safety stands, and lower the vehicle.

### **AXLE SHAFT (OUTPUT SHAFT), BEARING, SEAL AND TUBE ASSEMBLY REPLACEMENT (RIGHT SIDE)**

 **Remove or Disconnect (Figures 3, 5, 12, and 13)**

- Raise the vehicle and support it using safety stands.
1. Drive axle (halfshaft). Refer to "Drive Axle (Halfshaft) Replacement" in this section.
  2. Drain front axle. Refer to "Drain and Fill" in this section.
  3. Electrical connectors (131) (Figure 13).
  4. Axle shaft (output shaft) nuts (130) and washers (126) (Figure 13).
  5. Axle shaft (output shaft) bolts (6) from carrier (24) (Figure 3).
  6. Axle shaft (output shaft) tube from carrier.
    - Take care to keep the open end of the tube up.

## 4C-10 FRONT DRIVING AXLE



### Disassemble (Figure 3)

#### Tools Required:

J 29369-1 Bearing Remover (K2 models)

J 29369-2 Bearing Remover (K3 models)

- Hold the axle shaft (output shaft) tube in a vise by the mounting flange.

1. Sleeve (10).
2. Gear (8).
3. Thrust washer (7).
4. Axle shaft (output shaft) (1). Tap out with a soft mallet.
5. Deflector (2). Pry out with a screwdriver.
6. Seal (3). Pry out with a screwdriver.
7. Bearing (4). Use J 29369-1 (K2 models) or J 29369-2 (K3 models) and a slide hammer.



#### Clean

- Parts in a suitable solvent.
- Gasket surfaces on the axle shaft (output shaft) tube and carrier housing.



### Assemble (Figures 3 and 13)

#### Tools Required:

J 36609 Bearing Installer

J 36600 Seal Installer (K2 Models)

J 22833 Seal Installer (K3 Models)

1. New bearing (4). Use J 36609. Apply axle lubricant to the bearing.
2. New seal (3). Use J 36600 (K2 models) or J 22833 (K3 models). Coat the seal lips with grease.

3. Deflector (2).
4. Axle shaft (output shaft) (1).
5. Thrust washer (7). Use grease to hold it in place. Make sure the tabs on the washer align with the slot in the axle shaft (output shaft) tube.
6. Gear (8).
7. Sleeve (10).



### Install or Connect (Figures 3, 5, 12, and 13)

- Apply sealant GM P/N 12345739 or equivalent to the carrier sealing surface.

1. Axle shaft (output shaft) tube (5) to carrier (24) (Figure 3).
2. Bolts (6).



#### Tighten

- Bolts to 40 N.m (30 lb. ft.).
3. Axle shaft (output shaft) tube washers (126) and nuts (130) to frame (Figure 13).
- Nuts (130) to specifications:



#### Tighten

- K2 models to 100 N.m (75 lb. ft.).
  - K3 models to 145 N.m (106 lb. ft.).
4. Drive axle (halfshaft). Refer to "Drive Axle Replacement (Halfshaft)" in this section.
  5. Electrical connectors (131) (Figure 13).
  6. Fill front axle. Refer to "Drain and Fill" in this section.

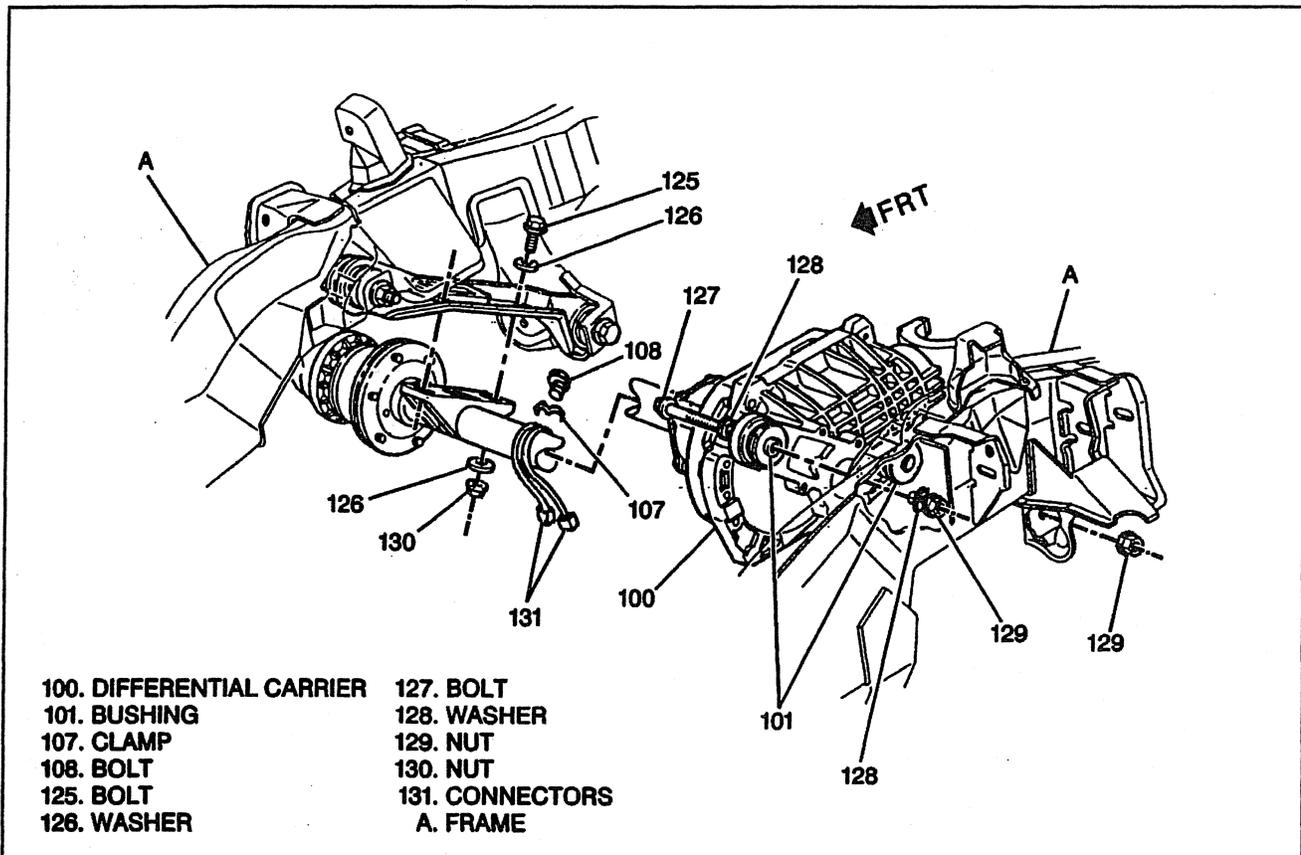


Figure 13—Differential Carrier Mounting

**AXLE SHAFT (OUTPUT SHAFT)  
AND SEAL REPLACEMENT  
(LEFT SIDE)**

Tools Required:

- J 36600 Seal Installer (K2 models)
- J 22833 Seal Installer (K3 models)

**←→ Remove or Disconnect (Figure 3)**

- Raise the vehicle. Support with jack stands.
- 1. Drain front axle. Refer to "Drain and Fill" in this section.
- 2. Drive axle (halfshaft). Refer to "Drive Axle Replacement (Halfshaft)" in this section.
- 3. Axle shaft (output shaft) (32). Attach a slide hammer with adapter to the axle shaft (output shaft) and pull it from the carrier case. Take care not to damage the case.
- 4. Deflector (31).
- 5. Seal (29). Pry out with a screwdriver.
- 6. Bearing using slide hammer J 23907.

**→← Install or Connect (Figure 3)**

- It may be necessary to attach a 1/2 inch by 13 inch long extension handle onto the slide hammer for easier pulling of the bearing.
- 1. Bearing (square shoulder in) using J 22761
- 2. New seal (29). Using J 36600 (K2 models) or J 22833 (K3 models) to install. Lubricate the seal lips with grease prior to installation.
- 3. Deflector (31).
- 4. Axle shaft (output shaft) (32). Carefully tap the axle shaft (output shaft) into place with a soft mallet.
- 5. Drive axle (halfshaft). Refer to "Drive Axle Replacement (Halfshaft)" in this section.
- 6. Fill front axle. Refer to "Drain and Fill" in this section.

**SHIFT FORK REPLACEMENT**

**←→ Remove or Disconnect (Figure 3)**

1. Axle shaft (output shaft) and tube assembly. Refer to "Axle Shaft (Output Shaft) and Tube Assembly Replacement" in this section.
2. Shift shaft (18), damper spring (17), fork (16), and clip (15) assembly.
3. Spring (14) from the carrier case, taking care not to dislodge the shim (20) from the axle shaft (output shaft).

**→← Install or Connect (Figure 3)**

1. Spring (14) into the carrier case.
2. Shift shaft (18), damper spring (17), fork (16), and clip (15) assembly into axle tube.
  - Make sure the clip is fully seated into the groove on the shift lever.
3. Axle shaft (output shaft) and tube assembly. Refer to "Axle Shaft (Output Shaft) and Tube Assembly Replacement" in this section.

**DIFFERENTIAL PILOT BEARING  
REPLACEMENT**

Tools Required:

- J 34011 Pilot Bearing Remover
- J 33842 Pilot Bearing Installer

**←→ Remove or Disconnect (Figure 3)**

1. Axle shaft (output shaft) and tube assembly. Refer to "Axle Shaft (Output Shaft) and Tube Assembly Replacement" in this section.
2. Shim (20).
3. Differential pilot bearing (21). Use J 34011.

**→← Install or Connect (Figure 3)**

1. Shim (20).
2. Differential pilot bearing (21). Use J 33842.
  - Lubricate the bearing with axle lubricant.
3. Axle shaft (output shaft) and tube assembly. Refer to "Axle Shaft (Output Shaft) and Tube Assembly Replacement" in this section.

**PINION FLANGE, DUST  
DEFLECTOR, OIL SEAL  
REPLACEMENT**

Tools Required:

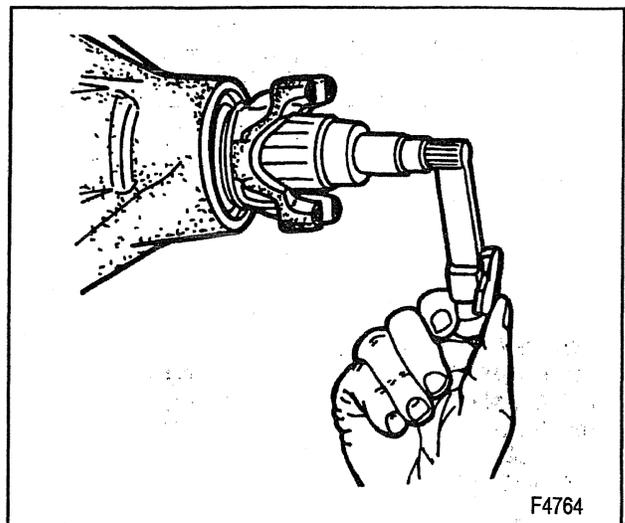
- J 8614-01 Companion Flange Holder and Remover
- J 36366 Seal Installer

**←→ Remove or Disconnect (Figures 14 through 17)**

- Raise the vehicle on a hoist.
- 1. Propeller shaft from the axle. Refer to SECTION 4A.
  - Tie the propeller shaft to a frame rail or cross-member.

**⊞ Measure**

- The torque required to rotate the pinion. Record the torque value for reassembly (Figure 14).



**Figure 14—Measuring the Pinion Rotating Torque**

## 4C-12 FRONT DRIVING AXLE

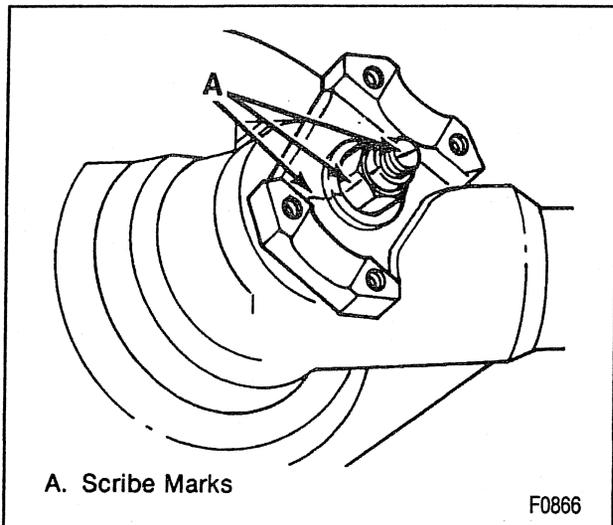


Figure 15—Scribed Marks

### ! Important

- Scribe a line on the pinion stem, pinion nut and the companion flange and record the number of exposed threads on the pinion stem (Figure 15).
2. Nut using J 8614-01 (Figure 16).
    - Position J 8614-01 on the flange so that the four notches on the tool face the flange.
  3. Flange using J 8614-01 (Figure 17).
    - Use the special nut and forcing screw to remove the flange.
  4. Oil seal.
    - Carefully pry the seal from the bore. Do not distort or scratch the aluminum case.

### 🔍 Inspect

- The pinion flange for a smooth oil seal surface.
- The pinion flange for worn drive splines.
- Replace if necessary.

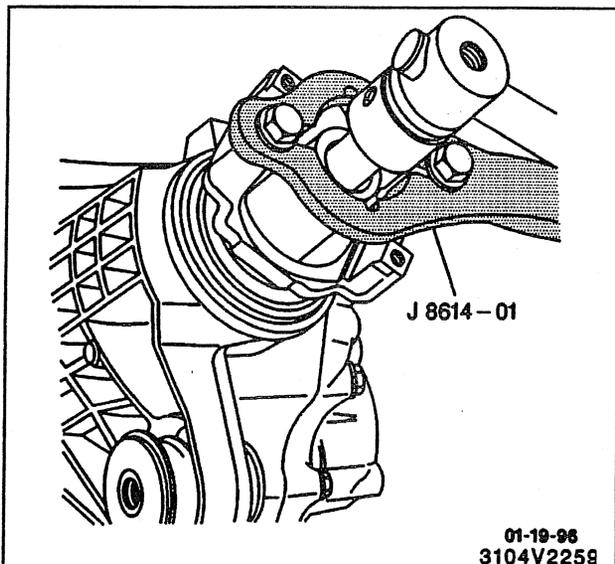


Figure 16—Removing/Installing the Pinion Nut

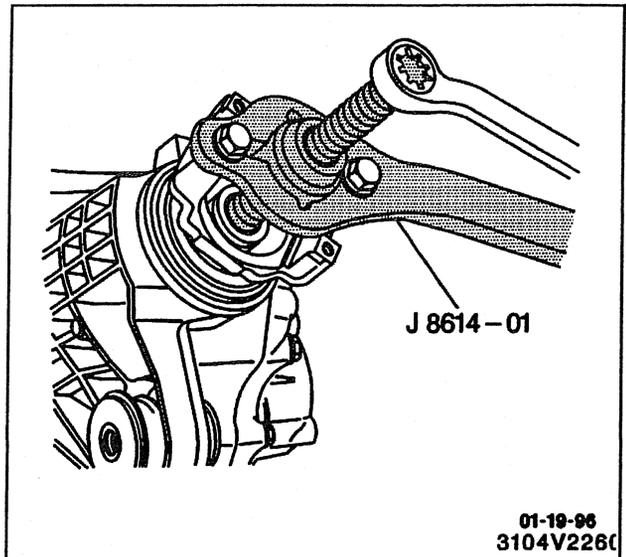


Figure 17—Removing/Installing the Pinion Flange

### 5. Dust deflector.

- Tap the deflector from the flange.
- Clean up the stake points on the flange.

### ↔ Install or Connect (Figures 17 and 18)

#### 1. Dust deflector on the flange.

- Stake the new deflector at three new equally spaced positions. Staking must be such that the seal operating surface is not damaged.

#### 2. Oil seal using J 36366 (Figure 18).

- Position the oil seal in the bore, then place J 36366 over the oil seal. Strike J 36366 with a hammer until the seal flange is seated on the axle housing surface. Drive the seal in straight, not at an angle, as this will damage the aluminum housing.

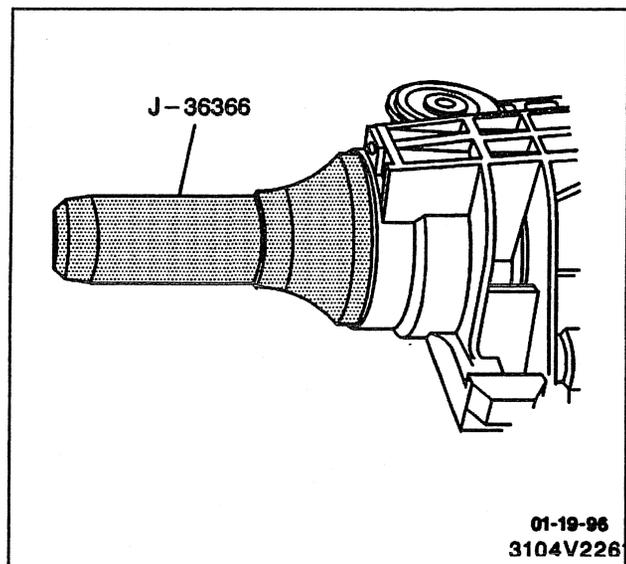


Figure 18—Installing the Pinion Seal

**NOTICE:** Do not hammer the pinion flange onto the pinion shaft or the pinion flange may be damaged.

3. Flange onto the pinion using J 8614-01 (Figure 17).
  - Place the washer and a new nut on the pinion threads and tighten the nut to the original scribed position using the scribe marks and exposed threads as a reference.

 **Measure**

- The rotating torque of the pinion and compare this with the rotating torque recorded earlier.

 **Tighten**

- The pinion nut by small increments until the torque required to rotate the pinion is 0.35 N·m (3 lb. in.) greater than the original torque.
4. Propeller shaft. Refer to SECTION 4A.
  5. Lower the vehicle.

**CARRIER REPLACEMENT**

 **Remove or Disconnect (Figure 14)**

- Raise the vehicle. Support with jack stands.
1. Drain front axle. Refer to "Drain and Fill" in this section.
  2. Front propeller shaft at the carrier yoke. Refer to SECTION 4A. Wire the propeller shaft out of the way.
  3. Left and right drive axle (halfshaft). Refer to "Drive Axle Replacement" in this section.
  4. Screws (125), nuts (130) and washers (126).
  5. Wiring at the axle.
  6. Vent hose at the axle.
  7. Carrier lower mounting bolt.
  8. Right side inner tie rod end from the relay rod. Refer to SECTION 3B3.
  9. Engine oil filter (some models).
  10. Attach a transmission jack to the carrier.
  11. Upper carrier mounting bolt.
  12. Carrier from the vehicle. Refer to SECTION 4C2.

 **Install or Connect (Figure 14)**

1. Carrier to the vehicle.
2. Carrier mounting bolts (127), nuts (129), and washers (128).

 **Tighten**

- Bolts (127) to 110 N·m (80 lb. ft.).
3. Remove the transmission jack.
  4. New engine oil filter (if removed).
  5. Tie rod. Refer to SECTION 3B3.
  6. Axle tube bolts (125), nuts (130), and washers (126).

- Nuts (130) to specifications:

 **Tighten**

- K2 models: 100 N·m (75 lb. ft.).
- K3 models: 145 N·m (106 lb. ft.).

7. Vent hose.
8. Wiring.
9. Left and right drive axle (halfshaft). Refer to "Drive Axle (Halfshaft) Replacement" in this section.
10. Front propeller shaft to the carrier yoke.

 **Tighten**

- Universal joint clamp bolts to 20 N·m (15 lb. ft.).
11. Fill front axle. Refer to "Drain and Fill" in this section.
  12. Add engine oil as necessary. Refer to SECTION 0B.

**CARRIER CASE BUSHING REPLACEMENT**

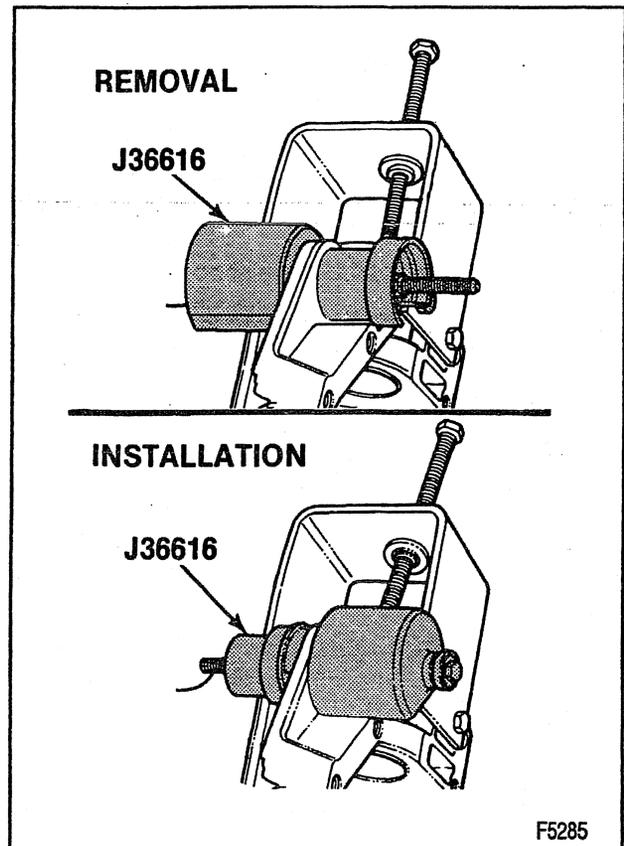
Tool Required:  
J 36616 Bushing Remover and Installer

 **Remove or Disconnect (Figures 3, 24, and 30)**

1. Carrier. Refer to "Carrier Replacement" in this section.
2. Carrier bushing using J 36616 (Figure 30).

 **Install or Connect (Figures 3, 14, and 19)**

1. Carrier bushing using J 36616 (Figure 19).
2. Carrier. Refer to "Carrier Replacement" in this section.



**Figure 19—Removing/Installing Carrier Case Bushings**

F5285

**UNIT REPAIR****OUTER CV JOINT/BOOT REPLACEMENT**

-  **Remove or Disconnect (Figures 20 through 22)**

**Tools Required:**

- J 8059 Snap Ring Pliers
- J 35910 Seal Clamp Tool
- J 36652 Swage Clamp Tool

1. Large swage ring (9) from the C/V joint, using a chisel and discard.

 **Important**

- Do not cut through the seal (12) and damage the sealing surface of C/V outer housing (18) with the chisel.
2. Small seal-retaining clamp (11) on axle shaft with a side cutter, and discard.
    - A. Separate the joint seal (12) from the C/V joint race (18) at large diameter and slide the seal away from joint along the axle shaft (13).
    - B. Wipe excess grease from face of C/V inner race (16).
    - C. Spread the ears on the race retaining ring (14) with J 8059 and remove the C/V joint assembly from the axle shaft (13).
  3. Seal (12) from the axle shaft (13).
    - Grease prior to installing the new seal.

 **Disassemble (Figures 20, 23 through 25)**

1. Use a brass drift and hammer to gently tap on the C/V joint cage (17) until it is tilted enough to remove the first chrome alloy ball (15) (Figure 23).
2. Tilt the cage (17) in opposite direction to remove opposing ball (15).
  - Repeat this process until all six balls (15) are removed.
3. Position the cage (17) and the inner race (16) 90 degrees to the center line of the outer race (18) and align the cage windows with the lands of the outer race.
4. Separate the cage (17) and the inner race (16) from the outer race (18) (Figure 24).
5. Rotate the inner race (16) 90 degrees to the center line of the cage (17) with the lands of the inner race aligned with the windows of the cage (Figure 25).
6. Pivot the inner race (16) into the cage (17) window and remove the inner race.

 **Assemble (Figures 20 through 25)**

**Tools Required:**

- J 8059 Snap Ring Pliers (or equivalent)
- J 35910 Boot Clamp Tool
- J 36652 Swage Clamp Tool

- Put a light coat of recommended grease on the ball grooves of the inner race (16) and the outer race (18). Refer to SECTION 0B for specified grease.

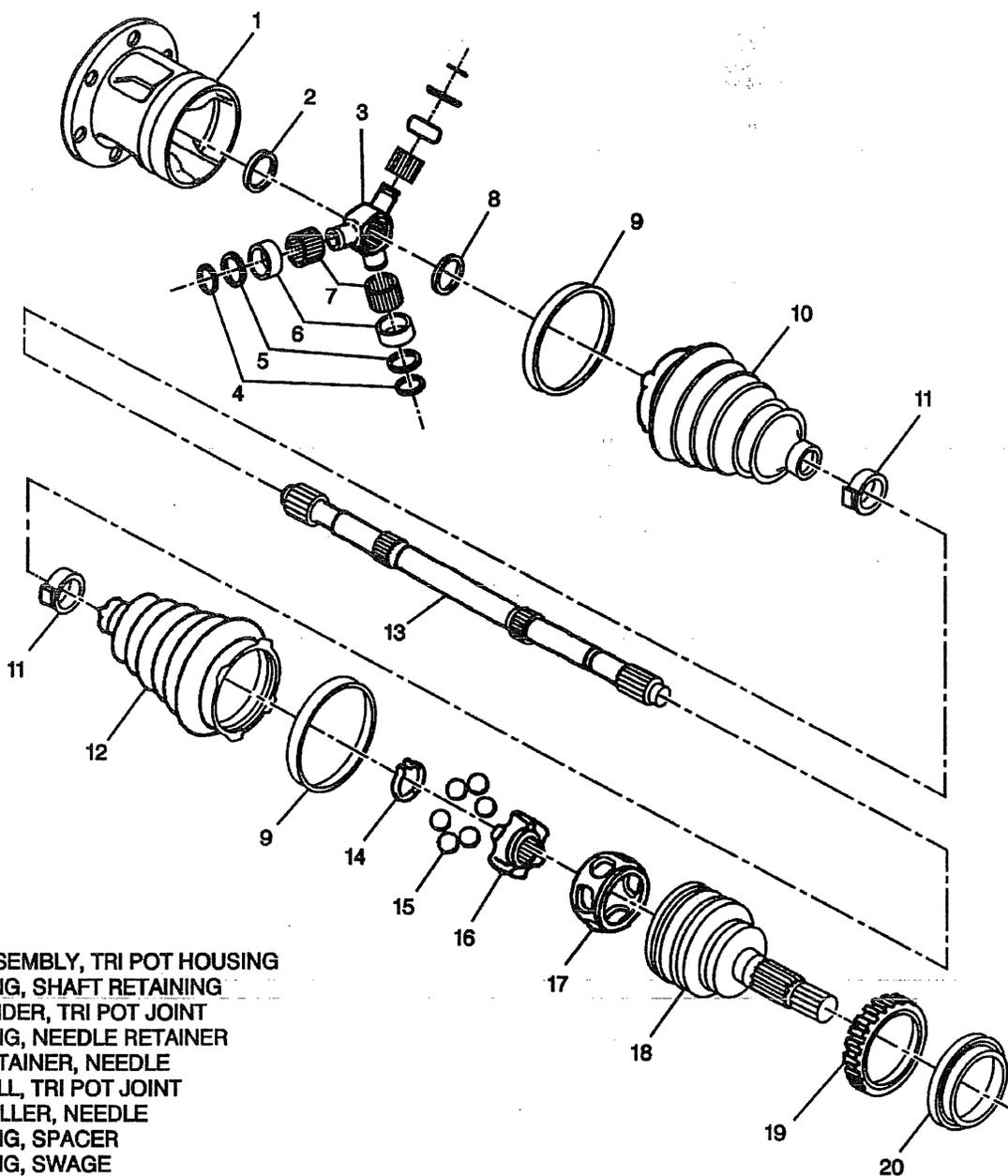
1. Inner race (16) into the cage (17) (Figure 25).
  - A. Rotate into place. Cage with inner race to the outer race (Figure 25).
  - B. Align the cage windows with the lands. Pivot the cage into position (Figure 24).
  - C. Make sure the retaining side of the inner race faces out.
2. Balls (15) (Figure 23).
  - Tap on the cage with a brass drift to tilt it enough to install the balls.
3. Small seal-retaining clamp (11) on the neck of the new seal (13). Do not crimp.
  - A. Slide the seal (12) onto the axle shaft (13) and position the neck of the seal in the seal groove on the axle shaft.
  - B. Crimp the self retaining clamp (11) using J 35910.

 **Tighten**

- Retaining clamp (12) to 136 N.m (100 lb. ft.) (Figure 21).
- C. Place approximately half of the grease provided inside the seal (12) and repack the C/V with the remaining grease.
4. Swage ring (9).
    - A. Pinch by hand slightly to distort into an oval shape and slide onto large diameter of the seal (12).
    - B. Push C/V joint onto axle shaft (13) until retaining ring (14) is seated in groove on axle shaft (Figure 26).
    - C. Slide large diameter of the seal (12) with the large swage ring (9) in place over the outside of the C/V joint race (18) and locate the seal lip in the housing groove (Figure 22).

 **Important**

- The seal (12) must not be dimpled, stretched or out of shape in any way. If the seal is not shaped correctly, carefully insert a thin flat blunt tool without no sharp edges between the large seal opening and the outer race (18) at maximum clearance of oval ring (9) to release the air. Shape the seal by hand and remove the tool.
- D. Refer to the chart in Figure 22 and select the correct size swage clamp tool J 36652.
  - E. Mount the proper size swage clamp tool in the vise and proceed as follows:
    1. Position the outboard end of the axle assembly in the tool.
    2. Place the top half of the tool on the lower half of the tool and check for proper alignment.
    3. Insert the bolts and tighten by hand until snug.



1. ASSEMBLY, TRI POT HOUSING
2. RING, SHAFT RETAINING
3. SPIDER, TRI POT JOINT
4. RING, NEEDLE RETAINER
5. RETAINER, NEEDLE
6. BALL, TRI POT JOINT
7. ROLLER, NEEDLE
8. RING, SPACER
9. RING, SWAGE
10. SEAL, TRI POT JOINT
11. CLAMP, SEAL RETAINING
12. SEAL, C/V JOINT
13. SHAFT, AXLE
14. RING, RACE RETAINING
15. BALL
16. RACE, C/V JOINT INNER
17. CAGE, C/V JOINT
18. RACE, C/V JOINT OUTER
19. RING, SENSOR
20. RING, DEFLECTOR

3104R4408

**Figure 20—Front Drive Axle Components**

# 4C-16 FRONT DRIVING AXLE

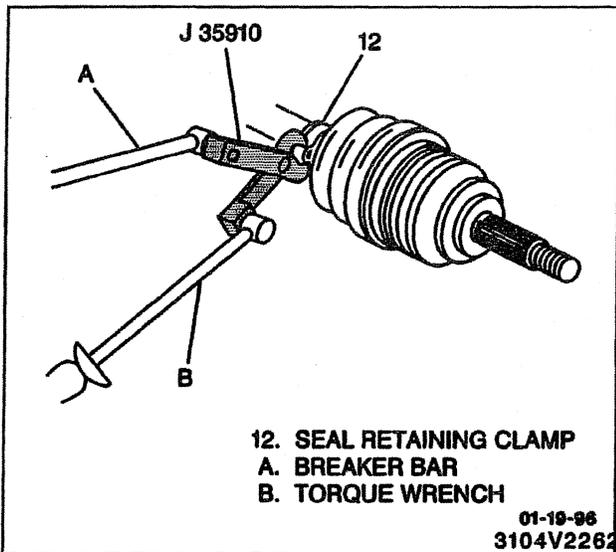


Figure 21—Installing Seal Retaining Clamp

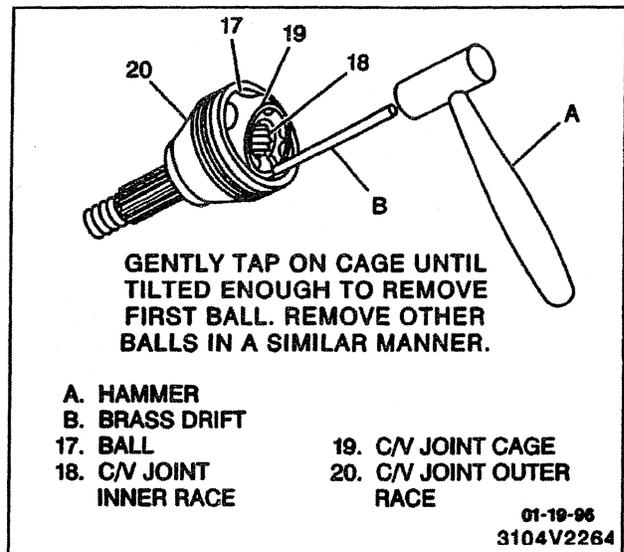


Figure 23—Removing C/V Joint Balls

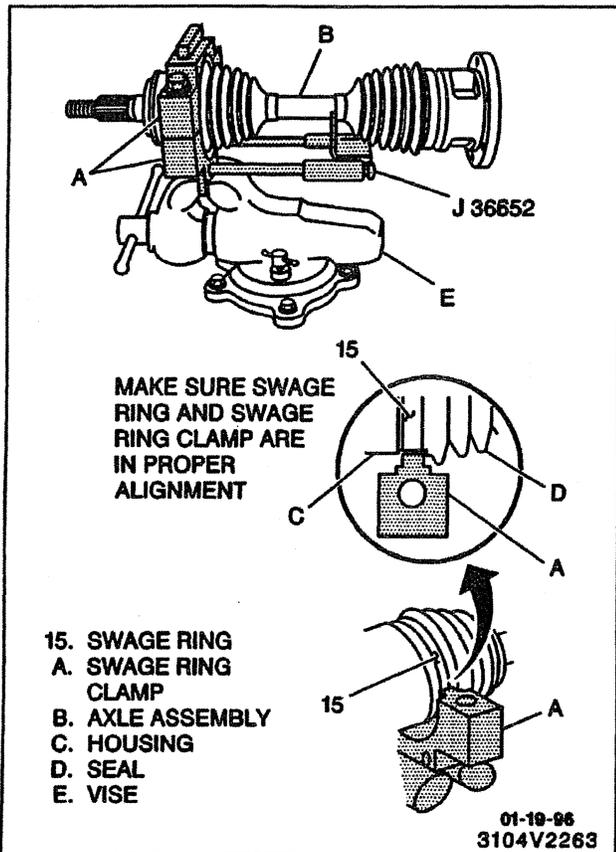


Figure 22—Installing Swage Ring

## ! Important

• Make sure the seal (12), housing (18), and swage ring (9) all remain in alignment (Figure 22).

4. Continue to tighten each bolt 180 degrees at a time alternately until both sides are bottomed.

F. Remove the axle assembly from the tool.

## ⇄ Install or Connect (Figures 13 and 14)

1. Small seal-retaining clamp (11) on the neck of the new seal (12). Do not crimp.
  - A. Slide the seal (12) onto the axle shaft (13) and position the neck of the seal in the seal groove on the axle shaft.
  - B. Crimp the self-retaining clamp (11) with J 35910 to 136 N.m (100 lb. ft.) (Figure 26).

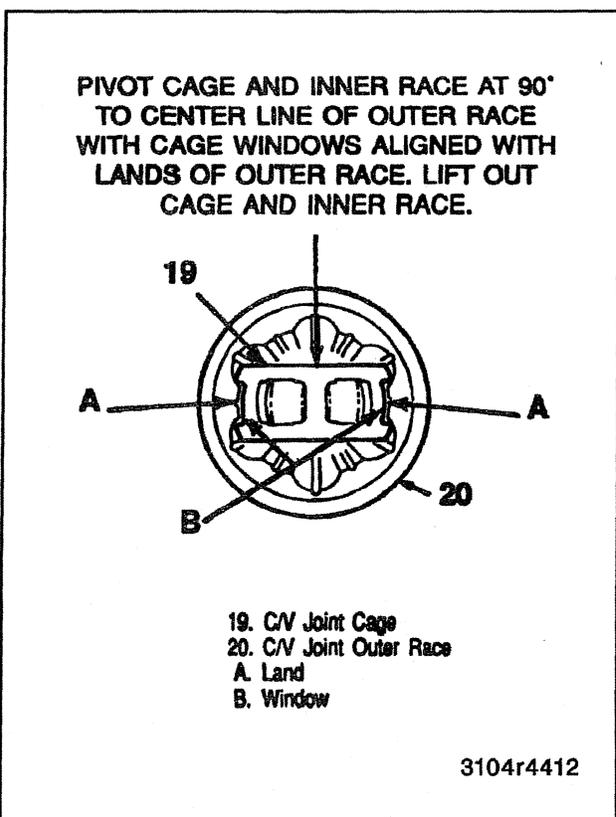


Figure 24—Separating Outer Race and Cage

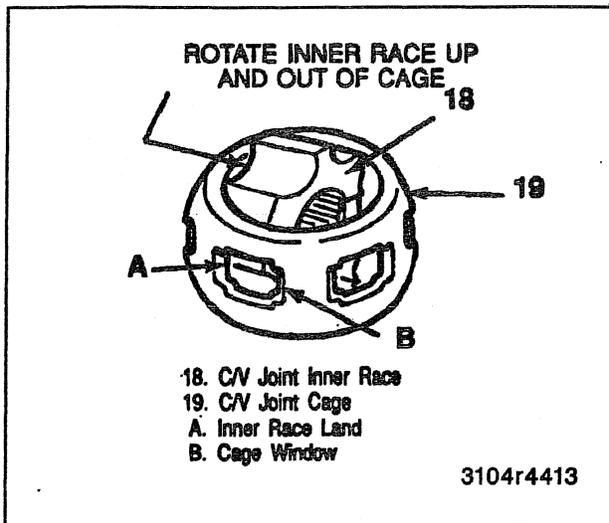


Figure 25—Separating Inner Race and Cage

- C. Place approximately half of the grease provided inside the seal (12) and repack the C/V with the remaining grease.
2. Swage ring (9).
  - A. Pinch by hand slightly to distort into an oval shape and slide onto large diameter of the seal (12).
  - B. Push C/V joint onto axle shaft (13) until retaining ring (14) is seated in groove on axle shaft.
  - C. Slide large diameter of the seal (12) with the large swage ring (9) in place over the outside of the C/V joint race (18) and locate the seal lip in the housing groove.

## INNER CV JOINT/BOOT (TRIPOT HOUSING) REPLACEMENT

### Disassemble (Figures 20 and 29)

**Tools Required:**

- J 8059 Snap Ring Pliers
- J 35910 Seal Clamp Tool
- J 36652 Swage Clamp Tool

1. Large swage ring (9) from the tripot joint, using a chisel, and discard.

### Important

- Do not cut through the seal (10) with the chisel and damage the sealing surface of the tripot outer housing (1).
2. Small seal-retaining clamp (11) from the axle shaft (13) with a side cutter, and discard.
    - Separate seal (10) from the tripot housing (1) at the large diameter and slide the seal away from the joint along the axle shaft (13).
  3. Tripot housing (1) from the spider (3) and shaft.
    - Spread the spacer ring (8) with J 8059 and slide the spacer ring and the tripot spider (3) back on the axle shaft (13).
  4. Shaft retaining ring (2) from the groove on the axle shaft (13) and slide the spider assembly off the shaft (Figure 28).

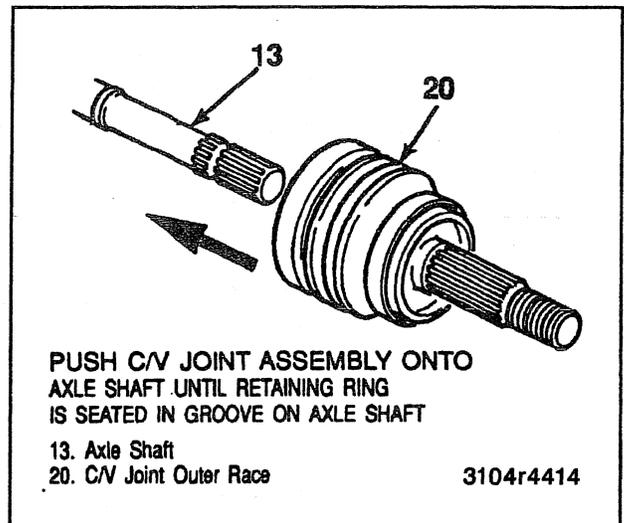


Figure 26—Installing C/V Joint to Axle

### Important

- Handle the tripot spider assembly with care or the tripot balls and needle rollers may separate from the spider trunions.
5. Remove the spacer ring (8) and the seal (10) from the axle shaft (13).
  6. Flush grease from the housing.

### Assemble (Figures 20, 21, 27 through 30)

1. Small seal-retaining clamp (11) on the neck of the seal (10).
  - Do not crimp.
2. Slide the seal (10) onto the shaft (13) and position the neck of the seal in the seal groove on the axle shaft.

### Tighten

- Crimp seal retaining clamp (11) with J 35910 to 136 N·m (100 lb. ft.) (Figure 21).

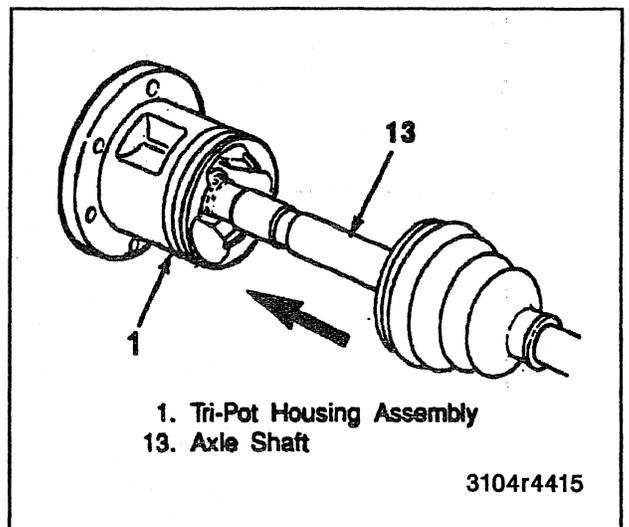


Figure 27—Installing Tripot to Housing

## 4C-18 FRONT DRIVING AXLE

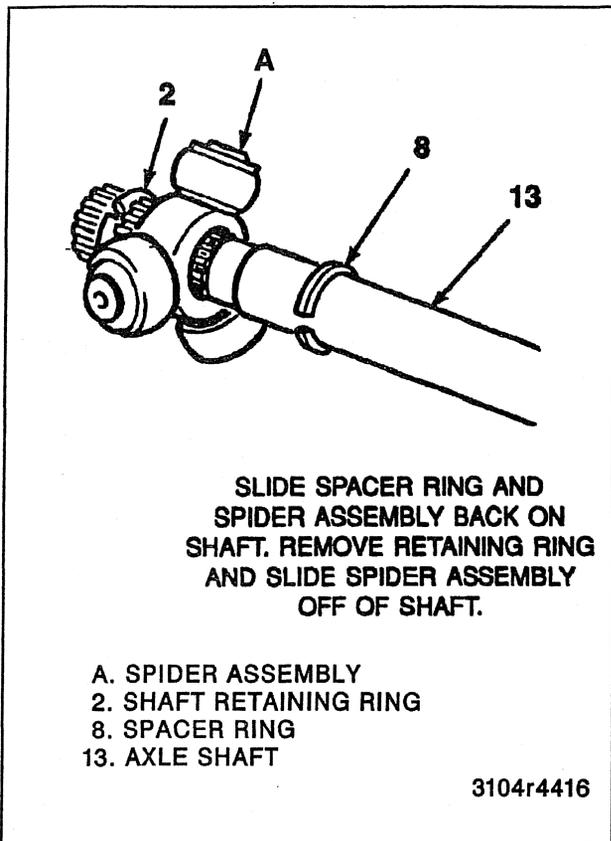


Figure 28—Removing Spider Assembly

3. Spacer ring (8) on the front axle shaft (13) and beyond the second groove as shown in Figure 29.
  - Slide the tripot spider assembly against the spacer ring (8) and the shaft (13).

**!** Important

- Be sure that the counterbored face of the tripot spider (3) faces the end of the shaft (13).
4. Shaft retaining ring (2) in the groove of the axle shaft (13) with J 8059.
  5. Slide the tripot spider (3) towards the end of the shaft (13) and reseal the spacer ring (8) in the groove on the axle (Figure 29).
    - A. Place approximately half of the grease provided in the seal (10) and use the remainder to repack the tripot housing (1).
  6. Pinch the swage ring (9) by hand slightly to distort it into an oval shape and slide it onto the large diameter of the seal (12).
  7. Slide the tripot housing (1) over the tripot spider assembly on the shaft (13) (Figure 27).
  8. Slide the large diameter of the seal (10) with the large swage ring (9) in place over the outside of the tripot housing (1) and locate the seal lip in the housing groove.
  9. Position the tripot assembly at the proper vehicle dimension as shown in Figure 30.

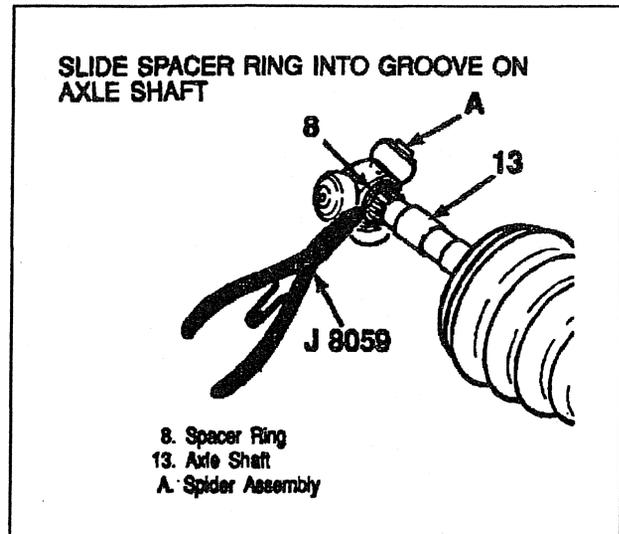


Figure 29—Installing Spider Assembly

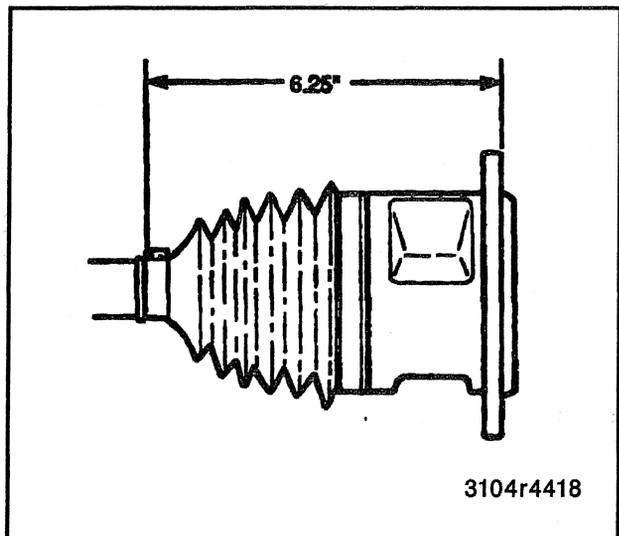


Figure 30—Tripot Seal Installation Measurements

**!** Important

- The seal (12) must not be dimpled, stretched or out of shape in any way. If the seal is not shaped correctly, slide the swage ring (9) off the seal and onto the housing (1). Carefully insert a thin, flat, blunt tool between the seal opening and the housing to release the air. Shape the seal properly by hand and remove the tool. (Figure 20).
10. Return the swage ring (9) to position on seal (12).
    - Refer to the chart in Figure 22 and select the proper size swage clamp tool J 36652.
  11. Mount the swage clamp tool in the vise and proceed as follows:
    - A. Position the inboard end of the axle assembly in the tool.
    - B. Place the top half of the proper size tool on the lower half of tool and check for proper alignment and dimension (Figures 22 and 30).
    - C. Insert the bolts and tighten by hand until snug.

**! Important**

- Make sure that the seal, housing, and swage ring (15) all remain in alignment (Figure 22).

- D. Continue to tighten each bolt 180 degrees at a time, alternating until both sides are bottomed.
- 12. Remove the axle assembly from the tool.

**SPECIFICATIONS**

**FASTENER TIGHTENING SPECIFICATIONS**

Item	N·m	Lb. Ft.
Axle Shaft Tube to Carrier Bolts.....	40	30
Brake Pipe Support Bracket Nut.....	18	13
Carrier Frame Screws.....	22	16
Carrier Mounting Bolts and Nuts.....	110	80
Drive Axle (Halfshaft) Nut at Front Hub.....	225	165
Drive Axle (Halfshaft) Bolts.....	78	58
Engagement Switch.....	20	15
Front Differential Carrier Shield Bolts.....	34	25
Lower Shock Absorber Mounting Nut.....	73	54
Outer Tie Rod Nut.....	47	35
Plug, Drain and Fill.....	33	24
Right Side Axle Tube to Frame Nuts		
K1, K2 Models.....	100	75
K3 Models.....	145	106
Stabilizer Bar Clamp to Frame Bolts.....	33	24
Thermal Actuator.....	22	16
Universal Joint Clamp Bolts.....	20	15
Upper Control Arm Stud Nut.....	100	75

**LUBRICATION**

Capacity

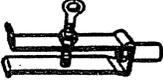
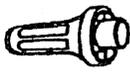
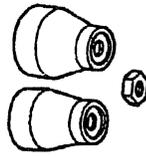
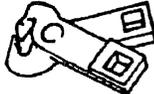
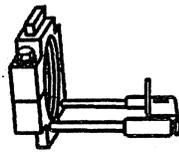
Fill to the level of the filler plug hole.

K2 Models.....	1.66L	1.75 Qt.
K3 Models.....	2.13L	2.25 Qt.
Type Recommended.....	SAE 80W-90 GL5 Gear Lubricant (SAE 80W GL5 in Canada)	

T2111

# 4C-20 FRONT DRIVING AXLE

## SPECIAL TOOLS

- |     |   |           |  |  |
|-----|---|-----------|--|--|
| 1.  |      | J 29369-1 |  |  |
| 2.  |      | J 29369-2 |  |  |
| 3.  |      | J 34011   |  |  |
| 4.  |      | J 22833   |  |  |
| 5.  |      | J 36366   |  |  |
| 6.  |      | J 36600   |  |  |
| 7.  |      | J 36609   |  |  |
| 8.  |      | J 33842   |  |  |
| 9.  |      | J 36616   |  |  |
| 10. |     | J 36845   |  |  |
| 11. |     | J 35910   |  |  |
| 12. |    | J 36605   |  |  |
| 13. |     | J 24319-B |  |  |
| 14. |     | J 8614-01 |  |  |
| 15. |  | J 28733-B |  |  |
| 16. |   | J 8059    |  |  |
| 17. |   | J 36652   |  |  |

1. AXLE TUBE BEARING REMOVER (K2 MODELS)
2. AXLE TUBE BEARING REMOVER (K3 MODELS)
3. DIFFERENTIAL PILOT BEARING REMOVER
4. AXLE TUBE SEAL INSTALLER (K3 MODELS)
5. PINION OIL SEAL INSTALLER
6. AXLE TUBE SEAL INSTALLER (K2 MODELS)
7. AXLE TUBE BEARING INSTALLER
8. DIFFERENTIAL PILOT BEARING INSTALLER
9. CARRIER CASE BEARING INSTALLER
10. DRIVE AXLE BOOT CLAMP PROTECTOR INSTALLER
11. SEAL CLAMP TOOL
12. KNUCKLE SEAL INSTALLER
13. STEERING LINKAGE PULLER
14. PINION FLANGE HOLDER
15. FRONT HUB SPINDLE REMOVER
16. SNAP RING PLIERS
17. SWAGE CLAMP TOOL

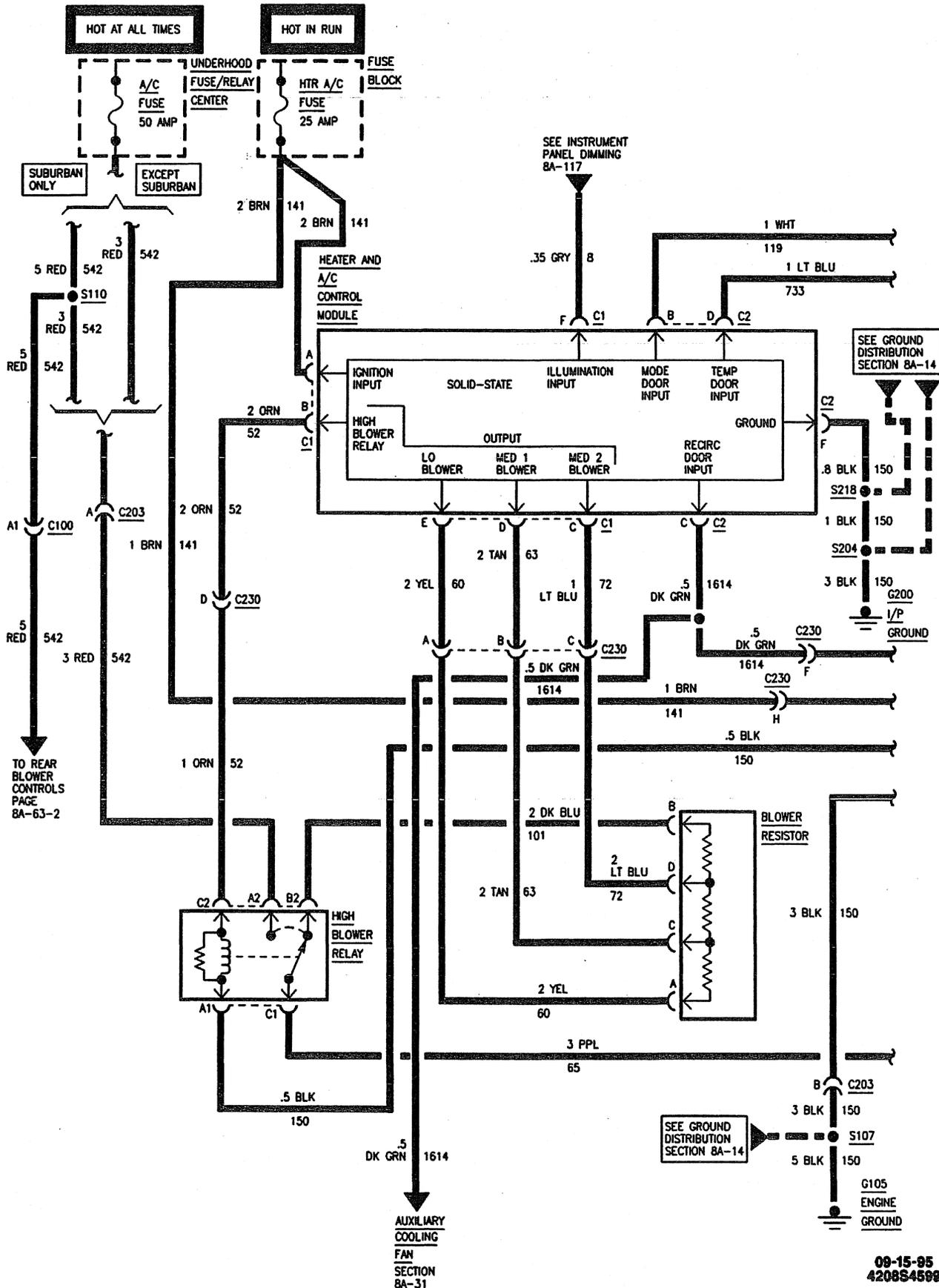
01-19-96  
3104V226E

**SECTION 8A**  
**ELECTRICAL DIAGNOSIS**  
**1995 C/K TRUCK SUPPLEMENT**

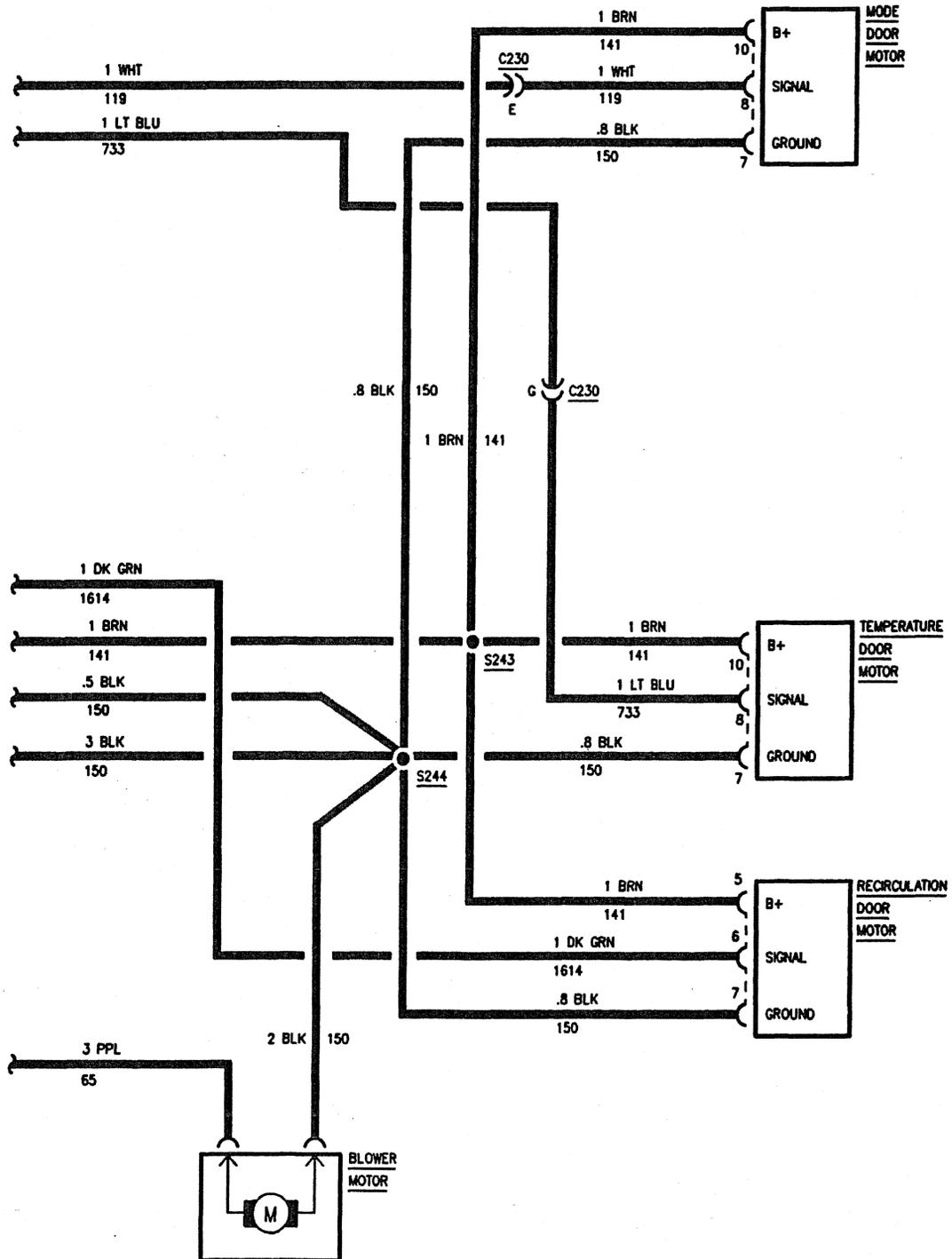
**SECTION**

- 65 HVAC Air Delivery and Temperature Controls

# HVAC AIR DELIVERY AND TEMPERATURE CONTROLS FRONT VENTILATION CONTROLS

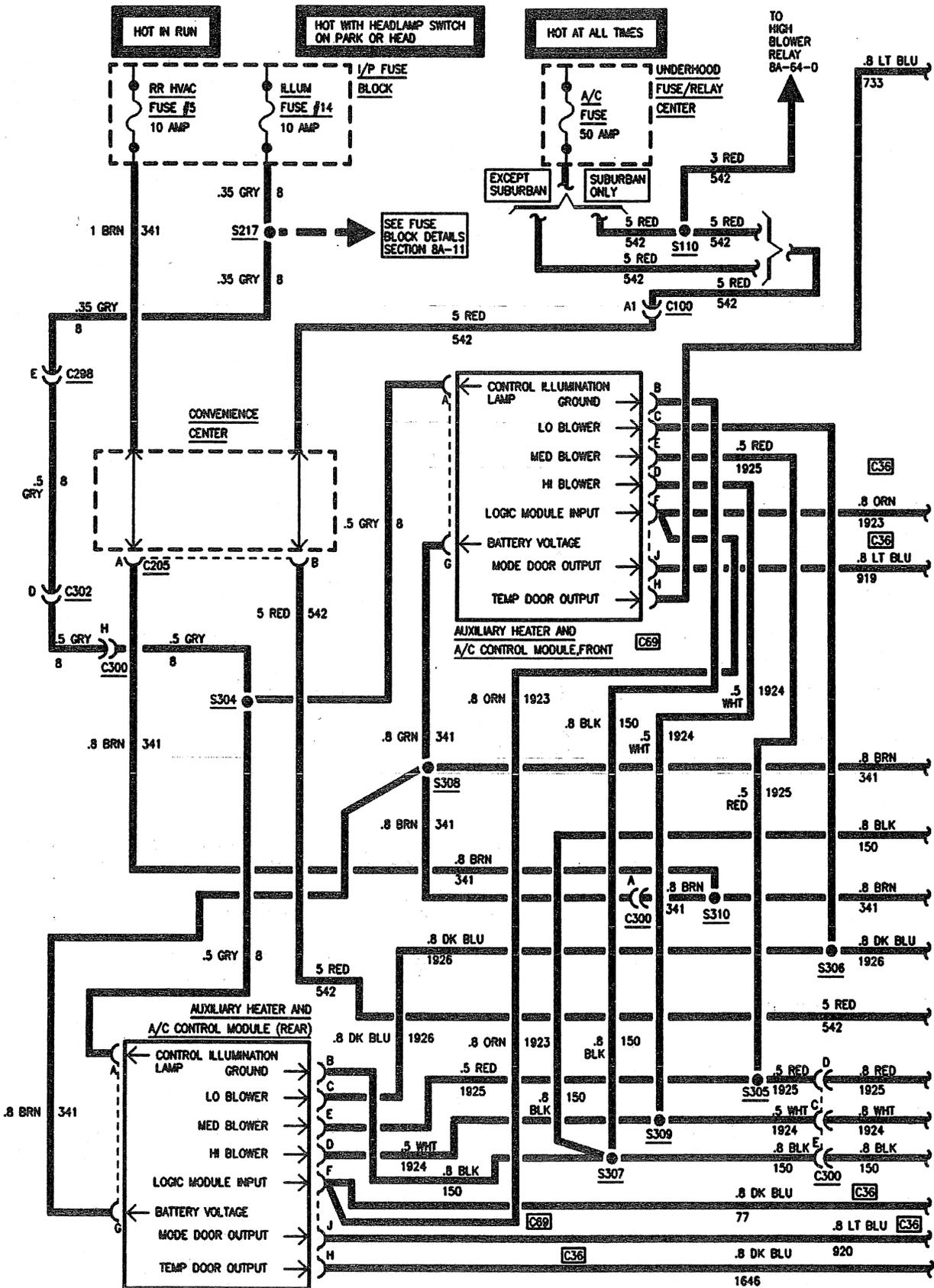


HVAC AIR DELIVERY AND TEMPERATURE CONTROLS  
FRONT VENTILATION CONTROLS

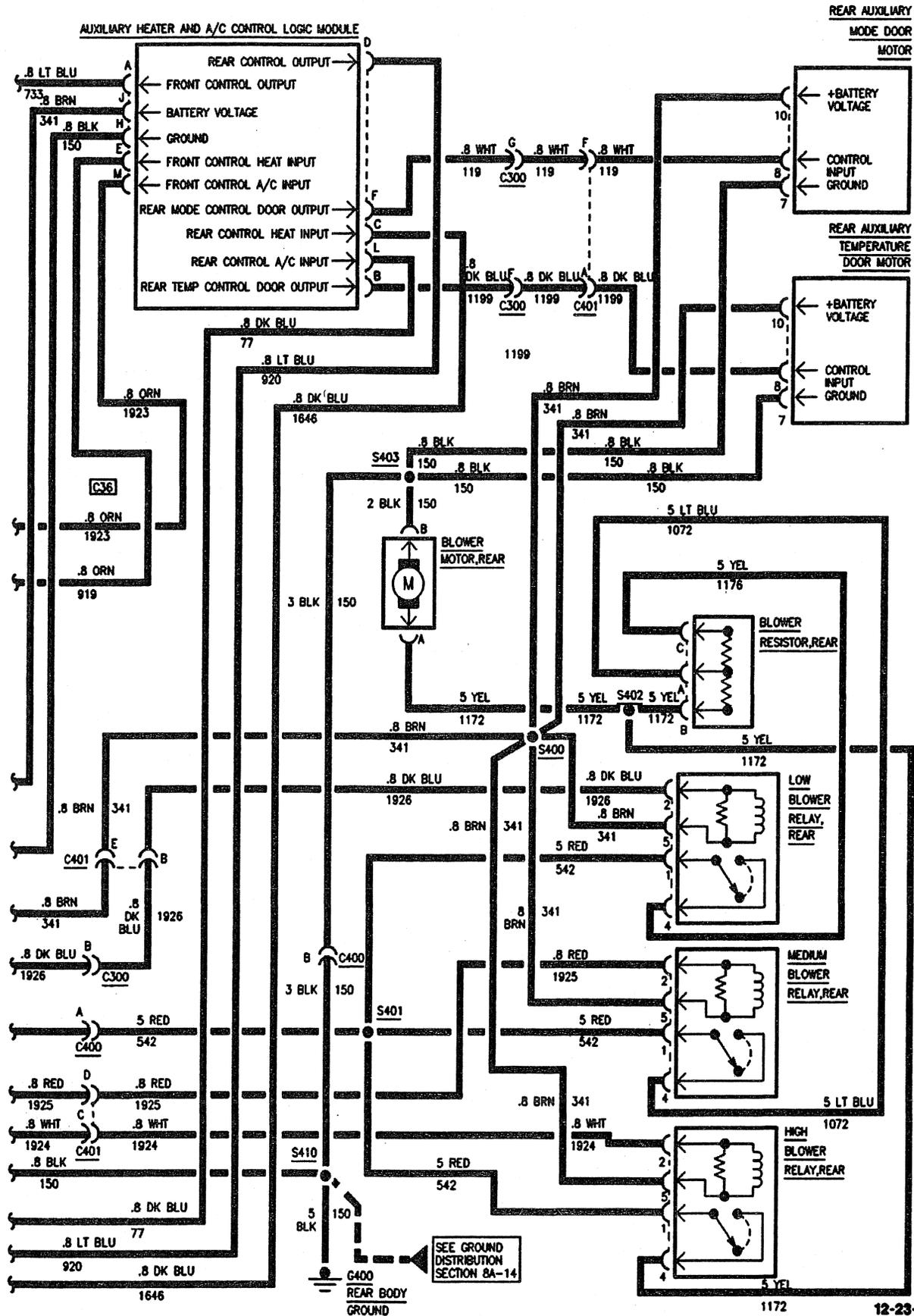


8A - 65 - 2 ELECTRICAL DIAGNOSIS

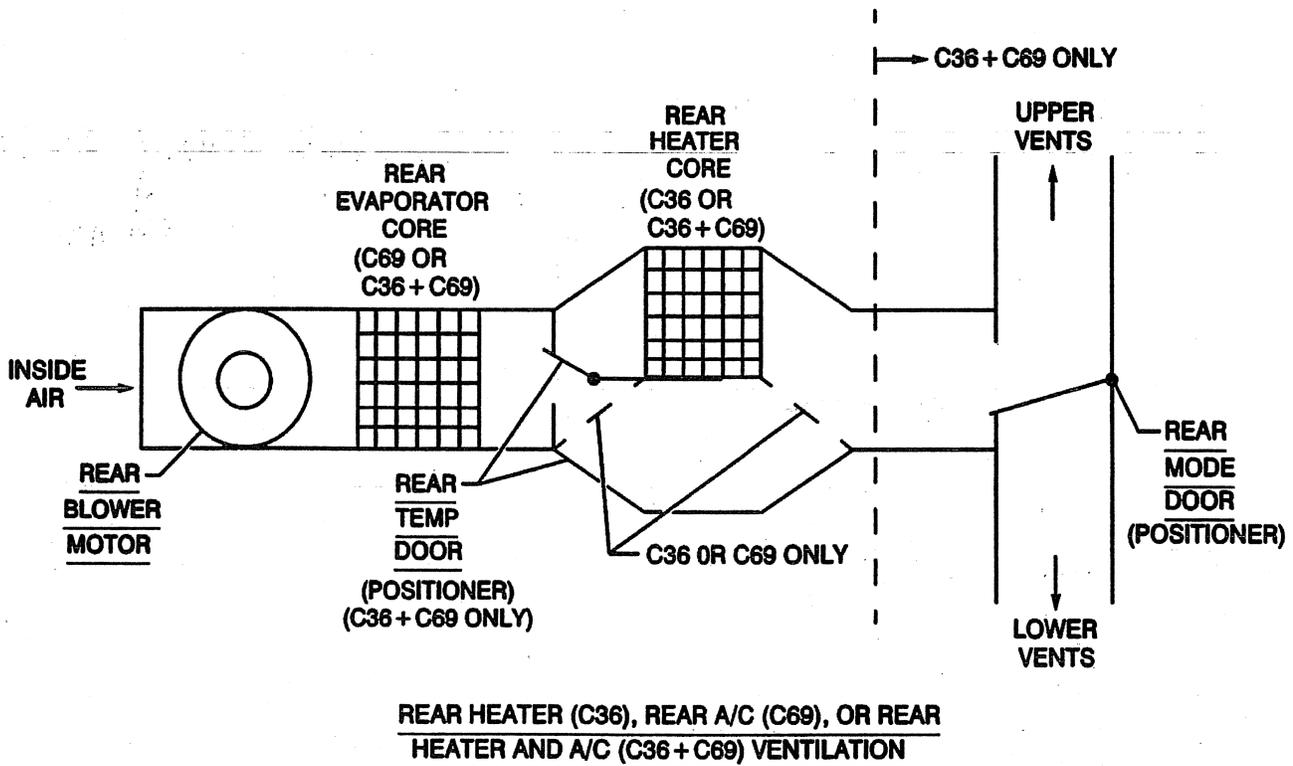
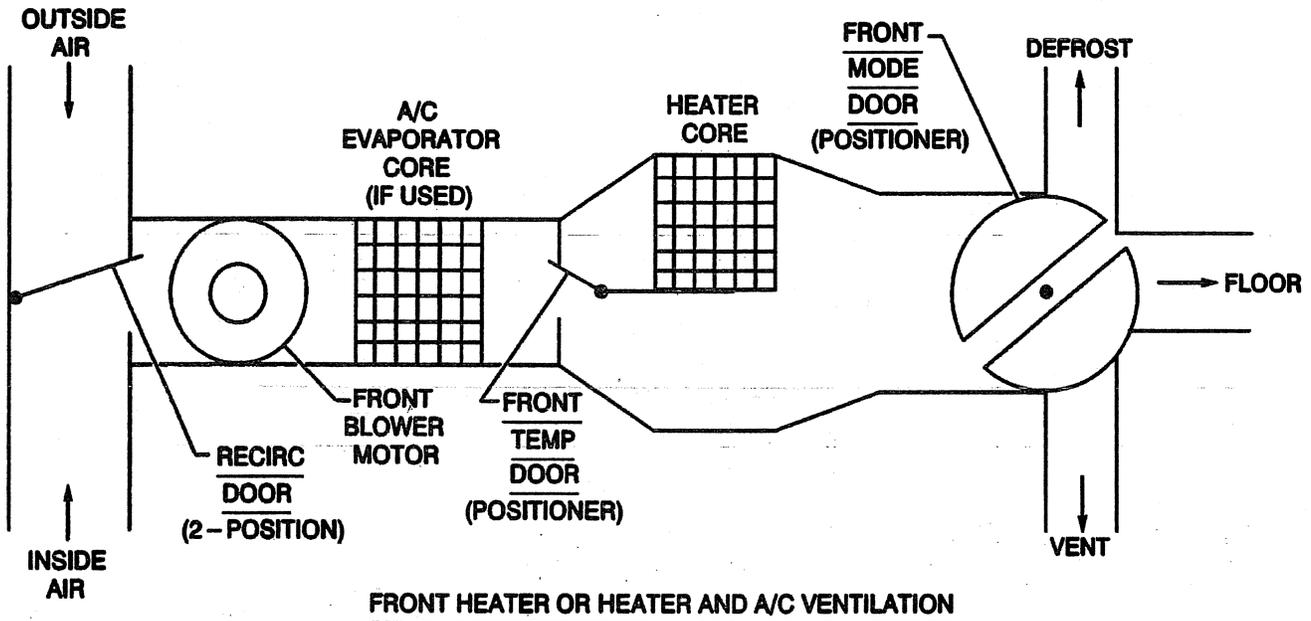
HVAC AIR DELIVERY AND TEMPERATURE CONTROLS  
REAR VENTILATION CONTROLS (C36 & C69)



HVAC AIR DELIVERY AND TEMPERATURE CONTROLS  
 REAR VENTILATION CONTROLS (C36 & C69)



**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**  
**VENTILATION FLOW SELECTION**



## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

COMPONENT	LOCATION	201-PG	FIG.	CONN
Auxiliary Heater and A/C Control Assembly, Front .....	Front of overhead console .....	38	.....	45
Auxiliary Heater and A/C Control, Rear .....	Rear of overhead console molding, in headliner			
Auxiliary Heater and A/C Logic Module .....	Rear of overhead console molding, in headliner			
Blower Motor .....	Under RH side of I/P .....	36	.....	43
Blower Motor, Rear .....	Behind RH rear wheelwell			
Blower Resistor Block .....	Under RH side of I/P, on HVAC plenum, center area .....	36	.....	43
Convenience Center - I/P Harness .....	Under LH side of I/P, on bulkhead .....	34	.....	41
Fuse Block - I/P Harness .....	Lower LH side of I/P .....	26	.....	31
High Blower Relay .....	Under I/P, on top of HVAC plenum .....	36	.....	43
High Blower Relay, Rear (auxiliary HVAC) .....	On auxiliary HVAC plenum, forward of LH rear wheelhouse .....	47	.....	56
Low Blower Relay, Rear .....	On auxiliary heater and A/C module .....	47	.....	56
Medium Blower Relay, Rear .....	On auxiliary heater and A/C module .....	47	.....	56
Mode Door Motor (Module) .....	Under I/P, on heater-A/C plenum, LH side .....	36	.....	43
Recirculation Door Motor .....	Under I/P, on heater-A/C case			
Temperature Door Motor (Module), Front .....	Under I/P, on heater-A/C plenum, center area .....	36	.....	43
Underhood Fuse-Relay Center .....	LH rear of engine compartment, on fender .....	5	.....	8
<b>CONNECTORS:</b>				
C100 .....	LH rear of engine compartment at bulkhead .....	7	.....	10
C203 .....	Behind RH portion of I/P, near heater motor, in foam wrap .....	28	.....	33
C298 .....	Behind LH side of I/P, near convenience center .....	27	.....	32
C300 .....	In overhead console			
C400 .....	RH rear of vehicle, above auxiliary blower motor			
C401 .....	RH rear of vehicle, above auxiliary blower motor			
<b>GROUNDS:</b>				
G105 (VIN P) .....	RH top rear of cylinder head .....	15	.....	18
G105 (VIN Z, H, K) .....	RH front wheelhouse .....	1	.....	4
G200 .....	Behind LH side of I/P, below fuse block			
G400 .....	RH "B" pillar .....	41	.....	49

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

<b>COMPONENT</b>	<b>LOCATION</b>	<b>201-PG FIG. CONN</b>
<b>SPLICES:</b>		
S107 (VIN F).....	Engine harness, 5 cm from transmission harness breakout	
S107 (VIN P).....	Engine harness, 5 cm from transmission harness breakout	
S107 (VIN S).....	Engine harness, 5 cm from transmission harness breakout	
S107 (VIN Z, H, K, N).....	Engine harness, approx. 5 cm from generator breakout	
S110 (VIN H, K, N).....	Engine harness, approx. 21 cm from C100	
S110 (VIN P).....	Engine harness, 15 cm from generator breakout	
S110 (VIN S).....	Engine harness, 29 cm from C100	
S118.....	Diesel positive battery harness, 18 cm into generator breakout	
S204.....	I/P harness, approx. 4 cm left of steering column connector breakout	
S217.....	I/P harness, approx. 12 cm right of fuse block breakout	
S217 (Crew Cab, VIN F).....	I/P harness approx. 12 cm right of breakout for LH door jamb switch	
S217 (Diesel).....	I/P harness, approx. 12 cm right of headlamp dimmer switch breakout	
S243.....	HVAC harness, 4 cm from recirc door breakout	
S244.....	HVAC harness, 4 cm from recirc door breakout	
S304 (Suburban).....	Rear HVAC control harness, 31 cm forward of HVAC logic module breakout	
S305 (Suburban).....	Rear HVAC control harness, 31 cm forward of HVAC logic module breakout	
S306 (Suburban).....	Rear HVAC control harness, 19 cm forward of HVAC logic module breakout	
S307 (Suburban).....	Rear HVAC control harness, 10 cm forward of HVAC logic module breakout	
S308 (Suburban).....	Rear HVAC control harness, 5 cm rear of HVAC logic module breakout	
S309 (Suburban).....	Rear HVAC control harness, 12 cm rear of HVAC logic module breakout	
S310 (Suburban).....	Front to rear body harness, 6 cm from front dome lamp breakout	
S401 (Rear A/C).....	Rear A/C harness, 23 cm from blower motor relays	
S401 (Rear Heat & A/C).....	Rear heat and A/C harness, 13 cm from blower motor relays breakout	
S402 (Rear A/C).....	Rear A/C harness, 7 cm from blower motor resistor breakout	
S402 (Rear Heat & A/C).....	Rear heat and A/C harness, 7 cm from blower motor resistor breakout	

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

<b>COMPONENT</b>	<b>LOCATION</b>	<b>201-PG FIG. CONN</b>
S403 (Rear Heat & A/C) .....	Rear heat and A/C harness, 7 cm from blower motor resistor breakout	
S410 (2-Door Utility).....	Front to rear lamps harness, 12 cm from RH rear door speaker breakout	
S410 (4-Door Utility).....	Front to rear lamps harness, 22 cm from RH rear door speaker breakout	
S410 (Suburban).....	Front to rear lamps harness, 12 cm from RH rear door speaker breakout	

**DIAGNOSIS - HVAC AIR DELIVERY AND VENTILATION****TROUBLESHOOTING HINTS: FRONT**

1. CHECK condition of HTR-A/C FUSE. If Fuse is open, LOCATE and REPAIR cause of overload and REPLACE Fuse.
2. CHECK that Grounds G105 and G200 are clean and tight.

**TROUBLESHOOTING HINTS: REAR AUXILIARY**

1. CHECK condition of RR HVAC FUSE 5. If Fuse is open, LOCATE and REPAIR cause of overload and REPLACE Fuse.
2. CHECK that Ground G400 is clean and tight.

**TROUBLESHOOTING HINTS: GENERAL**

1. See SECTION 8A-117 for diagnosis of the Instrument Panel Dimming Illumination lamp circuits.
2. If the Mode or Temperature Doors do not operate smoothly in response to control Dial changes, the rheostat in the Module may be bad or a ground connection from the Module may be open.
  - CHECK for a broken (or partially broken) wire inside the insulation which could cause system malfunction but prove "GOOD" in a Continuity/Voltage check with a system disconnected. These Circuits may be intermittent or resistive when loaded, and if possible, should be checked by monitoring for a Voltage drop with the system operational (under load).
  - CHECK for proper installation of aftermarket electronic equipment which may affect the integrity of other system (see "Troubleshooting Procedures," page 8A-4-0).

**8A - 65 - 8 ELECTRICAL DIAGNOSIS**

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

**FRONT VENTILATION CONTROLS DO NOT OPERATE**

TEST	RESULT	ACTION
1. Place Ignition Switch in Run. Disconnect Connector at Mode Door Motor. Connect a test lamp between Mode Door Motor Connector Cavity "10" and ground.	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (141) wire between I/P Fuse Block and Splice S243.
2. Connect self-powered test lamp between Mode Door Motor Connector Cavity "7" and ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Splice S244 and Ground G105.
3. Disconnect Connector C2 at Heater and A/C Control Module. Connect a test lamp between Heater and A/C Control Module Connector C2 Cavity "A" and ground.	Test lamp lights.	GO to step 4.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (141) wire between I/P Fuse Block and Heater and A/C Control Module.
4. Connect self-powered test lamp between Heater and A/C Control Module Connector C2 Cavity "F" and ground.	Test lamp lights.	REPLACE Heater and A/C Control Module.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Heater and A/C Control Module and Ground G200.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

## FRONT MODE DOOR MOTOR DOES NOT OPERATE

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Mode Door Motor. Place Blower Switch on the Heater and A/C Control Panel in LO. Observe that the Blower Motor is operating. Connect a Voltmeter from Mode Door Motor Connector Cavity "8" to ground. Adjust the position of the Mode Control Dial on the Heater and A/C Control Module while observing Voltmeter response.	Smooth variable Voltage observed.	GO to step 5.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 2.
2. Disconnect Connector C2 at Heater and A/C Control Module. Connect a test lamp from Heater and A/C Control Module Connector C2 Cavity "B" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on WHT (119) wire between Heater and A/C Control Module and Mode Door Motor.
	Test lamp does not light.	GO to step 3.
3. Connect self-powered test lamp between Heater and A/C Control Module Connector C2 Cavity "B" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on WHT (119) wire between Heater and A/C Control Module and Mode Door Motor.
	Test lamp does not light.	GO to step 4.
4. Connect self-powered test lamp between Heater and A/C Control Module Connector C2 Cavity "B" and Mode Door Motor Connector Cavity "8".	Test lamp lights.	REPLACE Heater and A/C Control Module.
	Test lamp does not light.	LOCATE and REPAIR open on WHT (119) wire between Heater and A/C Control Module and Mode Door Motor.
5. Connect a test lamp between Mode Door Motor Connector Cavity "10" and ground.	Test lamp lights.	GO to step 6.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (141) wire between Splice S243 and Mode Door Motor.
6. Connect self-powered test lamp between Mode Door Motor Connector Cavity "7" and ground.	Test lamp lights.	REPLACE Mode Door Motor.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Mode Door Motor and Splice S244.

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

**FRONT TEMPERATURE DOOR MOTOR DOES NOT OPERATE**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Temperature Door Motor. Connect a Voltmeter from Temperature Door Motor Connector Cavity "8" and ground. Adjust the position of the Mode Control Dial on the Heater and A/C Control Module while observing Voltmeter response.	Smooth variable Voltage observed.	GO to step 5.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 2.
2. Disconnect Connector C2 at Heater and A/C Control Module. Connect a test lamp from Heater and A/C Control Module Connector C2 Cavity "D" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on LT BLU (733) wire between Heater and A/C Control Module and Temperature Door Motor.
	Test lamp does not light.	GO to step 3.
3. Connect self-powered test lamp between Heater and A/C Control Module Connector C2 Cavity "D" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on LT BLU (733) wire between Heater and A/C Control Module and Temperature Door Motor.
	Test lamp does not light.	GO to step 4.
4. Connect self-powered test lamp between Heater and A/C Control Module Connector C2 Cavity "D" and Temperature Door Motor Connector Cavity "8".	Test lamp lights.	REPLACE Heater and A/C Control Module.
	Test lamp does not light.	LOCATE and REPAIR open on LT BLU (733) wire between Heater and A/C Control Module and Temperature Door Motor.
5. Connect a test lamp between Temperature Door Motor Connector Cavity "10" and ground.	Test lamp lights.	GO to step 6.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (141) wire between Splice S243 and Temperature Door Motor.
6. Connect self-powered test lamp between Temperature Door Motor Connector Cavity "7" and ground.	Test lamp lights.	REPLACE Temperature Door Motor.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Temperature Door Motor and Splice S244.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

## RECIRCULATION DOOR MOTOR FAILS IN THE VENT POSITION

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Recirculation Door Motor. Connect a test lamp between Recirculation Door Motor Connector Cavity "5" and ground.	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (141) wire between Splice S243 and Recirculation Door Motor.
2. Connect self-powered test lamp between Recirculation Door Motor Connector Cavity "7" and ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Recirculation Door Motor and Splice S244.
3. Connect a test lamp between Recirculation Door Motor Connector Cavity "6" and ground. Place the Blower Switch on the Heater and A/C Control Module in LO. Observe that the Blower Motor is operating. Actuate the Recirculation Push-button on the Heater and A/C Control Module.	Test lamp lights	REPLACE Recirculation Door Motor.
	Test lamp does not light.	GO to step 4.
4. Disconnect Connector C2 at Heater and A/C Control Module. Connect a self-powered test lamp between Heater and A/C Control Module Connector C2 Cavity "C" and Recirculation Door Motor Connector Cavity "6".	Test lamp lights.	GO to step 5.
	Test lamp does not light.	LOCATE and REPAIR open in DK GRN 1614 wire between Heater and A/C Control Module and Recirculation Door Motor.
5. Is this vehicle equipped with Auxiliary Cooling Fan?	No.	REPLACE Heater and A/C Control Module.
	Yes.	GO to step 6.
6. Disconnect Connector at Auxiliary Cooling Fan A/C Pressure Switch (See Section 8A-31). Connect self-powered test lamp between Auxiliary Cooling Fan A/C Pressure Switch Connector Cavity "A" and Recirculation Door Motor Connector Cavity "6".	Test lamp lights.	REPLACE Heater and A/C Control Module.
	Test lamp does not light.	LOCATE and REPAIR open in DK GRN (1614) wire between Auxiliary Cooling Fan A/C Pressure Switch and Splice S212. Note that Diode D101 (Page 8A-31-0) may be open.

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

**RECIRCULATION DOOR MOTOR FAILS IN THE RECIRCULATION POSITION**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Place Blower Switch in HI at the Heater and A/C Control Module. Disconnect Connector at Recirculation Door Motor. Is the Recirculation Door still in the recirculation position?	Yes.	REPLACE Recirculation Door Motor.
	No.	GO to step 2.
2. Disconnect Connector C3 at Heater and A/C Control Module. Connect self-powered test lamp from Heater and A/C Control Module Connector C2 Cavity "C" to ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	REPLACE Heater and A/C Control Module.
3. Is this an air conditioned vehicle with a Auxiliary Cooling Fan?	No.	LOCATE and REPAIR short to ground in DK GRN (1614) wire between Heater and A/C Control Module and Recirculation Door Motor.
	Yes.	GO to step 4.
4. Disconnect Connector at Auxiliary Cooling Fan A/C Pressure Switch. Disconnect Connector at Auxiliary Cooling Fan Temperature Switch. Remove Auxiliary Cooling Fan Relay from its socket. Connect self-powered test lamp from Auxiliary Cooling Fan A/C Pressure Switch Connector Cavity "A" to ground.	Test lamp lights.	LOCATE and REPAIR short to ground in DK GRN (1614) wire between Heater and A/C Control Module, Auxiliary Cooling Fan A/C Pressure Switch, and Recirculation Door Motor. If short is not found, then check that Diode D100 has not shorted.
	Test lamp does not light.	REPLACE Auxiliary Cooling Fan A/C Pressure Switch.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

## REAR VENTILATION CONTROLS DO NOT OPERATE FROM EITHER CONTROL MODULE

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Rear Auxiliary Mode Door Motor. Connect a test lamp between Rear Auxiliary Mode Door Motor Connector Cavity "10" and ground.	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between I/P Fuse Block and Rear Auxiliary Mode Door Motor.
2. Connect self-powered test lamp between Rear Auxiliary Mode Door Motor Connector Cavity "7" and ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Splice S403 and Ground G400.
3. Disconnect Connector at Front Auxiliary Heater and A/C Control Module. Connect a test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "G" and ground.	Test lamp lights.	GO to step 4.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between Splice S310 and Splice S308.
4. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "B" and ground.	Test lamp lights.	REPLACE Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Splice S307 and Splice S410.

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

**REAR AUXILIARY MODE DOOR DOES NOT OPERATE FROM EITHER CONTROL MODULE**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Place the Blower Switch at the Front Auxiliary Heater and A/C Control Module in OFF. Disconnect Connector at Rear Auxiliary Mode Door Motor. Connect a test lamp between Rear Auxiliary Mode Door Motor Connector Cavity "10" and ground.	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between Splice S400 and Rear Auxiliary Mode Door Motor.
2. Connect self-powered test lamp between Rear Auxiliary Mode Door Motor Connector Cavity "7" and ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Rear Auxiliary Mode Door Motor and Splice S403.
3. Connect Voltmeter between Rear Auxiliary Mode Door Motor Connector Cavity "8" and ground. Adjust the position of the Mode control Dial at the Front Auxiliary Heater and A/C Control Module while observing Voltmeter response.	Smoothly variable Voltage observed.	REPLACE Rear Auxiliary Mode Door Motor.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 4.
4. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect a test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "F" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on WHT (119) wire between Auxiliary Heater and A/C Control Logic Module and Rear Auxiliary Mode Door Motor.
	Test lamp does not light.	GO to step 5.
5. Connect self-powered test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "F" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on WHT (119) wire between Auxiliary Heater and A/C Control Logic Module and Rear Auxiliary Mode Door Motor.
	Test lamp does not light.	GO to step 6.
6. Connect self-powered test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "F" and Rear Auxiliary Mode Door Motor Connector Cavity "8".	Test lamp does not light.	LOCATE and REPAIR open in WHT (119) wire between Auxiliary Heater and A/C Control Logic Module and Rear Auxiliary Mode Door Motor.
	Test lamp lights.	REPLACE Auxiliary Heater and A/C Control Logic Module.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

## REAR AUXILIARY TEMPERATURE DOOR DOES NOT OPERATE FROM EITHER CONTROL MODULE

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Place Blower Switch at Front Auxiliary Heater and A/C Control Module in OFF. Disconnect Connector at Rear Auxiliary Temperature Door Motor. Connect a test lamp between Rear Auxiliary Temperature Door Motor Connector Cavity "10" and ground.	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between Splice S400 and Rear Auxiliary Temperature Door Motor.
2. Connect self-powered test lamp between Rear Auxiliary Temperature Door Motor Connector Cavity "7" and ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Rear Auxiliary Temperature Door Motor and Splice S403.
3. Connect Voltmeter between Rear Auxiliary Temperature Door Motor Connector Cavity "8" and ground. Adjust the position of the Temperature Control Dial at the Front Auxiliary Heater and A/C Control Module while observing Voltmeter response.	Smoothly variable Voltage observed.	REPLACE Rear Auxiliary Temperature Door Motor.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 4.
4. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect a test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "B" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on DK BLU (1199) wire between Auxiliary Heater and A/C Control Logic Module and Rear Auxiliary Temperature Door Motor.
	Test lamp does not light.	GO to step 5.
5. Connect self-powered test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "B" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on DK BLU (1199) wire between Auxiliary Heater and A/C Control Logic Module and Rear Auxiliary Temperature Door Motor.
	Test lamp does not light.	GO to step 6.
6. Connect self-powered test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "B" and Rear Auxiliary Temperature Door Motor Connector Cavity "8".	Test lamp does not light.	LOCATE and REPAIR open in DK BLU (1199) wire between Auxiliary Heater and A/C Control Logic Module and Rear Auxiliary Temperature Door Motor.
	Test lamp lights.	REPLACE Auxiliary Heater and A/C Control Logic Module.

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS**

**REAR CONTROL MODULE DOES NOT CONTROL REAR AUXILIARY DOORS**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Front Auxiliary Heater and A/C Control Module. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "F" and Auxiliary Heater and A/C Control Logic Module Connector Cavity "M".	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in ORN (1923) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
2. Connect a test lamp between Auxiliary Heater and A/C Control Logic Module Connector Cavity "J" and ground.	Test lamp lights.	GO to step 3.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between Splice S308 and Auxiliary Heater and A/C Control Logic Module.
3. Connect fused jumper wire from Auxiliary Heater and A/C Control Logic Module Pin "M" to ground. Connect fused jumper wire from Auxiliary Heater and A/C Control Logic Module Pin "J" to B+. Connect self-powered test lamp between Auxiliary Heater and A/C Control Logic Module Pins "D" and "B".	Test lamp lights.	GO to step 4.
	Test lamp does not light.	REPLACE Auxiliary Heater and A/C Control Logic Module.
4. Disconnect Connector at Rear Auxiliary Heater and A/C Control Module. Connect a test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "G" and ground.	Test lamp lights.	GO to step 5.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between Splice S308 and Rear Auxiliary Heater and A/C Control Module.
5. Connect self-powered test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "B" and ground.	Test lamp lights.	REPLACE Rear Auxiliary Heater and A/C Control Module.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Rear Auxiliary Heater and A/C Control Module and Spice S307.

**HVAC AIR DELIVERY AND TEMPERATURE CONTROLS****FRONT CONTROL MODULE DOES NOT CONTROL REAR AUXILIARY DOORS**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Front Auxiliary Heater and A/C Control Module. Connect a test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "G" and ground.	Test lamp lights.	GO to step 2.
	Test lamp does not light.	LOCATE and REPAIR open in BRN (341) wire between Splice S308 and Front Auxiliary Heater and A/C Control Module.
2. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "B" and ground.	Test lamp lights.	REPLACE Front Auxiliary Heater and A/C Control Module.
	Test lamp does not light.	LOCATE and REPAIR open in BLK (150) wire between Front Auxiliary Heater and A/C Control Module and Splice S307.

**REAR AUXILIARY MODE DOOR MOTOR DOES NOT OPERATE FROM FRONT CONTROL MODULE**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect Voltmeter from Auxiliary Heater and A/C Control Logic Module Connector Cavity "E" to ground. Adjust the Mode control Dial at the Front Auxiliary Heater and A/C Control Module while monitoring the Voltmeter indication.	Smooth variable Voltage observed.	REPLACE Auxiliary Heater and A/C Control Logic Module.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 2.
2. Disconnect Connector at Front Auxiliary Heater and A/C Control Module. Connect a test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "J" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on LT BLU (919) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 3.
3. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "J" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on LT BLU (919) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 4.
4. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "J" and Auxiliary Heater and A/C Control Logic Module Connector Cavity "E".	Test lamp does not light.	LOCATE and REPAIR open in LT BLU (919) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp lights.	REPLACE Front Auxiliary Heater and A/C Control Module.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

**REAR AUXILIARY TEMPERATURE DOOR MOTOR DOES NOT  
OPERATE FROM FRONT CONTROL MODULE**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect Voltmeter from Auxiliary Heater and A/C Control Logic Module Connector Cavity "A" to ground. Adjust the Temperature Control Dial at the Front Auxiliary Heater and A/C Control Module while monitoring the Voltmeter indication.	Smooth variable Voltage observed.	REPLACE Auxiliary Heater and A/C Control Logic Module.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 2.
2. Disconnect Connector at Front Auxiliary Heater and A/C Control Module. Connect a test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "H" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on LT BLU (733) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 3.
3. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "H" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on LT BLU (733) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 4.
4. Connect self-powered test lamp between Front Auxiliary Heater and A/C Control Module Connector Cavity "H" and Auxiliary Heater and A/C Control Logic Module Connector Cavity "A".	Test lamp does not light.	LOCATE and REPAIR open in LT BLU (733) wire between Front Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp lights.	REPLACE Front Auxiliary Heater and A/C Control Module.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

## REAR AUXILIARY MODE DOOR MOTOR DOES NOT OPERATE FROM REAR CONTROL MODULE

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect Voltmeter from Auxiliary Heater and A/C Control Logic Module Connector Cavity "D" to ground. Adjust the Mode control Dial at the Rear Auxiliary Heater and A/C Control Module while monitoring the Voltmeter indication.	Smooth variable Voltage observed.	REPLACE Auxiliary Heater and A/C Control Logic Module.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 2.
2. Disconnect Connector at Rear Auxiliary Heater and A/C Control Module. Connect a test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "J" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on LT BLU (920) wire between Rear Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 3.
3. Connect self-powered test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "J" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on LT BLU (920) wire between Rear Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 4.
4. Connect self-powered test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "J" and Auxiliary Heater and A/C Control Logic Module Connector Cavity "D".	Test lamp does not light.	LOCATE and REPAIR open in LT BLU (920) wire between Rear Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp lights.	REPLACE Rear Auxiliary Heater and A/C Control Module.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

**REAR AUXILIARY TEMPERATURE DOOR MOTOR DOES NOT  
OPERATE FROM REAR CONTROL MODULE**

TEST	RESULT	ACTION
1. Place Ignition Switch in RUN. Disconnect Connector at Auxiliary Heater and A/C Control Logic Module. Connect Voltmeter from Auxiliary Heater and A/C Control Logic Module Connector Cavity "C" to ground. Adjust the temperature Control Dial at the Rear Auxiliary Heater and A/C Control Module while monitoring the Voltmeter indication.	Smooth variable Voltage observed.	REPLACE Auxiliary Heater and A/C Control Logic Module.
	No Voltage, Erratic Voltage, or Fixed Voltage observed.	GO to step 2.
2. Disconnect Connector at Rear Auxiliary Heater and A/C Control Module. Connect a test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "H" and ground.	Test lamp lights.	LOCATE and REPAIR short to Voltage on DK BLU (1646) wire between Rear Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 3.
3. Connect self-powered test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "H" and ground.	Test lamp lights.	LOCATE and REPAIR short to ground on DK BLU (1646) wire between Rear Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp does not light.	GO to step 4.
4. Connect self-powered test lamp between Rear Auxiliary Heater and A/C Control Module Connector Cavity "H" and Auxiliary Heater and A/C Control Logic Module Connector Cavity "C".	Test lamp does not light.	LOCATE and REPAIR open in DK BLU (1646) wire between Rear Auxiliary Heater and A/C Control Module and Auxiliary Heater and A/C Control Logic Module.
	Test lamp lights.	REPLACE Rear Auxiliary Heater and A/C Control Module.

## HVAC AIR DELIVERY AND TEMPERATURE CONTROLS

### CIRCUIT OPERATION

#### FRONT VENTILATION CONTROLS

The Front Air Delivery and Temperature Controls are provided for vehicles with Heating and Air Conditioning as well as for vehicles with Heater alone. The Heater only option's Heater Control Module operates similarly to the Heater and A/C Control Module except that the A/C Push-button and Temperature Dial MAX Detent features are not provided for the control of the Recirculation Door. On some applications with Air Conditioning and Gasoline Engines, an Auxiliary Cooling Fan is provided. See Cooling Fan SECTION 8A-31 for more information.

The Front Mode Door Motor, the Front Temperature Door Motor, and the Recirculation Door Motor are powered by the BRN (141) wires when the Ignition Switch is in RUN. Grounding for the door motors is through the BLK (150) wires to Ground G105. The Heater and A/C Control Module is powered when the Ignition Switch is in RUN by the BRN (141 or 341) wires. Grounding is through the BLK (150) wire to Ground G200 for the I/P.

The Heater and A/C Control Module's ventilation controls for the Front Mode Door and the Recirculation Door are disabled when the Module's Front Blower Switch is in the OFF position. With the Front Blower Switch in the HI, M2, M1, or LO positions, the ventilation controls are enabled. The Front Temperature Door is not dependent on Front Blower Motor operations and can be controlled as long as the Ignition Switch is in RUN.

The Mode and temperature doors are positioned in proportion to the variable Voltage signal received from the Heater and A/C Control Module. Adjusting the Temperature Dial at the control Module adjusts a rheostat which provides a Voltage signal proportional to the Dial position. This Voltage is carried on the LT BLU (733) wire to the Front Temperature Door Motor which then positions in response to the Voltage signal. Adjusting the Mode Dial at the control Module adjusts a rheostat which provides a Voltage signal proportional to the Dial position. This Voltage is carried on the WHT (119) wire to the Front Mode Door Motor which then positions in response to the Voltage signal.

The Recirculation Door is a two-position door and is in the Recirculation position only when the input DK GRN (1614) wire is grounded through the Heater and A/C Control Module. For air conditioned vehicles equipped with Auxiliary Cooling Fan, the Recirculation Door is also grounded when the Auxiliary Cooling Fan A/C Pressure Switch (Section 8A-31) operates the Auxiliary Cooling Fan. The door is normally in the Outside Air position but moves to the Inside Air position when the input wire is grounded. A LED on the control Module is illuminated when the Recirculation Door is grounded through the control Module.

#### REAR AUXILIARY VENTILATION CONTROLS

The Rear Auxiliary Air Delivery and Temperature Controls provided with the combined Rear Auxiliary Heater and Air Conditioner option (C36 + C69) work independently of the ventilation controls used for the front of the vehicle. The front system is provided with a Recirculation Door and door controls but the rear auxiliary system does not have this capability. The Rear Auxiliary Mode Door and the Rear Auxiliary Temperature Door are exclusively controlled from either of two auxiliary control Modules. The front control Module's Blower Switch, located above the I/P, has a permissive position (REAR) which enables control from the rear Module. In the REAR position, if the Ignition Switch is in RUN, relay contacts in the Auxiliary Heater and A/C Control Logic Module change state to enable control input from the ventilation controls at the Rear Auxiliary Heater and A/C Control Module. When the Front Auxiliary Heater and A/C Control Module's Blower Switch is not in the REAR position, the Logic Module's relay is de-energized and control inputs from the front control Module control the doors.

Each control Module produces a variable Voltage signal to the door motor. Each door motor is powered from the BRN (341) wires when the Ignition Switch is in the RUN position. Door grounding is through the BLK (150) wires to Ground G400. The variable Voltage signal causes the door motor to operate to a position consistent with the signal's Voltage. The Voltage corresponds to the control Dial selection on the selected Control Module.