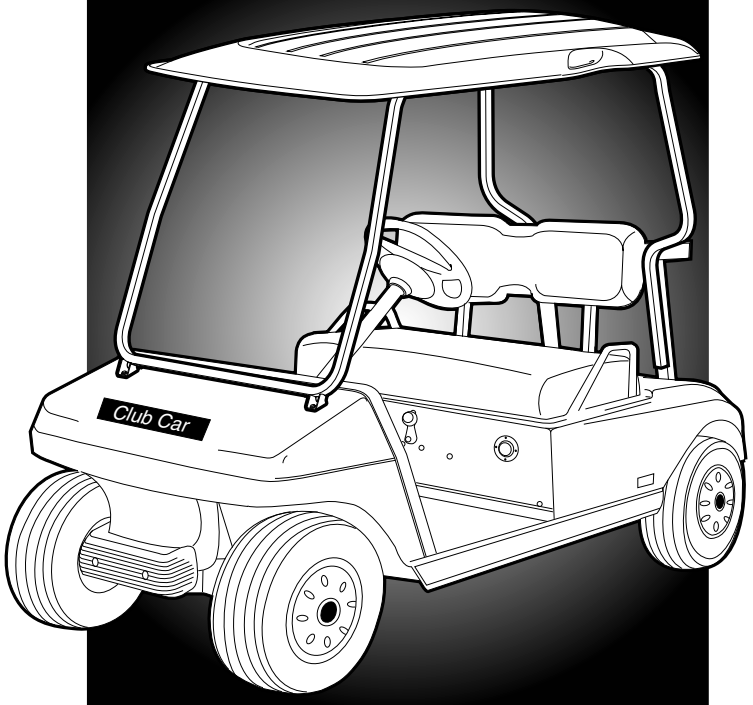
Club Car®

2004 MAINTENANCE SERVICE MANUAL



DS GOLF CARS
GASOLINE/ELECTRIC

MANUAL NUMBER 102397601
EDITION CODE 1203A00000

FOREWORD

Club Car vehicles are designed and built to provide the ultimate in performance efficiency; however, proper maintenance and repair are essential for achieving maximum service life and continued safe and reliable operation.

This manual provides detailed information for the maintenance and repair of DS Golf Cars, and should be used in conjunction with the appropriate maintenance and service supplement.

If you do not have the appropriate maintenance and service supplement, you may order one from your local Club Car representative. Maintenance and service supplements available include the following:

2004 PowerDrive System 48 Vehicle Maintenance & Service Supplement	**Publication Part No. 102397605**
2004 V-Glide 36-Volt Vehicle Maintenance & Service Supplement	**Publication Part No. 102397604**
2004 FE290 Gasoline Vehicle Maintenance & Service Supplement	**Publication Part No. 102397607**
2004 IQ System Vehicle Maintenance and Service Supplement	**Publication Part No. 102397606**

This manual and corresponding maintenance and service supplement should be thoroughly reviewed prior to servicing the vehicle. The procedures provided must be properly implemented, and the DANGER, WARNING, and CAUTION statements must be heeded.

This manual was written for the trained technician who already has knowledge and skills in electrical and mechanical repair. If the technician does not have such knowledge and skills, attempted service or repairs to the vehicle may render the vehicle unsafe. For this reason, Club Car advises that all repairs and/or service be performed by an authorized Club Car distributor/dealer representative or by a Club Car factory-trained technician.

It is the policy of Club Car, Inc. to assist its distributors and dealers in continually updating their service knowledge and facilities so they can provide prompt and efficient service for vehicle owners. Regional technical representatives, vehicle service seminars, periodic service bulletins, maintenance and service manuals, and other service publications also represent Club Car's continuing commitment to customer support.

This manual, used in conjunction with the appropriate maintenance and service supplement, covers all aspects of typical vehicle service; however, unique situations do sometimes occur when servicing a vehicle. If it appears that a service question is not answered in this manual, you may write to us at: Club Car, Inc.; P.O. Box 204658; Augusta, Georgia 30917-4658, USA, Attention: Technical Services, or contact a Club Car Technical Service Representative at (706) 863-3000, extension 3580.

This manual effective July 28, 2003.

⚠ WARNING

- **Read Section 1 – Safety before attempting any service on the vehicle.**
- **Before servicing vehicle, read complete section(s) and any referenced information that may be relevant to the service or repair to be performed.**

NOTE: *This manual represents the most current information at the time of publication. Club Car, Inc. is continually working to further improve its vehicles and other products. These improvements may affect servicing procedures. Any modification and/or significant change in specifications or procedures will be forwarded to all Club Car distributors and dealers and will, when applicable, appear in future editions of this manual.*

Club Car, Inc. reserves the right to change specifications and designs at any time without notice and without the obligation of making changes to units previously sold.

There are no warranties expressed or implied in this manual. See the limited warranty found in the vehicle owner's manual or write to: Club Car, Inc., P.O. Box 204658, Augusta, GA 30917-4658, USA, Attention: Warranty Administration.

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SECTION 1 – SAFETY

To ensure the safety of those servicing Club Car vehicles, and to protect the vehicles from possible damage resulting from improper service or maintenance, the procedures in this manual must be followed.

It is important to note that throughout this manual there are statements labeled DANGER, WARNING, or CAUTION. These special statements relate to specific safety issues, and must be read, understood, and heeded before proceeding with procedures. There are statements labeled NOTE, which provide other essential service or maintenance information.

⚠ DANGER

- **A DANGER indicates an immediate hazard that will result in severe personal injury or death.**

⚠ WARNING

- **A WARNING indicates an immediate hazard that could result in severe personal injury or death.**

⚠ CAUTION

- **A CAUTION with the safety alert symbol indicates a hazard or unsafe practice that could result in minor personal injury or product or property damage.**

CAUTION

- **A CAUTION without the safety alert symbol indicates a potentially hazardous situation that could result in property damage.**

GENERAL WARNING

The following safety statements must be heeded whenever the vehicle is being operated, repaired, or serviced. Service technicians should become familiar with these general safety statements. Also, other specific safety statements appear throughout this manual and on the vehicle.

⚠ DANGER

- **Battery – Explosive gases! Do not smoke. Keep sparks and flames away from the vehicle and service area. Ventilate when charging or operating vehicle in an enclosed area. Wear a full face shield and rubber gloves when working on or near batteries.**
- **Battery – Poison! Contains acid! Causes severe burns. Avoid contact with skin, eyes, or clothing. Antidotes:**
  - **External: Flush with water. Call a physician immediately.**
  - **Internal: Drink large quantities of milk or water. Follow with milk of magnesia or vegetable oil. Call a physician immediately.**
  - **Eyes: Flush with water for 15 minutes. Call a physician immediately.**
- **Gasoline – Flammable! Explosive! Do not smoke. Keep sparks and flames away from the vehicle and service area. Service only in a well-ventilated area.**
- **Do not operate gasoline vehicle in an enclosed area without proper ventilation. The engine produces carbon monoxide, which is an odorless, deadly poison.**

⚠ WARNING

- **Follow the procedures exactly as stated in this manual, and heed all DANGER, WARNING, and CAUTION statements in this manual as well as those on the vehicle.**
- **Only trained technicians should service or repair the vehicle. Anyone doing even simple repairs or service should have knowledge and experience in electrical and mechanical repair. The appropriate instructions must be used when performing maintenance, service, or accessory installation.**
- **Prior to servicing the vehicle or leaving the vehicle unattended, turn the key switch OFF, remove the key, and place the Forward/Reverse handle in the NEUTRAL position. Chock the wheels when servicing the vehicle.**

Gasoline vehicles only:

- **To avoid unintentionally starting the vehicle:**
  - **Disconnect battery cables, negative (–) cable first (Figure 1-1, Page 1-3).**
  - **Disconnect the spark plug wire from the spark plug.**
- **Frame ground – Do not allow tools or other metal objects to contact frame when disconnecting battery cables or other electrical wiring. Do not allow a positive wire to touch the vehicle frame, engine, or any other metal component.**

Electric vehicles only:

- **IQ System Vehicles:**
  Place Tow/Run switch in the TOW position before disconnecting or connecting the batteries.
- **All Electric Vehicles:**
  To avoid unintentionally starting the vehicle, disconnect the batteries as shown (Figure 1-2, 1-3, or 1-4 on page 1-3).
- **IQ System Vehicles:**
  After disconnecting the batteries, wait 90 seconds for the controller capacitors to discharge.
- **PowerDrive System 48 Vehicles:**
  After disconnecting the batteries, discharge the controller capacitors as follows:
  - **Turn the key switch to ON and place the Forward/Reverse handle in the REVERSE position.**
  - **Slowly press the accelerator pedal and keep it pressed until the reverse warning buzzer can no longer be heard. When the buzzer stops sounding, the controller capacitors are discharged.**

All vehicles:

- **Wear safety glasses or approved eye protection when servicing the vehicle. Wear a full face shield and rubber gloves when working on or near batteries.**
- **Do not wear loose clothing or jewelry such as rings, watches, chains, etc., when servicing the vehicle.**
- **Moving parts! Do not attempt to service the vehicle while it is running.**
- **Hot! Do not attempt to service hot engine or exhaust system. Failure to heed this warning could result in severe burns.**
- **Use insulated tools when working near batteries or electrical connections. Use extreme caution to avoid shorting of components or wiring.**
- **Check the vehicle owner's manual for proper location of all vehicle safety and operation decals and make sure they are in place and are easy to read.**
- **Any modification or change to the vehicle that affects the stability or handling of the vehicle, or increases maximum vehicle speed beyond factory specifications, could result in severe personal injury or death.**

WARNING CONTINUED ON NEXT PAGE...

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**
- **If wires are removed or replaced, make sure wiring and wire harness are properly routed and secured. Failure to properly route and secure wiring could result in vehicle malfunction, property damage, personal injury, or death.**
- **Improper use of the vehicle or failure to properly maintain it could result in decreased vehicle performance, severe personal injury, or death.**
- **Do not leave children unattended on vehicle.**

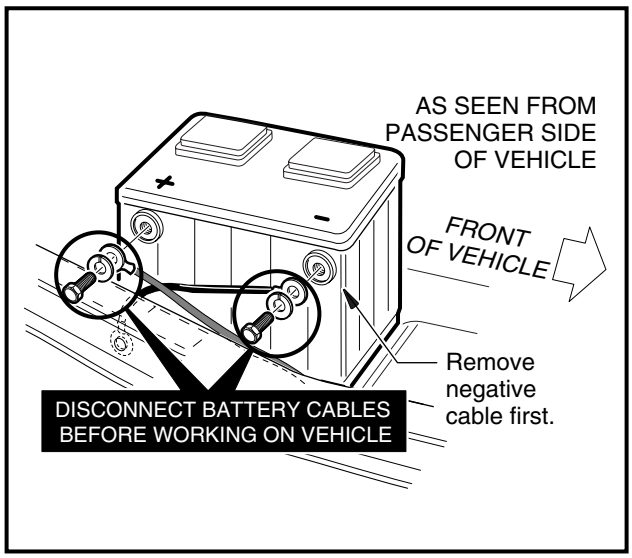

Figure 1-1 Gasoline Vehicle

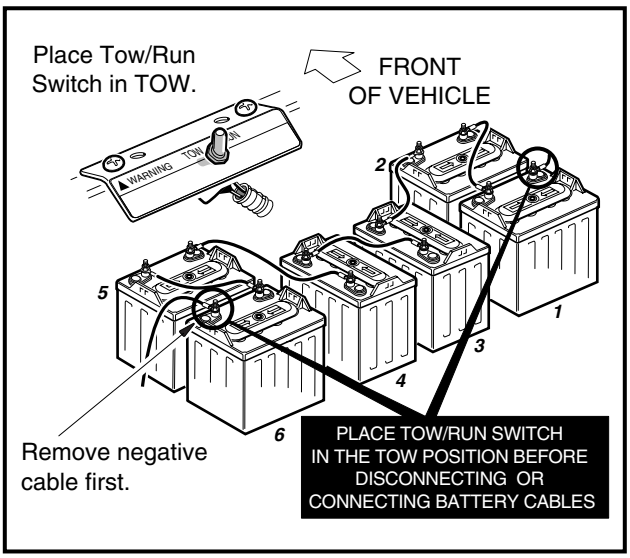

Figure 1-2 IQ System Vehicle

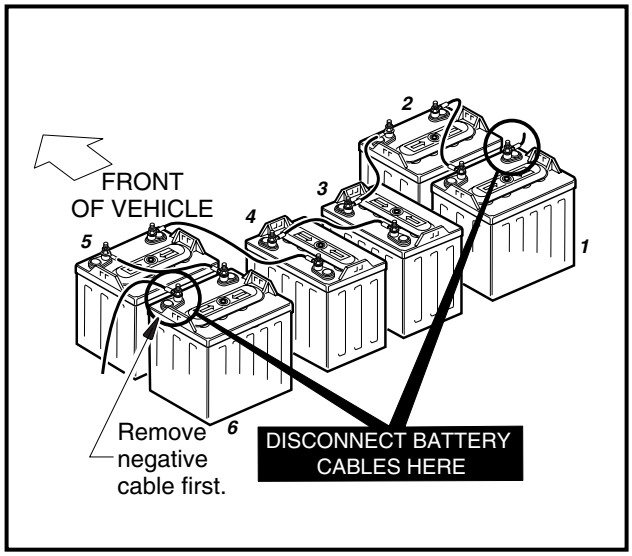

Figure 1-3 PowerDrive System 48 Vehicle

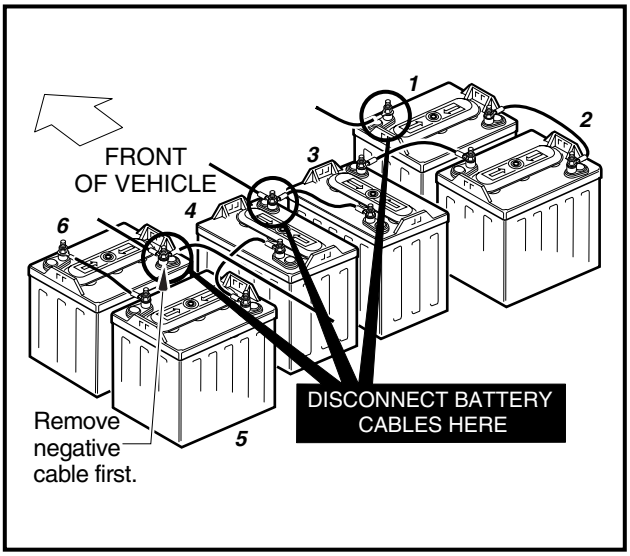

Figure 1-4 V-Glide 36-Volt Vehicle

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SECTION 2 – VEHICLE SPECIFICATIONS

SPECIFICATIONS	DS GASOLINE	POWERDRIVE SYSTEM 48 ELECTRIC	IQ SYSTEM ELECTRIC	DS 36-VOLT ELECTRIC
POWER SOURCE				
Engine: 4 cycle, OHV, 286 cc, 9.0 hp rated, single cylinder, air cooled, with pressure lubrication system	•			
Drive motor: Direct drive, 48 volts DC, series wound, 3.1 hp		•		
Drive motor: Direct drive, 48 volts DC, shunt wound, 3.2 hp			•	
Drive motor: Direct drive, 36 volts DC, series wound, 2.97 hp				•
Fuel system: Side draft carburetor with float bowl, fixed jets, fuel filter, and impulse fuel pump	•			
Governor: Automatic ground speed sensing, internally geared in unitized transaxle	•			
Ignition: Transistor electronic ignition with electronic RPM limiter	•			
Unitized transaxle: Fully synchronized forward and reverse with neutral and reduced speed reverse (11.8:1 forward, 17.1:1 reverse)	•			
Transaxle: Double reduction helical gear with 12.28:1 direct drive axle		•	•	•
Electrical system: Battery - 12 volt, 500 cold cranking amps at 0°, 650 cranking amps at 32°, 105 minute reserve and 35 amp charging capacity	•			
Electrical system: 48 volts DC, reduced speed reverse		•	•	
Electrical system: 36 volts DC, reduced speed reverse				•
Batteries: High capacity, deep cycle, Trojan PowerDrive 8 volt, 117 min. capacity		•	•	
Batteries: High capacity, deep cycle, Trojan 6 volt, 115 min. capacity				•
Charger: Automatic, 48 volt UL and CSA listed		•	•	
Charger: Automatic, 36 volt UL and CSA listed				•
Torque converter: Automatic, variable speed, dry type	•			
STEERING/SUSPENSION/BRAKES				
Steering: Self-adjusting rack and pinion	•	•	•	•
Suspension: Front and rear tapered mono-leaf springs with dual hydraulic shocks	•	•	•	•
Brakes: Dual rear wheel self-adjusting brakes with cast iron drums and single brake pedal with automatic-release park brake	•	•	•	•
BODY/CHASSIS				
Frame/Chassis: Twin I-Beam welded aluminum	•	•	•	•
Front and rear body: ArmorFlex®	•	•	•	•
Body finish: Matched paint finish over molded-in color	•	•	•	•
Tires: 18 x 8.5 - 8 tubeless, 4 ply rated	•	•	•	•
DIMENSIONS/WEIGHT				
Overall length	91-1/2 in. (232 cm)	91-1/2 in. (232 cm)	91-1/2 in. (232 cm)	91-1/2 in. (232 cm)
Specifications continued on next page...				

SPECIFICATIONS	DS GASOLINE	POWERDRIVE SYSTEM 48 ELECTRIC	IQ SYSTEM ELECTRIC	DS 36-VOLT ELECTRIC
DIMENSIONS/WEIGHT, Continued:				
Overall width	47-1/4 in. (120 cm)	47-1/4 in. (120 cm)	47-1/4 in. (120 cm)	47-1/4 in. (120 cm)
Overall height (at steering wheel)	48 in. (122 cm)	48 in. (122 cm)	48 in. (122 cm)	48 in. (122 cm)
Wheelbase	65-1/2 in. (166 cm)	65-1/2 in. (166 cm)	65-1/2 in. (166 cm)	65-1/2 in. (166 cm)
Ground clearance	4-1/2 ft. (11 cm)	4-1/2 ft. (11 cm)	4-1/2 ft. (11 cm)	4-1/2 ft. (11 cm)
Front wheel tread	34-1/2 in. (88 cm)	34-1/2 in. (88 cm)	34-1/2 in. (88 cm	34-1/2 in. (88 cm
Rear wheel tread	38-1/2 in. (98 cm)	38-1/2 in. (98 cm)	38-1/2 in. (98 cm)	38-1/2 in. (98 cm)
Weight (without batteries)		455 lb. (206 kg)	494 lb. (224 kg)	448 lb. (203 kg)
Weight (dry, without battery)	598 lb. (271 kg)			
Forward speed	12-15 mph (19-24 kph)	12-15 mph 19-24 kph)	12-15 mph (19-24 kph)	12-15 mph (19-24 kph)
Curb clearance circle (diameter)	17 ft.-6 in. (533 cm)	17 ft.-6 in. (533 cm)	17 ft.-6 in. (533 cm)	17 ft.-6 in. (533 cm)
Braking distance (at 12 mph (19 km/h)	14 ft. (427 cm)	14 ft. (427 cm)	14 ft. (427 cm)	14 ft. (427 cm)
Standard seating capacity (persons)	2	2	2	2
Liquid Capacities				
Engine crankcase without filter	32 oz. (0.98 liters)			
Engine crankcase with filter	38 oz. (1.16 liters)			
Unitized transaxle	27 oz. (0.8 liters)			
Transaxle		22 oz. (0.67 liters)	22 oz. (0.67 liters)	22 oz. (0.67 liters)
Fuel (unleaded gasoline only)	7 gallons (26.5 liters)			
Tire Pressure				
Front and rear	12-14 psi (0.83-0.96 Bars)	18-20 psi (1.24-1.38 Bars)	18-20 psi (1.24-1.38 Bars)	18-20 psi (1.24-1.38 Bars)

SECTION 3 – GENERAL INFORMATION

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**

Important features unique to the different models covered in this manual are highlighted. Club Car, Inc. recommends the owner/operator read and understand this manual and pay special attention to features specific to their vehicle(s).

Refer to the owner's manual provided with the vehicle for information on the following topics:

- Controls and Indicators
- Pre-Operation and Daily Safety Checklist
- Driving Instructions
- Towing
- Transporting on a Trailer
- Subsequent Owner Registration
- Warranties

SERIAL NUMBER IDENTIFICATION

The serial number of the vehicle is printed on a bar code decal mounted on the frame directly above the accelerator pedal (Example: AQ0401-123456 for Electric or AG0401-123456 for Gasoline) **(Figure 3-1, Page 3-1)**. There is also a second serial number decal mounted on the front body frame behind the center dash panel. The center dash panel must be removed to view this decal.

NOTE: *Have the vehicle serial number available when ordering parts or making inquiries.*

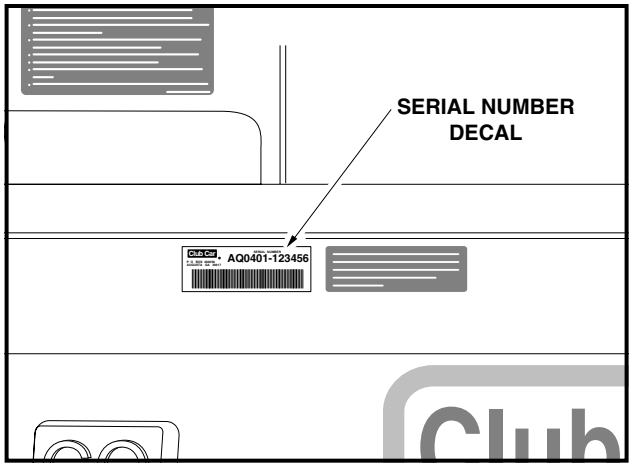

Figure 3-1 Serial Number Decal

SAFETY COMMITTEE

If the golf car is to be rented or is part of a fleet, we strongly recommend that a safety committee be appointed. One of the main concerns of this committee should be the safe operation of the golf cars.

This should include at a minimum:

- Where golf cars should be driven.
- Ensuring that proper warnings of driving hazards are displayed and visible. See below for list of signs available from Club Car Service Parts Department.
- Who should and who should not drive golf cars.
- Instructing first time drivers.
- Maintaining golf cars in a safe driving condition
- How various rules are to be enforced.

The safety committee should include all these items and such others as the committee feels necessary or appropriate.

WARNING SIGN	CCI P/N
Sharp Left	S9911211
Sharp Right	S9921211
Steep Hill	S9931211

STORAGE – GASOLINE VEHICLE

See General Warning, Section 1, Page 1-1.

⚠ DANGER

- **Do not drain gasoline when the engine is hot or while it is running.**
- **Be sure to clean up any spilled gasoline before operating the vehicle.**
- **Store gasoline in an approved gasoline container only. Store in a well-ventilated area away from sparks, open flames, heaters, or heat sources.**
- **Keep gasoline out of the reach of children.**
- **Do not siphon gasoline from the vehicle.**

⚠ WARNING

- **Turn the key switch OFF, remove the key, and leave the Forward/Reverse handle in the NEUTRAL position during storage. This is to prevent unintentionally starting the vehicle or a fire hazard.**
- **Turn fuel shut-off valve to closed (OFF) position (Figure 3-3, Page 3-3).**
- **Do not attempt to charge frozen batteries or batteries with bulged cases. Discard the battery. Frozen batteries can explode.**

⚠ CAUTION

- **Batteries in a low state of charge will freeze at low temperatures.**

PREPARING THE GASOLINE VEHICLE FOR EXTENDED OFF-SEASON STORAGE

1. Batteries should be clean and free of corrosion. Wash tops and terminals of batteries with a solution of baking soda and water (1 cup (237 mL) baking soda per 1 gallon (3.8 L) of water). Rinse solution off batteries. Do not allow this solution to enter the batteries. Be sure terminals are tight. Let the terminals dry and then coat them with Battery Terminal Protector Spray (CCI P/N 1014305).
2. Store vehicle in a cool, dry place. This will minimize battery self-discharge. If the battery appears to be weak, have it charged by a trained technician. Use an automotive-type 12-volt battery charger rated at 10 amps or less.
3. Drain carburetor and seal the fuel tank.
   3.1. Place the Forward/Reverse handle in the NEUTRAL position and the neutral lockout cam in the SERVICE (MAINTENANCE) position. Turn the fuel shut-off valve to the closed (OFF) position **(Figure 3-3, Page 3-3)** and run the engine until fuel remaining in the carburetor and fuel lines is depleted and the engine stalls. Return the neutral lockout cam to the OPERATE position.
   3.2. Loosen, but do not remove, the carburetor drain screw and drain fuel remaining in bowl into a small container, then pour the fuel from the container into vehicle fuel tank. Tighten the carburetor drain screw.
   3.3. Disconnect fuel vent line from fuel tank vent nipple.
   3.4. Plug the fuel tank vent nipple so that it is air tight. We recommend using a slip-on vinyl cap.

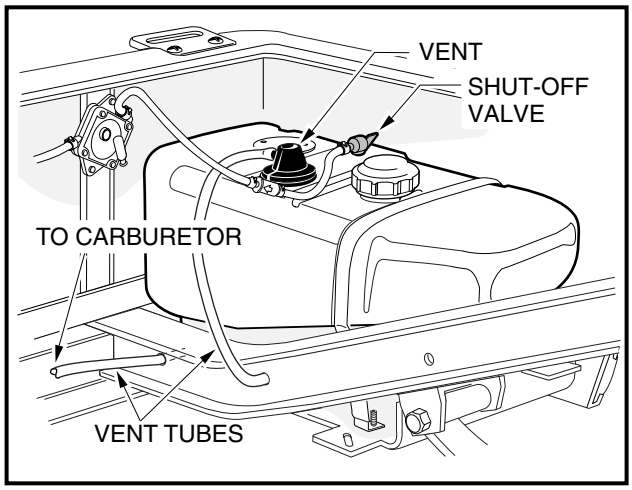

Figure 3-2 Fuel Tank, Vent, and Lines

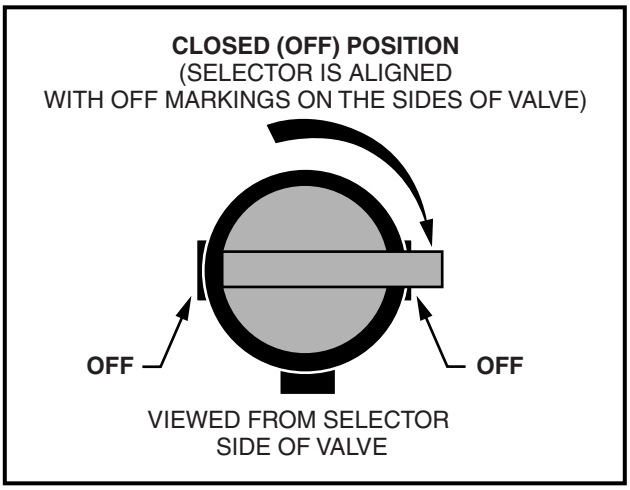

Figure 3-3 Fuel Shut-Off Valve – Closed Position

4. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
5. To protect the engine, remove the spark plug and pour 1/2 ounce (14.2 mL) of SAE 10 weight oil into the engine through the spark plug hole. Rotate the engine crankshaft by hand several times and then install the spark plug.
6. Adjust tires to recommended tire pressure. **See Section 2 – Vehicle Specifications.**

Preparing the Gasoline Vehicle for Extended Off-Season Storage, Continued:

7. Perform semiannual periodic lubrication. **See Periodic Lubrication Schedule, Section 10 – Periodic Maintenance, in the appropriate maintenance and service supplement.**
8. Thoroughly clean front body, rear body, seats, engine compartment, and underside of vehicle.
9. Do not engage the park brake. Chock the wheels to prevent the vehicle from rolling.

RETURNING THE STORED GASOLINE VEHICLE TO SERVICE

1. Connect battery cables, positive (+) cable first.
2. Restore fuel system to operation.
   2.1. Remove plug from the fuel tank vent nipple and reconnect fuel vent line to nipple. Open the fuel shut-off valve **(Figure 3-4, Page 3-4)**. Make sure the valve is fully open. A partially closed fuel shut-off valve **(Figure 3-5, Page 3-4)** combined with the use of the choke, can result in a fouled spark plug and engine failure.
   2.2. Place the Forward/Reverse handle in the NEUTRAL position and the neutral lockout cam to the SERVICE (MAINTENANCE) position. Crank the engine until fuel is pumped into the carburetor and fuel lines and the engine starts. Turn the engine off and return the neutral lockout cam to the OPERATE position. **See following NOTE.**

NOTE: *Due to the oil added to the engine in preparation for storage, the engine may smoke excessively for a short while when running it for the first time after storage.*

3. Adjust tires to recommended tire pressure. **See Section 2 – Vehicle Specifications.**
4. Perform the Pre-Operation and Daily Safety Checklist. **See the vehicle owner's manual.**

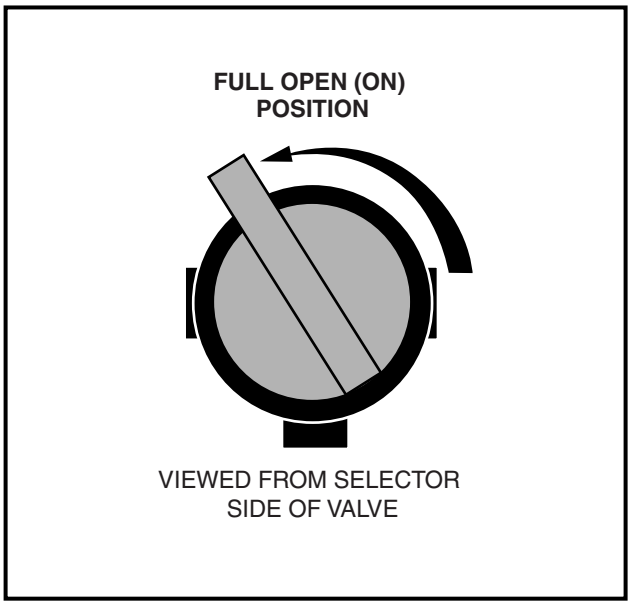

Figure 3-4 Fuel Shut-Off Valve – Open Position

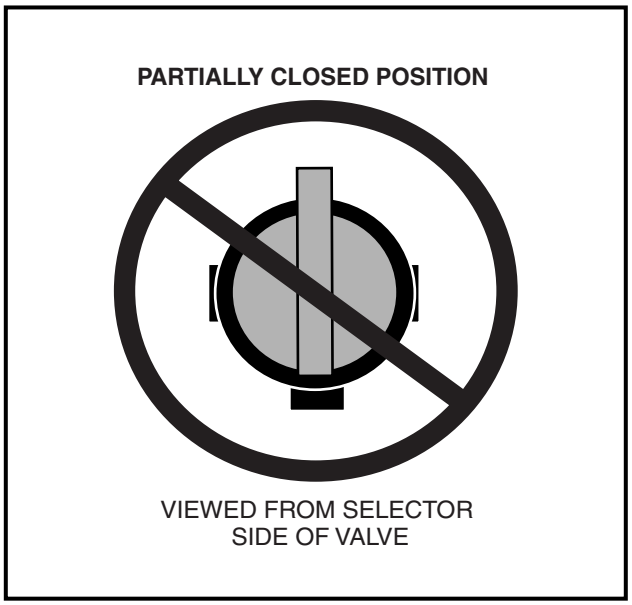

Figure 3-5 Incorrect Fuel Shut-off Valve Setting

STORAGE – ELECTRIC VEHICLE

See General Warning, Section 1, Page 1-1.

⚠ WARNING

- **Turn the key switch OFF, remove the key, and leave the Forward/Reverse handle in the NEUTRAL position during storage. This is to prevent unintentionally starting the vehicle or a fire hazard.**
- **Do not attempt to charge frozen batteries or batteries with bulged cases. Discard the battery. Frozen batteries can explode.**

⚠ CAUTION

- **Batteries in low state of charge will freeze at low temperatures.**
- **To avoid exposing electrical components to moisture and subsequent damage, do not use any type of pressure washing or steam cleaning equipment to wash the vehicle.**
- **IQ System vehicles only: Place Tow/Run switch in the TOW position.**

PREPARING THE ELECTRIC VEHICLE FOR EXTENDED OFF-SEASON STORAGE

1. Fully charge batteries. **See Section 13 – Batteries, in the appropriate maintenance and service supplement.**
2. Batteries should be clean and free of corrosion. Wash tops and terminals of batteries with a solution of baking soda and water (1 cup (237 mL) baking soda per 1 gallon (3.8 L) of water). Rinse solution off batteries. Do not allow this solution to enter the batteries. Be sure terminals are tight. Let the terminals dry and then coat them with Battery Terminal Protector Spray (CCI P/N 1014305).
3. Store vehicle in a cool, dry place. This will minimize battery self-discharge.
4. Adjust tires to recommended tire pressure. **See Section 2 – Vehicle Specifications.**
5. Lubricate front suspension and do all other semiannual periodic lubrication. **See Periodic Lubrication Schedule, Section 10 – Periodic Maintenance, in the appropriate maintenance and service supplement.**
6. Thoroughly clean front body, rear body, seats, battery compartment, and underside of vehicle.
7. Do not engage the park brake. Chock the wheels to prevent the vehicle from rolling.
8. Keep batteries fully charged during storage.

NOTE: ***PowerDrive Battery Chargers:*** *Leave PowerDrive battery chargers plugged in during storage. The onboard computer will automatically activate the charger when necessary. If charger cannot remain plugged in, or AC power will not be available during extended storage, disconnect the batteries for storage.* ***See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.***

Accu-Power Battery Chargers only: *Charge batteries every six to eight weeks. If it is not possible to charge the batteries every six to eight weeks, disconnect the batteries for storage.* ***See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.***

CAUTION

- **Check the vehicle monthly to ensure the charger is operating correctly during storage.**

RETURNING THE STORED ELECTRIC VEHICLE TO SERVICE

1. If necessary, connect batteries.
2. Fully charge batteries.
3. Adjust tire to recommended pressure. **See Section 2 – Vehicle Specifications.**
4. Perform the Pre-Operation and Daily Safety Checklist. **See the vehicle owner's manual.**

SECTION 4 – BODY AND TRIM

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**

CLEANING THE VEHICLE

See General Warning, Section 1, Page 1-1.

CAUTION

- **Do not use detergents or cleaning solvents that contain ammonia, aromatic solvents, or alkali materials on body panels or seats.**
- **Do not allow battery acid to drip on body panels. Battery acid will cause permanent damage. Wash spilled battery acid from body panels immediately.**

Club Car DS vehicles are equipped with ArmorFlex® front and rear bodies. Use only commercially available automotive cleaners with a sponge or soft cloth for normal cleaning. A garden hose at normal residential water pressure is adequate.

Club Car does not recommend any type of pressure washing or steam cleaning. Such a process (especially if the vehicle has an ArmorFlex rear body that is removed) will expose electrical components to moisture. Moisture entering electrical components can result in water damage and subsequent component failure.

Use non-abrasive wax products. Battery acid, fertilizers, tars, asphalt, creosote, paint, or chewing gum should be removed immediately to prevent possible stains. **See following NOTE.**

NOTE: *Dispose of waste water properly.*

SEAT

To preserve seat appearance, clean regularly with mild soap or detergent applied with a sponge or soft cloth. Use a soft bristle brush to clean areas that are especially soiled. Use the following guidelines:

Light Soiling: A solution of 10% liquid dish soap and warm water applied with a soft, damp cloth is recommended. A soft bristle brush may be used if necessary. Wipe off any residue with a water dampened cloth.

Difficult Stains: Dampen a soft, white cloth with a solution of 10% household bleach (sodium hypochlorite) and 90% water. Rub gently to remove stain, then rinse with a water dampened cloth to remove bleach concentration.

More Difficult Stains: Perform previous procedure using full-strength bleach, or allow bleach to puddle on affected area for approximately 30 minutes. Rinse with a water dampened cloth to remove any remaining bleach concentration. **See following CAUTION.**

CAUTION

- **To prevent damage to the vehicle when removing difficult stains or heavy soiling, remove the seat bottom from the vehicle first.**

FRONT AND REAR BODY REPAIR

See General Warning, Section 1, Page 1-1.

STRESS LINES OR STREAKS

Repeatedly flexing the ArmorFlex body can cause white stress lines or streaks in the finish. To remove them:

1. Hold a heat gun 12 inches (30 cm) away from the affected area, with the gun on its lowest heat setting.
2. Slowly wave the heat gun back and forth over the affected area until the streak fades.
3. It may be necessary to move the gun closer to the body to fade the streak, but under no circumstance should the gun be held closer than 6 inches (15 cm) to the body. **See following CAUTION.**

CAUTION

- **Holding the heat gun too close to the body could melt the body or damage the finish.**

MINOR IMPACT DAMAGE/DEFORMATIONS

Minor impact damage to an ArmorFlex body can be repaired using a procedure similar to the one used to remove stress lines. To remove deformations resulting from minor impact damage:

1. Hold a heat gun 12 inches (30 cm) away from the affected area, with the gun on its lowest heat setting.
2. Periodically remove the heat gun and bend the body, using a push block, in the opposite direction of the deformation.
3. Continue heating and bending the body until the original shape returns. Under no circumstance should the gun be held closer than 6 inches (15 cm) to the body. **See preceding CAUTION.**

MINOR SCRATCHES AND SURFACE BLEMISHES

For minor scratches or blemishes in the ArmorFlex body that do not penetrate the finish:

1. Thoroughly clean the affected area using a strong, non-abrasive detergent and hot water, then clean with Ultra-Kleen® Solvent Cleaner to remove any oil-based contaminants.
2. Lightly buff imperfection with a clean soft cloth or buff pad. Do not use any kind of rubbing (abrasive) compound on body assemblies.
3. Wax the entire body part to restore luster and weather protection.

SMALL SCRATCHES THAT CANNOT BE BUFFED OUT

1. Thoroughly clean the affected area with alcohol and then dry thoroughly.
2. Using 240 grit or finer sandpaper, lightly sand the scratch to feather the edges. Finish sand the scratch with 320 grit or finer paper to remove gloss from the surface. Sand as little body surface as possible beyond the scratch. **See following CAUTION.**

CAUTION

- **Be careful not to sand completely through the finish to the body material. If the finish is sanded through and the Thermo Plastic Olefin (TPO) body material is exposed, refer to Gouges, Punctures, Tears, Large Scratches, and Abrasions on page 4-3.**

3. Using the brush provided with the touch-up paint (available from Club Car Service Parts – see following color chart), apply paint to the scratch. Multiple layers of paint may be required to fill the scratch.
4. Allow paint to dry completely (approximately 10-20 minutes), then lightly buff the imperfection.
5. Wax the entire body part to restore luster and weather protection.

GOUGES, PUNCTURES, TEARS, LARGE SCRATCHES, AND ABRASIONS

Touch-up is not recommended. Replace the entire body part or have it repaired by a professional paint and body repair shop with experience repairing TPO bodies.

TOUCH-UP PAINT COLOR CHART

COLOR	CCI P/N
Beige	101997201
White	101997202
Red	101997203
Gray	101997204
Dark Gray	101997205
Royal Blue (Pacific Blue)	101997206
Black	101997207
Dark Green	101997209
Classic Blue (Navy)	101997211
Burgundy	101997212

CANOPY

See General Warning, Section 1, Page 1-1.

CANOPY REMOVAL

1. Remove the eight nuts (7) and eight washer-head screws (6) from the holes in each channel and brace of the canopy as shown. Remove the canopy (11) from the windshield frame (3) and rear braces (4 and 5) **(Figure 4-1, Page 4-4)**.
2. Remove the nylon lock nuts (10) and four flat washers (9) from the bottom end of the driver and passenger side rear braces (4 and 5). Remove the four hex-head cap screws (8) and four flat washers (9) and remove the rear braces from the front side of the seat back supports.
3. Remove the two washer-head screws (1) securing the windshield frame (3) to the front body of the vehicle.
4. Remove the pads (12) from under the windshield frame mounting bracket on the front body.

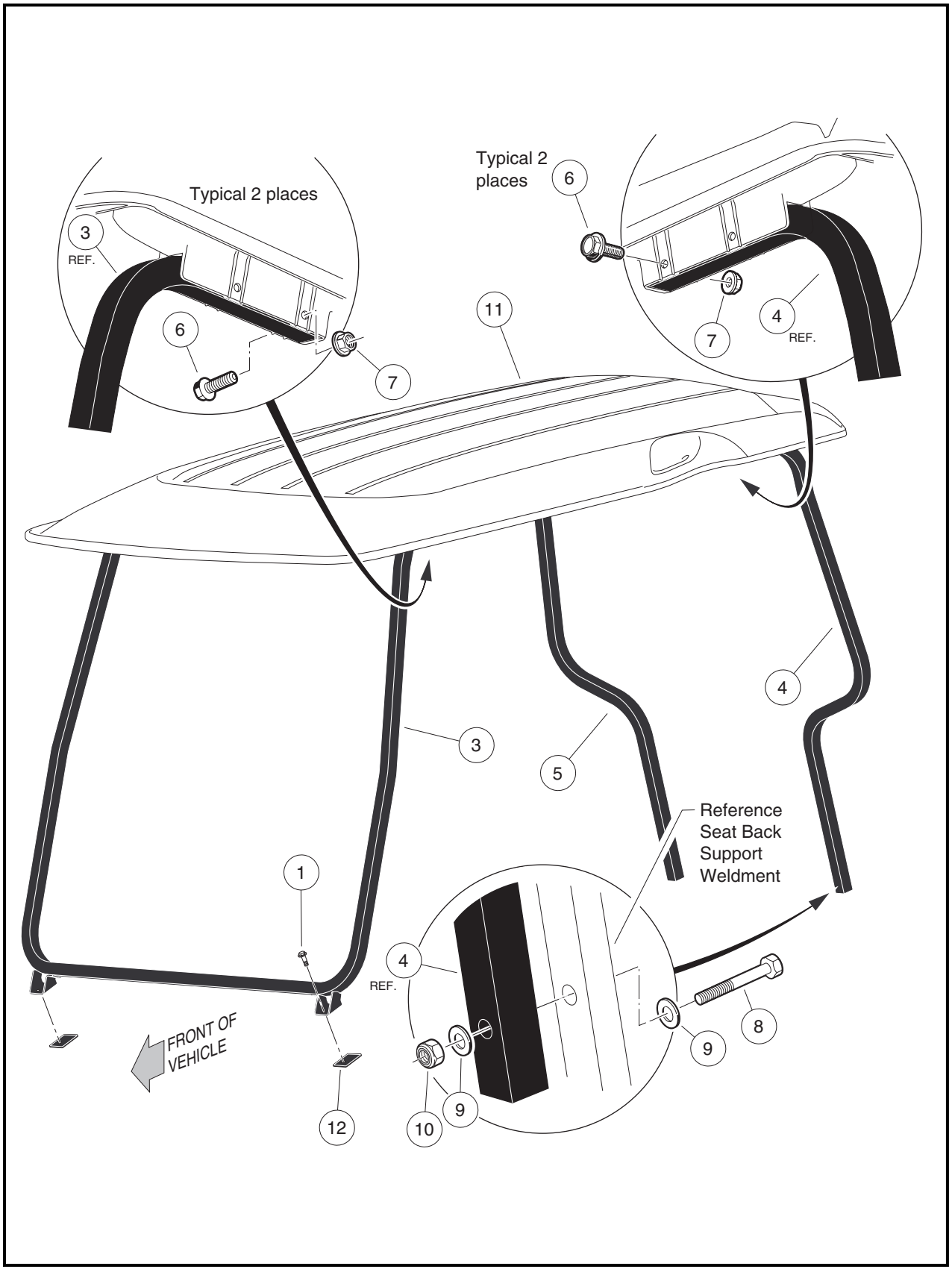

Figure 4-1 Canopy Assembly

CANOPY INSTALLATION

1. Place the pads (12) on the front body and under the windshield frame mounting brackets **(Figure 4-1, Page 4-4)**. Align the slots on the pads with the slots in the mounting brackets.
2. Secure the windshield frame (3) to the front body of the vehicle with two washer-head screws (1). Tighten the screws to 45 in-lb (5.1 N-m).
3. Mount bottom end of the driver and passenger side rear braces (4 and 5) to the front side of the seat back supports with four hex-head cap screws (8) and four flat washers (9). Secure with four flat washers (9) and four nylon lock nuts (10). Tighten the hardware to 45 in-lb (5.1 N-m).
4. Place the canopy (11) onto the windshield frame (3) and braces (4 and 5). Insert the upper ends of the frame and braces into the channels in the underside of the canopy. Insert eight washer-head screws (6) through the holes in each channel and brace as shown. Secure the canopy with eight nuts (7). Tighten the screws to 45 in-lb (5.1 N-m).

FRONT BODY

See General Warning, Section 1, Page 1-1.

FRONT BODY REMOVAL

1. Remove screws (3) and lock nuts (4) and pull front bumper (2) from vehicle frame **(Figure 4-2, Page 4-6)**.
2. Remove blind rivets (5) **(Figure 4-2, Page 4-6)**.
3. Remove the eight nuts (7) and eight washer-head screws (6) from the holes in each channel and brace of the canopy as shown. Remove the canopy (11) from the windshield frame (3) and rear braces (4 and 5) **(Figure 4-1, Page 4-4)**.
4. Remove the two washer-head screws (1) securing the windshield frame (3) to the front body of the vehicle **(Figure 4-1, Page 4-4)**.
5. Remove the pads (12) from under the windshield frame mounting bracket on the front body.
6. Remove carriage bolts (10), lock nuts (17), and washers (11) from front body trim **(Figure 4-2, Page 4-6)**.
7. Loosen (do not remove) screws (12) holding front body trim (9) against front body.
8. Remove the screws (16) securing the front body to the frame.
9. Pull front body (8) from under trim (9) and remove the body from the vehicle.

FRONT BODY INSTALLATION

1. Install front body (8) under trim (9), align holes and finger-tighten screws (16) holding front body against frame **(Figure 4-2, Page 4-6)**.
2. Install carriage bolts (10), washers (11), and lock nuts (17) onto front body trim. Tighten bolts to 11 ft-lb (14.9 N·m). Tighten screws (16) to 20 in-lb (2.3 N·m). **See following NOTE.**

NOTE: *If installing a new front body, two 5/16 (8 mm) holes must be drilled after the body has been placed on the vehicle. Use the body trim (9) as a guide for drilling the holes.*

3. Tighten screws (12) holding front body trim against front body to 17 in-lb (1.9 N·m).
4. Remove the two finger-tightened screws (16) from step 1 that secure the front body to frame **(Figure 4-2, Page 4-6)**.

Front Body Installation, Continued:

5. Place the pads (12) on the front body and under the windshield frame mounting brackets **(Figure 4-1, Page 4-4)**. Align the slots on the pads with the slots in the mounting brackets.
6. Secure the windshield frame (3) to the front body of the vehicle with the two washer-head screws (16) removed in step 4 **(Figure 4-1, Page 4-4)**. Tighten the screws to 45 in-lb (5.1 N-m).
7. Place the canopy (11) onto the windshield frame (3) and rear braces (4 and 5). Insert the upper ends of the frame and braces into the channels in the underside of the canopy. Insert eight washer-head screws (6) through the holes in each channel and brace as shown. Secure the canopy with eight nuts (7) **(Figure 4-1, Page 4-4)**. Tighten the screws to 45 in-lb (5.1 N-m).
8. Install push type blind rivets (5) that secure lower part of front body to frame.
9. Install front bumper onto vehicle with screws (3) and lock nuts (4). Tighten to 65 in-lb (7.3 N·m).

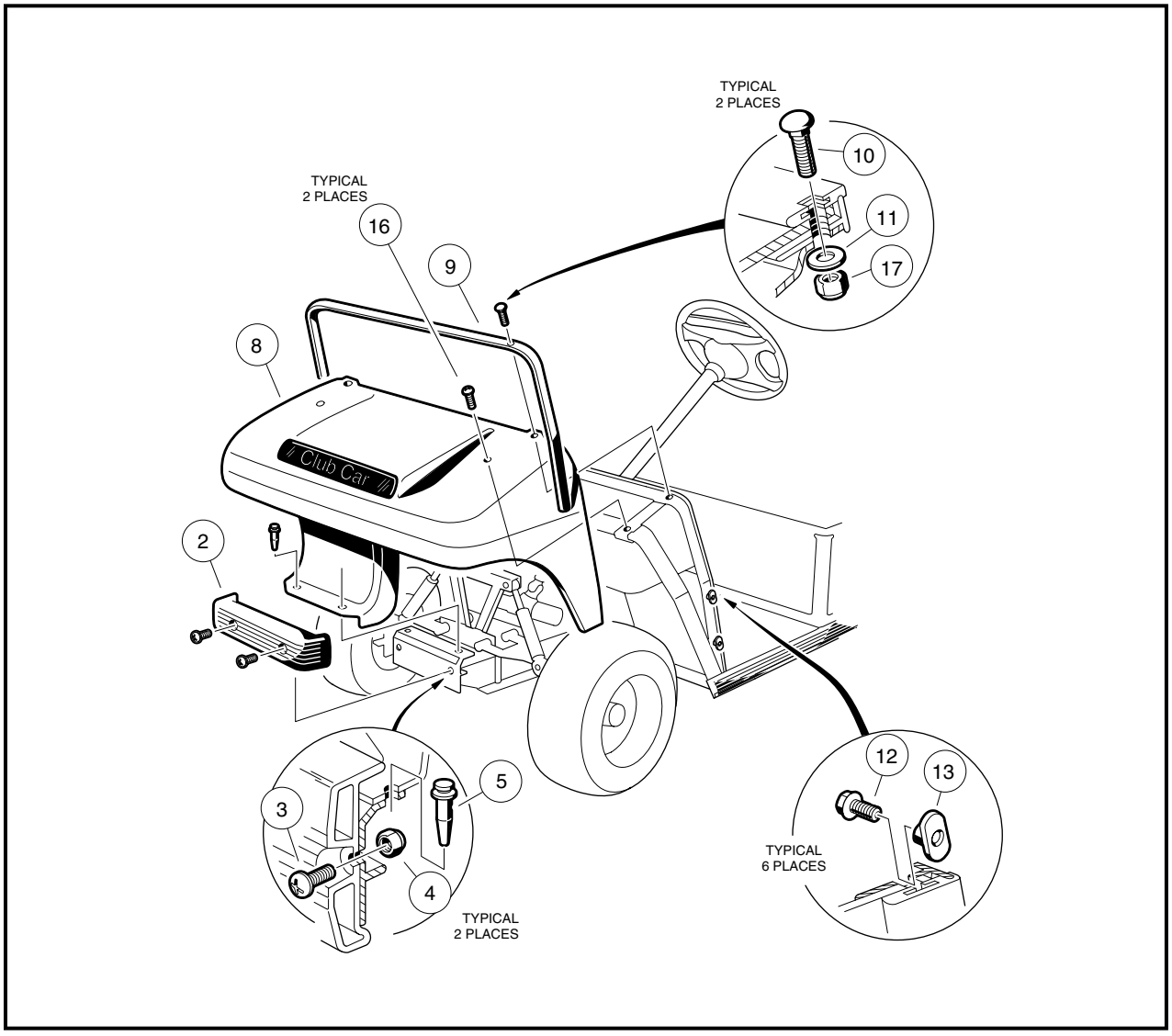

Figure 4-2 Front Body Assembly

REAR BODY

See General Warning, Section 1, Page 1-1.

REAR BODY REMOVAL

NOTE: *The rear bumper does not have to be removed to remove rear the body.*

1. Remove the seat from the rear body.
2. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
3. Remove bagwell protector by gently pulling the bagwell protector at each plastic barrel (2) **(Figure 4-3, Page 4-7)**.
4. Remove the two screws (1), lock nuts and washers located under bagwell protector in bagwell floor.
5. Remove the two screws, nuts and washers located at the bottom edge of the seat support panel (in kick-plate just above the floormat) **(Figure 4-4, Page 4-7)**.

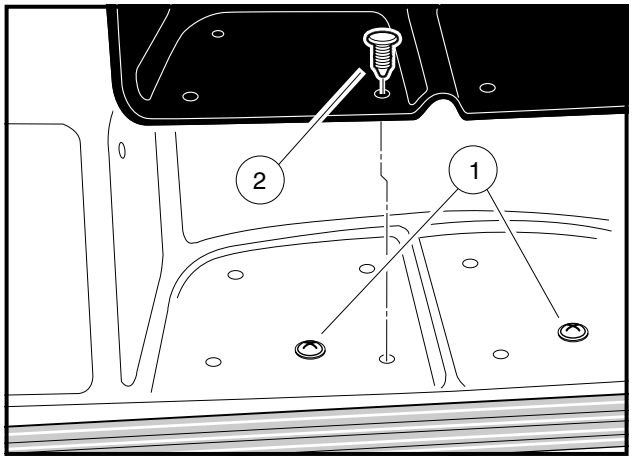

Figure 4-3 Remove Screws Under Bagwell Protector

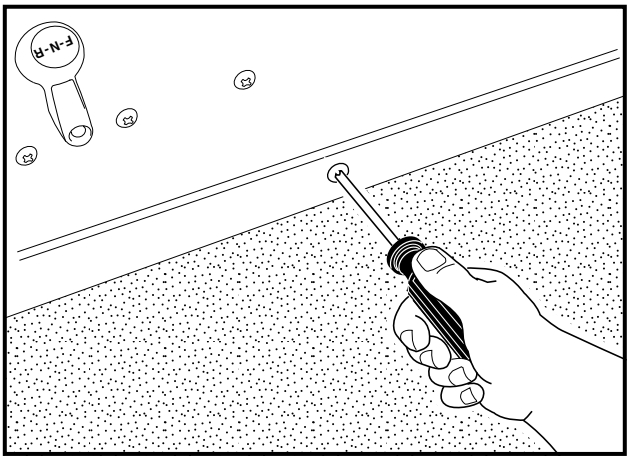

Figure 4-4 Remove Kick-Plate Screws

6. **V-Glide Electric, PowerDrive System 48 Electric, and Gasoline vehicles:** Remove the screw securing the Forward/Reverse handle and slide the handle from the shaft.
7. **Electric vehicles only:** Disconnect or remove charger receptacle:

- **PowerDrive System 48 and IQ System vehicles (Figure 4-5, Page 4-8)**:

  The charger receptacle must be disconnected, but does not have to be removed from the body:

  7.1. Remove wire ties binding 10-gauge red wire (from charger receptacle to battery) to the vehicle frame. Disconnect the 10-gauge red wire at the positive post of battery no. 1.

  7.2. Remove the retaining nut and disconnect the 10-gauge black wire (from the onboard computer) from the receptacle.

  7.3. Unplug the fuse holder assembly to disconnect the gray sense lead from the receptacle.

- **V-Glide 36-volt vehicles (Figure 4-6, Page 4-8):**

  7.4. Remove the four phillips-head screws (1) that secure the receptacle bezel (2) to the rear body.

  7.5. Remove the bezel from the receptacle and then remove the receptacle from the body. The wires do not have to be disconnected from the receptacle.

Rear Body Removal, Continued:

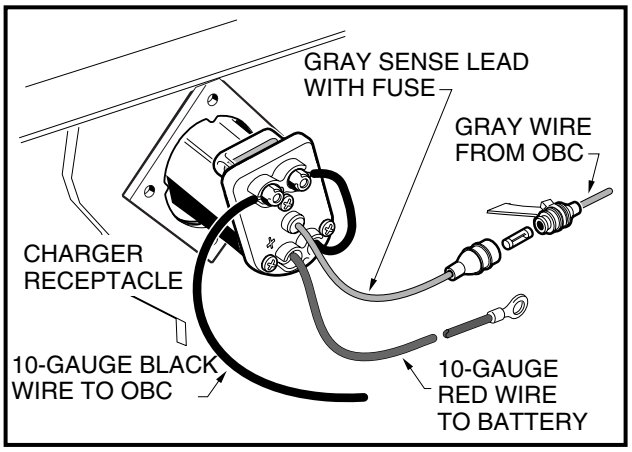

Figure 4-5 PowerDrive Charger Receptacle

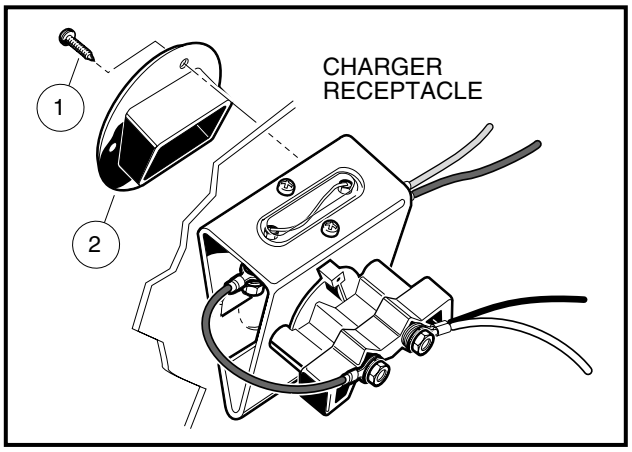

Figure 4-6 V-Glide Charger Receptacle

8. Disconnect and remove Forward/Reverse switch:

- **V-Glide 36-volt and PowerDrive System 48 vehicles:**

  8.1. Remove three screws, plastic washers and nylon lock nuts securing the Forward/Reverse switch to the rear body, then pull the Forward/Reverse switch from the body and place it on the vehicle frame I-beam (with wiring intact).

- **IQ System vehicles:**

  8.2. Disconnect the four-pin connector (12) and the three-pin connector (13) from the Forward/Reverse switch **(Figure 4-7, Page 4-8)**.

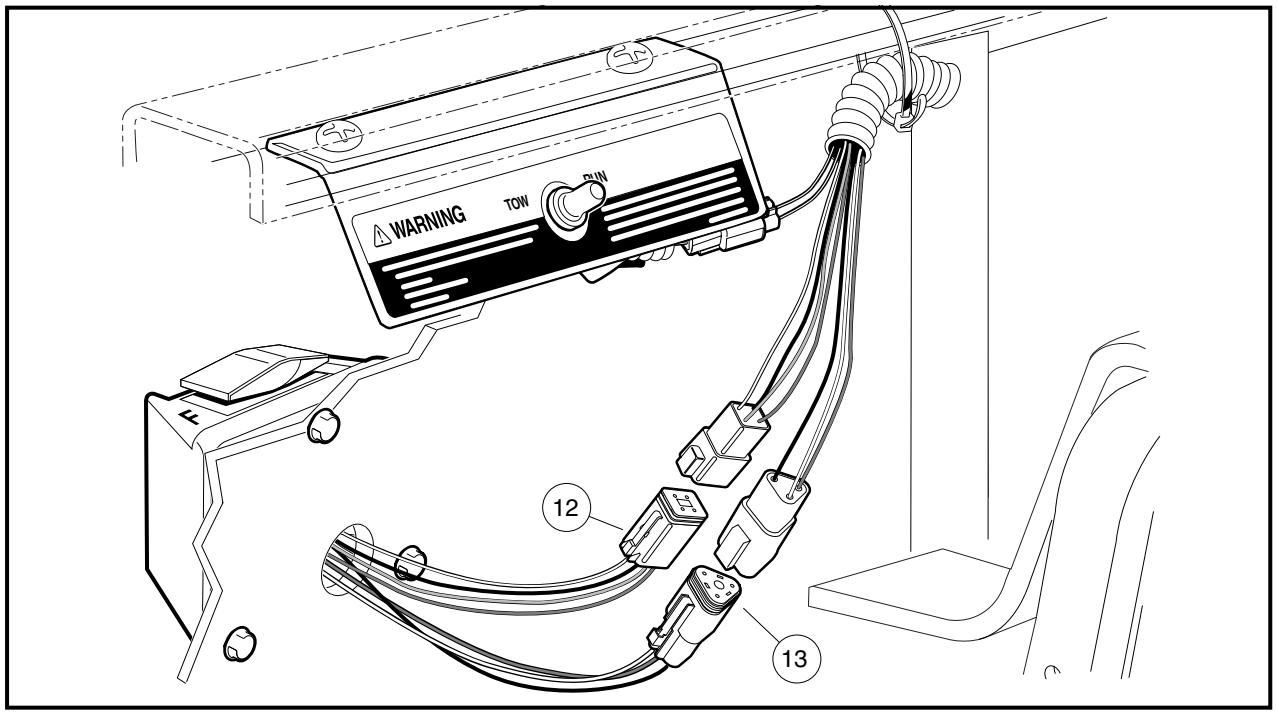

Figure 4-7 IQ System Forward/Reverse Switch

- **Gasoline vehicles:**

NOTE: *To remove the rear body, the choke button assembly does not have to be removed from the body. However, adjustment of the choke positioner may be necessary after the rear body is reinstalled.*

8.3. Remove four screws and nylon lock nuts securing the Forward/Reverse shifter to the rear body. Pull the Forward/Reverse shifter (with wiring and cable assembly still connected) from body and allow it to rest on vehicle frame I-beam.

8.4. Remove the shifter cable from the cable hanger under the driver-side seat hinge.

8.5. Remove two nylon lock nuts from fuel pump and remove fuel pump from seat support.

9. Remove the two screws securing the rear access panel.
10. Remove two carriage bolts (2), nuts (4), and washers (3) attaching the rear legs (1) of the seat back support assembly to the body **(Figure 4-8, Page 4-9)**.
11. Remove four screws (8), flat washers (9), and spacers (10), attaching the front legs (5) of the seat back support assembly to the body **(Figure 4-8, Page 4-9)**.
12. Lift seat back assembly from vehicle. **(Figure 4-8, Page 4-9)**.
13. Lift the rear body from the vehicle.

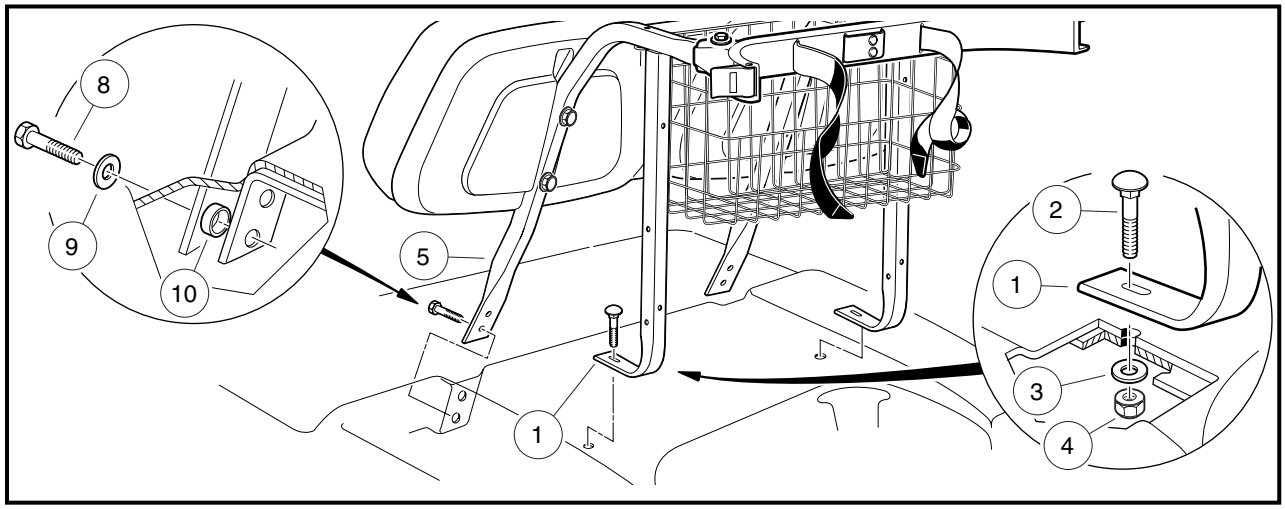

Figure 4-8 Seat Back Support Front and Rear Leg Mounting

REAR BODY INSTALLATION

1. Install in reverse order of removal:

1.1. Tighten four screws (8), flat washers (9) and spacers (10), attaching the front legs (5) of the seat back support assembly to the body to 20 in-lb (2.3 N·m) **(Figure 4-8, Page 4-9)**.

1.2. Tighten the two bolts (2), nuts (4) and washers (3), attaching the rear legs (1) of the seat back support assembly to the body to 11 ft-lb (14.9 N·m) **(Figure 4-8, Page 4-9)**.

1.3. Tighten screws and lock nuts securing the Forward/Reverse switch or shifter to 33 in-lb (2.8 N·m).

1.4. **All vehicles except IQ System vehicles:** Install Forward/Reverse handle and tighten to 14 in-lb (1.6 N·m).

1.5. Tighten kick-plate screws, nuts and washers to 48 in-lb (5.4 N·m) **(Figure 4-4, Page 4-7).**

1.6. Tighten two screws (1), lock nuts and washers under rear body to 33 in-lb (2.8 N·m) **(Figure 4-3, Page 4-7)**.

Rear Body Installation, Continued:

1.7. **Gasoline vehicles only**: Check the choke positioner for proper adjustment and adjust if necessary. Install fuel pump. **See Section 14 – Fuel System, in the FE290 Maintenance and Service Supplement.**

Electric vehicles only:

1.8. **36-volt vehicles**: Tighten the four charger receptacle bezel screws (1) to 16 in-lb (1.8 N·m) **(Figure 4-6, Page 4-8)**.

1.9. **48-volt vehicles**: Tighten the four charger receptacle bezel screws to 16 in-lb (1.8 N·m). Tighten the nut that secures the 10-gauge black wire to the charger receptacle to 23 in-lb (2.6 N·m).

1.10. **IQ System vehicles:** Connect the four-pin connector (12) and the three-pin connector (13) to the Forward/Reverse switch **(Figure 4-7, Page 4-8)**.

All electric vehicles:

1.11. Tighten the battery connections to 110 in-lb (12.4 N·m) and coat terminals with Battery Terminal Protector Spray (CCI P/N 1014305).

FLOOR MAT

See General Warning, Section 1, Page 1-1.

FLOOR MAT REMOVAL

1. Remove the brake and accelerator pedals. **See Section 5 – Accelerator and Brake Pedal Group.**
2. Loosen two screws in the rear body kick-plate **(Figure 4-4, Page 4-7)** and pull the rear edge of the floormat from between the rear body and the floor panel.
3. Remove the top edge of the floormat from the overlapping flange under the dash.
4. Lift the mat from the vehicle.

FLOOR MAT INSTALLATION

1. Reverse the removal procedure to install the floormat. Tighten kick-plate screws to 48 in-lb (5.4 N·m).
2. Install the brake and accelerator pedals. **See Section 5 – Accelerator and Brake Pedal Group.**

SECTION 5 – ACCELERATOR AND BRAKE PEDAL GROUP

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**

THROTTLE INPUT DEVICE IDENTIFICATION

To service and adjust the pedal group properly, the accelerator type must be identified before work begins. All gasoline DS golf cars use the same type of pedal group; however, electric DS golf cars utilize one of two different accelerator systems: Motor Controller Output Regulator (MCOR) **(Figure 5-1, Page 5-1)** or a V-Glide wiper switch (36-volt) **(Figure 5-2, Page 5-1)**. Service and adjustment procedures differ significantly, so it is important to make sure that the correct procedure is used.

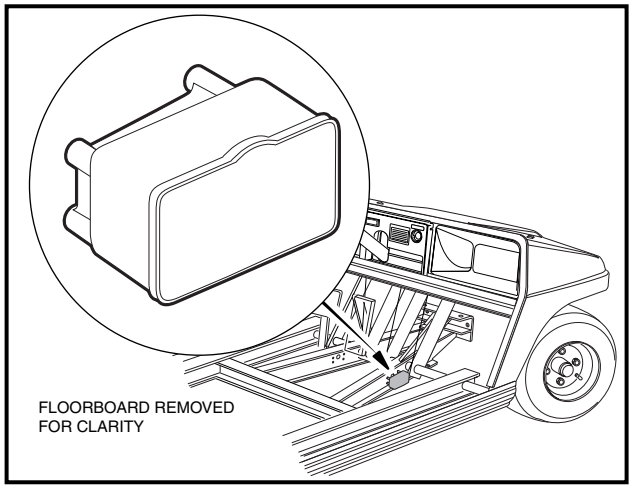

Figure 5-1 Electric Vehicle Equipped with MCOR (Motor Controller Output Regulator)

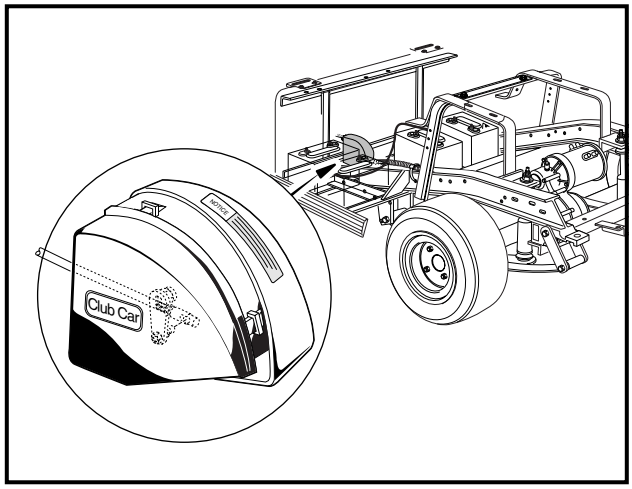

Figure 5-2 Electric Vehicle Equipped with a V-Glide Wiper Switch (36-Volt)

BRAKE PEDAL AND PARK BRAKE

See General Warning, Section 1, Page 1-1.

BRAKE PEDAL REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**

Brake Pedal Removal, Continued:

2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jack stands under the front cross tube of the vehicle frame and lower the vehicle onto the jack stands. **See following WARNING**.

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

3. Remove the brake pedal assembly.
   3.1. Disconnect the equalizer rod (13) from the pedal shaft by removing the clevis pin (14) and bow-tie pin (15) **(Figure 5-4, Page 5-3)**.
   3.2. Remove the nuts (5), washers (2), bolts (4) and mounting blocks (23). If the mounting blocks show signs of excessive wear or are damaged, they must be replaced with new ones before installing pedal assembly.
   3.3. Remove the nut (12) and brake stop bumper (11).
   3.4. Lift the pedal assembly (8) through the floorboard.

BRAKE PEDAL INSTALLATION

1. From the top side of the floorboard, insert the brake pedal assembly through the opening in the floor as shown **(Figure 5-3, Page 5-2)**, and install the brake pedal stop bumper (11) on the brake pedal assembly **(Figure 5-4, Page 5-3)**. Do not tighten the jam nut (12) at this time.

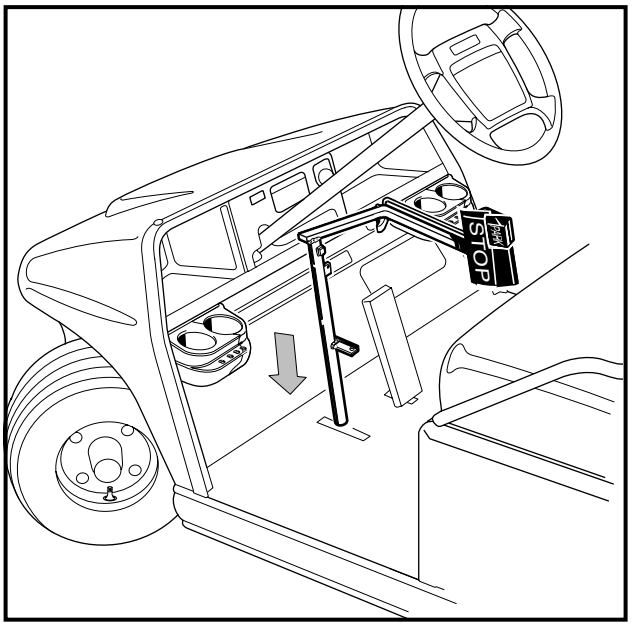

Figure 5-3 Brake Pedal Weldment Through Floor

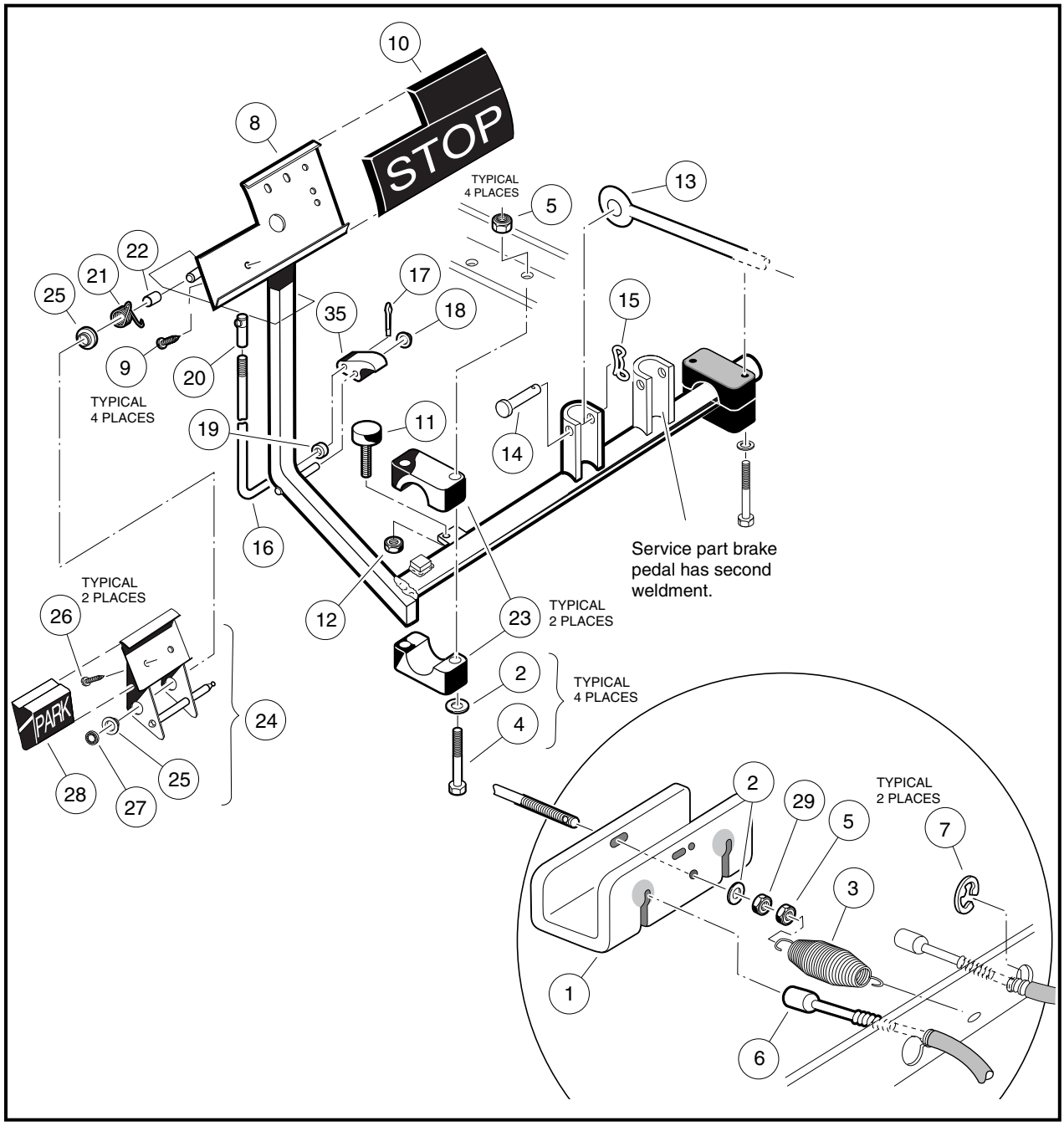

Figure 5-4 Brake and Park Brake Pedal Assembly

2. Secure the equalizer rod (13) to the brake pedal assembly (8) with the clevis pin (14) and bow-tie pin (15) as shown **(Figure 5-4, Page 5-3)**.
3. Position and attach brake pedal assembly, mounting blocks (23) and washers (2) to vehicle frame as shown. Tighten the bolts and nuts to 113 in-lb (12.8 N·m) **(Figure 5-4, Page 5-3)**.
4. Tighten the nut (2) on the equalizer rod (1) so that brake pedal free-play is 1/4 inch to 1/2 inch (6 mm to 13 mm) **(Figure 5-5, Page 5-4). See following NOTE.**

NOTE: *Brake pedal free-play is the distance the brake pedal can be pressed before the brake actuator arm moves.*

Brake Pedal Installation, Continued:

5. Tighten the jam nut (3) while holding the adjustment nut (2) in the correct position **(Figure 5-5, Page 5-4).**
6. Adjust the pedal group. Refer to the appropriate adjustment procedure:
   - **Pedal Group Adjustment – Gasoline Vehicle on page 5-12**
   - **Pedal Group Adjustment – Electric MCOR Vehicles on page 5-17**
   - **Pedal Group Adjustment – Electric V-Glide Vehicles on page 5-21**

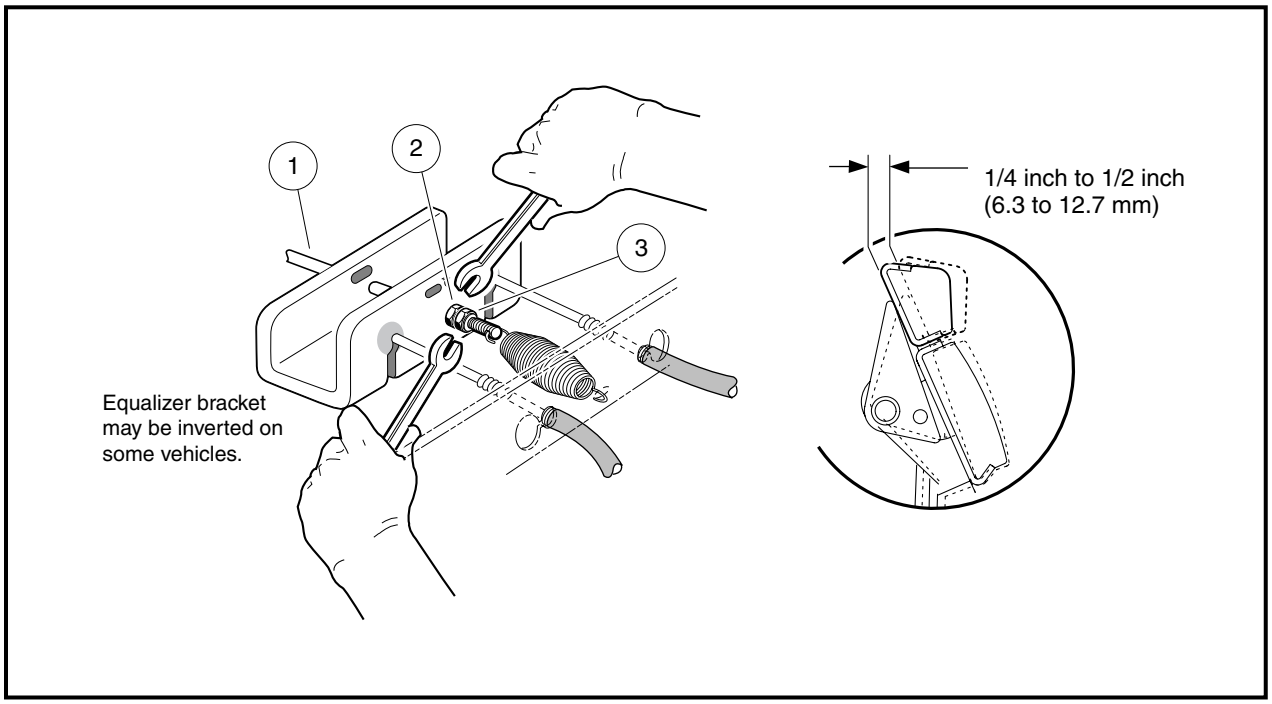

Figure 5-5 Brake Pedal Free-Play Adjustment

PARK BRAKE REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jack stands under the front cross tube of the vehicle frame and lower the vehicle onto the jack stands. **See following WARNING.**

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

3. Remove the park brake assembly.

   3.1. To remove the park brake rod and pawl assembly (16 through 19 and 35), remove the push nut (18) and disconnect the ball joint sleeve (20) from the park brake pedal (24) **(Figure 5-4, Page 5-3). See following NOTE**.

NOTE: *New push nuts (18) and (27) must be used when reassembling the park brake* ***(Figure 5-6, Page 5-5)****.*

   3.2. To remove the park brake pedal (1), remove the push nut (27), disconnect the torsion spring (21) **(Figure 5-6, Page 5-5)** and slide the pedal off of the shaft. **See preceding NOTE**.

   3.3. Inspect all parts for wear or damage and replace as necessary.

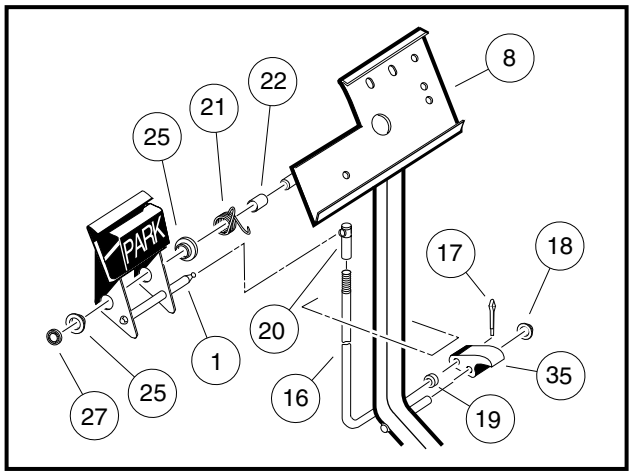

Figure 5-6 Park Brake Assembly

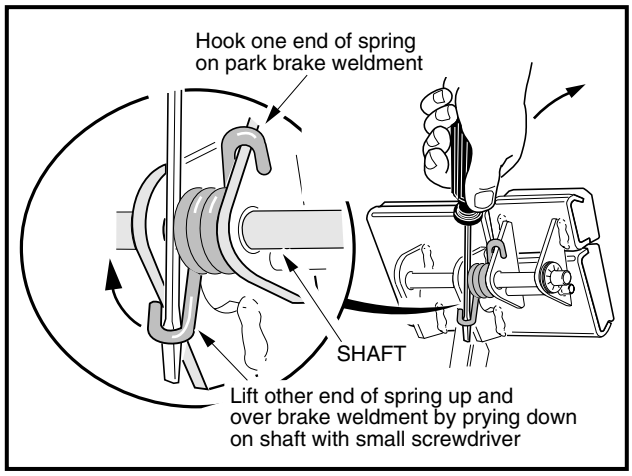

Figure 5-7 Torsion Spring Installation

PARK BRAKE INSTALLATION

1. From the bottom side of the floorboard, insert the park brake rod (16) through the brake pedal assembly opening as shown **(Figure 5-6, Page 5-5)**. Then install the park brake pawl (35) onto the shaft on the brake pedal assembly (8) and also insert the park brake rod (16) into the park brake pawl.
2. Install the push nut (18) onto the park brake pawl shaft.
3. Install the spacer (22) and torsion spring (21) on the park brake pedal shaft on the brake pedal assembly.
4. Install the two bushings (25) in the park brake pedal and position the park brake pedal on the shaft on the brake pedal assembly weldment **(Figure 5-6, Page 5-5)**. Then attach the ends of the torsion spring to the park brake pedal and to the brake pedal weldment as shown **(Figure 5-7, Page 5-5)**.
5. Install the push nut (27) on the park brake pedal shaft **(Figure 5-6, Page 5-5)**.
6. Connect park brake rod (16) ball joint to ball stud on park brake pedal assembly.
7. Adjust park brake ratchet/pawl gap and pawl engagement. Refer to the appropriate adjustment procedure:

   - **Pedal Group Adjustment – Gasoline Vehicle on page 5-13, Step 4**
   - **Pedal Group Adjustment – Electric MCOR Vehicles on page 5-18, Step 4**
   - **Pedal Group Adjustment – Electric V-Glide Vehicles on page 5-22, Step 4**

ACCELERATOR PEDAL – GASOLINE AND ELECTRIC V-GLIDE VEHICLES

See General Warning, Section 1, Page 1-1.

NOTE: *Proper identification of the accelerator type is required before performing this procedure.* ***See Throttle Input Device Identification on page 5-1.***

This section pertains to gasoline vehicles and electric V-Glide vehicles. For electric MCOR vehicles, proceed to Accelerator Pedal – Electric MCOR Vehicles on page 5-9.

ACCELERATOR PEDAL REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jack stands under the front cross tube of the vehicle frame and lower the vehicle onto the jack stands. **See following WARNING**.

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

3. Disconnect the accelerator rod assembly (17, 18, and 19) **(Figure 5-8, Page 5-7)** at the front and rear ball studs and remove it from the vehicle.
4. Use a 9/16-inch socket and 9/16-inch wrench to remove the nut (23), two washers (25), and bolt (4) securing the accelerator pedal (1) to the pivot rod (6).
5. Remove the nut (10) and ball stud (16) from the accelerator pivot rod assembly (6).
6. Slide the spring retainer (11) off of the accelerator pivot rod.
7. Inspect the pivot support bearing (9) for wear and replace if necessary.
8. Use a marker to mark the position of the park brake ratchet (24) on the accelerator pivot rod (6)**. See following NOTE**.

NOTE: *Failure to mark position of the ratchet could cause it to be installed improperly, resulting in improper adjustment and possible failure of the park brake.*

9. Remove the lock nut (26) from the accelerator pivot shaft **(Figure 5-8, Page 5-7)**.
10. Press the brake pedal slightly and slide the park brake ratchet (24) toward the end of the accelerator pivot rod. Rotate the ratchet and remove it from the pivot rod.
11. Remove the pivot rod (6) and spacer (20) from the accelerator pivot rod supports (21).
12. Inspect the accelerator pivot rod supports (21) for wear or damage and replace as necessary. If the pivot rod supports do not require replacement, loosen, but do not remove the four bolts (22) and lock nuts (15) to make installation of the pivot rod easier.
13. Remove the accelerator pedal (1) from the vehicle.
14. Inspect all parts for wear and damage. Replace as necessary.

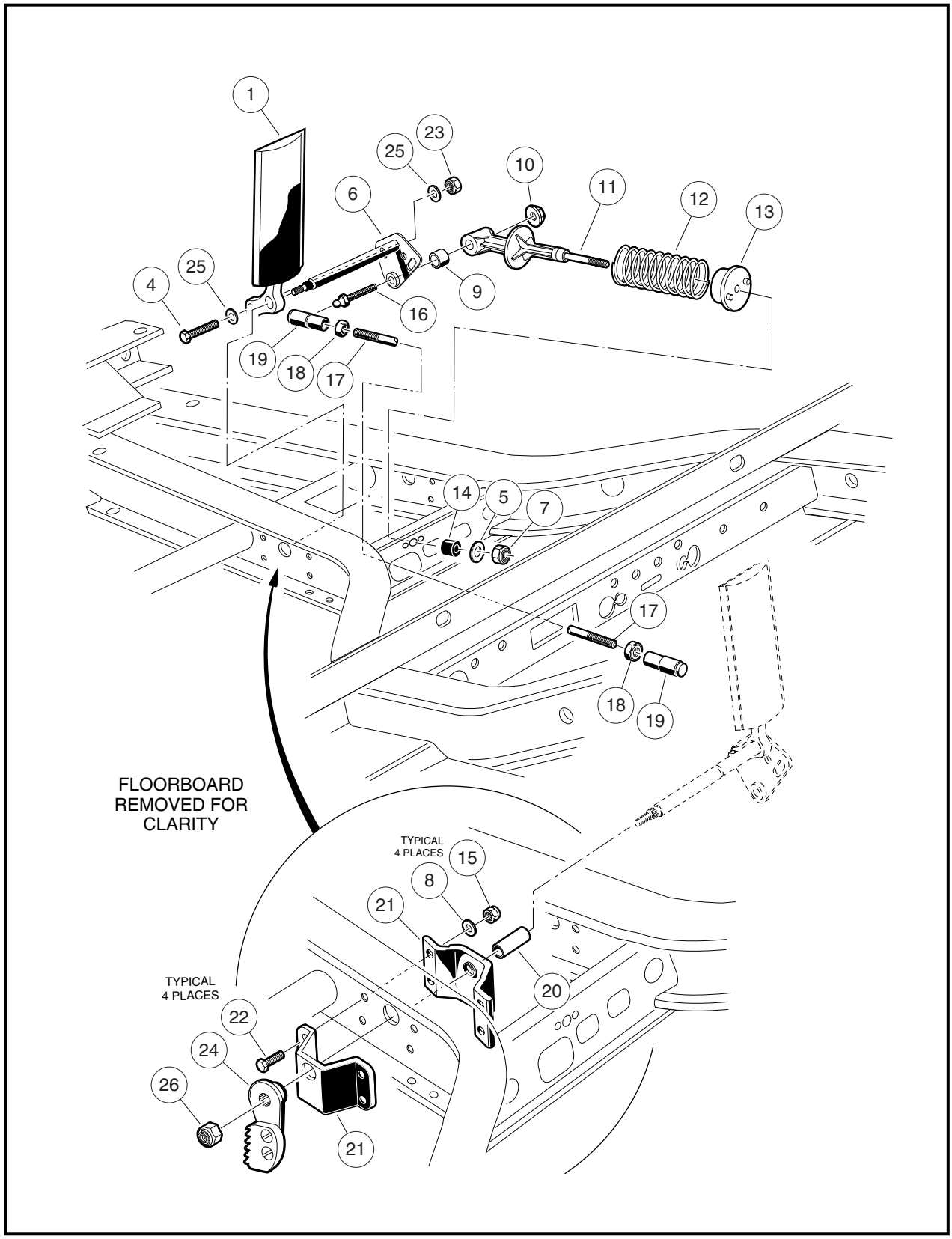

Figure 5-8 Accelerator Pedal Assembly – Gasoline Vehicles and V-Glide Wiper Switch (36-Volt) Vehicles

ACCELERATOR PEDAL INSTALLATION

1. If the accelerator pivot rod supports were replaced, position the supports (21) on the vehicle frame and install the four bolts (22), flat washers (8), and lock nuts (15). Finger-tighten nuts at this time **(Figure 5-8, Page 5-7)**.
2. Insert the lower end of the accelerator pedal (1) through the floorboard and install the accelerator pivot rod (6) through the uppermost hole in the pedal.
3. Install the plastic spacer (20) on the pivot rod.
4. Insert the pivot rod through the pivot rod supports on the vehicle frame.
5. Tighten the four bolts (22) attaching the pivot rod supports to the frame to 75 in-lb (8.5 N·m).
6. Insert the bolt (4), with washer (25), through the lower hole in the pedal and through the pivot rod. Secure with washer (25) and new lock nut (23) **(Figure 5-8, Page 5-7)**. Finger-tighten lock nut at this time.
7. Install the ball stud (16) through the pivot rod. Install the spring retainer (11) onto the ball stud. Secure these parts with the nut (10) **(Figure 5-8, Page 5-7)**. Tighten the nut to 50 in-lb (5.5 N·m).
8. Press the brake pedal slightly, and with the park brake ratchet oriented so that the tip of the ratchet is pointed toward the rear of vehicle, slide the ratchet onto the pivot rod (do not slide the ratchet onto the pivot rod splines). Release the brake pedal and allow the ratchet to rotate until its tip is pointed downward **(Figure 5-9, Page 5-8)**. The ratchet should now rotate freely on the rod.

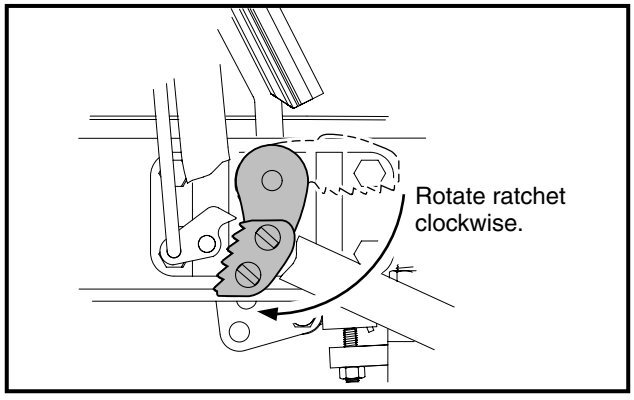

Figure 5-9 Ratchet Installation

9. Rotate ratchet clockwise until it touches the park brake pawl, then slide the ratchet onto the splines of the pivot rod (it may be necessary to push the pivot rod toward the driver-side of the vehicle to make the splines accessible). The ratchet may have to be rotated counterclockwise slightly to align the splines.
10. Move the pivot rod back toward the driver side of the vehicle and line up the match marks on the pivot rod and ratchet. Rotate the pivot rod back and forth slightly to align the splines and slide the ratchet onto the splines.
11. Install the lock nut (26) on pivot rod and tighten the nut to 18 ft-lb (24.5 N·m) **(Figure 5-8, Page 5-7)**.
12. Install the accelerator rod assembly (17, 18, and 19).
13. Adjust the accelerator pedal height. Refer to the appropriate adjustment procedure:
    - **Pedal Group Adjustment – Gasoline Vehicle on page 5-15, Step 5**
    - **Pedal Group Adjustment – Electric V-Glide Vehicles on page 5-24, Step 5**
14. Adjust the accelerator rod (gasoline vehicles only). **See step 6 of Pedal Group Adjustment – Gasoline Vehicle on page 5-15.**

ACCELERATOR PEDAL – ELECTRIC MCOR VEHICLES

See General Warning, Section 1, Page 1-1.

NOTE: *Proper identification of the accelerator type is required before performing this procedure.* ***See Throttle Input Device Identification on page 5-1.***

This sections pertains to electric MCOR vehicles only. For gasoline vehicles and electric V-Glide vehicles, go to Accelerator Pedal – Gasoline and Electric V-Glide Vehicles on page 5-6.

ACCELERATOR PEDAL REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jack stands under the front cross tube of the vehicle frame and lower the vehicle onto the jack stands. **See following WARNING**.

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

3. Remove the MCOR (2) and drive bar (3) as instructed **(Figure 5-10, Page 5-10)**. **See MCOR Removal, Section 12, in the appropriate maintenance and service supplement.**
4. Use a 9/16-inch socket and 9/16-inch wrench to remove the nut (7), two washers (5), and bolt (4) securing the accelerator pedal (1) to the pivot rod (6) **(Figure 5-10, Page 5-10).**
5. Remove the nut (10) and bolt (8) from the accelerator pivot rod assembly (6).
6. Slide the spring retainer (11) off of the accelerator pivot rod.
7. Inspect the pivot support bearing (9) for wear and replace if necessary.
8. Use a marker to mark the position of the park brake ratchet (24) on the accelerator pivot rod (6)**. See following NOTE.**

NOTE: *Failure to mark position of the ratchet could cause it to be installed improperly, resulting in improper adjustment and possible failure of the park brake.*

9. Remove the lock nut (23) from the accelerator pivot rod **(Figure 5-10, Page 5-10)**.
10. Press the brake pedal slightly and slide the park brake ratchet (24) toward the end of the accelerator pivot rod. Rotate the ratchet and remove it from the pivot rod.
11. Remove the pivot rod (6) and spacer (20) from the accelerator pivot rod supports (21).
12. Inspect the accelerator pivot rod supports (21) for wear and damage and replace as necessary. If the pivot rod supports do not require replacement, loosen (but do not remove) the four bolts (22) and lock nuts (15) to make installation of the pivot rod easier.
13. Remove the accelerator pedal (1) from the vehicle **(Figure 5-10, Page 5-10)**.
14. Inspect all parts for wear and damage. Replace as necessary.

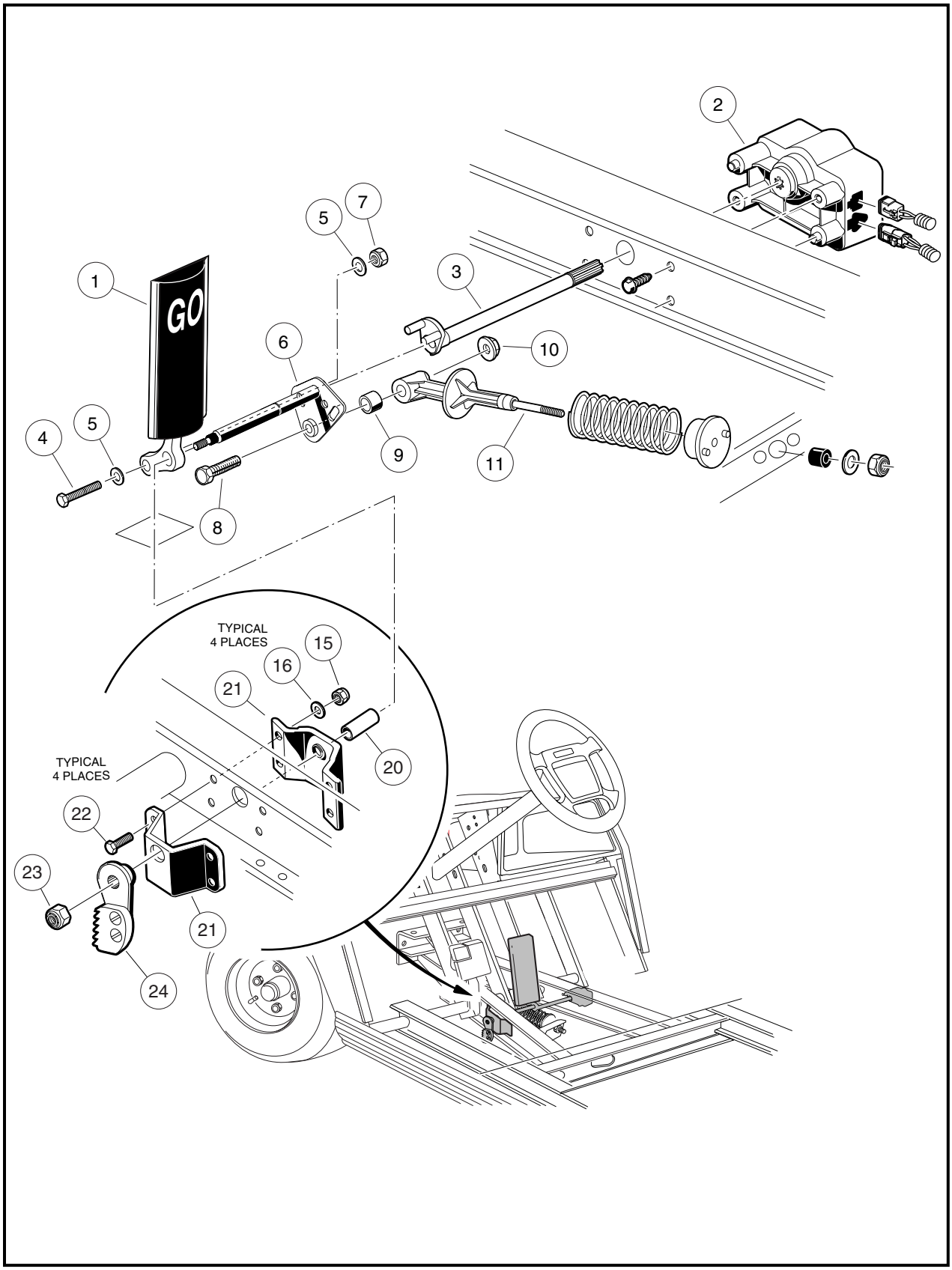

Figure 5-10 Accelerator Pedal – Electric Vehicle with MCOR

ACCELERATOR PEDAL INSTALLATION

1. If the accelerator pivot rod supports were replaced, position the supports (21) on the vehicle frame and install the four bolts (22), flat washers (16), and lock nuts (15) **(Figure 5-10, Page 5-10)**. Finger-tighten hardware at this time.
2. Insert the lower end of the accelerator pedal (1) through the floorboard and install the accelerator pivot rod (6) through the uppermost hole in the pedal **(Figure 5-10, Page 5-10)**.
3. Install plastic spacer (20) on pivot rod (6).
4. Insert the pivot rod through the pivot rod supports (21) on the vehicle frame.
5. Tighten the four bolts (22) attaching the pivot rod supports to the frame to 75 in-lb (8.5 N·m).
6. Insert the bolt (4), with washer (5), through the lower hole in the pedal and through the pivot rod. Secure with washer (5) and new lock nut (7) **(Figure 5-10, Page 5-10)**. Finger-tighten lock nut at this time.
7. Install the bolt (8) through the pivot rod (6) and spring retainer (11). Secure these parts with the nut (10) **(Figure 5-10, Page 5-10)**. Tighten the nut to 50 in-lb (5.5 N·m).
8. Press the brake pedal slightly, and with the park brake ratchet oriented so that the tip of the ratchet is pointed toward the rear of the vehicle, slide the ratchet onto the pivot rod (do not slide the ratchet onto the pivot rod splines). Release the brake pedal and allow the ratchet to rotate until its tip is pointed downward **(Figure 5-11, Page 5-11)**. The ratchet should now rotate freely on the rod.

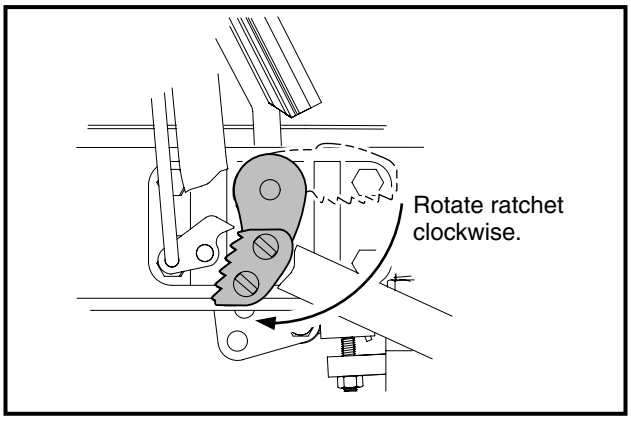

Figure 5-11 Ratchet Installation

9. Rotate the ratchet clockwise until it touches the park brake pawl, then slide the ratchet onto the splines of the pivot rod (it may be necessary to push the pivot rod toward the driver-side of the vehicle to make the splines accessible). The ratchet may have to be rotated counterclockwise slightly to align the splines.
10. Move the pivot rod back toward the driver-side of the vehicle and line up the match marks on the pivot rod and ratchet. Rotate the pivot rod back and forth slightly to align the splines and slide the ratchet onto the splines.
11. Install lock nut (23) on pivot rod **(Figure 5-10, Page 5-10)**. Tighten to 18 ft-lb (24.5 N·m).
12. Install the MCOR (2) and drive bar (3) as instructed. **See MCOR Removal, Section 12, in the appropriate maintenance and service supplement.**
13. Adjust the accelerator pedal height. **See step 5 of Pedal Group Adjustment – Electric MCOR Vehicles on page 5-20.**

PEDAL GROUP ADJUSTMENT – GASOLINE VEHICLE

See General Warning, Section 1, Page 1-1.

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Adjust brake pedal height.
   2.1. Chock wheels and release park brake. Lift rear of vehicle and place jack stands under the axle tubes to support the vehicle.
   2.2. To provide slack in the brake cables, loosen the equalizer retaining nuts (2 and 3) on the equalizer rods (1) **(Figure 5-12, Page 5-12)**.

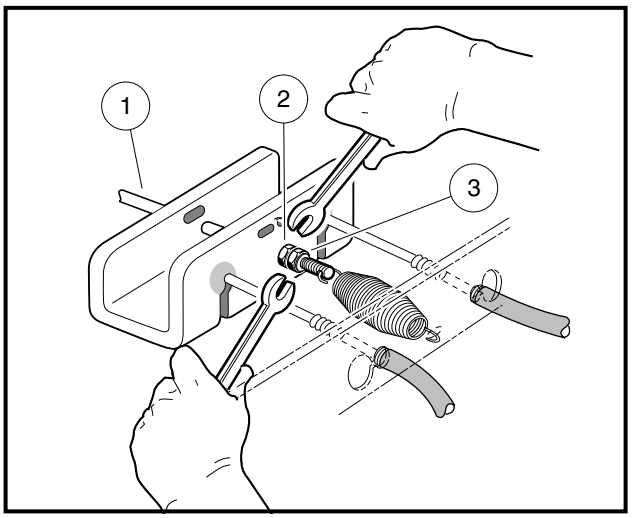

Figure 5-12 Loosen Rear Brake Equalizer Rod Nuts

   2.3. Loosen the brake stop jam nut (31), then relieve pedal pressure on the stop by pushing down slightly on the pedal. Next, adjust the brake stop bumper (22) up or down **(Figure 5-13, Page 5-12)**. Adjusting the bumper upward decreases distance between pedal and floorboard. Adjusting the bumper downward increases distance between pedal and floorboard. Proper brake pedal height is 6 inches (15.2 cm) **(Figure 5-14, Page 5-12)**.
   2.4. Tighten the jam nut (31) to 8 ft-lb (9.5 N·m) **(Figure 5-13, Page 5-12)**.

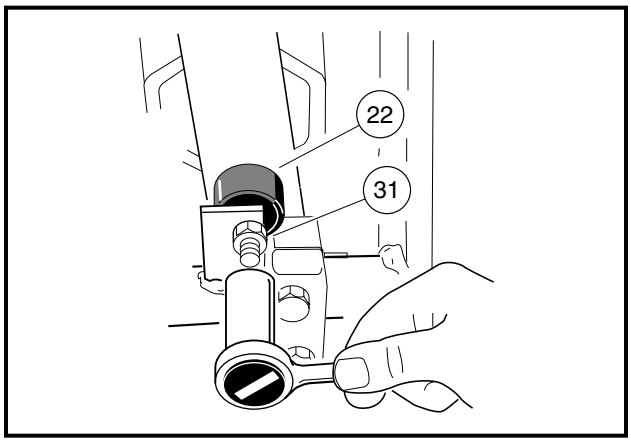

Figure 5-13 Brake Pedal Height Adjustment

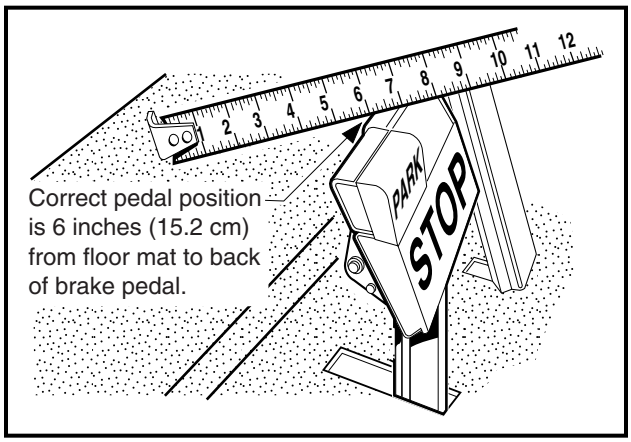

Figure 5-14 Brake Pedal Height Measurement

3. Adjust brake pedal free play. **See following NOTE.**

NOTE: *Brake pedal free play is the distance the brake pedal can be pressed before the brake actuator arm (at the brake cluster) moves.*

3.1. Measuring perpendicular from the floorboard to the back of the brake pedal, press the brake pedal and measure the distance that the pedal moves before all of the slack is taken out of the brake cables **(Figure 5-14, Page 5-12)**.

3.2. Tighten the nut (2) on the equalizer rod (1) so that the brake pedal free play is 1/4 to 1/2 inch (6.3 to 12.7 mm) **(Figure 5-15, Page 5-13)**.

3.3. Tighten the jam nut (3) while holding the adjustment nut (2) in the correct position**.**

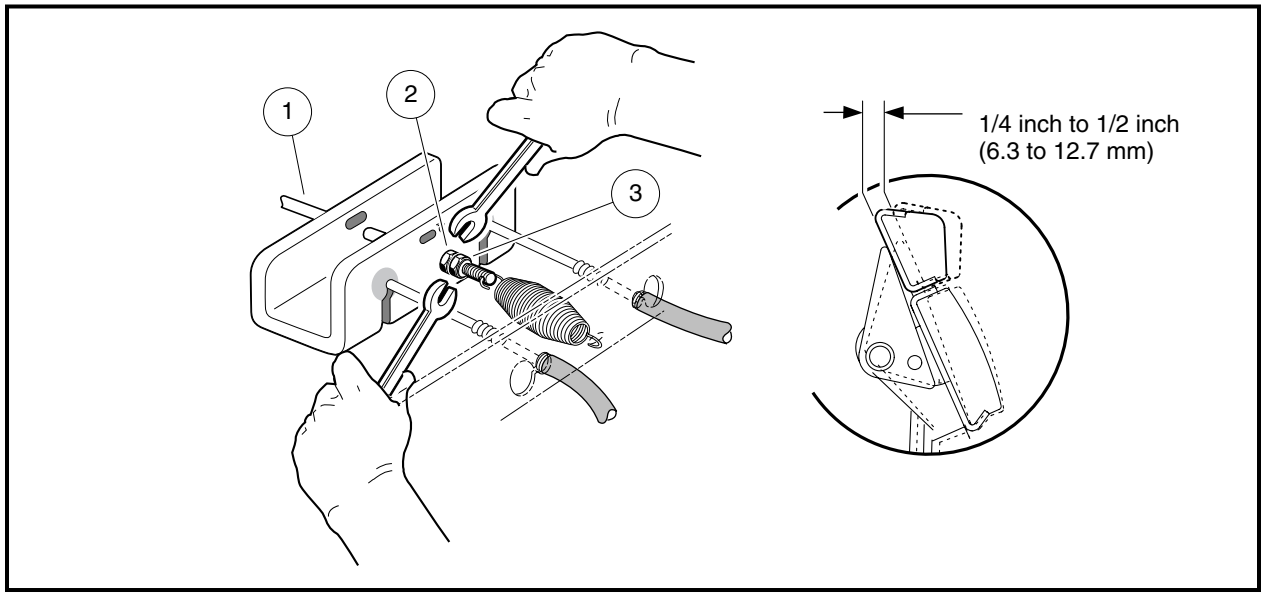

Figure 5-15 Brake Pedal Free-Play Adjustment

4. Adjust park brake ratchet/pawl gap and pawl engagement.

4.1. Inspect the park brake pawl and ratchet for excessive wear, grooves, cracks or chips. If either the pawl or ratchet is damaged, both must be replaced.

4.2. Adjust retaining nut (7) on spring support rod until there is a 0.060 inch (1.5 mm) gap between the pawl and the tips of the ratchet teeth. Use a feeler gauge to verify the gap **(Figure 5-16, Page 5-14)**. The gap should be consistent through range of pawl movement. If the gap is not consistent, loosen the four bolts (6) securing the accelerator pivot rod supports and adjust the supports. If the gap becomes smaller as the park brake pedal is pressed, move the pivot rod supports slightly rearward until the gap is consistent. If the gap becomes larger as the park brake pedal is pressed, move the pivot rod supports slightly forward until gap is consistent. **See following NOTE.**

NOTE: *The accelerator rod must also be checked if the ratchet/pawl gap is adjusted.* ***See step 6 of Pedal Group Adjustment – Gasoline Vehicle on page 5-15.***

The accelerator rod must be disconnected before proceeding to step 4.3.

Pedal Group Adjustment – Gasoline Vehicle, Continued:

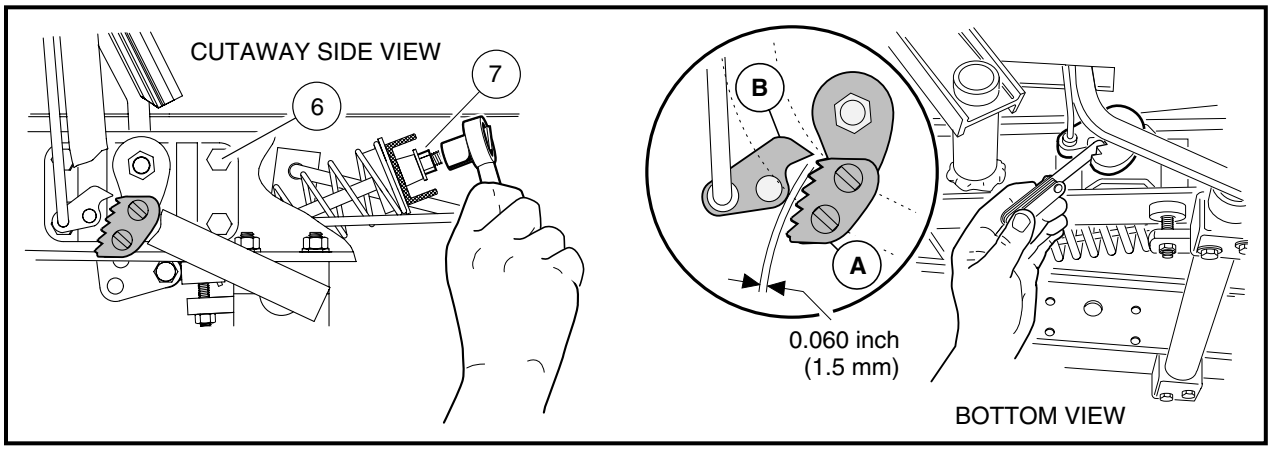

Figure 5-16 Park Brake Ratchet/Pawl Gap Adjustment

4.3. With the park brake unlocked, measure and note the distance from the top of the accelerator pedal to the floorboard, and then lock the park brake **(Figure 5-17, Page 5-14)**.

4.4. With the park brake locked, make sure at least 75% of ratchet tooth length engages the pawl **(Figure 5-18, Page 5-14)**. Tooth engagement should be between the two lines marked on the pawl.

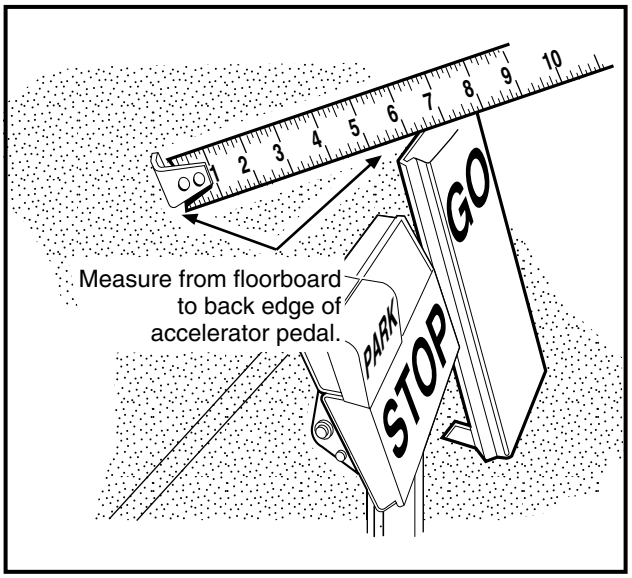

Figure 5-17 Accelerator Pedal Height Measurement

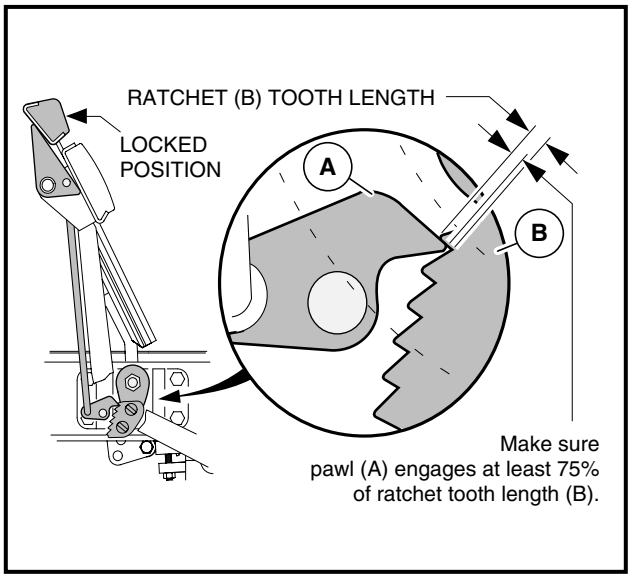

Figure 5-18 Ratchet/Pawl Tooth Engagement

4.5. With park brake still locked, measure the distance from the top of accelerator pedal to floorboard. If the measurement has changed, ratchet tooth engagement is too deep and must be adjusted.

4.6. If ratchet/pawl engagement must be adjusted, disconnect the ball joint at the top of the brake rod and rotate the ball joint sleeve clockwise to increase engagement or counterclockwise to decrease engagement. Reconnect ball joint **(Figure 5-19, Page 5-15)**.

4.7. If the accelerator push rod was disconnected from the accelerator pedal, reconnect it.

4.8. Check for proper brake operation prior to driving the vehicle.

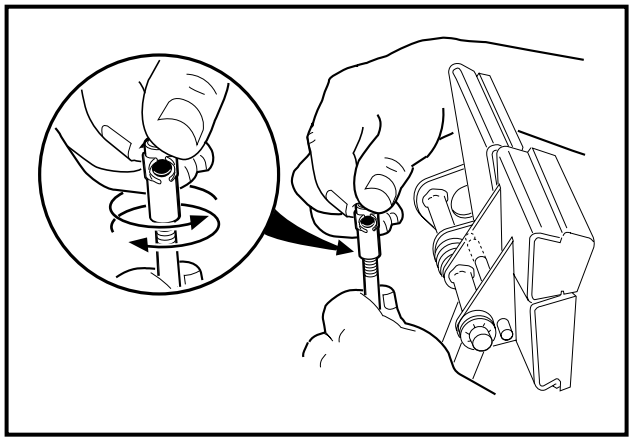

Figure 5-19 Brake Rod Adjustment

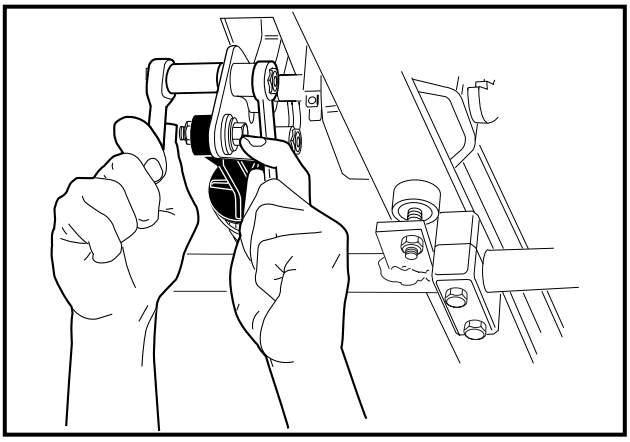

Figure 5-20 Accelerator Pedal Height Adjustment

5. Adjust accelerator pedal height.
   5.1. Loosen the nut and bolt **(Figure 5-20, Page 5-15)** securing the accelerator pedal to the pivot plate.
   5.2. Clamp the accelerator pedal adjustment tool (CCI P/N 101871001) to the accelerator pedal, with the end marked *accelerator pedal height* closest to the floorboard **(Figure 5-21, Page 5-15)**. Press the accelerator pedal until the end of the tool rests against the floorboard; (pedal height should be 5-5/8 inches (14.3 cm). Use a rubber strap to hold pedal in position against the floorboard and then tighten nut to 26 ft-lb (35.3 N·m).

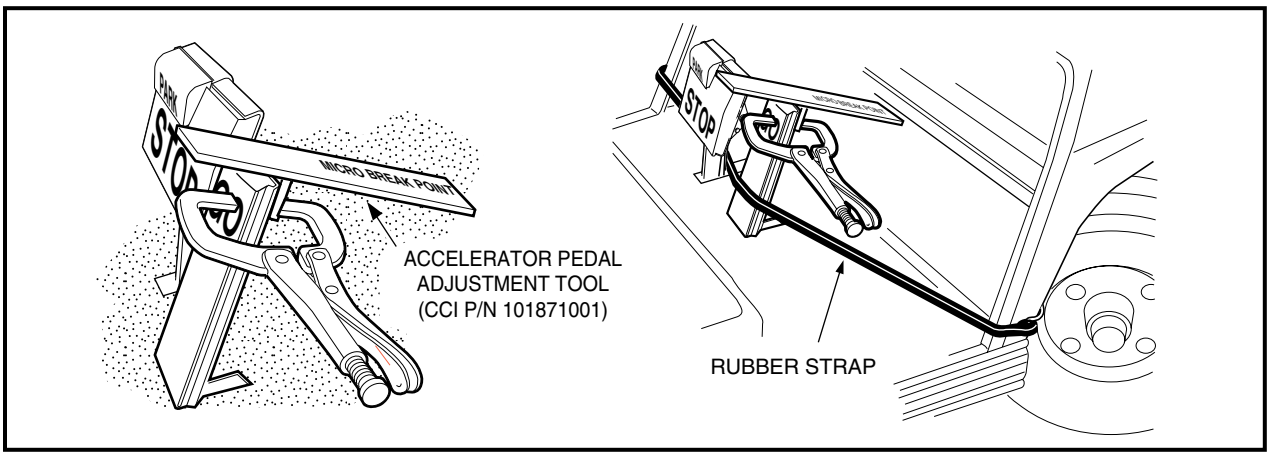

Figure 5-21 Accelerator Pedal Height Adjustment

6. Adjust the accelerator rod. **See following DANGER.**

⚠ DANGER

- **Before servicing, turn the key switch to OFF and place the Forward/Reverse handle in the NEUTRAL position.**
- **To prevent accidentally starting the vehicle, disconnect the battery as instructed in WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-1. This will prevent the possibility of the vehicle running over you when you are adjusting the accelerator rod.**

6.1. Remove the electrical box screw and cover. **See preceding DANGER.**

Pedal Group Adjustment – Gasoline Vehicle, Continued:

6.2. Loosen the jam nuts (18) and disconnect the accelerator rod (17) at the accelerator pedal. Adjust the length of the rod **(Figure 5-8, Page 5-7)** to obtain an accelerator cable cam position of 14° as shown **(Figure 5-22, Page 5-16). See following CAUTION.**

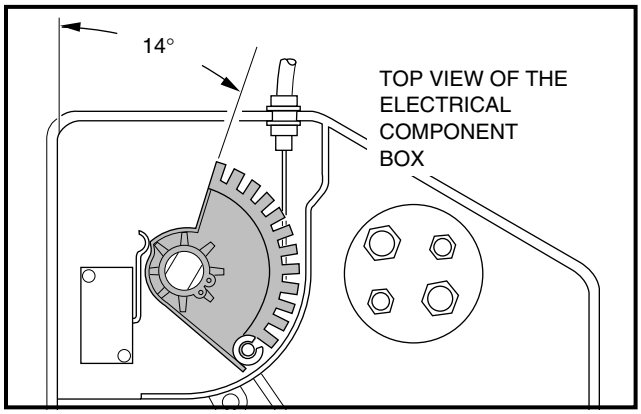

Figure 5-22 Accelerator Cable

⚠ CAUTION

- **After accelerator rod adjustment, make sure that approximately the same number of threads are exposed at each end of the accelerator rod.**
- **If lever on the limit switch in the electrical box is bent, replace limit switch.**
- **When loosening jam nuts on the accelerator rod with one end disconnected, hold the disconnected accelerator rod with locking pliers.**
- **When tightening jam nuts on the accelerator rod, hold the disconnected ball joint with locking pliers.**

6.3. Reconnect the accelerator rod at the accelerator pedal.

6.4. Before tightening jam nuts on accelerator rod, set park brake to first ratchet and pawl position. Press accelerator pedal and make sure the following events occur in the ***exact order shown***:

EVENT	APPROXIMATE PEDAL TRAVEL
Park brake release	2° - 4°
Solenoid activation	4° - 8°
Carburetor throttle actuation	8° - 12°

6.5. If the events above occur as they should, hold the ball joint at each end of the accelerator rod with pliers and tighten the accelerator rod jam nut against it.

6.6. Ensure that the events occur as described in step 6.4 above. **See following NOTE.**

NOTE: *After the accelerator pedal and rod are adjusted, the final governed engine RPM should be set.* ***See Engine RPM Adjustment in the appropriate maintenance and service supplement.***

6.7. Install the electrical box cover and screw.

7. Adjust the brakes. **See Brake Adjustment, Section 6, Page 6-8.**

PEDAL GROUP ADJUSTMENT – ELECTRIC MCOR VEHICLES

See General Warning, Section 1, Page 1-1.

NOTE: *Proper identification of the accelerator type is required before performing this procedure.* ***See Throttle Input Device Identification on page 5-1.***

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Adjust brake pedal height.
   2.1. Chock wheels and release park brake. Lift rear of vehicle and place jack stands under the axle tubes to support the vehicle.
   2.2. To provide slack in the brake cables, loosen the equalizer retaining nuts (2 and 3) on the equalizer rods (1) **(Figure 5-23, Page 5-17)**.

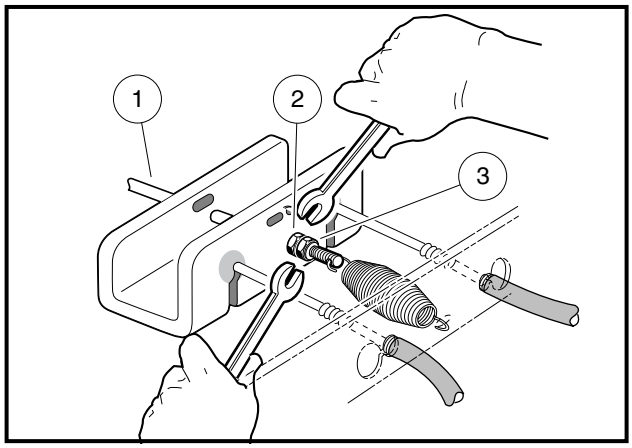

Figure 5-23 Loosen Rear Brake Equalizer Rod Nuts

   2.3. Loosen the brake stop jam nut (31), then relieve pedal pressure on the stop by pushing down slightly on the pedal. Next, adjust the brake stop bumper (22) up or down **(Figure 5-24, Page 5-17)**. Adjusting the bumper upward decreases distance between pedal and floorboard. Adjusting the bumper downward increases distance between pedal and floorboard. Proper brake pedal height is 6 inches (15.2 cm) **(Figure 5-25, Page 5-17)**.
   2.4. Tighten the jam nut (31) to 8 ft-lb (9.5 N·m) **(Figure 5-24, Page 5-17)**.

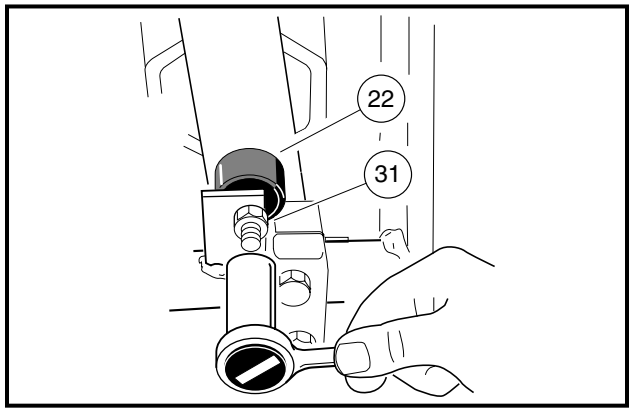

Figure 5-24 Brake Pedal Height Adjustment

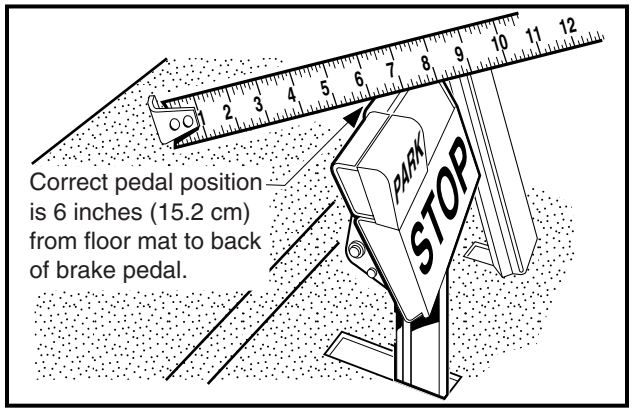

Figure 5-25 Brake Pedal Height Measurement

Pedal Group Adjustment – Electric MCOR Vehicles, Continued:

3. Adjust brake pedal free play. **See following NOTE.**

NOTE: *Brake pedal free play is the distance the brake pedal can be pressed before the brake actuator arm (at the brake cluster) moves.*

3.1. Measuring perpendicular from the floorboard to the back of the brake pedal, press the brake pedal and measure the distance that the pedal moves before all of the slack is taken out of the brake cables **(Figure 5-25, Page 5-17).**

3.2. Tighten the nut (2) on the equalizer rod (1) so that the brake pedal free play is 1/4 to 1/2 inch (6.3 to 12.7 mm) **(Figure 5-26, Page 5-18)**.

3.3. Tighten the jam nut (3) while holding the adjustment nut (2) in the correct position **(Figure 5-26, Page 5-18).**

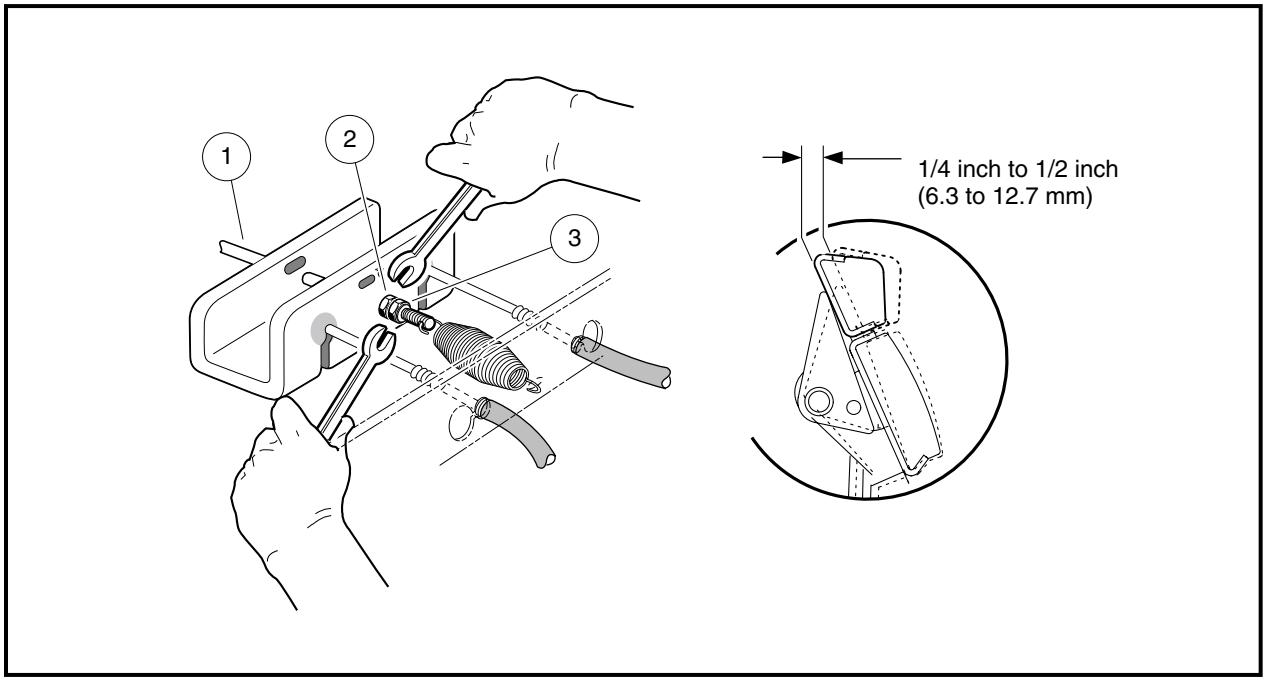

Figure 5-26 Brake Pedal Free-Play Adjustment

4. Adjust park brake ratchet/pawl gap and pawl engagement.

4.1. Inspect the park brake pawl and ratchet for excessive wear, grooves, cracks or chips. If either the pawl or ratchet is damaged, both must be replaced.

4.2. Adjust retaining nut (7) on spring support rod until there is a 0.060 inch (1.5 mm) gap between the pawl and the tips of the ratchet teeth. Use a feeler gauge to verify the gap **(Figure 5-27, Page 5-19)**. The gap should be consistent through range of pawl movement. If the gap is not consistent, loosen the four bolts (6) securing the accelerator pivot rod supports and adjust the supports. If the gap becomes smaller as the park brake pedal is pressed, move the pivot rod supports slightly rearward until the gap is consistent. If the gap becomes larger as the park brake pedal is pressed, move the pivot rod supports slightly forward until gap is consistent.

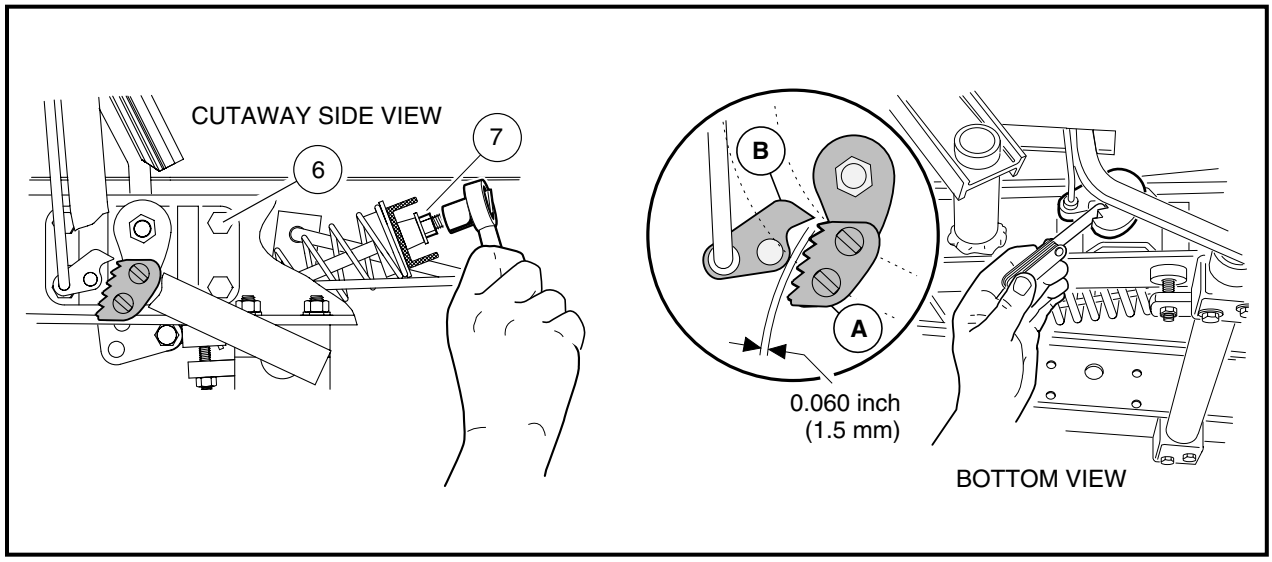

Figure 5-27 Park Brake Ratchet/Pawl Gap Adjustment

4.3. With the park brake unlocked, measure and note the distance from the top of the accelerator pedal to the floorboard, and then lock the park brake **(Figure 5-28, Page 5-19)**.

4.4. With the park brake locked, make sure at least 75% of ratchet tooth length engages the pawl **(Figure 5-29, Page 5-19)**. Tooth engagement should be between the two lines marked on the pawl.

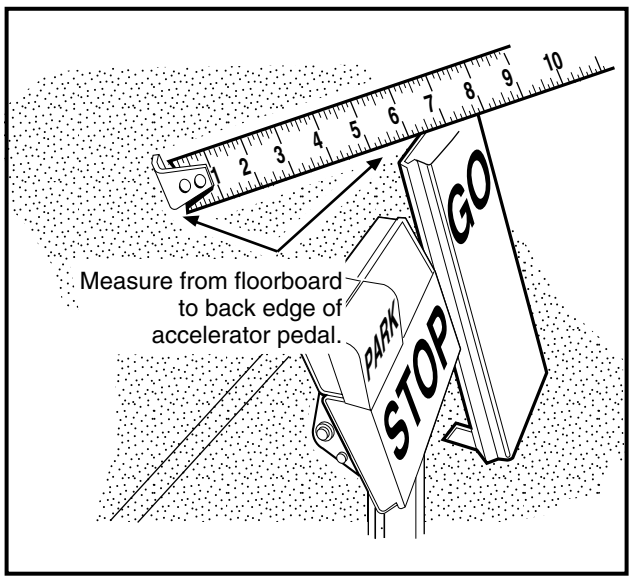

Figure 5-28 Accelerator Pedal Height Measurement

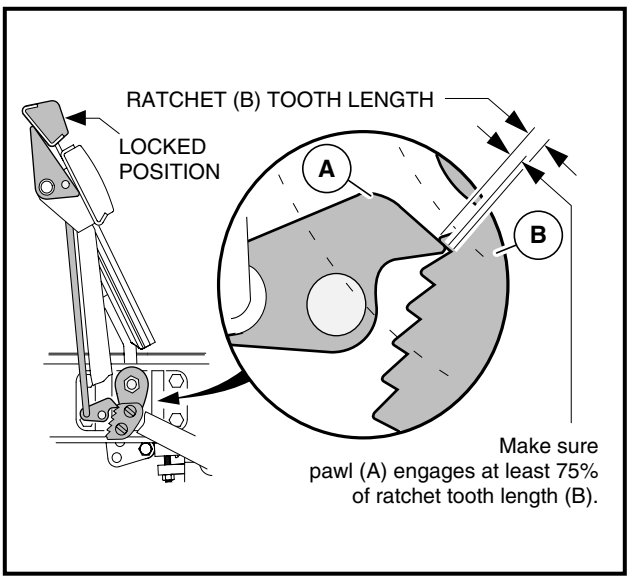

Figure 5-29 Ratchet/Pawl Tooth Engagement

4.5. With park brake still locked, measure the distance from the top of accelerator pedal to floorboard. If the measurement has changed, ratchet tooth engagement is too deep and must be adjusted.

4.6. If ratchet/pawl engagement must be adjusted, disconnect the ball joint at the top of the brake rod and rotate the ball joint sleeve clockwise to increase engagement or counterclockwise to decrease engagement. Reconnect ball joint **(Figure 5-30, Page 5-20)**.

4.7. Check for proper brake operation prior to driving the vehicle.

Pedal Group Adjustment – Electric MCOR Vehicles, Continued:

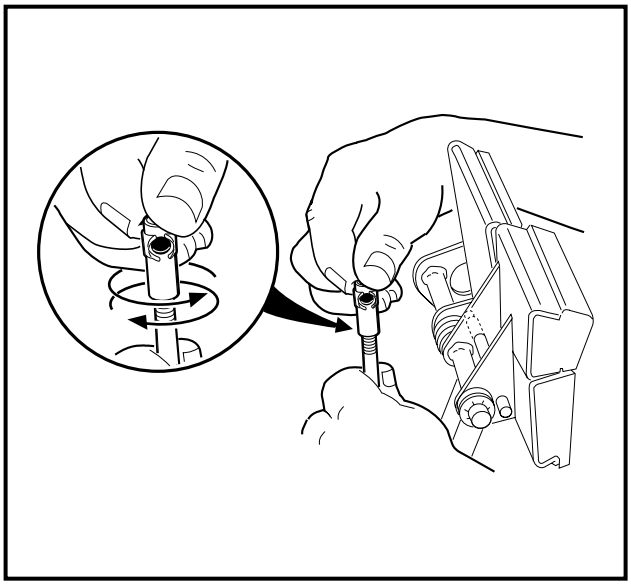

Figure 5-30 Brake Rod Adjustment

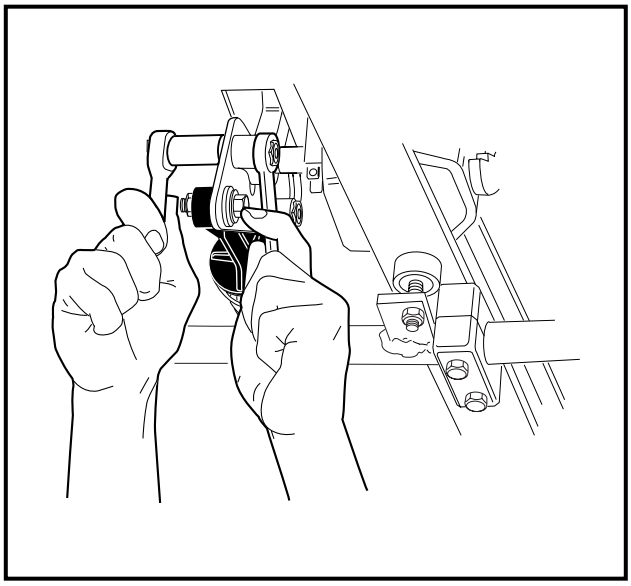

Figure 5-31 Accelerator Pedal Height Adjustment

5. Adjust accelerator pedal height.
   5.1. Loosen the nut and bolt **(Figure 5-31, Page 5-20)** securing the accelerator pedal to the pivot plate.
   5.2. Clamp the accelerator pedal adjustment tool (CCI P/N 101871001) to the accelerator pedal, with the end marked *accelerator pedal height* closest to the floorboard **(Figure 5-32, Page 5-20)**. Press the accelerator pedal until the end of the tool rests against the floorboard; pedal height should be 5-5/8 inches (14.3 cm). Use a rubber strap to hold pedal in position against the floorboard and then tighten nut to 26 ft-lb (35.3 N·m).
6. Adjust the brakes. **See Brake Adjustment, Section 6, Page 6-8.**

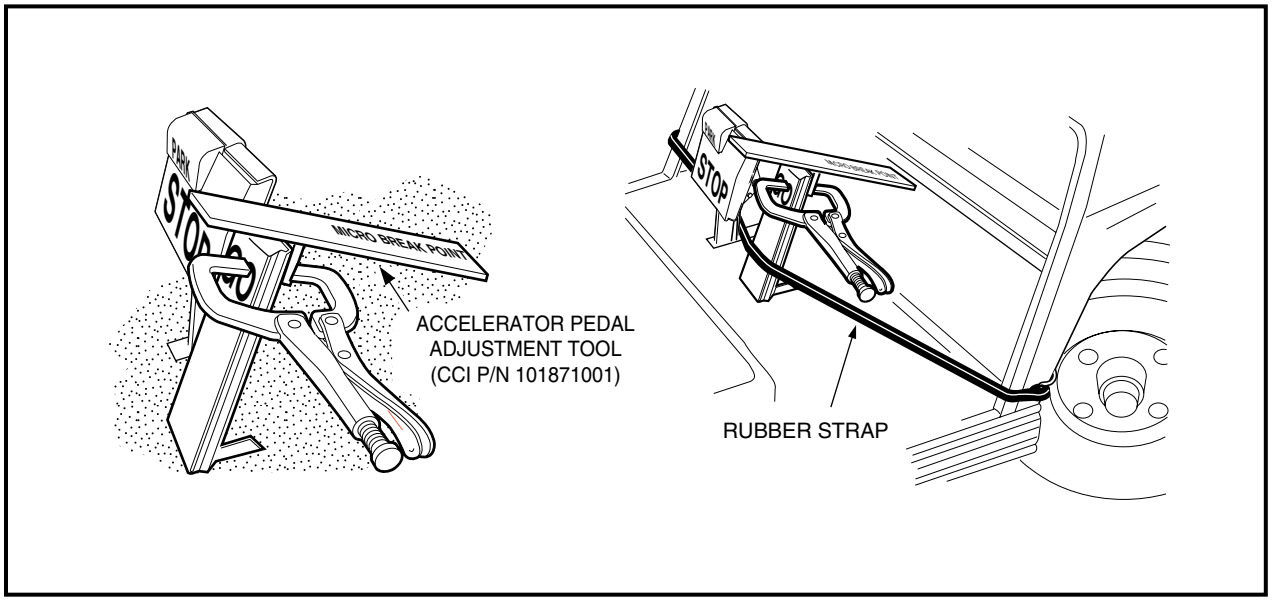

Figure 5-32 Accelerator Pedal Height Adjustment

PEDAL GROUP ADJUSTMENT – ELECTRIC V-GLIDE VEHICLES

See General Warning, Section 1, Page 1-1.

NOTE: *Proper identification of the accelerator type is required before performing this procedure.* ***See Throttle Input Device Identification on page 5-1.***

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Adjust brake pedal height.
   2.1. Chock wheels and release park brake. Lift rear of vehicle and place jack stands under the axle tubes to support the vehicle.
   2.2. To provide slack in the brake cables, loosen the equalizer retaining nuts (2 and 3) on the equalizer rods (1) **(Figure 5-33, Page 5-21)**.

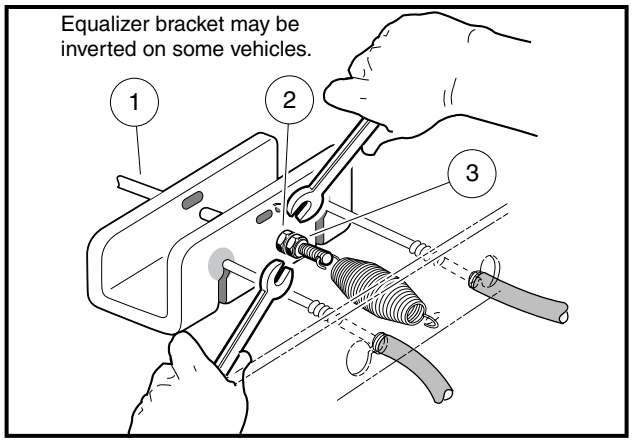

Figure 5-33 Loosen Rear Brake Equalizer Rod Nuts

   2.3. Loosen the brake stop jam nut (31), then relieve pedal pressure on the stop by pushing down slightly on the pedal. Next, adjust the brake stop bumper (22) up or down **(Figure 5-34, Page 5-21)**. Adjusting the bumper upward decreases distance between pedal and floorboard. Adjusting the bumper downward increases distance between pedal and floorboard. Proper brake pedal height is 6 inches (15.2 cm) **(Figure 5-35, Page 5-21)**.
   2.4. Tighten the jam nut (31) to 8 ft-lb (9.5 N·m) **(Figure 5-34, Page 5-21)**.

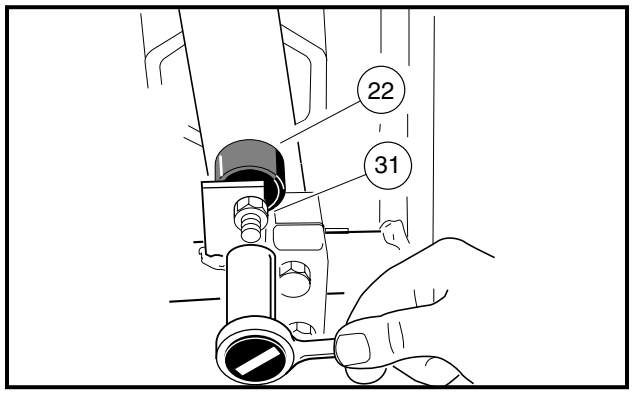

Figure 5-34 Brake Pedal Height Adjustment

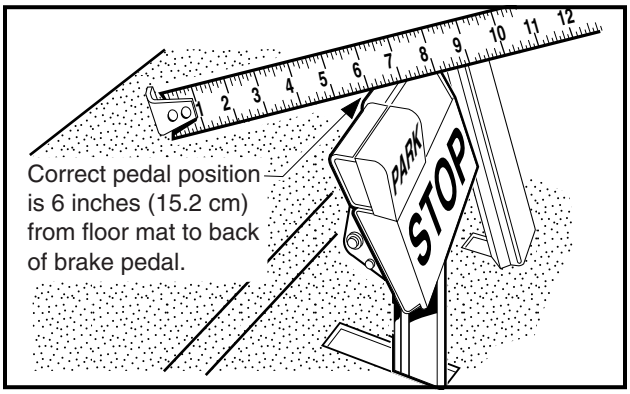

Figure 5-35 Brake Pedal Height Measurement

Pedal Group Adjustment – Electric V-Glide Vehicles, Continued:

3. Adjust brake pedal free play. **See following NOTE.**

NOTE: *Brake pedal free play is the distance the brake pedal can be pressed before the brake actuator arm (at the brake cluster) moves.*

3.1. Press the brake pedal and measure perpendicular from the floorboard to the back of the brake pedal, the distance that the pedal moves before all of the slack is taken out of the brake cables **(Figure 5-35, Page 5-21).**

3.2. Tighten the nut (2) on the equalizer rod (1) so that the brake pedal free play is 1/4 to 1/2 inch (6.3 to 12.7 mm) **(Figure 5-36, Page 5-22)**.

3.3. Tighten the jam nut (3) while holding the adjustment nut (2) in the correct position **(Figure 5-36, Page 5-22).**

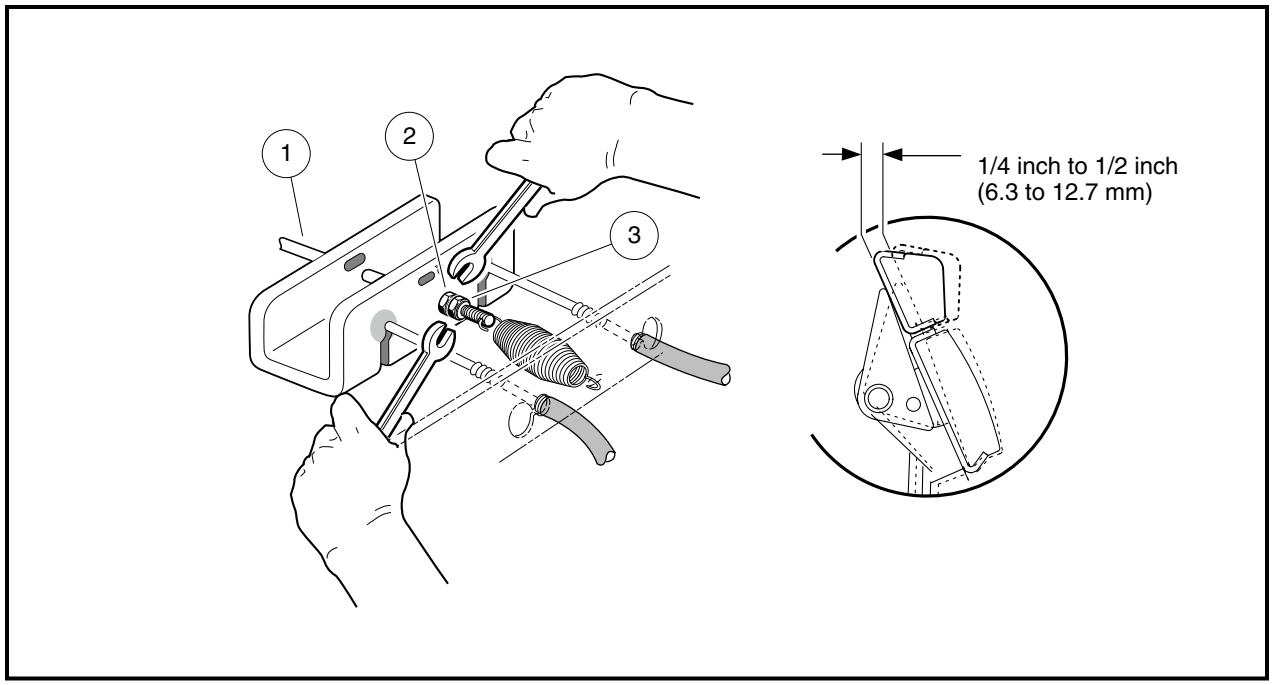

Figure 5-36 Brake Pedal Free-Play Adjustment

4. Adjust park brake ratchet/pawl gap and pawl engagement.

4.1. Inspect the park brake pawl and ratchet for excessive wear, grooves, cracks or chips. If either the pawl or ratchet is damaged, both must be replaced.

4.2. Adjust retaining nut (7) on spring support rod until there is a 0.060 inch (1.5 mm) gap between the pawl and the tips of the ratchet teeth. Use a feeler gauge to verify the gap **(Figure 5-37, Page 5-23)**. The gap should be consistent through range of pawl movement. If the gap is not consistent, loosen the four bolts (6) securing the accelerator pivot rod supports and adjust the supports. If the gap becomes smaller as the park brake pedal is pressed, move the pivot rod supports slightly rearward until the gap is consistent. If the gap becomes larger as the park brake pedal is pressed, move the pivot rod supports slightly forward until gap is consistent.

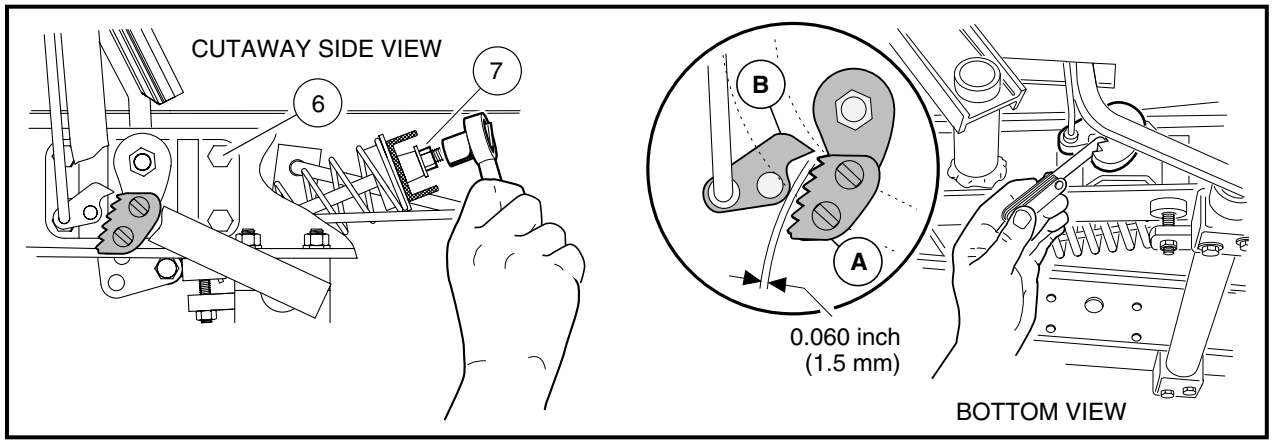

Figure 5-37 Park Brake Ratchet/Pawl Gap Adjustment

NOTE: *The accelerator rod must also be checked if the ratchet/pawl gap is adjusted.* ***See step 6 of Pedal Group Adjustment – Electric V-Glide Vehicles on page 5-26.***

The accelerator rod must be disconnected before proceeding to step 4.3.

4.3. With the park brake unlocked, measure and note the distance from the top of the accelerator pedal to the floorboard, and then lock the park brake **(Figure 5-38, Page 5-23)**.

4.4. With the park brake locked, make sure at least 75% of ratchet tooth length engages the pawl **(Figure 5-39, Page 5-23)**. Tooth engagement should be between the two lines marked on the pawl.

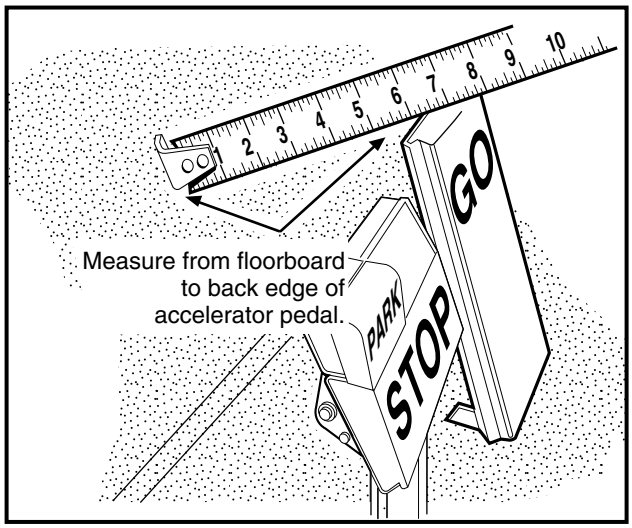

Figure 5-38 Accelerator Pedal Height Measurement

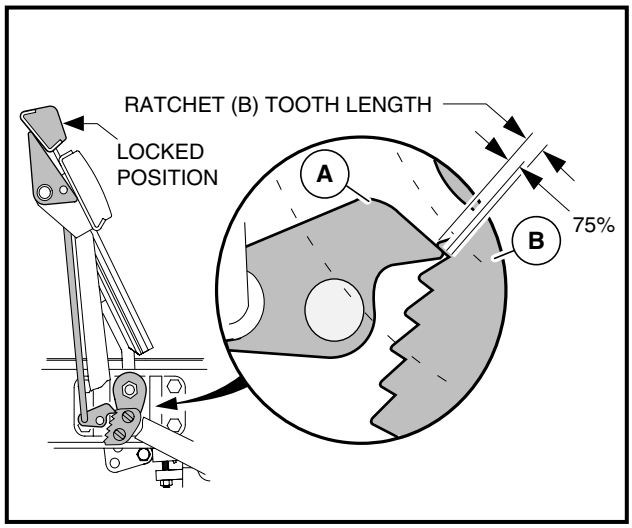

Figure 5-39 Ratchet/Pawl Tooth Engagement

4.5. With park brake still locked, measure the distance from the top of accelerator pedal to floorboard. If the measurement has changed, ratchet tooth engagement is too deep and must be adjusted.

4.6. If ratchet/pawl engagement must be adjusted, disconnect the ball joint at the top of the brake rod and rotate the ball joint sleeve clockwise to increase engagement or counterclockwise to decrease engagement. Reconnect ball joint **(Figure 5-40, Page 5-24)**.

4.7. If the accelerator push rod was disconnected from the accelerator pedal, reconnect it.

4.8. Check for proper brake operation prior to driving the vehicle.

Pedal Group Adjustment – Electric V-Glide Vehicles, Continued:

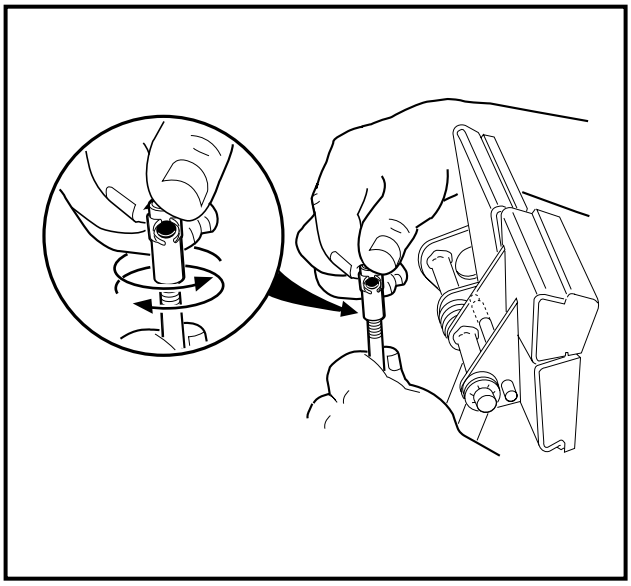

Figure 5-40 Brake Rod Adjustment

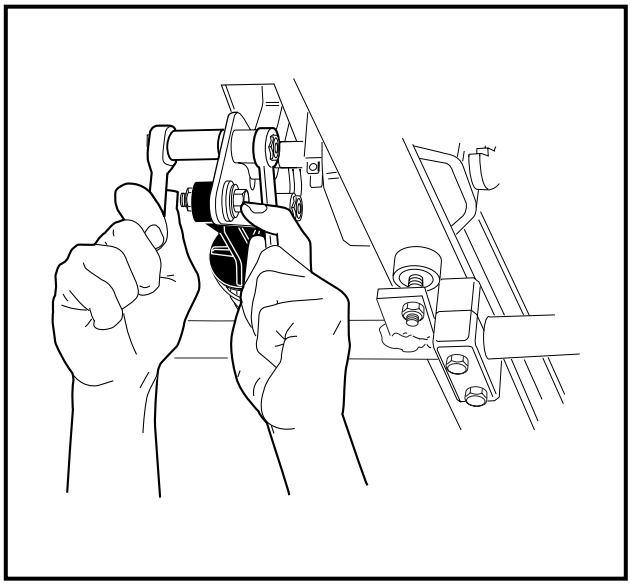

Figure 5-41 Accelerator Pedal Height Adjustment

5. Adjust accelerator pedal height.

   5.1. Loosen the nut and bolt **(Figure 5-41, Page 5-24)** securing the accelerator pedal to the pivot plate.

   5.2. Clamp the accelerator pedal adjustment tool (CCI P/N 101871001) to the accelerator pedal, with the end marked *accelerator pedal height* closest to the floorboard **(Figure 5-42, Page 5-24)**. Press the accelerator pedal until the end of the tool rests against the floorboard; (pedal height should be 5-5/8 inches (14.3 cm). Use a rubber strap to hold pedal in position against the floorboard and then tighten nut to 26 ft-lb (35.3 N·m).

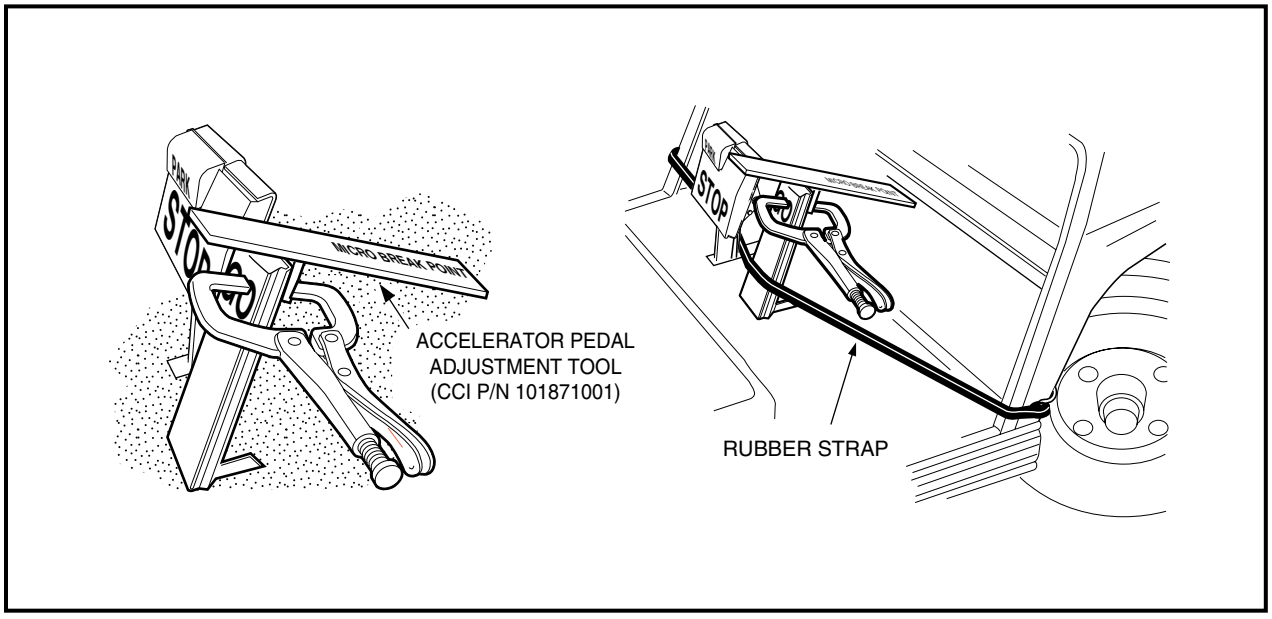

Figure 5-42 Accelerator Pedal Height Adjustment

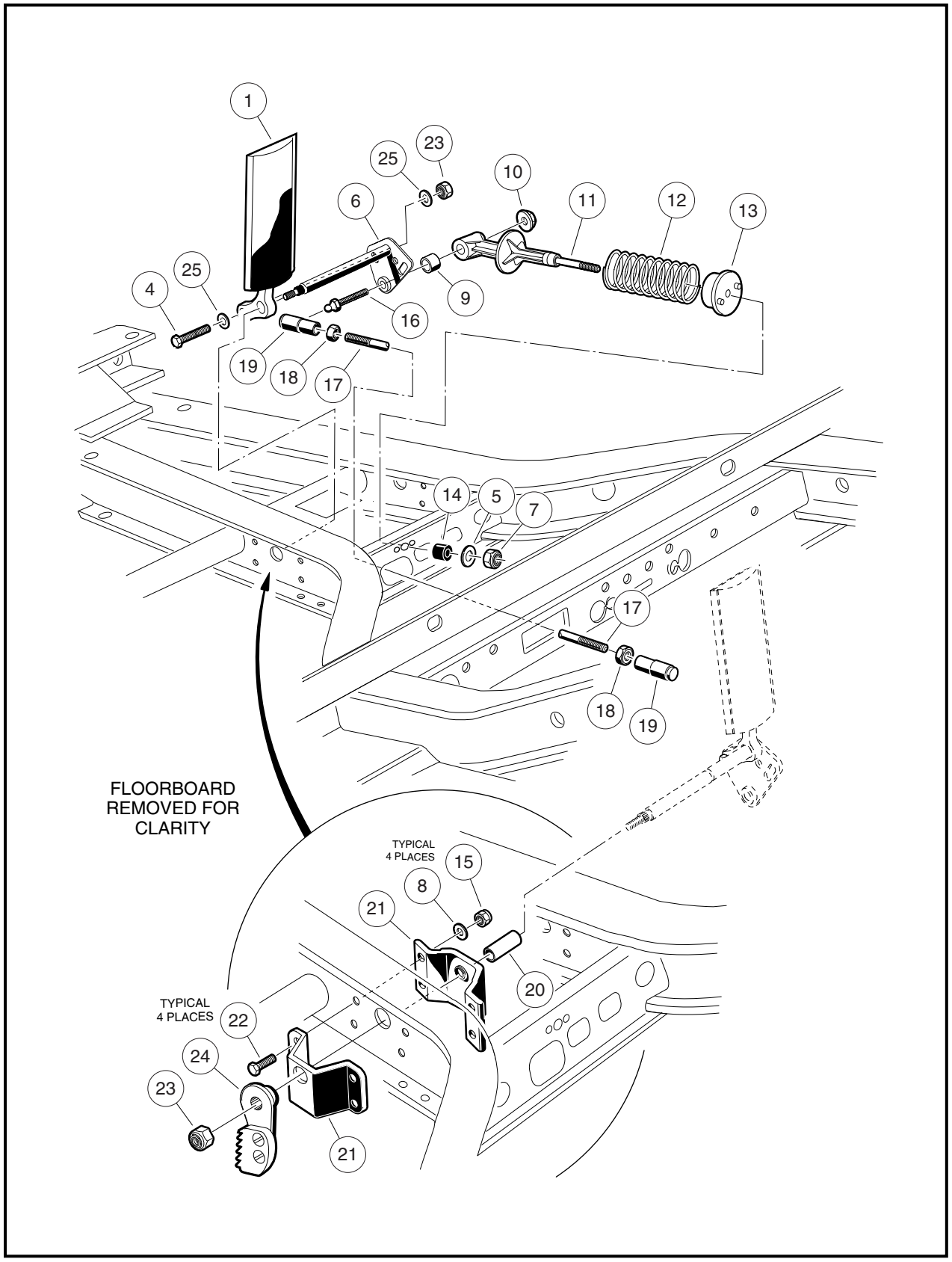

Figure 5-43 Accelerator Pedal Assembly – Gasoline Vehicles and V-Glide (36-Volt) Vehicles

Pedal Group Adjustment – Electric V-Glide Vehicles, Continued:

6. Adjust the accelerator rod. **See following DANGER.**

⚠ DANGER

- **Before servicing, turn the key switch to OFF and place the Forward/Reverse handle in the NEUTRAL position.**
- **To prevent accidentally starting the vehicle, disconnect the battery as instructed in WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-1. This will prevent the possibility of the vehicle running over you when you are adjusting the accelerator rod.**

6.1. Remove the driver-side wiper switch cover. **See following CAUTION.**

⚠ CAUTION

- **Adjust accelerator rod/wiper switch arm exactly as stated in step 6.2 below or the wiper switch could become damaged and not operate properly.**

6.2. Slowly press the accelerator pedal to the floor and hold it in this position. With the accelerator pedal fully pressed, the wiper switch arm brush should be positioned entirely on the last fixed contact. It is acceptable for the wiper switch arm to come into contact with the wiper switch housing provided there is no excessive pressure against the housing. To check wiper arm pressure against the housing, keep the accelerator pedal fully pressed and disconnect the accelerator rod from the wiper switch ball stud. Then try to reconnect it. If the accelerator pedal must be released in order to reconnect the accelerator rod, then the wiper switch arm is exerting excessive pressure against the housing; proceed to step 6.3. If the accelerator rod can be easily connected, it is correctly adjusted.

6.3. If the accelerator rod is not adjusted correctly, disconnect it from the ball stud at the wiper switch and manually rotate the bell crank until the wiper switch arm brush is positioned entirely on the last fixed contact.

6.4. While holding accelerator rod (17) with pliers, loosen the jam nut (18) and adjust the ball joint (19) sleeve to fit on the wiper switch ball stud, with approximately the same number of threads showing at each end of the rod **(Figure 5-43, Page 5-25)**. Then tighten jam nut (18) against the sleeve.

6.5. Press the accelerator pedal several times and then check to be sure that the wiper switch arm brush is positioned entirely on the eighth fixed contact, and that the wiper switch arm is not exerting excessive pressure against the wiper switch housing.

6.6. Install the wiper switch cover.

7. Adjust the brakes. **See Brake Adjustment, Section 6, Page 6-8.**

SECTION 6 – WHEEL BRAKE ASSEMBLIES

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**
- **Some aftermarket brake shoes contain asbestos fiber, and asbestos dust is created when these brake mechanisms are handled. Wear approved eye and respiratory protection when disassembling and cleaning brake mechanisms. Inhalation of asbestos could result in severe personal injury or death. Do not use compressed air or aerosol sprays to clean the brake mechanism. Clean brake mechanism using the negative pressure enclosure/hepa vacuum system or low pressure/wet cleaning method per OSHA/29 CFR - 1910.1001.**

GENERAL INFORMATION

DS Golf Cars are equipped with self-adjusting, mechanically-expanding shoe drum brakes on each rear wheel.

BRAKE SHOE REMOVAL

See General Warning, Section 1, Page 1-1. See also Warning on Page 6-1.

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Place chocks at the front wheels. Loosen, but do not remove lug nuts on rear wheels and lift the rear of the vehicle with a chain hoist or floor jack. Place jack stands under the axle tubes to support the vehicle.
3. Loosen the equalizer retaining nuts (2 and 3) on the equalizer rod (1) to loosen the brake cable **(Figure 6-1, Page 6-2)**.
4. Remove the rear wheels and then the brake drums. If the brake drums were easily removed, proceed to step 6. **See following CAUTION and NOTE.**

⚠ CAUTION

- **Worn or damaged brake drums cannot be machined to refinish them. Replace as necessary.**

NOTE: *When servicing vehicles with severely worn brake shoes and when the drums cannot be removed by normal methods, proceed to step 5 to minimize damage to the brake cluster and brake components.*

5. Remove brake drums and badly worn brake shoes.
   5.1. On the back of each brake cluster assembly, locate the heads of two brake shoe retainer pins. It may be necessary to remove sealant material around the head of each pin.

Brake Shoe Removal, Continued:

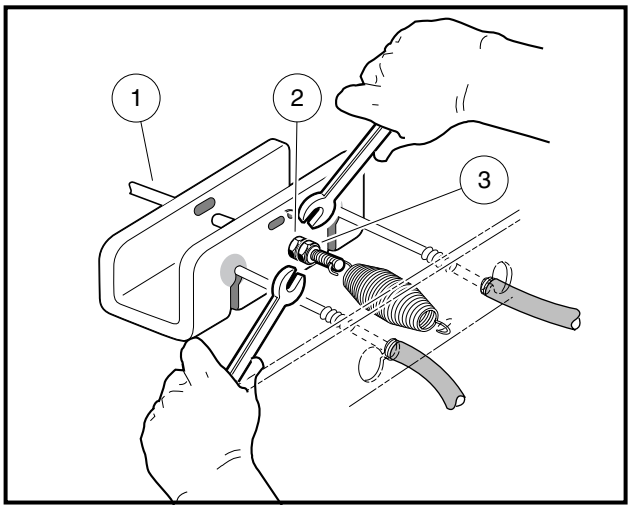

Figure 6-1 Loosen Equalizer Retaining Nuts

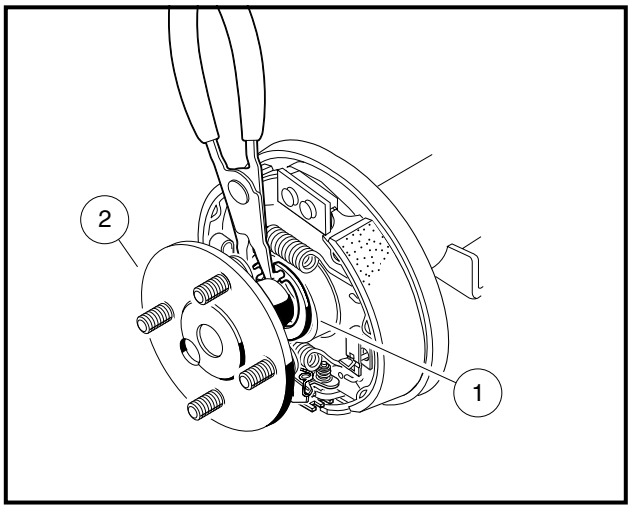

Figure 6-2 Remove Axle Retaining Ring

5.2. Insert a 1/2 inch x 5/8 inch cold chisel under the head of each pin and shear them off as illustrated **(Figure 6-3, Page 6-2)**. This will release the shoes from the backing plate, allowing them to pivot away from the inside of the brake drum, which should then allow the brake drum to be pulled free. After completing step 6, skip step 7. **See following NOTE.**

NOTE: *Although step 6 allows easier access to the brake shoes, it is not imperative to do so in order to remove the brake shoes.*

6. Remove the axle.

6.1. Using 90° snap ring pliers (CCI P/N 1012560), remove the axle retaining ring (1) **(Figure 6-2, Page 6-2)**.

6.2. Pull the axle shaft (2) from the axle tube **(Figure 6-2, Page 6-2)**.

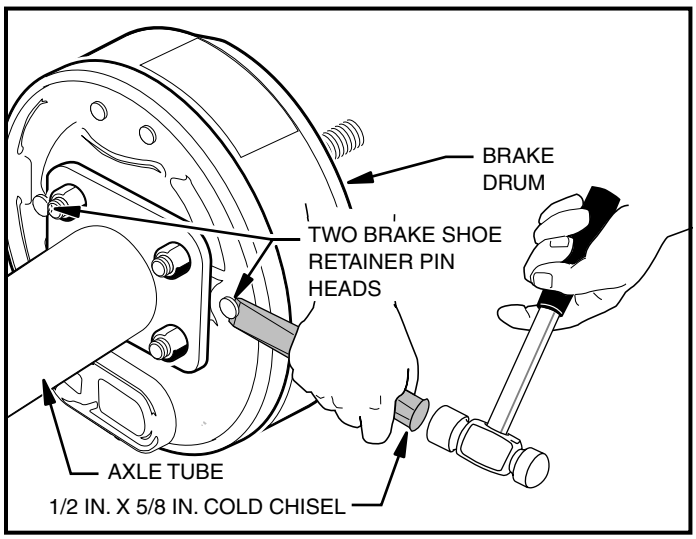

Figure 6-3 Shoe Retainer Pins

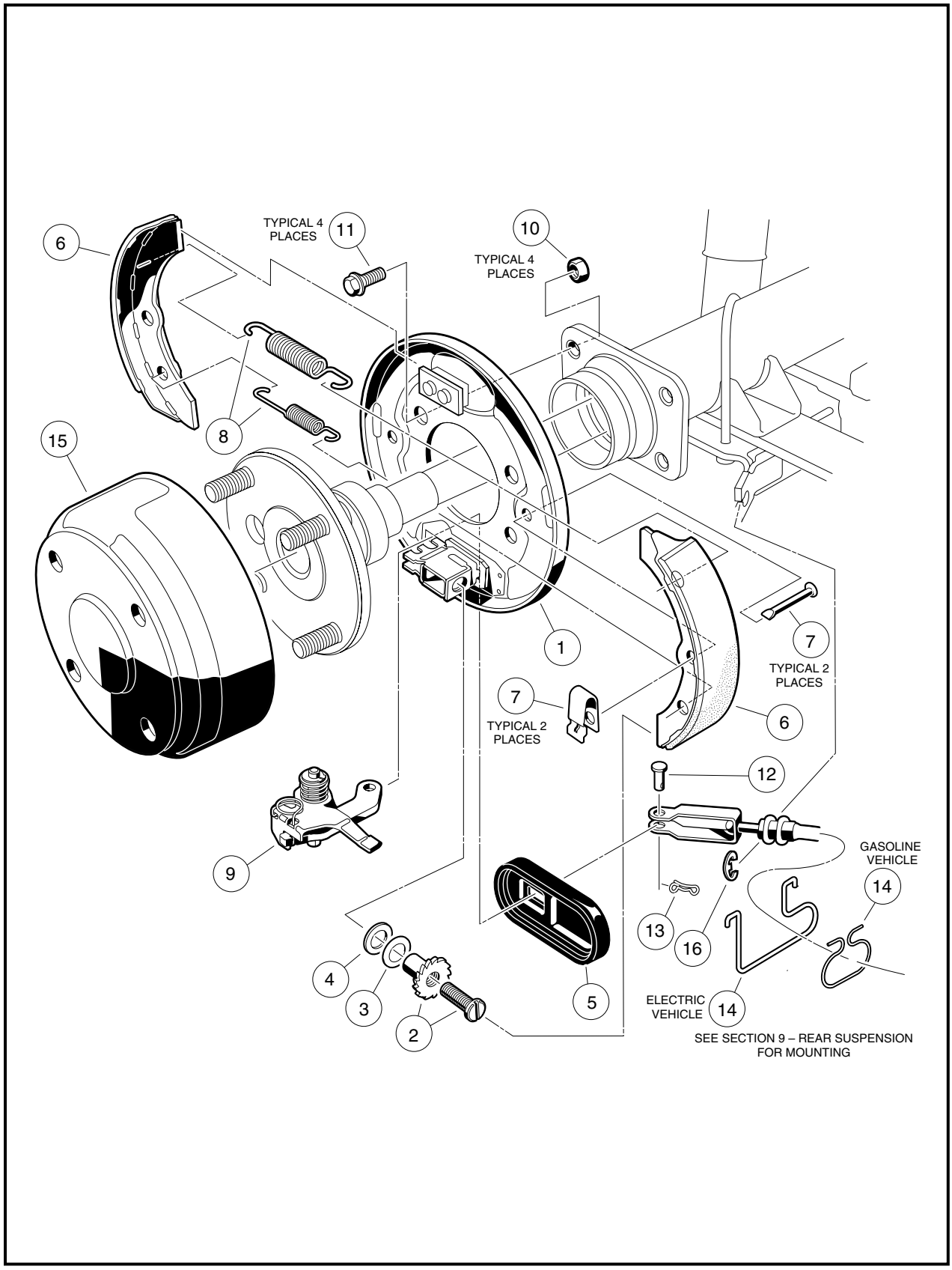

Figure 6-4 Self-adjusting Wheel Brake Assembly

Brake Shoe Removal, Continued:

7. Using needle nose pliers, turn the clip retainer pin (1) 90° to remove the shoe retainer clip (2) **(Figure 6-5, Page 6-4)**. **See following CAUTION.**

⚠ CAUTION

- **The brake shoes are under pressure and can release suddenly when brake shoe retainers are removed.**

8. Grasp both brake shoes and pull them, together with the springs, out of the brake assembly as shown **(Figure 6-6, Page 6-4)**.

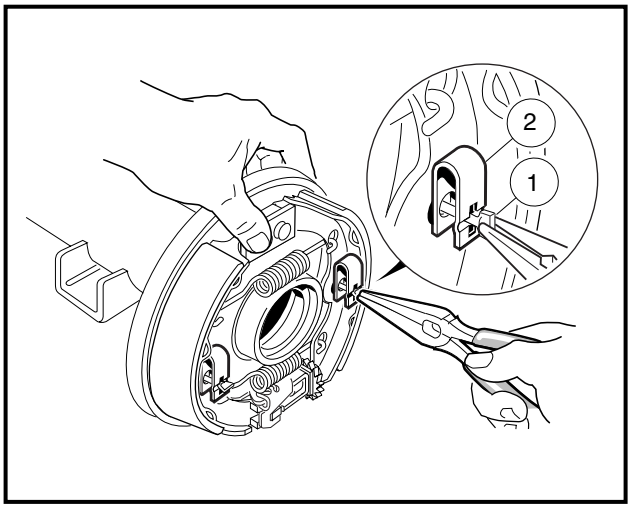

Figure 6-5 Remove Shoe Retainer Clip

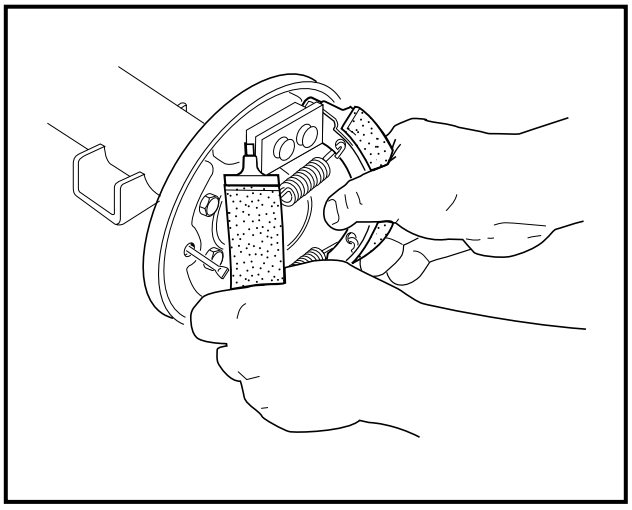

Figure 6-6 Remove Brake Shoes

9. Remove adjuster wheel (1) with two washers (2 and 3) from the backing plate **(Figure 6-7, Page 6-4)**.

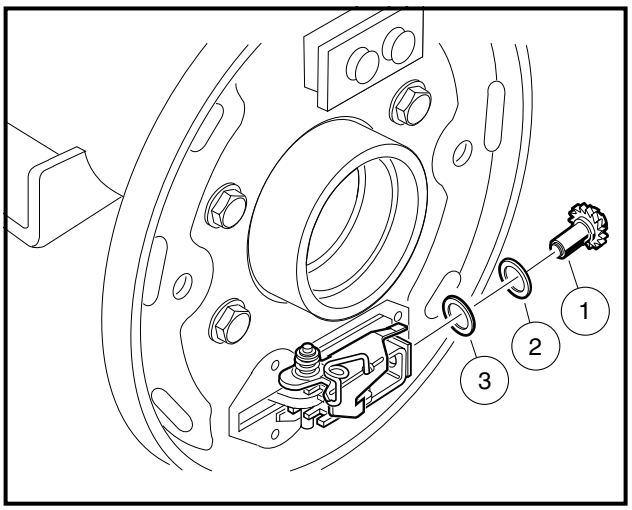

Figure 6-7 Remove Adjuster Wheel

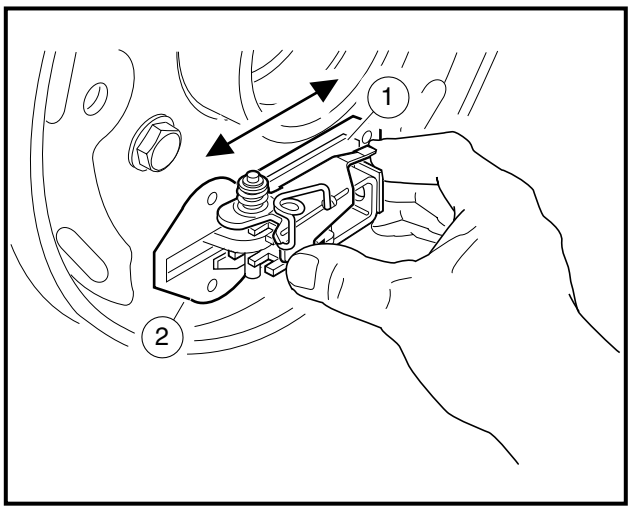

Figure 6-8 Lubricate Slide and Slide Plate

BRAKE ASSEMBLY CLEANING

See General Warning, Section 1, Page 1-1. See also Warning on Page 6-1.

1. Carefully clean the brake backing plate and all of its mechanical components.
2. Remove the rubber boot from backing plate and wipe with a clean damp cloth.
3. Lubricate the slide (1) and slide plate (2) with dry moly lubricant (CCI P/N 1012151) on both sides of the backing plate **(Figure 6-8, Page 6-4)**. After lubricating, work the slide back and forth to ensure that it slides smoothly and easily. Reinstall rubber boot onto backing plate. **See following WARNING.**

⚠ WARNING

- **Apply grease carefully when performing the following steps. Do not allow any grease to get onto the friction surfaces of the brake shoe pads. Failure to heed this warning could cause diminished brake performance, possibly resulting in property damage or severe personal injury.**

4. Use a small brush to carefully apply a light coat of white lithium NLGI #2 grease (Dow Corning BR2-Plus or equivalent) on each of the six raised bosses on the brake backing plate **(Figure 6-9, Page 6-5)**. **See preceding WARNING.**
5. Use a small brush to carefully apply a light coat of white lithium NLGI #2 grease (Dow Corning BR2-Plus or equivalent) to each end of both brake shoes and into the slots in the brake shoe mounting block as shown **(Figure 6-10, Page 6-5)**. **See preceding WARNING.**

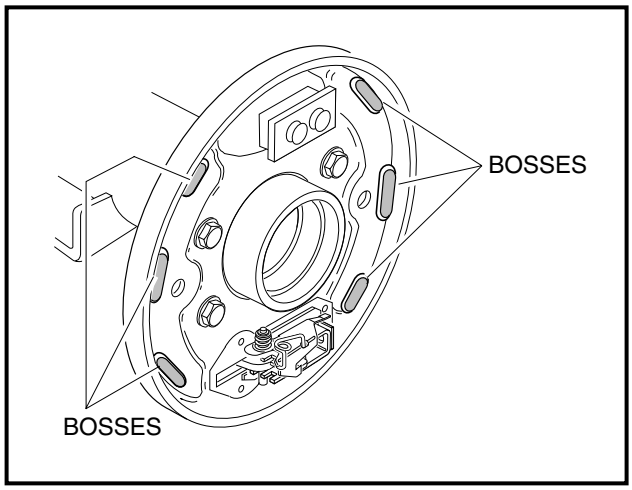

Figure 6-9 Apply Grease On Bosses

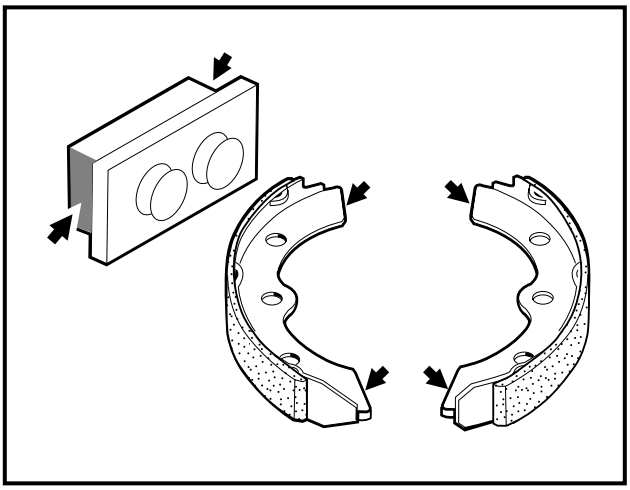

Figure 6-10 Apply Grease To Brake Shoes and Slots

6. Use a small brush to carefully apply a light coat of white lithium NLGI #2 grease (Dow Corning BR2-Plus or equivalent) to the brake adjuster assembly, adjuster wheel shoe slots, and the shaft of the adjuster wheel as shown **(Figure 6-11, Page 6-6)**. **See preceding WARNING.**
7. Install the adjuster wheel (1) and two washers (2 and 3) into the adjuster assembly **(Figure 6-7, Page 6-4)**.

Brake Assembly Cleaning, Continued:

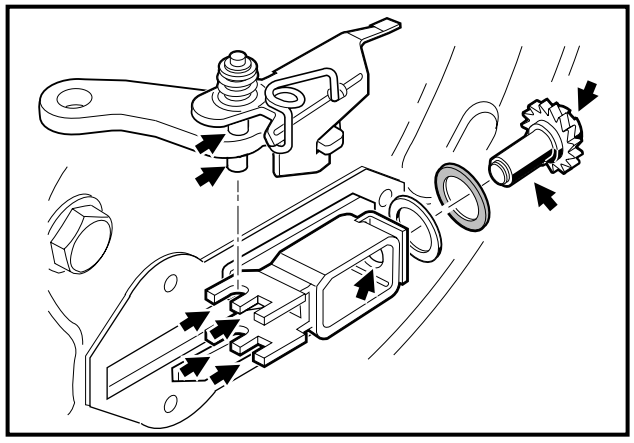

Figure 6-11 Apply Grease To Brake Adjuster

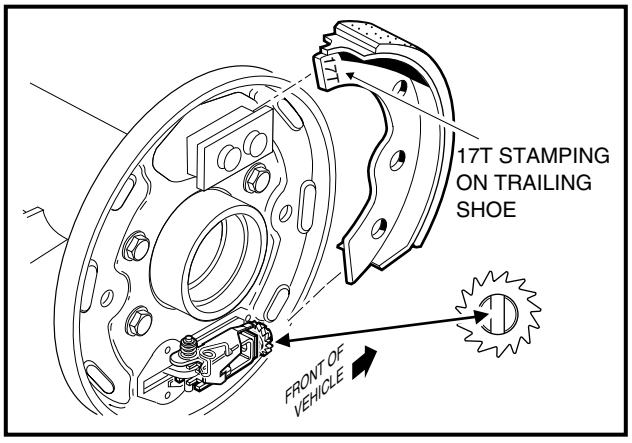

Figure 6-12 Install Adjuster Wheel, Trailing Shoe

BRAKE SHOE INSTALLATION

See General Warning, Section 1, Page 1-1. See also Warning on Page 6-1.

1. Turn the adjusting wheel screw so that the shoe slot is vertical, then position the trailing shoe in the slots in the shoe mounting block and adjuster assembly **(Figure 6-12, Page 6-6)**. **See following NOTE**.

NOTE: *The trailing shoe has 17T stamped into the tip of the shoe flange **(Figure 6-12, Page 6-6)**. The leading shoe is stamped 17L. When installing the shoes, the stamping on both shoes should be oriented to the top of the brake assembly. When installing the shoes on the passenger side of the vehicle, the side of the trailing shoe flange marked 17T should be facing out and be visible. On the driver side, the 17L on the leading shoe should be facing out and be visible.*

*When installed on the backing plate, the **leading** shoe (stamped 17L) is **always** oriented toward the **rear** of the vehicle.*

2. Install the shoe retainer clip, using pliers to compress the clip (1) while turning the retainer pin (2) into position **(Figure 6-13, Page 6-6)**.
3. Attach the springs onto the trailing shoe already installed. Then hold the leading shoe next to the trailing shoe, correctly oriented, and attach the springs to it **(Figure 6-14, Page 6-6)**.

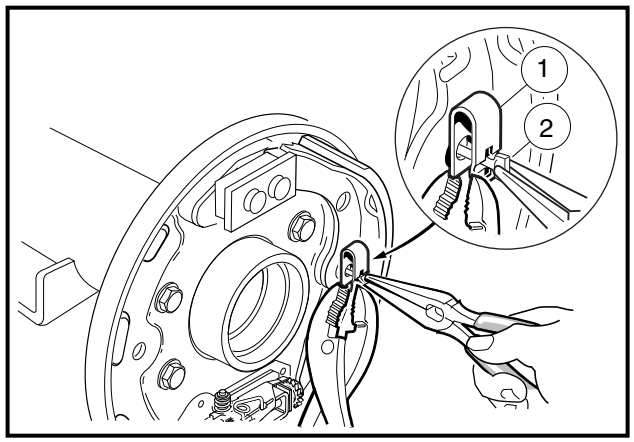

Figure 6-13 Install Trailing Shoe Retainer Clip

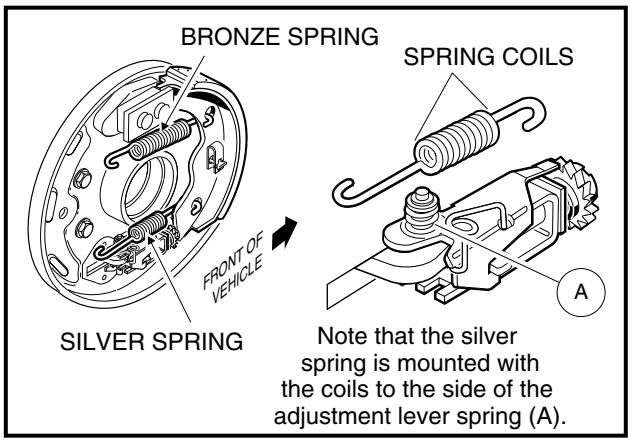

Figure 6-14 Attach Springs

4. While maintaining spring attachment on both shoes, position tips of leading shoe in the mounting slots and then push shoe into place. Hold shoe in position and install retaining clip **(Figure 6-15, Page 6-7)**.

5. After the shoes are installed, move them together up and down and side to side to make sure that they will easily slide approximately 1/4 to 3/8 inch (6.3 to 9.5 mm) without binding **(Figure 6-16, Page 6-7)**.

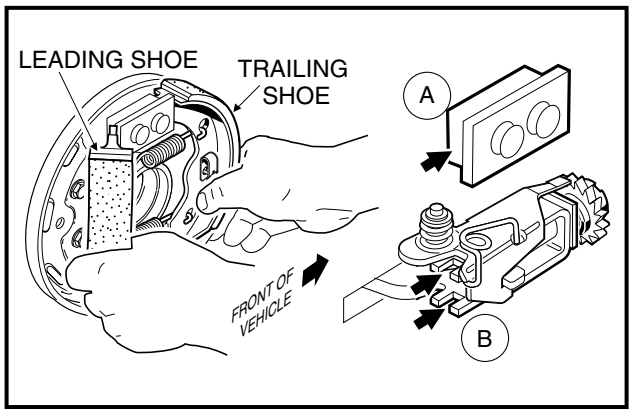

Figure 6-15 Install Leading Shoe

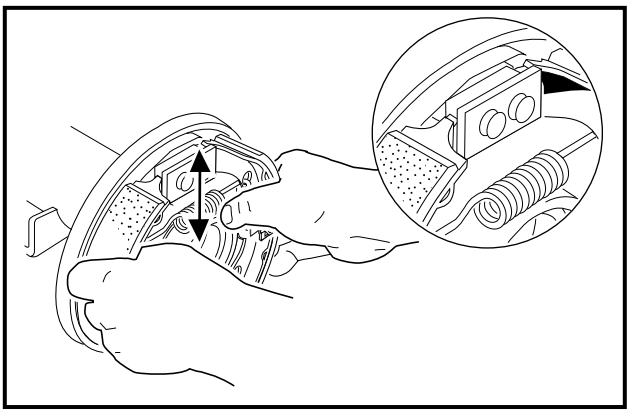

Figure 6-16 Check Shoe Positions

6. Place a flatblade screwdriver under the adjusting arm and raise the arm off of the adjusting wheel. While holding the arm up, turn the wheel upward until it stops **(Figure 6-17, Page 6-7)**. Remove the screwdriver.

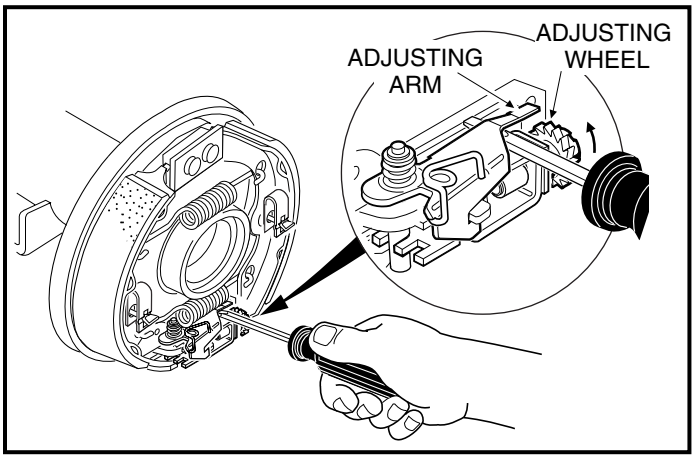

Figure 6-17 Set Adjusting Wheel

7. Install the axle shaft (2) into the axle tube and install the retaining ring (1) **(Figure 6-2, Page 6-2)**. **See following WARNING and CAUTION.**

⚠ WARNING

- **Be sure retaining ring is properly seated in groove. If ring is not properly installed, the axle assembly will separate from the transaxle and damage the axle assembly and other components. Loss of control of the vehicle could result in severe personal injury or death.**

Brake Shoe Installation, Continued:

⚠ CAUTION

- **Before installing axle shaft, clean any residual oil from the exposed end of the axle tube and from the oil seal area.**

8. Install the brake drum, and make sure that it is properly seated. **See following NOTE.**

NOTE: *If drum installation is difficult, the brake shoes may need to be adjusted vertically in the mounting slots.*

9. After the drum is installed, make sure the axle and drum turn freely and then install the wheel. **See Wheel Installation, Section 8, Page 8-1.**

BRAKE ADJUSTMENT

See General Warning, Section 1, Page 1-1. See also Warning on Page 6-1.

1. When cleaning or repair on both wheels is complete, and with the brake cable still loose, lower the vehicle to the floor.
2. Make the brake shoe and drum adjustment by pressing and releasing the brake pedal repeatedly until an audible clicking can no longer be heard.
3. Adjust brake pedal free play.
   - **For gasoline vehicles: See Pedal Group Adjustment – Gasoline Vehicle, Section 5, Page 5-12.**
   - **For electric V-Glide vehicles: See Pedal Group Adjustment – Electric V-Glide Vehicles, Section 5, Page 5-21.**
   - **For electric MCOR vehicles: See Pedal Group Adjustment – Electric MCOR Vehicles, Section 5, Page 5-17.**

BRAKE CLUSTER REMOVAL AND INSTALLATION

See General Warning, Section 1, Page 1-1. See also Warning on Page 6-1.

Brake Cluster Removal

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Place chocks at the front wheels and loosen the lug nuts on the rear wheels. Lift the rear of the vehicle with a chain hoist or floor jack. Place jack stands under the axle tubes to support the vehicle. **See General Warning, Section 1, Page 1-1.**
3. Loosen the equalizer retaining nuts (2 and 3) on the equalizer rod (1) to loosen the brake cable **(Figure 6-1, Page 6-2)**.
4. Remove lug nuts and rear wheels and then the brake drums. **See following NOTE.**

NOTE: *When servicing vehicles with self-adjusting brakes with badly worn brake shoes and when the drums cannot be removed by normal methods, perform Step 5 of Brake Shoe Removal on page 6-1, then continue with this procedure.*

*Although **step 5 – Removing the Axle** allows easier access to the brake shoes, it is not imperative to do so in order to remove the brake shoes.*

5. Remove the axle.
   5.1. Using 90° snap ring pliers (CCI P/N 1012560), remove the axle retaining ring (1) **(Figure 6-2, Page 6-2)**.
   5.2. Pull the axle shaft (2) from the axle tube **(Figure 6-2, Page 6-2)**.
6. Remove bow-tie pin (13) and clevis pin (12) from brake cable **(Figure 6-4, Page 6-3)**.
7. Remove four bolts (11) and lock nuts (10) that mount the brake assembly to the transaxle **(Figure 6-4, Page 6-3)**.
8. Remove brake assembly from transaxle.

BRAKE CLUSTER INSTALLATION

1. Install in reverse order of disassembly. Use new bow-tie pins when installing brake cables. **See following CAUTION.**

⚠ CAUTION

- **Before installing axle shaft, clean any residual oil from the exposed end of the axle tube and from the oil seal area.**

2. Be sure bolts (11) (CCI P/N 1014153) and new lock nuts (10) (CCI P/N 1013924) are used to mount the brake assembly **(Figure 6-4, Page 6-3)**.
3. Torque bolts to 30 ft-lb (40.6 N·m). **See following WARNING.**

⚠ WARNING

- **Be sure retaining ring is properly seated in groove. If ring is not properly installed, the axle assembly will separate from the transaxle and damage the axle assembly and other components. Loss of control of the vehicle could result in severe personal injury or death.**

4. Tighten lug nuts on rear wheels, using crisscross pattern, to 55 ft-lb (74.6 N·m). **See Wheel Installation, Section 8, Page 8-1.**
5. Adjust the brakes. **See Brake Adjustment on page 6-8.**

BRAKE CABLE REMOVAL AND INSTALLATION

See General Warning, Section 1, Page 1-1. See also Warning on Page 6-1.

Brake Cable Removal

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Place chocks at the front wheels.
3. Release the park brake if engaged and loosen equalizer retaining nuts (1) on equalizer rod (2) to slightly loosen the brake cables (3) **(Figure 6-18, Page 6-10)**.

Brake Cable Removal, Continued:

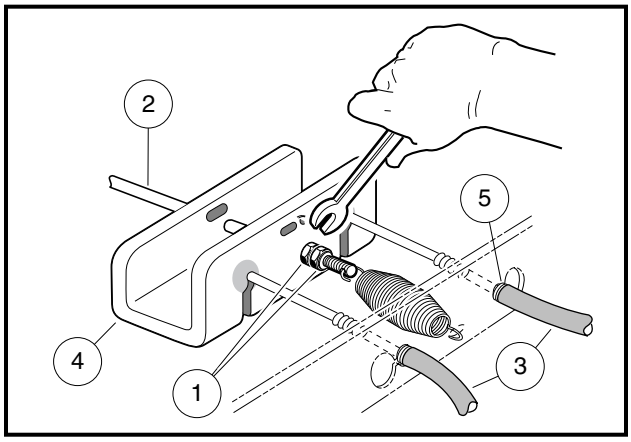

Figure 6-18 Loosen Brake Cables

4. Rotate the brake cable upward and pull cable end through hole in top of equalizer (4).
5. Remove E-clip from cable at vehicle frame (5) **(Figure 6-18, Page 6-10)**. Remove cable from frame.
6. Remove bow-tie pin (1) and the clevis pin (2) from the brake lever on each wheel and pull the clevis (3) away from the lever. **(Figure 6-19, Page 6-10)**.
7. Remove E-clip (4) from cable at the cable support bracket (5). Remove cable from bracket.
8. Note routing of cable through hanger for installation of new cable. Pull cable from vehicle.

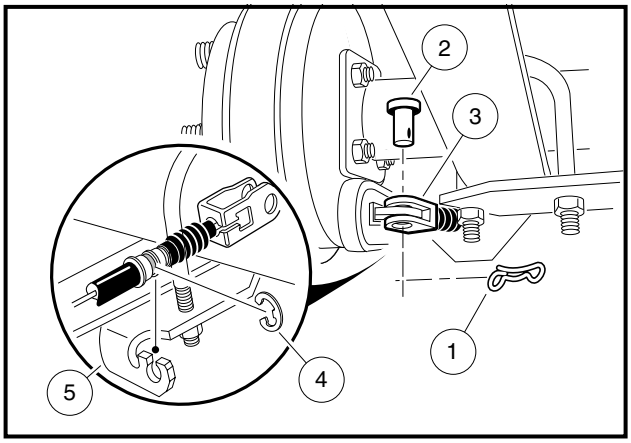

Figure 6-19 Disconnect Cables at Rear Brakes

Brake Cable Installation

1. Place the end of the new cable into the equalizer (4) **(Figure 6-18, Page 6-10)**. Secure the cable to the vehicle frame with new E-clip. Route cable through hanger in the same manner as before.
2. At the rear wheel brake, connect the cable to the brake actuator arm using new clevis pin (2) and new bow-tie pin (1) **(Figure 6-19, Page 6-10)**.
3. Place the cable in the cable support bracket (5) and secure with new E-clip (3).
4. Adjust the brakes. **See Brake Adjustment on page 6-8.**

SECTION 7 – STEERING AND FRONT SUSPENSION

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**

GENERAL INFORMATION

Steering is controlled through a rack and pinion steering assembly that is connected by a steering column to a steering wheel. No manual adjustment to the rack and pinion gear assembly is required. A spring loaded self-adjusting mechanism is incorporated into the assembly.

STEERING WHEEL

See General Warning, Section 1, Page 1-1.

STEERING WHEEL REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Remove the two mounting screws (30) and plate (28) **(Figure 7-3, Page 7-3)**.
3. Match mark the steering wheel (25) and steering shaft (19) so when the steering wheel is removed it can be placed back in exactly the same position on steering column shaft.
4. Loosen the steering wheel nut (27) and back it off approximately 1/4 inch (6 mm). Do not remove the nut.
5. Use the steering wheel puller (CCI P/N 102061201) to remove steering wheel.
   - 5.1. Place the puller anvil (4) through the top opening of the steering wheel **(Figure 7-1, Page 7-2)**.
   - 5.2. Insert the anvil feet through the two slots in the base plate (marked "B") (5) as shown **(Figure 7-1, Page 7-2)**.
   - 5.3. Rotate the anvil screw (6) clockwise until the base plate contacts the bottom of the steering wheel where it attaches to the steering column **(Figure 7-2, Page 7-2)**.
   - 5.4. Using a 1/2 inch drive air impact wrench, tighten the anvil screw (6) until the steering wheel breaks free from the steering shaft.
   - 5.5. Remove the steering wheel puller.

Steering Wheel Removal, Continued:

5.6. Remove the steering wheel nut (27) and the steering wheel (25) from the steering column (20) **(Figure 7-3, Page 7-3)**.

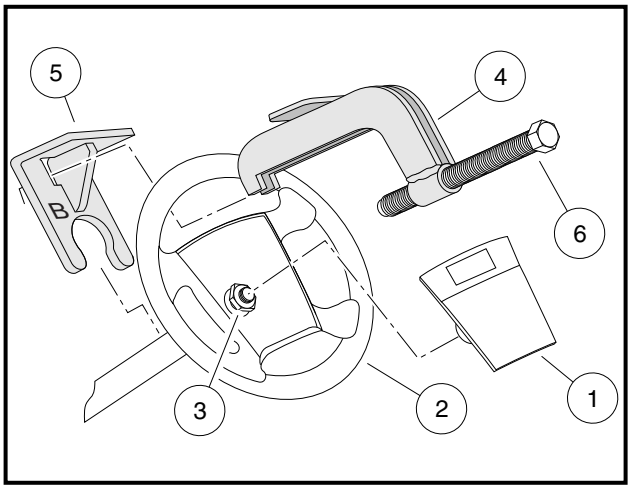

Figure 7-1 Steering Wheel Puller

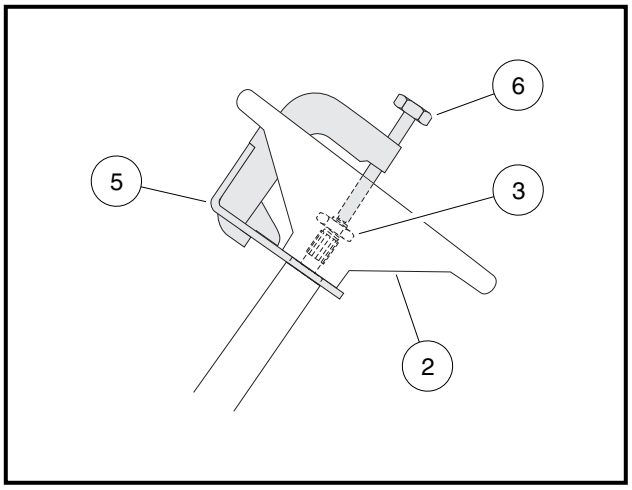

Figure 7-2 Steering Wheel Puller

STEERING WHEEL INSTALLATION

NOTE: *To minimize corrosion and to make future removal of the steering wheel easier, apply a small amount of oil or anti-seize compound to steering shaft splines and taper before installing the steering wheel.*

1. Install the steering wheel (25) on the splines of the steering shaft (19). Be sure to align the match marks placed on the wheel and steering column in step 3 above **(Figure 7-3, Page 7-3)**.
2. Install the steering wheel nut (27) and tighten to 13 ft-lb (17.6 N·m).
3. Install the scorecard plate (28) and plate mounting screws (30) **(Figure 7-3, Page 7-3)**. Tighten screws to 16 in-lb (1.8 N·m).

STEERING COLUMN

See General Warning, Section 1, Page 1-1.

STEERING COLUMN REMOVAL

1. Disconnect the battery cables as instructed. **See WARNING "To avoid unintentionally starting..." in General Warning, Section 1, Page 1-2.**
2. Remove the steering wheel as previously instructed.
3. Remove the front body as instructed in Section 4 – Body and Trim.

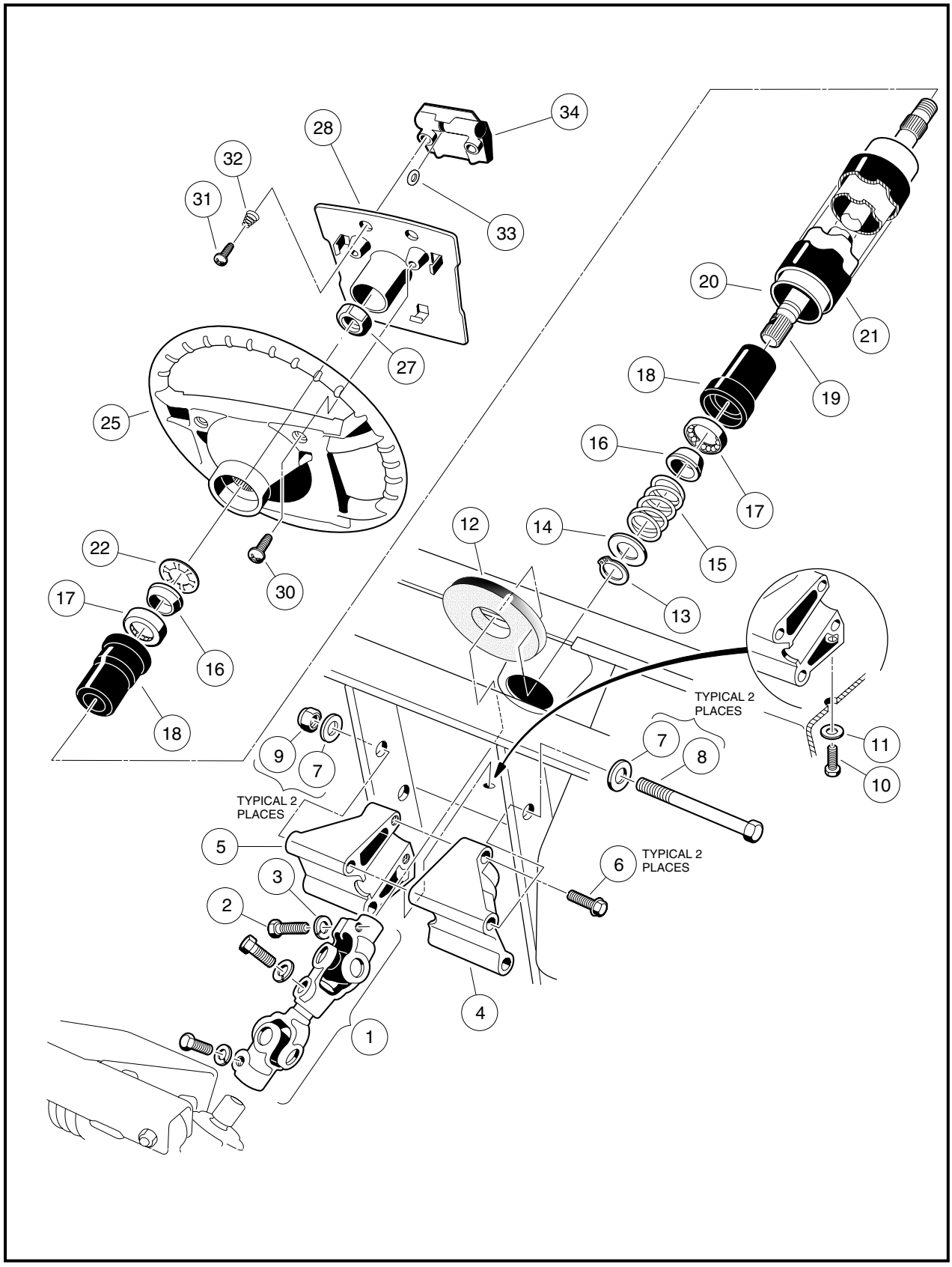

Figure 7-3 Steering Column

Steering Column Removal, Continued:

4. Remove the center dash panel **(Figure 7-4, Page 7-4)**.
   4.1. Remove the plastic cap (1) covering the mounting screw (2) on each side of the center dash panel (3) **(Figure 7-4, Page 7-4)**.
   4.2. Loosen (but do not remove) the screw (2) on each side of the center dash panel (3).
   4.3. Insert screwdriver at the top center of the dash between dash and cowl brace. Gently pry center dash out slightly from under edge of cowl brace.
   4.4. Pull center dash out approximately 1 inch (2.5 cm) from the frame and then bend the top right corner of the center dash inward while pulling the top of the panel out and down. **See following NOTE.**

NOTE: *Bending the top right corner of the center dash inward during removal will prevent the contacts on the back of the key switch from touching the metal frame around the dash.*

   4.5. Disconnect the wires from the electrical components mounted on the dash panel. Do not allow wires to touch.
   4.6. Slide center dash panel up the steering column.

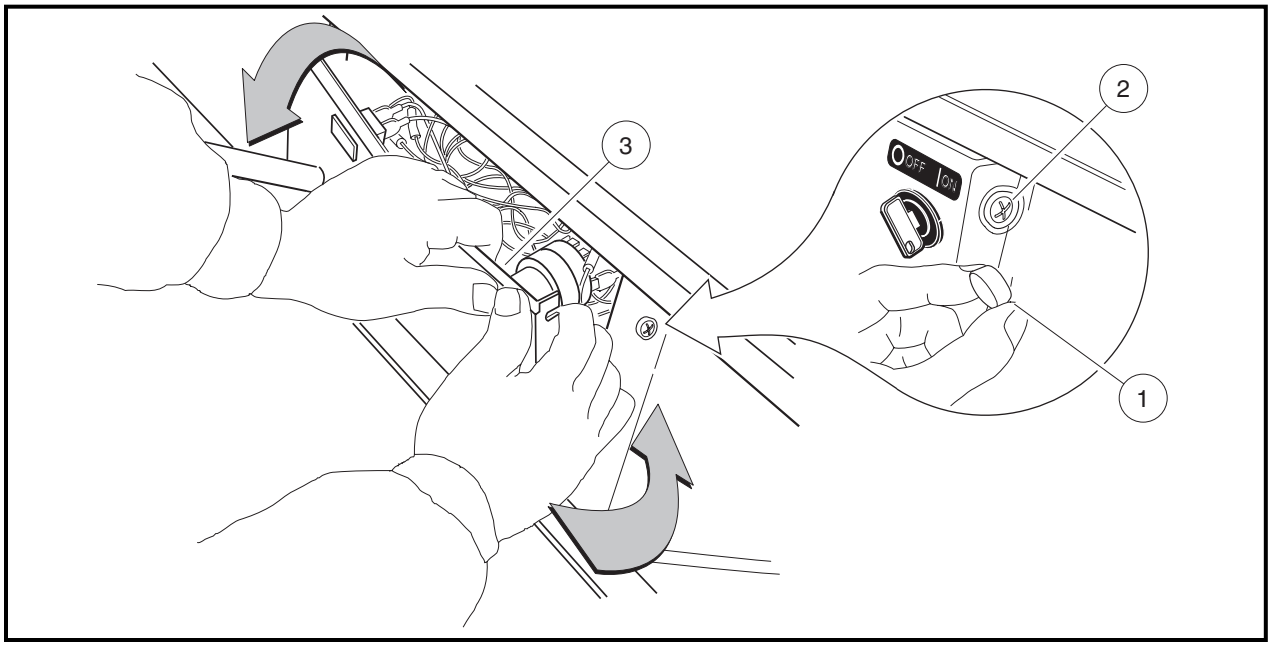

Figure 7-4 Dash Removal

5. Remove the driver-side dash pocket.
   5.1. Remove cup holder hardware and cup holder.
   5.2. Remove the flange lock screw from the top of the dash pocket.
   5.3. Drill out the two pop rivets holding the dash pocket in place.
   5.4. Slide dash pocket out of vehicle.
6. Remove the upper bolt (2) and lock washer (3) from the universal joint **(Figure 7-3, Page 7-3).**
7. Remove the nuts (9), bolts (8 and 10), and washers (7 and 11) from the steering column mount (4 and 5).
8. Remove the steering column from the vehicle.

STEERING COLUMN DISASSEMBLY

1. Remove screws (6) and mount (4 and 5) from steering column. Remove boot (12) **(Figure 7-3, Page 7-3)**.
2. While supporting steering column (21) on a workbench, remove snap ring (13) from shaft.**See following NOTE.**

NOTE: *Do not allow the steering shaft to slide out of the steering tube when removing the snap ring.*

3. Remove the washer (14), spring (15) and wedge (16). **See following NOTE.**

NOTE: *Use a new seal, retaining rings and new bearings for reassembly.*

4. Slide the shaft out of the tube to expose the retaining ring (22). Use pliers to twist the retaining ring (22) until it breaks off, then remove the wedge (16)**.**
5. Remove the shaft (19) from the bottom of the tube (20).
6. Use steering shaft (19) to push bearing seat (18) out from the opposite end of the steering tube (20).
7. Insert a flat blade screwdriver between the bottom of the outer race of the bearing (17) and the bottom lip of the bearing seat (18) and remove the bearing (17).

STEERING COLUMN ASSEMBLY

1. Insert bearing seat (18) into both ends of steering tube (20). Place a block of wood on bearing seat and tap lightly on block until bearing seat (18) is fully seated in steering tube (20) **(Figure 7-5, Page 7-5)**.
2. Press the bearing (17) all the way into the bearing seat (18) using a steering column bearing press tool (CCI P/N 1014264) or a metal tube approximately six inches (15.2 cm) long with a maximum outer diameter of 1-3/16 inches (3.3 cm) and a minimum inside diameter of 7/8 inch (2.2 cm). Be sure the bearing is installed in the bearing seat as shown **(Figure 7-5, Page 7-5)** so the wedge (16) will ride against the inner race of the bearing.

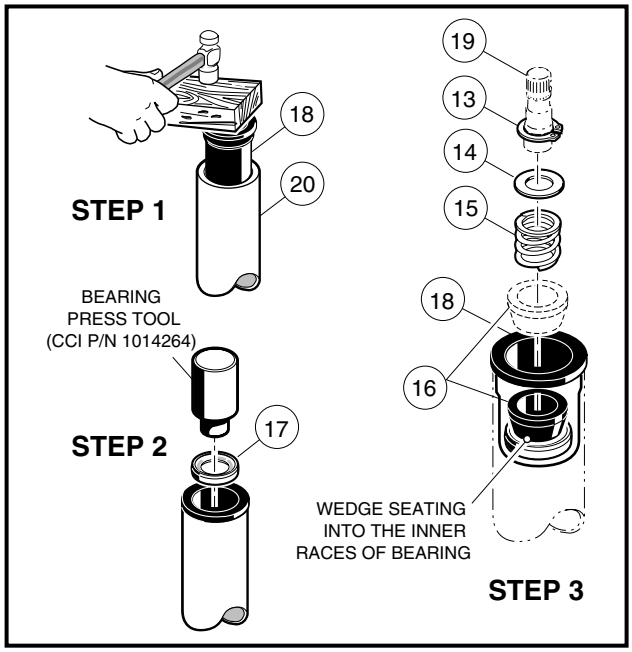

Figure 7-5 Steering Shaft – Bottom End

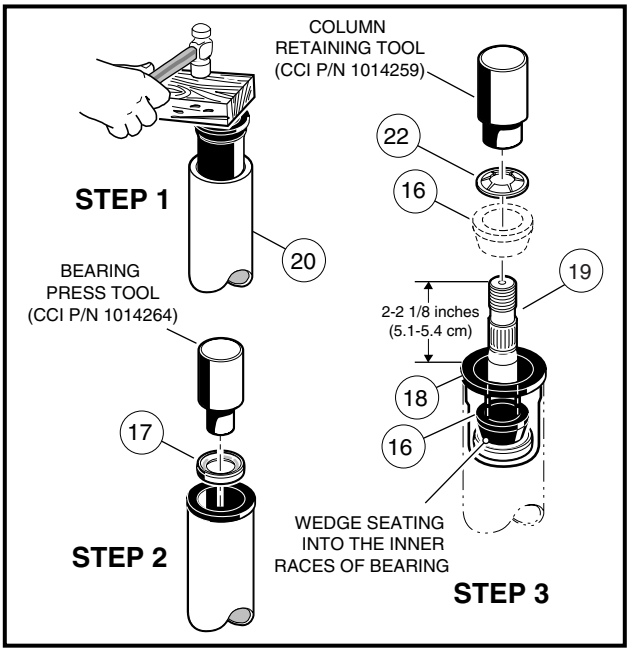

Figure 7-6 Steering Shaft – Top End

Steering Column Assembly, Continued:

3. Install the wedge (16), spring (15), washer (14), and snap ring (13) onto the bottom end of the steering shaft (19) **(Figure 7-5, Page 7-5)**.
4. Insert the shaft (19) from the bottom of the steering tube (20) **(Figure 7-3, Page 7-3)**.
5. Turn the assembly over and place the shaft (19) on a bench. Install the wedge (16) and retaining ring (22) onto the top of the shaft **(Figure 7-6, Page 7-5)**. Be sure the prongs on the retaining ring face up and away from the wedge. Use a steering column retaining ring tool (CCI P/N 1014259) to seat the retaining ring to the proper depth. Support end of tube while pressing. If you do not have the recommended tool, use the same tube as was used in step 2 to press the retaining ring onto the top of the shaft. The retaining ring should be pressed onto the shaft until 2 to 2-1/8 inches (5.1-5.4 cm) of the shaft extends from the top of the bearing seat in the steering tube **(Figure 7-6, Page 7-5)**.

STEERING COLUMN INSTALLATION

1. Install boot (12). Reinstall mount (4 and 5) onto the end of the steering column. Tighten bolts (6) to 20 ft-lb (27 N·m) **(Figure 7-3, Page 7-3)**.
2. For ease of assembly and to prevent corrosion, apply a light coat of anti-seize or lubricating compound to both splined ends of the steering shaft.
3. Position the steering column assembly in the vehicle while inserting the steering column shaft into the upper universal joint (1). The flat portion of the steering shaft spline (19) must be aligned with the bolt hole in the universal joint (1) before sliding the spline into the universal joint. While holding the steering column in place, attach it to the frame using bolts (8) washers (7) and nuts (9) **(Figure 7-3, Page 7-3)**. Thread the nuts onto the bolts but do not tighten them.
4. Reinstall washer (11) and screw (10). Tighten to 20 ft-lb (27 N·m).
5. Install the bolt (2) and lock washer (3) on the upper universal joint and finger-tighten.
6. Tighten the two nuts (9) and bolts (8) to 17 ft-lb (23 N·m).
7. Tighten the bolt (2) on the upper universal joint to 15 ft-lb (20 N·m).
8. Check the other two bolts on the universal joint (1) to ensure that they are properly tightened to 15 ft-lb (20 N·m) **(Figure 7-3, Page 7-3)**.
9. Reinstall dash pocket and related hardware.
10. Reinstall center dash panel in reverse order of disassembly. Make sure the key switch terminals do not touch the frame and the center dash panel is properly seated and snapped into place.
11. Install front body and bumper. **See Section 4 – Body and Trim.**

STEERING ADJUSTMENT

See General Warning, Section 1, Page 1-1.

1. Turn the steering wheel all the way to the right. Note the distance between the passenger-side spindle stop (2) and passenger-side A-plate (3) **(Figure 7-7, Page 7-7).** The internal stop on the rack must reach its limit of travel against rack and pinion housing at exactly the same time the spindle stops against the passenger-side A-plate (with vehicle wheels turned to the right). If simultaneous contact occurs, steering is in correct adjustment; Proceed to step 4. If simultaneous contact does not occur, proceed to step 2.

2. Loosen the nuts (27 and 29) and turn the drag link (28) **(Figure 7-9, Page 7-9)** to adjust the drag link rod. Adjust the link rod with the steering wheel turned all the way to the right, so the passenger-side spindle stop lightly touches the passenger-side A-Plate. The internal stop on the rack must reach its limit of travel at the same time the spindle stops against the passenger-side A-plate (with vehicle wheels turned to the right). **See following CAUTION.**

CAUTION

- **The drag link has both left and right-hand threads. The end of the drag link toward the spindle has left-hand threads, and the end toward the rack has right-hand threads. To prevent damage to threaded parts, care should be taken when servicing the drag link.**

3. When all adjustments have been completed, tighten the nuts (27 and 29) on the drag link assembly with an open end wrench. Tighten nuts to 21 ft-lb (28.4 N·m) **(Figure 7-9, Page 7-9)**. **See following CAUTION.**

CAUTION

- **When tightening the nuts (27 and 29), make sure the drag link (28) does not turn (Figure 7-9, Page 7-9).**

4. Straighten wheels and then turn steering wheel from lock to lock. Wheels should turn smoothly and easily. If steering wheel does not turn smoothly and easily, inspect steering assemblies; e.g., ball joints (23) **(Figure 7-9, Page 7-9)** and (6 and 13) **(Figure 7-20, Page 7-18)**, spindle bushings (3 and 4) **(Figure 7-21, Page 7-19)**, wave washers (20) **(Figure 7-21, Page 7-19)**, and rack assembly (17) **(Figure 7-9, Page 7-9)**. Also inspect front suspension assemblies; e.g., A-Plates (1) **(Figure 7-20, Page 7-18)** urethane bushings (2) **(Figure 7-20, Page 7-18)** and leaf springs (6) **(Figure 7-21, Page 7-19)**. Replace components as necessary.

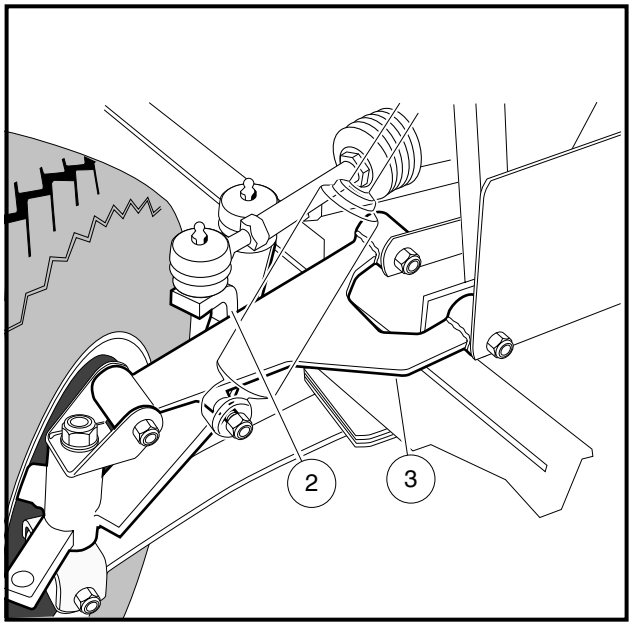

Figure 7-7 Adjust Steering Alignment

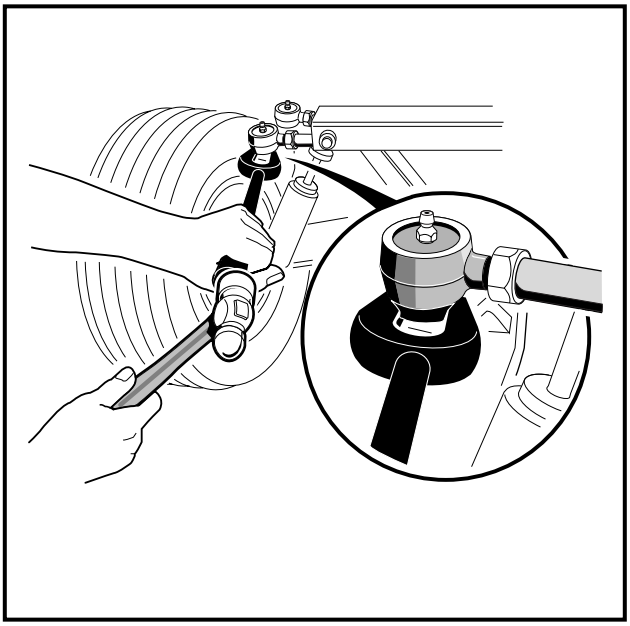

Figure 7-8 Ball Joint Tool

RACK AND PINION

See General Warning, Section 1, Page 1-1.

RACK AND PINION REMOVAL

1. Remove the front body as instructed in Section 4 – Body and Trim**.**
2. Remove the cotter pin (22) and ball joint retaining nut (25) **(Figure 7-9, Page 7-9)**.
3. Using a ball joint removal tool, remove the ball joint (23) **(Figure 7-9, Page 7-9)** from the spindle assembly. **See Figure 7-8, Page 7-7.**
4. Remove the bolts (30), washers (31), and lock nuts (32) from the steering rack assembly mounting bracket **(Figure 7-9, Page 7-9)**.
5. Remove the bolt (2) and flat washer (3) on the upper universal joint, then remove the rack assembly and universal joint from the vehicle **(Figure 7-3, Page 7-3)**.

RACK AND PINION DISASSEMBLY

CAUTION

- **The ball joint (23) (Figure 7-9, Page 7-9) has left-hand threads.**

1. Remove ball joint (23) and inspect it for excessive wear **(Figure 7-9, Page 7-9)**.
2. Remove the drag link (28) **(Figure 7-9, Page 7-9)**.
3. Remove both bellows clamps (2) (plastic wire ties).
4. Remove the hex nut (29) and slide off the dust seal bellows (1).
5. Remove the retaining ring (21), then slide off dust seal bellows (20).
6. Remove the rack screw lock nut (15), rack guide screw (16), rack guide pressure spring (14), and the rack guide (13).
7. Remove the universal joint assembly from the pinion (8) by fully removing the bolt and then sliding off the universal joint.
8. If necessary, remove the dust seal (12)**. See following NOTE.**

NOTE: *If the dust seal (12) is removed, replace with a new one* ***(Figure 7-9, Page 7-9)****.*

9. Using snap ring pliers, remove the internal snap ring (11) **(Figure 7-9, Page 7-9).**
10. Install the universal joint onto the pinion and place a large open end wrench under the universal joint **(Figure 7-10, Page 7-10)**. Use the wrench as a lever to pull the pinion from the housing.

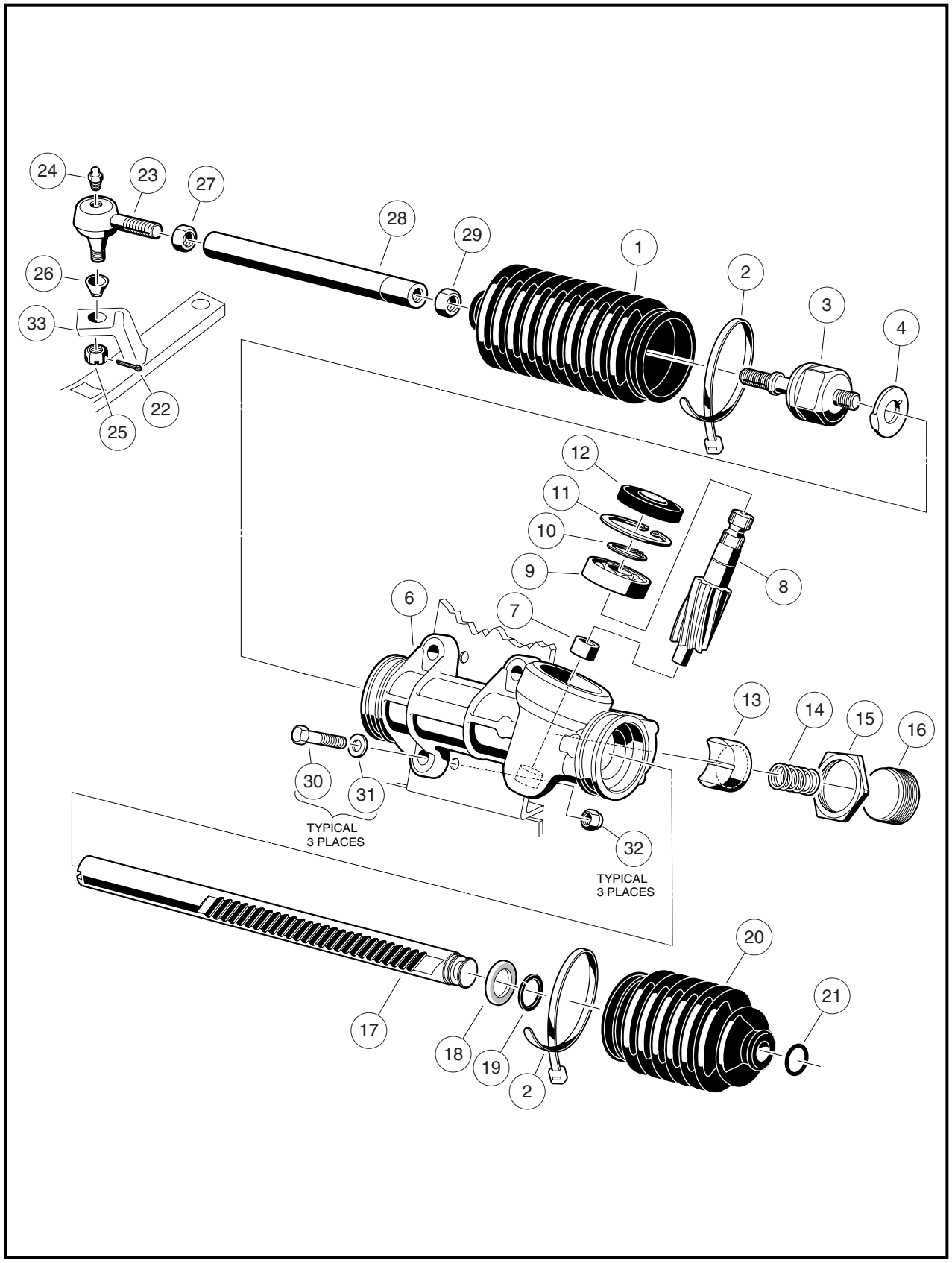

Figure 7-9 Steering Gear

Rack and Pinion Disassembly, Continued:

11. If the ball bearing (9) has been damaged, remove the external snap ring (10) **(Figure 7-9, Page 7-9)** and press the bearing off **(Figure 7-11, Page 7-10)**.

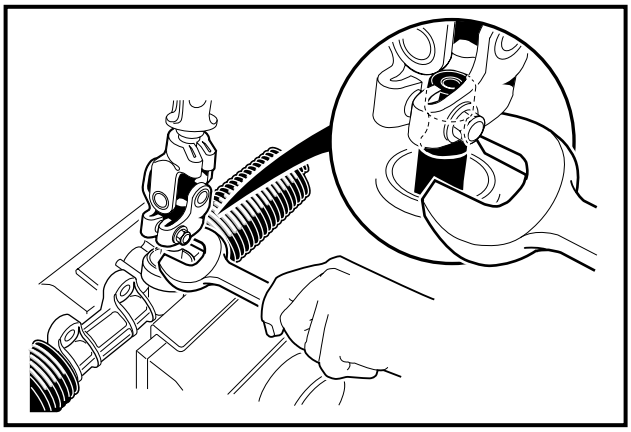

Figure 7-10 Remove Pinion from Housing

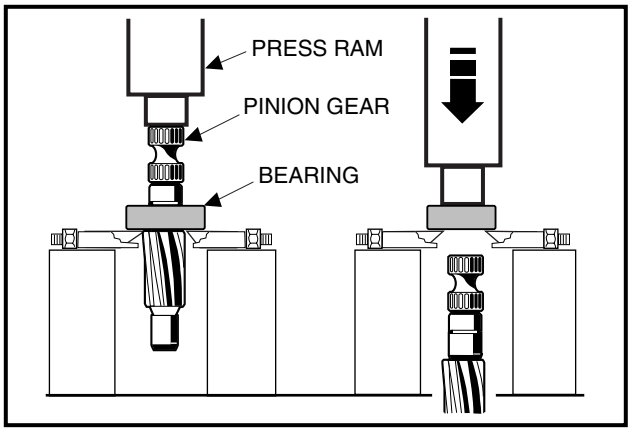

Figure 7-11 Remove Bearing from Pinion

12. Remove retaining ring (19) and stop washer (18), then remove rack (17) from housing (6) **(Figure 7-9, Page 7-9)**.

13. If the inner ball joint (3) is excessively worn, remove the ball joint and tab washer (4) from the rack **(Figure 7-12, Page 7-10)**.

    13.1. Secure the rack in a vise using wood blocks between the rack and the jaws of the vise to protect the rack from damage **(Figure 7-12, Page 7-10)**.

    13.2. Loosen and remove the inner ball joint with a wrench.

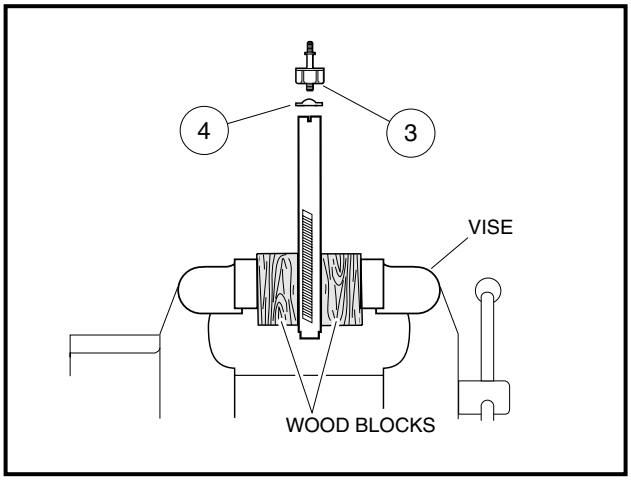

Figure 7-12 Secure Rack in Vise

14. Inspect the bushing inside the steering box assembly (6) for excessive wear. If wear is excessive, replace the steering box assembly (CCI P/N 101878302) **(Figure 7-9, Page 7-9)**.

RACK AND PINION ASSEMBLY

1. Install a new tab washer (4) and an inner ball joint (3) **(Figure 7-12, Page 7-10)**. Install the ball joint onto the rack by securing the rack in a vise using wood blocks between the rack and the jaws of the vise to protect the rack from damage. Tighten the ball joint to 60 ft-lb (81 N·m).
2. Bend the edges of the tab washer (4) up against the ball joint (3).
3. Apply a liberal amount of EP grease to the teeth of the rack (17), then slide the rack through the housing (6). Install the stop washer (18) and retaining ring (19) to the end of the rack **(Figure 7-9, Page 7-9)**. **See following CAUTION.**

CAUTION

- **In step 4, do not press against the outer race of the bearing.**

4. If the bearing (9) was removed, grease and press on a new bearing, exerting all pressure on the inner race. **(Figure 7-9, Page 7-9)**
5. Install the external snap ring (10).
6. If the needle bearing (7) is damaged, the steering box assembly (CCI P/N 101878302) must be replaced.
7. Install pinion (8) and bearing (9) assembly into the housing (6) **(Figure 7-9, Page 7-9)**. Make sure the rack gear teeth will mesh with the gear teeth on the pinion. The rack may need to be rotated slightly while lightly tapping on the pinion-bearing assembly with a rubber mallet. **See following CAUTION**.

CAUTION

- **Do not force the pinion-bearing assembly into the housing. The gear teeth or the small bearing could be damaged.**

8. Install the internal snap ring (11) **(Figure 7-9, Page 7-9)**.
9. Use a socket to apply pressure evenly, and press in a new dust seal **(Figure 7-13, Page 7-11)**.

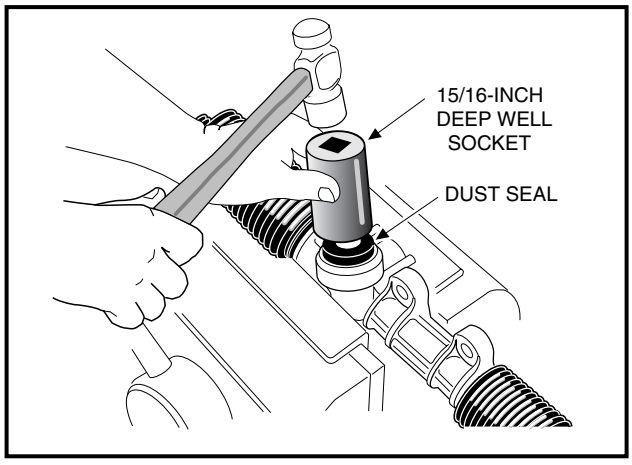

Figure 7-13 Press In Dust Seal

10. Apply a small amount of grease to the rack guide (13) where it comes into contact with the rack (17) **(Figure 7-9, Page 7-9)**.
11. Place a few drops of Loctite® 222 on the threads of the screw (16) **(Figure 7-9, Page 7-9)**.

Rack and Pinion Assembly, Continued:

12. Install the rack guide (13), pressure spring (14), and screw (16). The screw should be threaded in until a rotational torque of 10 in-lb (1.13 N·m) is achieved **(Figure 7-9, Page 7-9)**.

    12.1. Reposition the rack and pinion in a vise.

    12.2. Insert a 3/8 inch deep well socket into the steering column end of the universal joint (2) and tighten the bolt (1) to 15 ft-lb (20.3 N·m) **(Figure 7-15, Page 7-12)**.

    12.3. Use a torque wrench connected to the 3/8 inch deep well socket to measure the resistance of the rack and pinion. Rotational resistance should measure 7 to 15 in-lb (.8 to 1.7 N·m).

    12.4. If measured resistance does not equal 7 to 15 in-lb, loosen the lock nut (15) and tighten the screw (16) until it bottoms out, then back the screw off one quarter turn. Tighten the lock nut to 28 ft-lb (38 N·m) **(Figure 7-14, Page 7-12)**. **See following NOTE.**

NOTE: *When tightening the lock nut (15), make sure the screw (16) does not change adjustment **(Figure 7-14, Page 7-12)**.*

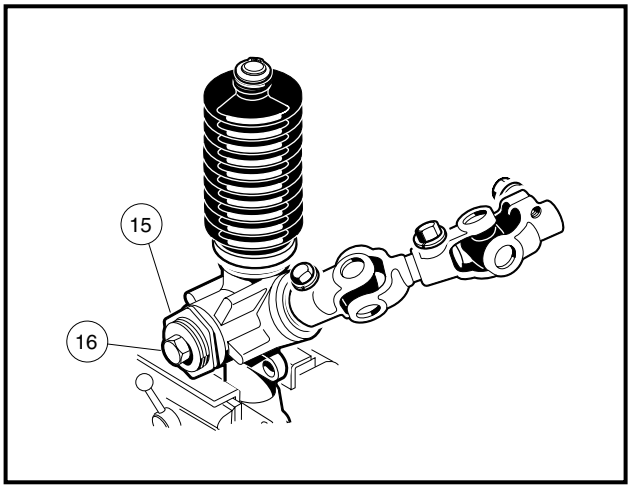

Figure 7-14 Rack and Pinion Adjustment

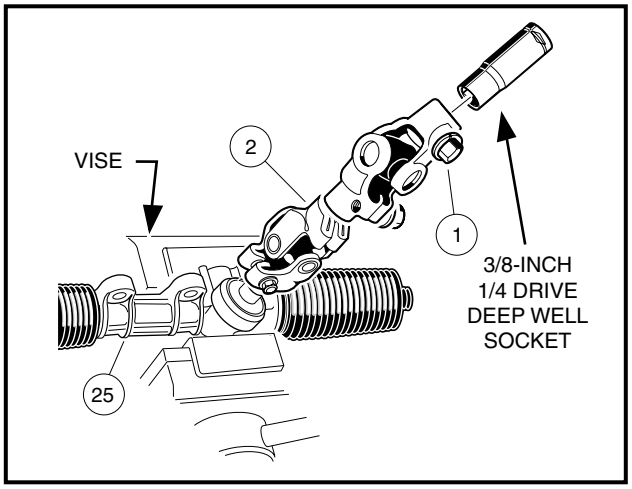

Figure 7-15 Rack and Pinion Resistance

13. Install the dust seal bellows (20) and retaining ring (21) **(Figure 7-9, Page 7-9)**.
14. Install the dust seal bellows (1) and hex nut (29).
15. Install the universal joint on the pinion. Tighten the bolt to 15 ft-lb (20 N·m).
16. Install new bellows clamps (wire ties) (2).
17. Install the drag link (28) by fully threading the grooved end onto the inner ball joint (3). **See following CAUTION.**

CAUTION

- **The ball joint (23) (Figure 7-9, Page 7-9) has left-hand threads.**
- **The tie rod and drag link have right-hand threads on one end and left-hand threads on the other end. Right-hand threads are identified by a groove in the tie rod or drag link.**

18. Install the ball joint (23). **See preceding CAUTION.**

RACK AND PINION INSTALLATION

1. Position the steering gear box assembly on the shock and gear support and install the bolts (30), washers (31), and nuts (32). Do not tighten the mounting bolts **(Figure 7-9, Page 7-9)**.
2. For ease of assembly and to prevent corrosion, apply a light coat of anti-seize and lubricating compound to the splined end of the steering column shaft.
3. Align the flat portion of the steering shaft spline with the bolt hole in the universal joint and then slide the shaft into the upper universal joint. Install the bolt and lock washer on the upper universal joint and tighten to 15 ft-lb (20 N·m).
4. Tighten the steering rack mounting bolts (30) to 22 ft-lb (29.8 N·m) **(Figure 7-9, Page 7-9)**.
5. Adjust the steering. **See Steering Adjustment on page 7-6.**

TIE ROD AND DRAG LINK

See General Warning, Section 1, Page 1-1.

TIE ROD AND DRAG LINK REMOVAL

1. Using locking pliers to hold tie rod and drag link, loosen jam nuts (7 and 12) on tie rod ball joints **(Figure 7-20, Page 7-18)**, and loosen jam nuts (27 and 29) on the drag link **(Figure 7-9, Page 7-9)**.
2. Remove the cotter pin (22) and ball joint retaining nut (25) **(Figure 7-9, Page 7-9)**.
3. Remove the cotter pins (22) and ball joint retaining nuts (20) **(Figure 7-21, Page 7-19)**.
4. Use a ball joint removal tool to remove ball joints (13 and 6) **(Figure 7-20, Page 7-18)** and (23) **(Figure 7-9, Page 7-9)** from the spindles.
5. Remove the ball joints from the tie rod (11) **(Figure 7-20, Page 7-18)**.
6. Remove drag link (28) from inner ball joint assembly (3) and drag link ball joint (23) **(Figure 7-9, Page 7-9)**.

TIE ROD AND DRAG LINK INSTALLATION

1. Thread ball joints (6 and 13) into tie rod (11) to a depth of 1/2 inch (12.5 mm) **(Figure 7-20, Page 7-18)**. **See following WARNING and CAUTION.**

⚠ WARNING

- **The ball joints must be threaded into the rod at least 5/16 of an inch (8 mm). Failure to thread ball joints in deep enough may cause a ball joint to separate from the rod during adjustment or while being operated, possibly resulting in loss of vehicle control and severe personal injury.**

CAUTION

- **The tie rod and drag link have right-hand threads on one end and left-hand threads on the other end. Right-hand threads are identified by a groove in the tie rod or drag link.**

2. Install ball joint ends (6 and 13) into the left and right-hand spindle arms (23), then install the retaining nuts (20) and cotter pins (22) **(Figure 7-20, Page 7-18)**.

Tie Rod and Drag Link Installation, Continued:

3. Thread the drag link rod (28) all the way onto the threaded stud of the inner ball joint assembly (3) (right-hand threads) **(Figure 7-9, Page 7-9)**.
4. Thread the ball joint (23) into the drag link rod (28) (left-hand threads) to full thread depth **(Figure 7-9, Page 7-9)**.
5. Install the ball joint (23) on the spindle arm riser (33), then install the retaining nut (25) **(Figure 7-9, Page 7-9)**. Tighten nut to 18 ft-lb (24.4 N·m), then install a new cotter pin (22).
6. Adjust wheel toe-in **(see page 7-15)** and steering **(see page 7-6)**.

FRONT SUSPENSION

See General Warning, Section 1, Page 1-1.

LUBRICATION

Five grease fittings are provided (one in each spindle housing, one in the ball joint on each end of the tie rod, and one in the ball joint of the steering drag link). Lubricate these fittings at the recommended interval with the proper lubricant. **See the Lubrication Chart in the appropriate maintenance and service supplement**. **See following CAUTION.**

CAUTION

- **To ensure proper lubrication of the front suspension and steering linkages, raise front of vehicle to lubricate. See General Warning, Section 1, Page 1-1.**

WHEEL ALIGNMENT

Wheel alignment is limited to equalizing the camber angle of each front wheel and adjusting toe-in of the front wheels. There is also a drag link adjustment to equalize the turning radius in both directions. **See Steering Adjustment on page 7-6. See following NOTE.**

NOTE: *Prior to making any front suspension adjustments, inspect components for wear or damage and repair or replace as necessary.*

Camber Adjustment

1. Check each front wheel with a framing square. At the floor (or ground), there should be an equal amount of space between each tire and the framing square **(Figure 7-16, Page 7-15)**.
2. Loosen, but do not remove, the four bolts (30) that secure the leaf spring (6) to the bottom spring plate (29) **(Figure 7-21, Page 7-19). See also Figure 7-17, Page 7-15**.
3. Loosen, but do not remove, the hex nut (8) on the adjustment eccentric (7) **(Figure 7-17, Page 7-15)** in the center of the spring. **See also Figure 7-21, Page 7-19.**
4. Use a 7mm deep-well socket to rotate the eccentric **(Figure 7-17, Page 7-15)**.
5. After adjusting camber, tighten the four spring retaining bolts (30) **(Figure 7-21, Page 7-19)** to 23 ft-lb (31 N·m). Then roll the vehicle forward one full tire revolution and recheck the camber. **See also Figure 7-16, Page 7-15**.
6. Tighten the hex nut (8) on the adjustment eccentric (7) to 10 ft-lb (13.5 N·m) **(Figure 7-21, Page 7-19) See also Figure 7-17, Page 7-15**.

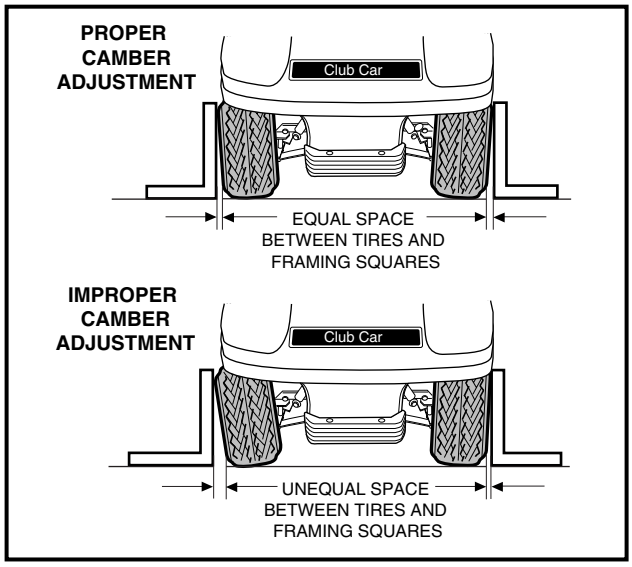

Figure 7-16 Check Camber

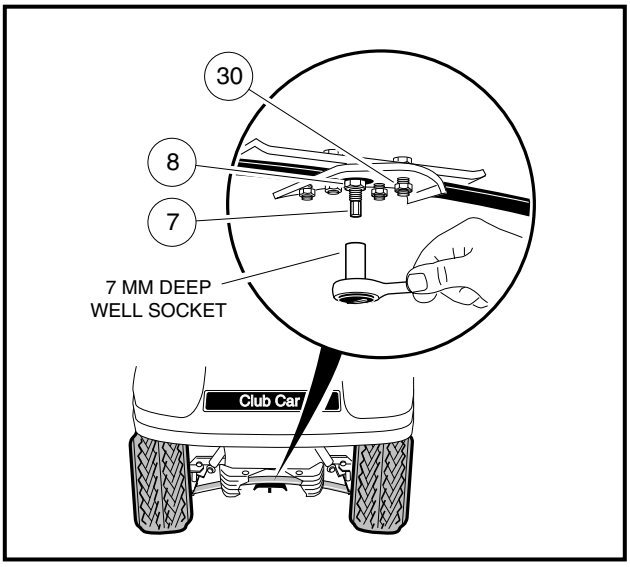

Figure 7-17 Adjust Camber

Toe-in Adjustment

1. On a level surface, roll the vehicle forward, then stop. Make sure the front wheels are pointed straight ahead. Do not turn the steering wheel again during this procedure.
2. On each front tire, mark (as closely as possible) the center of the tread face that is oriented toward the rear of the vehicle. The marks should be even with the bottom surfaces of the vehicle frame I-beams.
3. Measure the distance between the marks on the rear-facing surfaces of the tires, and then roll the vehicle **forward** one and one-half wheel revolutions until the marks appear on the forward facing surfaces of the tires at about the same height from the floor **(Figure 7-18, Page 7-15)**.

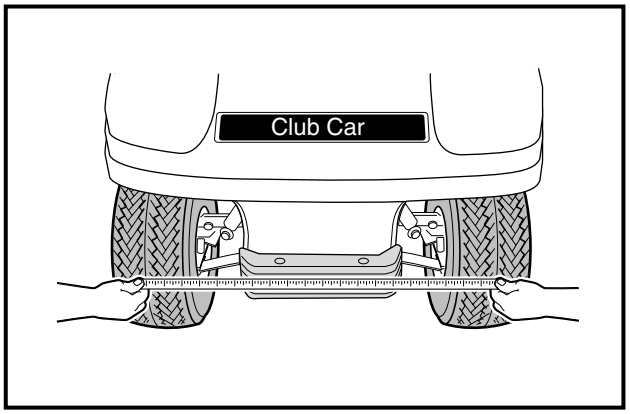

Figure 7-18 Check Toe-In

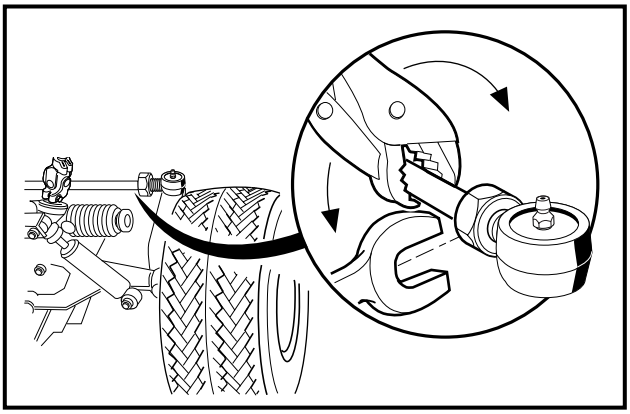

Figure 7-19 Adjust Toe-In

4. Measure the distance between the marks on the forward-facing surfaces of the tires **(Figure 7-18, Page 7-15)**. **See following NOTE.**

NOTE: *The front measurement must be less than the rear measurement.*

5. Subtract the measurement on the front of the tires from the measurement on the rear of the tires. The difference is the toe-in. Proper toe-in is 1/8 to 3/8 of an inch (3.2 to 9.5 mm).

Toe-in Adjustment, Continued:

6. If adjustment is necessary, loosen the jam nut on each tie rod ball joint and rotate the tie rod to increase or decrease toe-in **(Figure 7-19, Page 7-15)**. **See following CAUTION.**

CAUTION

- **The tie rod has right-hand threads on one end and left-hand threads on the other end. Right-hand threads are identified by a groove in the tie rod.**

7. Tighten nuts (loosened in step 6) to 21 ft-lb (28 N·m) and recheck toe-in.
8. After toe-in adjustment is made and with wheels in the straight ahead position, the steering wheel should be at the center of its travel. There should be equal travel to the left and right. **See following NOTE.**

NOTE: *If the minimum turning radius is not the same for both left and right turns, adjust the steering* ***(see Steering Adjustment on page 7-6)****.*

If the vehicle is equipped with the permanent towing or deluxe onboard towing option, adjust by loosening the ball joint hex nut on the tow assembly and rotating the steering arm to achieve 16 -1/2 inches (42 cm) from centerline of right front tire to the closest edge of the hole in towing lug.

FRONT SUSPENSION COMPONENTS

See General Warning, Section 1, Page 1-1.

TAPERED LEAF SPRING REMOVAL

1. Loosen lug nuts on both front wheels and raise front of vehicle with a chain hoist or floor jack. Place jack stands under the front cross tube of the vehicle frame and lower the vehicle onto the jack stands. **See General Warning, Section 1, Page 1-1.**
2. Remove both front wheels.
3. Remove the nuts (14) and bolts (25) from the bottom of each kingpin (26) **(Figure 7-21, Page 7-19)**.
4. Remove the four bolts (30), four nuts (32), four lock washers (31), and bottom spring plate (29).
5. Remove tapered leaf spring (6).
6. Check the condition of the urethane bushings (27) and steel bushings (28). Replace any that are worn or damaged.

TAPERED LEAF SPRING INSTALLATION

1. Install urethane bushings (27) and steel bushings (28) into leaf spring eyes **(Figure 7-21, Page 7-19)**.
2. Install tapered leaf spring (6), bottom spring plate (29), four bolts (30), four lock washers (31), and four nuts (32). Using a crisscross pattern sequence, tighten bolts to 23 ft-lb (31 N·m).
3. Install spring in kingpins (26) with bolts (25) and nuts (14). Tighten to 17 ft-lb (23 N·m).
4. Install the wheels and finger-tighten the lug nuts.
5. Lower the vehicle and finish tightening lug nuts (using a crisscross pattern) to 55 ft-lb (74.6 N·m).
6. Adjust camber and toe-in as instructed on page 7-14.

KINGPIN AND STEERING SPINDLE REMOVAL

1. Remove the front hub. **See Front Wheel Bearings and Hubs on page 7-20.**
2. Remove cotter pins (22) and nuts (20), then remove ball joints from the spindles **(Figure 7-20, Page 7-18).** Remove drag link ball joint. **See also Tie Rod and Drag Link Removal on page 7-13**.
3. Remove the nut (17) and lock washer (if present) from the top of the kingpin (26) **(Figure 7-21, Page 7-19)**.
4. Raise the upper clevis (16) from the kingpin **(Figure 7-21, Page 7-19)**.
5. Remove the thrust washer (19).
6. Slide the spindle off the kingpin (26).
7. Remove the wave washer (20) and inspect it**.** If the washer is broken or has a wave bottom to wave crest height dimension of less than 0.040 inch (0.10 cm), it must be replaced.
8. Remove bolt (25) and nut (14) from bottom of kingpin (26) and remove kingpin.
9. Inspect the kingpin and spindle. If either is worn or damaged, it must be replaced.
10. Inspect the bushings (3 and 4). If the bushings are worn or damaged, remove them and press in new ones. **See following NOTE.**

NOTE: *If the bushings are replaced, ream new bushings to 0.750-0.752 (3/4 inch) (19.05-19.10 mm) in diameter. The reamer should be long enough to ream both bushings from one direction.*

KINGPIN AND STEERING SPINDLE INSTALLATION

1. Inspect all parts and replace them as necessary.
2. Install the kingpin (26) over the leaf spring eye. Insert the bolt (25) and install the nut (14) **(Figure 7-21, Page 7-19)**. Tighten the bolt to 17 ft-lb (23 N·m).
3. Install the wave washer (20) on the kingpin.
4. Install the steering spindle on the kingpin. Then install the thrust washer (19), upper plate clevis (16), and nut (17). If lock washer was present, do not reinstall. Tighten the nut to 40 ft-lb (54.2 N·m) **(Figure 7-21, Page 7-19)**.
5. Attach the ball joints (6 and 13) to the spindle arm (23), install and tighten the nut (20), and install the cotter pin (22) **(Figure 7-20, Page 7-18)**.
6. Install the drag link ball joint. **See Tie Rod and Drag Link Installation on page 7-13.**
7. Install front hub and wheel. **See Front Hub Installation on page 7-21.**

DELTA A-PLATE REMOVAL

1. Loosen lug nuts on both front wheels and raise front of the vehicle with a chain hoist or floor jack. Place jack stands under the front cross tube of the vehicle frame and lower the vehicle onto the jack stands.
2. Remove wheel.
3. Remove bolts (10 and 24), A-Plate straps (14), and nuts (5) **(Figure 7-20, Page 7-18)**.
4. Remove the lower shock absorber mounting nut (9), then slide the shock absorber free of the Delta A-Plate.
5. Remove the Delta A-Plate (1).
6. Inspect the bushings (2) and sleeves (3 and 4) in the Delta A-Plate and replace them if necessary.

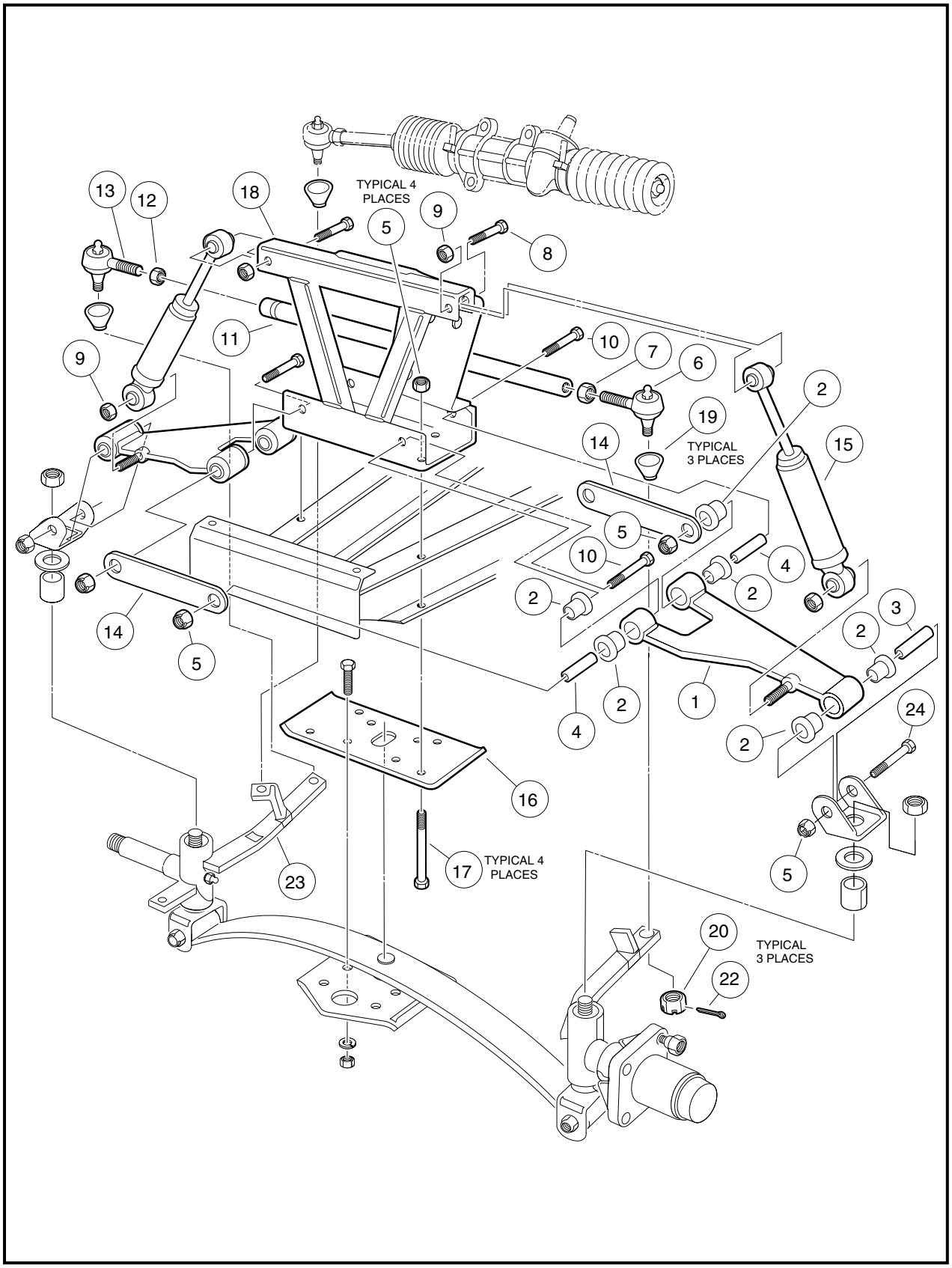

Figure 7-20 Upper Front Suspension Assembly

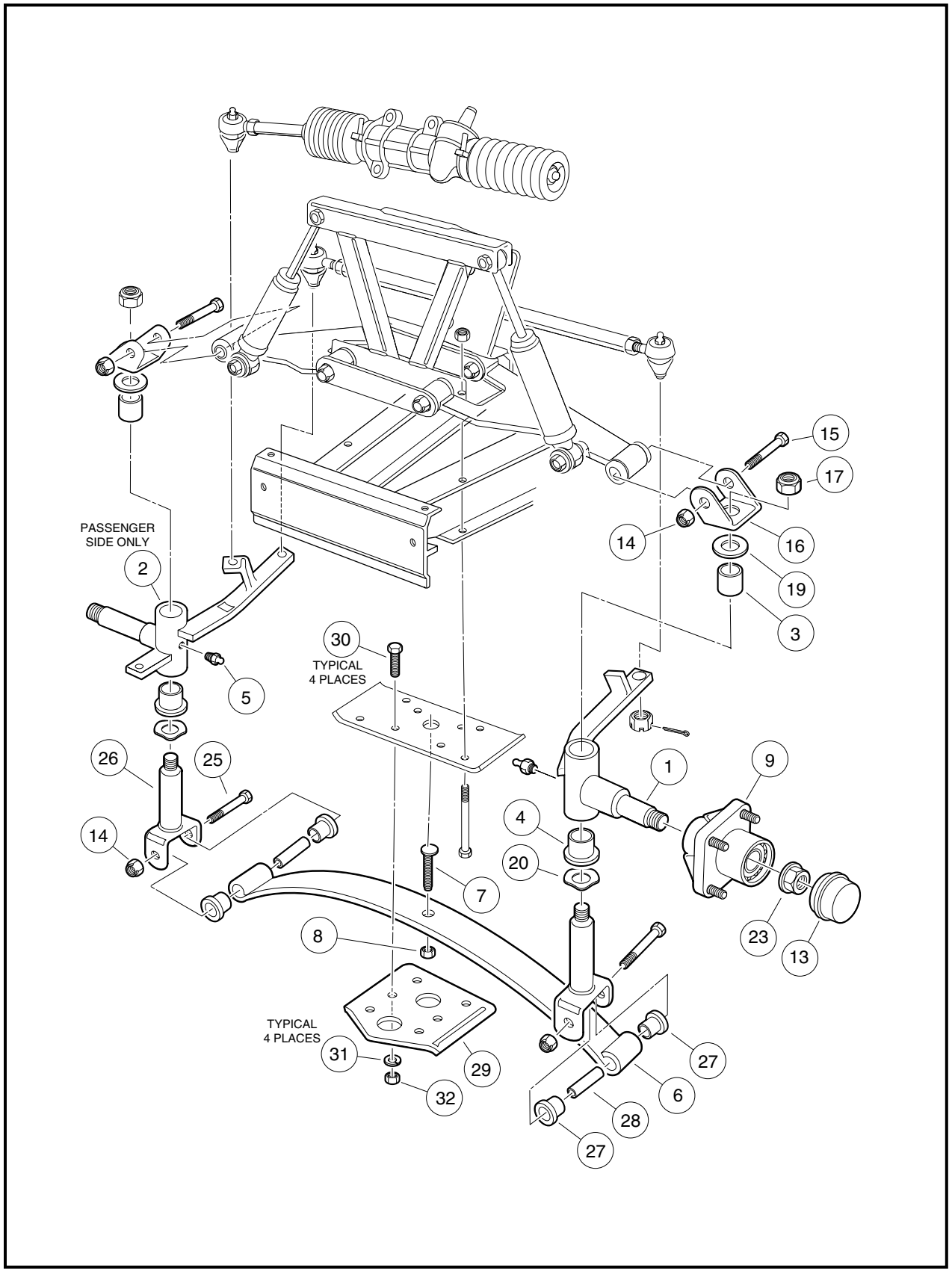

Figure 7-21 Lower Front Suspension Assembly

DELTA A-PLATE INSTALLATION

1. Install the A-Plate in reverse order of removal. Tighten the A-Plate suspension bolts (10 and 24) to 20 ft-lb (27 N·m) **(Figure 7-20, Page 7-18)**.
2. Tighten shock absorber mounting nut (9) to 20 ft-lb (27.1 N·m).
3. Install the wheels and adjust the wheel alignment as instructed on page 7-14.

SHOCK ABSORBER REMOVAL

1. Inspect the shock absorbers for fluid leakage at the point where the shaft enters the shock absorber body. Leaking shock absorbers should be replaced.
2. Remove the nut (9) attaching the shock absorber to the A-Plate **(Figure 7-20, Page 7-18)**.
3. Remove the nut (9) and bolt (8) attaching the shock absorber to the shock and gear support.
4. Remove the shock absorber.

SHOCK ABSORBER INSTALLATION

NOTE: *When installing shock absorbers, make sure front shocks have identical part numbers and rear shocks have identical part numbers.*

1. Install the shock absorber by reversing the removal procedure.
2. Tighten the nuts to 20 ft-lb (27 N·m).

FRONT WHEEL BEARINGS AND HUBS

See General Warning, Section 1, Page 1-1.

NOTE: *The hubs used on this vehicle contain sealed bearings that cannot be serviced or replaced. If the bearings are worn or damaged, the entire hub must be replaced.*

FRONT WHEEL FREE PLAY INSPECTION

1. Raise the front of the vehicle.
2. Use your hands to attempt to rock the wheel and hub assembly back and forth on the spindle. If there is any observable movement of the wheel and hub on the spindle, the hub bearing is worn and the hub assembly must be replaced. **See Front Hub Removal on page 7-20.**

FRONT HUB REMOVAL

1. Remove the front wheels. **See Wheel Removal, Section 8, Page 8-1.**
2. Remove dust cap (1) and lock nut (2) **(Figure 7-22, Page 7-21)**.
3. Side the hub assembly (3) off of the spindle shaft (4).
4. Lightly sand spindle shaft to clean away any light rust.

5. Inspect the surface of the spindle shaft for surface damage. It should be clean and smooth. If severe pitting from rust or corrosion has occurred, replace the spindle assembly. **See Kingpin and Steering Spindle Removal on page 7-17.**

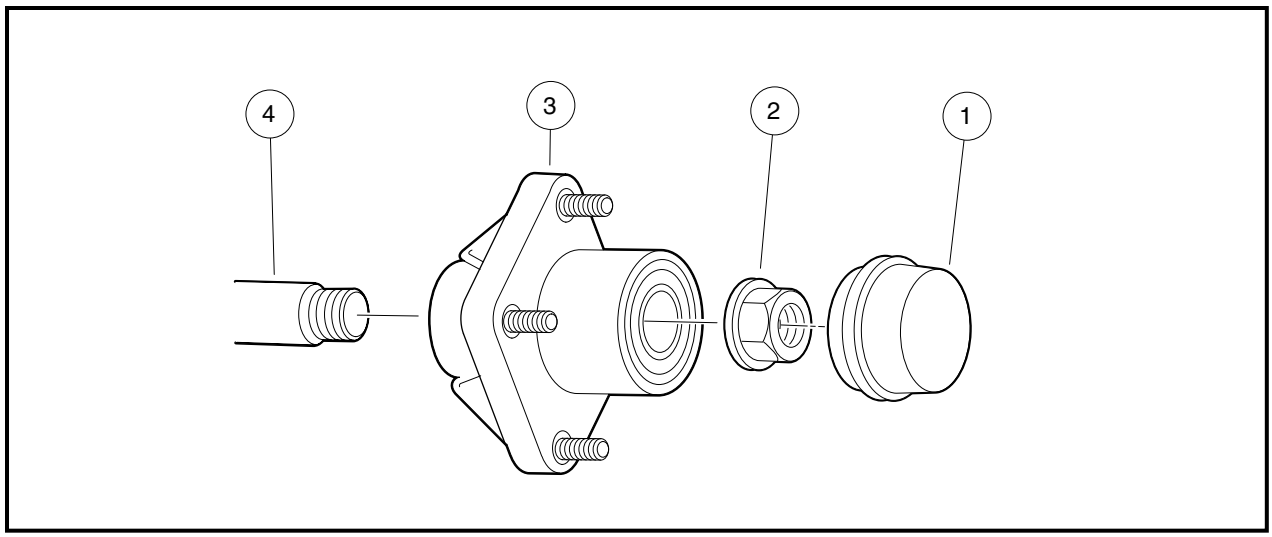

Figure 7-22 Front Wheel Hub

FRONT HUB INSTALLATION

1. Clean and apply a light coat of anti-seize lubricant to the spindle shaft.
2. Slide the hub assembly (3) onto the spindle shaft **(Figure 7-22, Page 7-21)**.
3. Install a new flanged lock nut and tighten to 50 ft-lb (67.8 N·m).
4. Rotate the hub. The hub should rotate smoothly without binding, side play, or any indication of rough spots during rotation.
5. Install the dust cap (1) using a rubber mallet and tapping lightly around the edge of the cap.
6. Repeat the procedure for the opposite wheel.
7. Install wheels and finger-tighten lug nuts.
8. Lower the vehicle and finish tightening lug nuts, using a crisscross pattern, to 55 ft-lb (74.6 N·m).

SECTION 8 – WHEELS AND TIRES

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**

GENERAL INFORMATION

Maximum tire life and good vehicle handling qualities are directly related to proper wheel and tire care.

- Keep tires properly inflated. **See Section 2 – Vehicle Specifications.**
- Keep lug nuts properly tightened.
- Keep the front end aligned and adjusted.

WHEELS

See General Warning, Section 1, Page 1-1.

WHEEL REMOVAL

1. Slightly loosen the lug nuts on the wheel to be removed.
2. Raise the end of the vehicle from which the wheel is to be removed. Make sure that the wheels are off the ground. **See General Warning, Section 1, Page 1-1.**
3. Remove the lug nuts and remove the wheel.

WHEEL INSTALLATION

1. Install wheel(s), and use a crisscross pattern to tighten the lug nuts until they are snug.
2. Lower the vehicle and use a crisscross pattern to finish tightening lug nuts to 55 ft-lb (74.6 N·m).

TIRES

See General Warning, Section 1, Page 1-1.

TIRE REMOVAL

NOTE: *Tire must be removed or installed from the valve stem side of the rim.*

1. Remove the tire and wheel assembly from the vehicle as instructed above.
2. Remove the valve cap and valve core and allow air to escape from the tire.

Tire Removal, Continued:

3. If possible, use a tire machine to remove the tire from the rim.
   3.1. If a tire machine is not available, loosen both tire beads by applying pressure to the tire side walls and pushing the tire bead away from the rim flange and into the rim well **(Figure 8-1, Page 8-2, Detail A)**.
   3.2. With the valve stem side of the wheel up, use a tire tool to carefully start the upper bead over the edge of the wheel rim (**Figure 8-1, Page 8-2, Detail B)**. **See following CAUTION.**

CAUTION

- **To avoid damage to the tire, do not use excessive force when starting the bead over the edge of the rim.**

   3.3. When top bead is free of the rim, pull the bead from the bottom side of the rim up into the upper part of the rim well. Insert the tire tool under the lower bead as shown (**Figure 8-1, Page 8-2, Detail C)** and carefully pry the lower bead over the rim flange.
   3.4. Once the lower bead is started over the rim flange, the tire can be removed from the rim by hand.

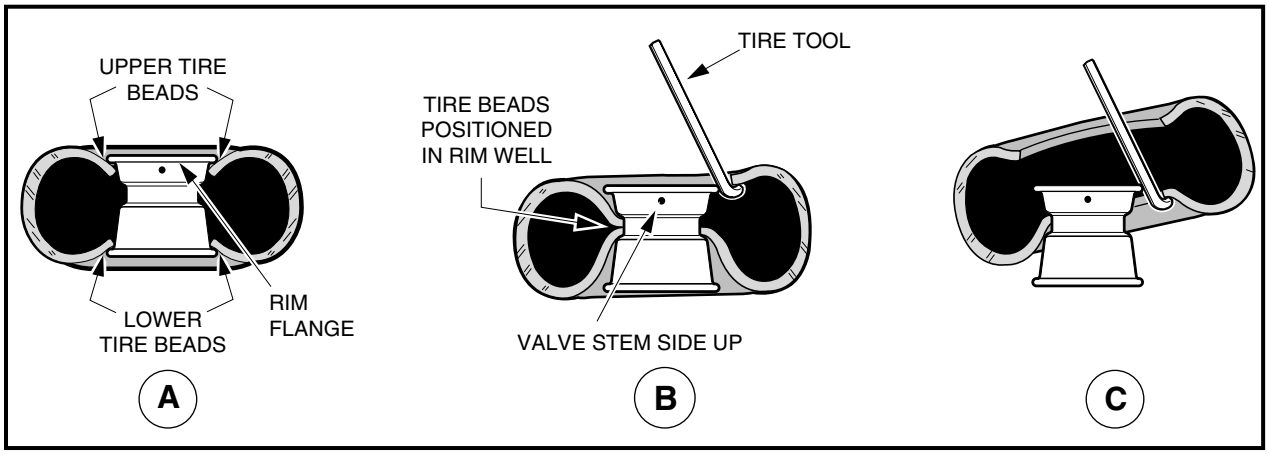

Figure 8-1 Tire Removal

TIRE REPAIR

1. Determine the location and cause of the air leak:
   1.1. Remove the wheel. **See Wheel Removal on page 8-1.** Inflate the tire to no more than 20 psi (1.38 Bars).
   1.2. Immerse the tire in water and then mark the point where bubbles are formed by escaping air.
   1.3. Determine the cause of the air leak. **See following NOTE.**

NOTE: *An air leak could be due to a punctured casing, faulty valve core, improperly seated valve stem, or improperly seated tire bead.*

Small holes in the casing can be plugged using a standard automotive tubeless tire repair kit available at auto supply stores.

2. When the cause of the air leak has been determined, remove tire from the rim and repair as required. **See Tire Removal on page 8-1.**

TIRE INSTALLATION

⚠ WARNING

- **While mounting or inflating tire, keep hands, fingers, etc. from exposed areas between the tire bead and rim.**

1. Clean both tire beads to remove dirt or other foreign matter.
2. Where the tire beads seat, clean the wheel rim with a wire brush. Wipe away any debris with a clean cloth. **See following NOTE.**

NOTE: *Because tubeless tires require a perfect seal in order to seat, keeping the tire and rim clean is very important.*

3. Apply a liberal amount of tire-mounting lubricant (soap and water solution) to both tire beads and rim flanges.
4. Install the tire on the rim from the valve stem side. If there is no tire machine available, use a rubber mallet and tire iron.
5. Remove the valve core, and position tire so that both beads are on the rim flange narrow bead seats.
6. Place tire and wheel assembly against wall in upright position and push it against wall while inflating tire to 30-35 psi (2.07-2.42 Bars). The three-point contact (wall, floor, and hand) will help ensure that beads snap into place and form a proper seal as tire is inflated **(Figure 8-2, Page 8-3)**. **See following WARNING.**

⚠ WARNING

- **Do not use a compressed air source with pressure over 100 psi (6.90 Bars). Due to low pressure requirements of a small tire, over-inflation could be reached almost instantly with a high pressure air supply. Over-inflation could cause tire to explode, possibly resulting in severe personal injury.**

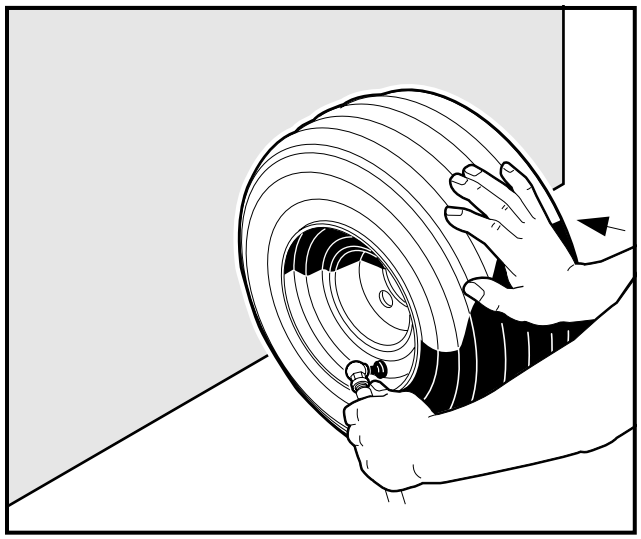

Figure 8-2 Inflate Tire

Tire Installation, Continued:

7. Quickly remove the air nozzle and install the valve core.
8. Adjust air pressure in tire to recommended pressure. **See Section 2 – Vehicle Specifications.**
9. Immerse the wheel and tire assembly in water to make sure there are no leaks.

SECTION 9 – REAR SUSPENSION

⚠ DANGER

- **See General Warning, Section 1, Page 1-1.**

⚠ WARNING

- **See General Warning, Section 1, Page 1-1.**

GENERAL INFORMATION

The rear suspension of the DS vehicle is completely independent. It consists of two leaf springs controlled by two shock absorbers mounted between the springs and the vehicle frame.

SHOCK ABSORBERS

See General Warning, Section 1, Page 1-1.

SHOCK ABSORBER REMOVAL AND INSPECTION

1. Check shock absorbers (7) for damage or fluid leakage at the point where the shaft enters the shock absorber body. Replace damaged or leaking shock absorbers **(Figure 9-1, Page 9-2)**.
2. To remove a shock absorber, remove the nut (5), cup washer (9) and rubber bushing (10) from the stem at the top of the shock absorber.
3. Remove the nut (5), cup washer (9), and rubber bushing (10) from lower mounting stem.
4. Compress the shock absorber to remove it.

SHOCK ABSORBER INSTALLATION

1. To install, reverse the removal procedure.
2. On the upper and lower shock absorber mounting stems, tighten the nuts until the rubber bushing expands to the size of the cup washer.

LEAF SPRINGS

See General Warning, Section 1, Page 1-1.

LEAF SPRING REMOVAL

1. Loosen, but do not remove, lug nuts on tire and wheel assembly on the side from which the spring is to be removed. Place chocks at the front wheels and lift the rear of the vehicle with a chain hoist or floor jack. Position jack stands under the frame crossmember between the spring mount and the side stringer, just forward of each rear wheel. Lower the vehicle to let the jack stands support the vehicle **(Figure 9-2, Page 9-3)**. **See following WARNING**.

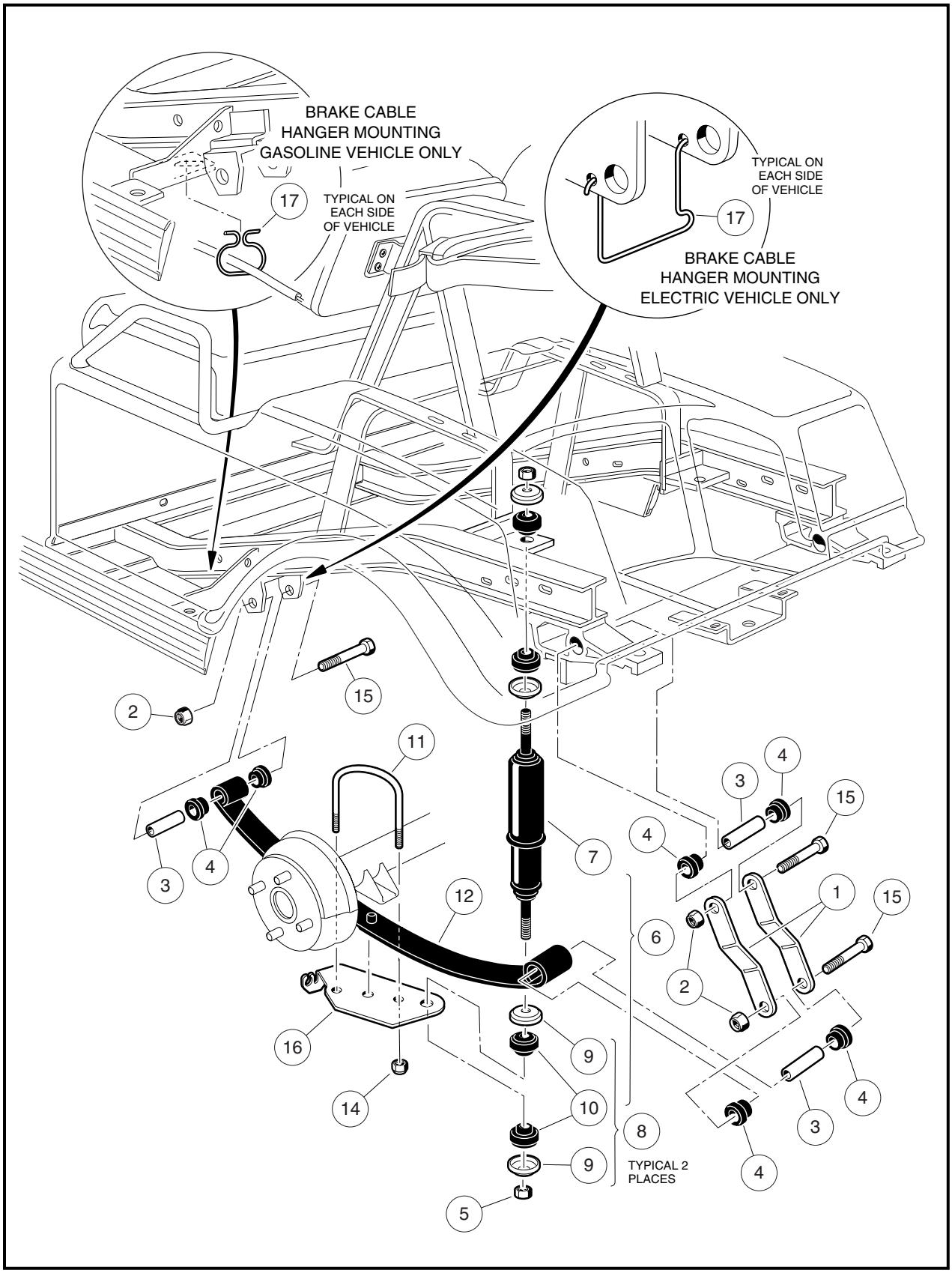

Figure 9-1 Rear Suspension Assembly and Mounting

Leaf Spring Removal, Continued:

⚠ WARNING

- **Lift only one end of the vehicle at a time. Use a suitable lifting device (chain hoist or hydraulic floor jack) with 1000 lb. (454 kg) minimum lifting capacity. Do not use lifting device to hold vehicle in raised position. Use approved jack stands of proper weight capacity to support the vehicle and chock the wheels that remain on the floor. When not performing a test or service procedure that requires movement of the wheels, lock the brakes.**

2. Place a floor jack under the transaxle differential casing to support (but not lift) the drivetrain. Raise it just enough to relieve tension on the shock absorbers without compressing them.
3. Remove the tire and wheel assembly on the side from which the spring is to be removed.
4. Remove the bow-tie pin (1) and the clevis pin (2) at the brake lever and brake cable connection and pull the clevis (3) away from the lever **(Figure 9-3, Page 9-3)**. Detach the brake cable from the shock mount bracket (16) **(Figure 9-1, Page 9-2).**
5. Remove the nut (5), cup washer (9), and rubber bushing (10) from the lower mounting stem of the shock absorber.
6. Remove the nuts (14) and the U-bolt (11) securing the spring to the transaxle. Remove the shock mount bracket (16) and the U-bolt.
7. Remove the nut (2) and bolt (15) attaching the rear spring to the shackle (1).
8. Remove the nut (2) and bolt (15) attaching the front of the spring to the vehicle frame and remove the spring.
9. Inspect the bushings (4) and spacers (3) in the spring eyes and replace them if they are worn or damaged.

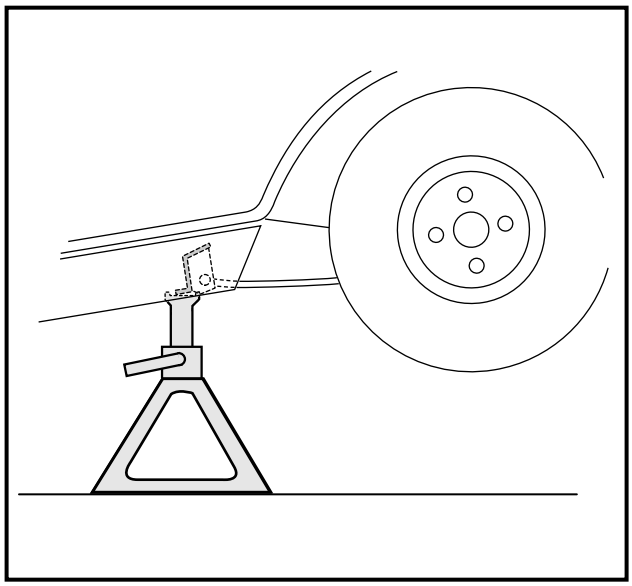

Figure 9-2 Support Vehicle on Jack Stands

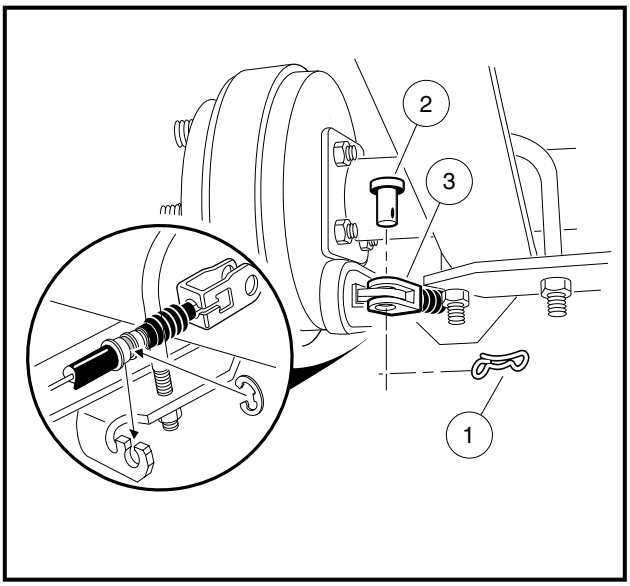

Figure 9-3 Disconnect Brake Cable

LEAF SPRING INSTALLATION

1. To install the springs, reverse the removal procedure. **See following CAUTION.**

CAUTION

- **When positioning the spring on the transaxle, be sure to insert the locating bolt on the spring in the locating hole in the transaxle saddle.**

2. Tighten the nuts on the U-bolts to 35 ft-lb (46.5 N·m).
3. Tighten nylon lock nuts (2) on spring mounting bolts (15) to 27 ft-lb (36.6 N·m) **(Figure 9-1, Page 9-2)**.

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