



Global Electric Motorcars, LLC

A DaimlerChrysler Company

INSTRUCTIONS

Product: GEM Electric Motorcars

Models: All

Subject: Half Shaft Removal, Service and Re-Installation

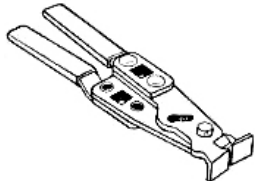
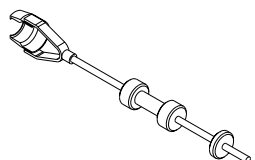
Estimated Completion Time: 1 Hour (For one side of vehicle, including removal, service and re-installation of Half Shaft.)

Parts: See Page # 9

REQUIRED TOOLS / SUPPLIES:

- | | |
|----------------------------|---|
| (1) Hydraulic jack | (1) Dead blow hammer |
| (2) Jackstands | (1) Steering wheel puller |
| (1) 3/8" Ratchet | (1) 3/4" wrench |
| or (1) 3/8" Air Wrench | (1) Snap Ring Remover |
| (1) 15/16" Socket | (6Ft.) Mechanics Wire |
| (1) 19mm Socket | (1) Channel Lock Pliers |
| (1) Needle Nose pliers | (2) Short Pry Bar |
| (1) large Flat Screwdriver | (1) Bench Vice |
| (1) Small Flat Screwdriver | (1oz.) Valvoline® Special Moly Ep Grease |
| (1) Torque wrench | (1 Container) Locktite™ 242 Thread retaining Compound |
| (1) Standard screwdriver | |

SPECIAL TOOLS:

TOOL	DESCRIPTION	VENDOR P/N	APPLICATION
	Lisle™, CV Boot Clamp Pliers For Ear-Type Clamps (For inner clamp)	LIS-30800	Installation of inboard CV half shaft large inner clamp
	CV Boot Clamp Pliers Lisle™ Earless Type Clamps (For outer clamp)	LIS-30500	Installation of outboard CV half shaft large outer clamp
	Axle/CV Shaft Puller (Available at Artic Cat ATV Dealerships)	0444-099	Removal of half Shafts

WARNING!

To prevent personal injury or property damage: Switch the 72-volt Master Disconnect to "OFF", be sure the ignition switch is always in the "OFF" position and that the "KEY" is removed. Then make sure that all moving parts have come to a complete stop before servicing, adjusting, or repairing. Set the parking brake and place wood blocks (4" X 4" or larger) to the rear surfaces of the rear tires.

The following instructions are for removing, repairing and reinstallation of the half shaft assembly on GEM vehicles.

To service the half shaft assembly, proceed as follows.

SERVICE PROCEDURE:

Half Shaft Removal:

Without being said, the first step of this procedure would be determining which half shaft boot, or boots need repair. In some cases the entire half shaft might need replacement. To determine this, see page # 4 for symptoms of wear.

1. Park the vehicle on a flat level surface.
2. Remove bench seat cushion (rear bench seat cushion for 4 passenger vehicles) to access the Master Disconnect switch. Switch master disconnect off. (See Fig. # 1)

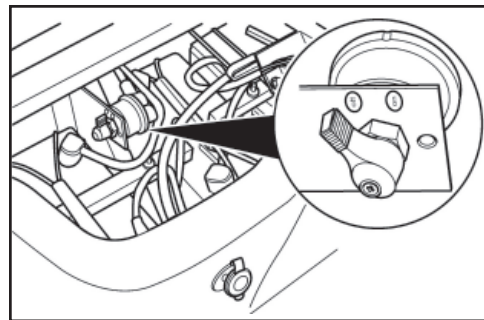


Fig. # 1 Switch master disconnect off

3. Pry off the front wheel covers with standard screwdriver.
4. Loosen the 10mm or 12mm wheel lug nuts with a 19mm socket. (Do not remove at this time).

5. Raise the vehicle at the front end with a hydraulic jack positioned under the A-frame. (See Fig. # 2).
6. Use Jack-stands positioned at points shown in (Fig # 2) to “**Safely Support**” the vehicle.

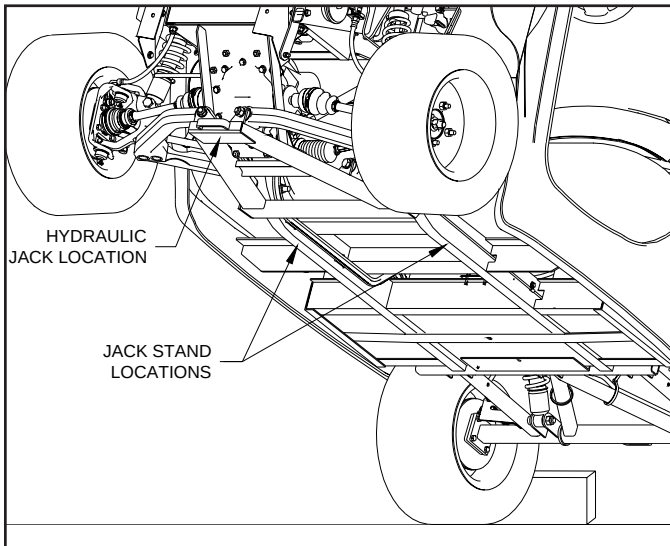


Fig. # 2 Jack points

7. Remove 10mm or 12mm wheel lug nuts from each front wheel and remove wheels. (See Fig. # 3).

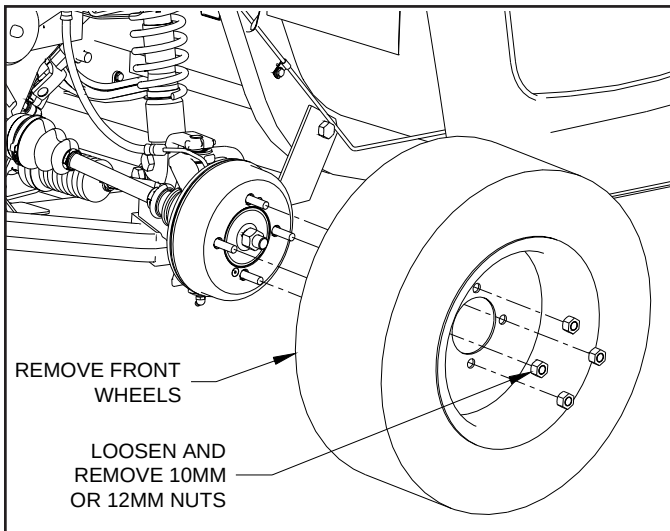


Fig. # 3 Remove wheels

8. Remove the M16 Hex nut (Do not re-use nut) and M16 flat washer. Use a 15/16" socket to loosen nut. (See Fig. # 4)

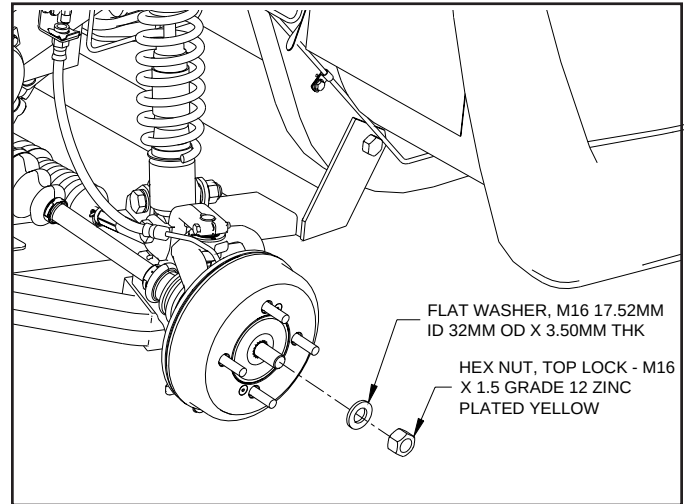


Fig. # 4 Remove half shaft nut

9. Use a 3/4" wrench and 3/4" socket and ratchet to remove the M12 X 1.75 bolt from the upper shock mount.

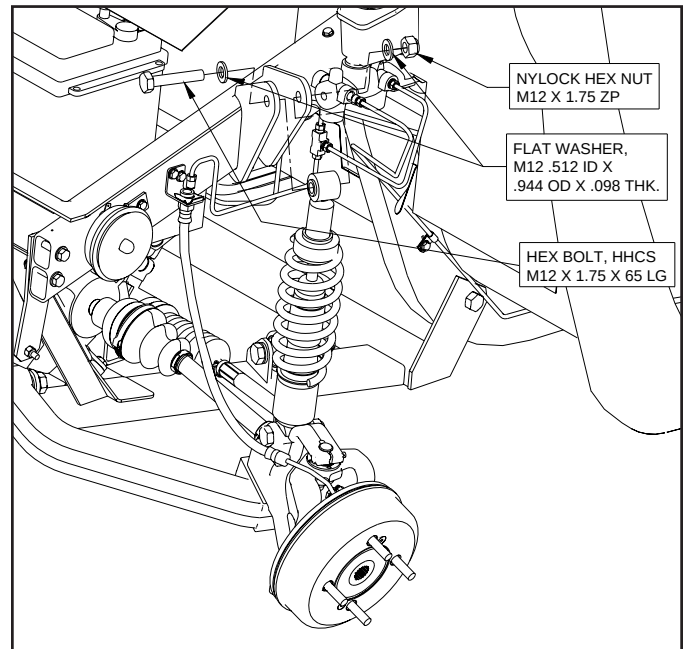


Fig. # 5 Remove bolt from upper shock mount

NOTE:

Support the suspension assembly with mechanics wire to avoid unnecessary strain on the brake line.

10. The inboard end of the half shaft is secured on the differential with a spring clip. Using a pair of short pry bars, (or if available, use a Axle / CV shaft puller) gently force the inner end of the half shaft off the differential. Take care to not damage the splined shaft during this procedure. (See Fig. # 6)

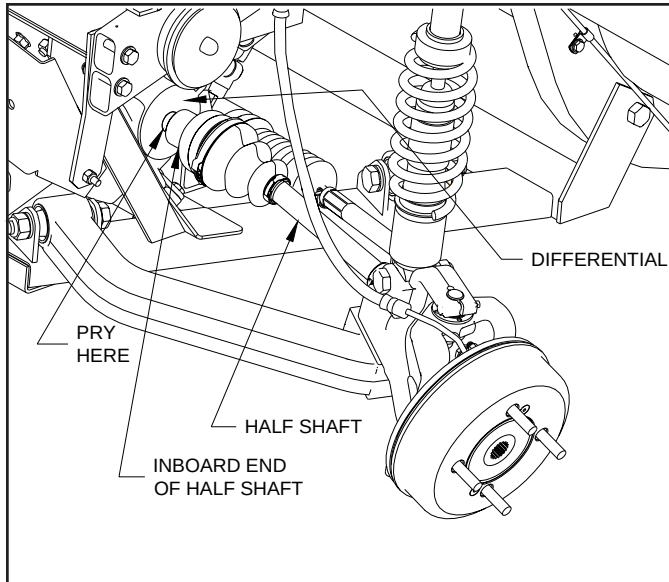


Fig. # 6 Pry half shaft from differential

11. After the inboard end of the half shaft is free, the outboard end can be removed from the wheel end assembly. (See Fig. # 7)

NOTE

You may need to turn the steering wheel (Left for driver side and right for passenger side) to remove outboard end from wheel assembly.

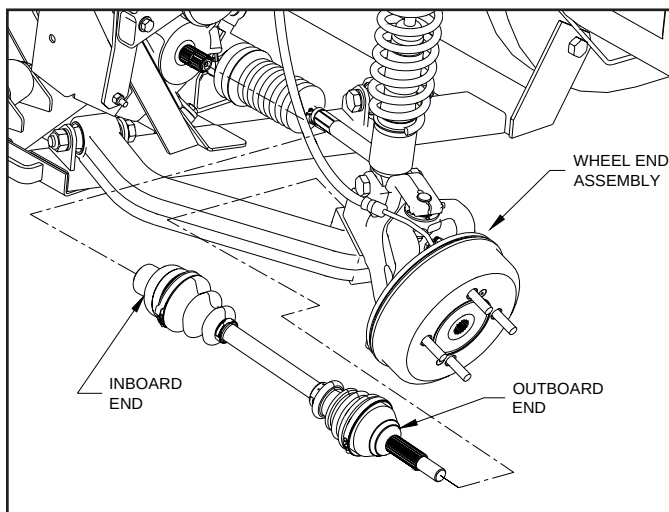


Fig. # 7 Remove half shaft

12. Make sure the spring clip is still on the splined shaft of the differential and is not damaged. (If damaged, replace) (See Fig. # 8)

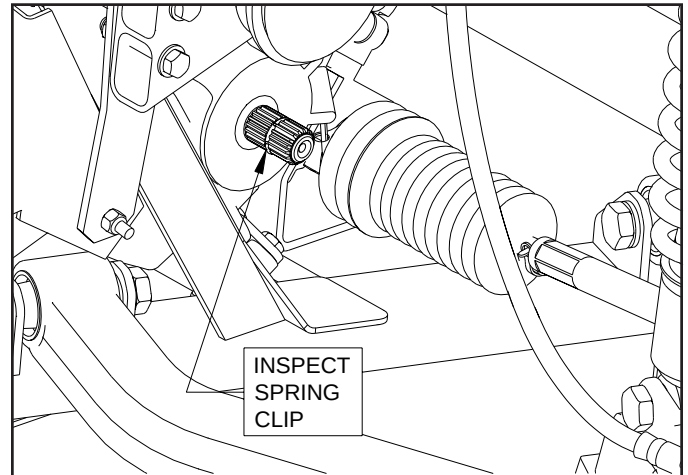


Fig. # 8 Inspect spring clip

13. At this point, the half shaft now can be either serviced or replaced. If replacing, proceed to half shaft re-installation on page # 8.

SERVICE PROCEDURE:

Half Shaft Service:

Half Shaft CV Boots must be replaced if they exhibit any of the following symptoms:

- Grease accumulating around the outside of the CV boot. In most cases the outboard CV boot fails. (This is caused either by a small hole or tear in the CV boot. See Fig. # 9)

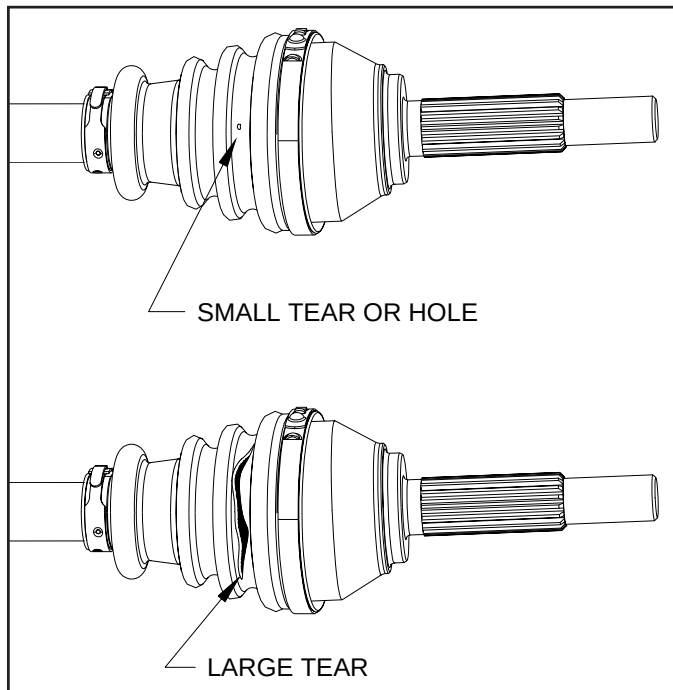


Fig. # 9 Determine if replacement is needed

Half Shafts must be replaced if they exhibit any of the following symptoms:

- A clicking noise in turns, which indicates that the outboard joint is damaged.
- A thump or clunk when accelerating from coasting, which points to a faulty inboard joint.
- Vibration or shuddering during acceleration, which may be caused by a damaged inboard or outboard joint, a sticking inboard joint, or an excessive operating angle.

Replacing Outboard CV Boot:

1. Use a small flat screwdriver to remove the small half shaft boot clamp. (See Fig. # 10)
2. Use a small flat screwdriver to remove the large outer half shaft boot clamp. (See Fig. # 10)

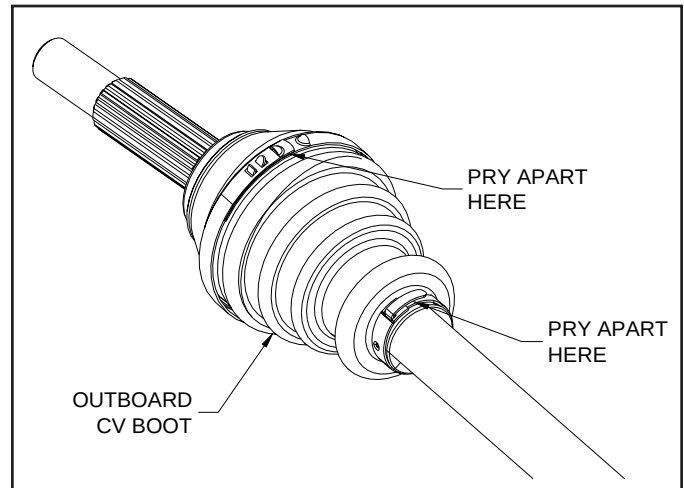


Fig. # 10 Pry apart CV boot clamps

3. Push back CV Boot to expose the snap ring. (See Fig. # 11)

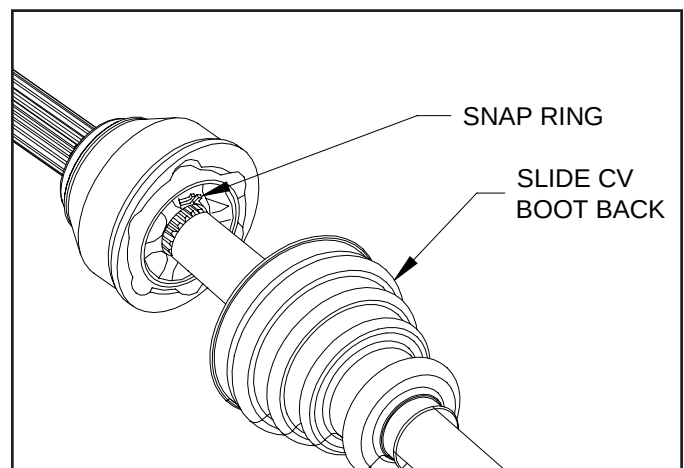


Fig. # 11 Push CV Boot back to expose snap ring

4. Secure the half shaft in a vice.

5. Use a snap ring pliers, to spread apart the snap ring enough to release the spindle end of the half shaft. (See Fig. # 12 & 13)

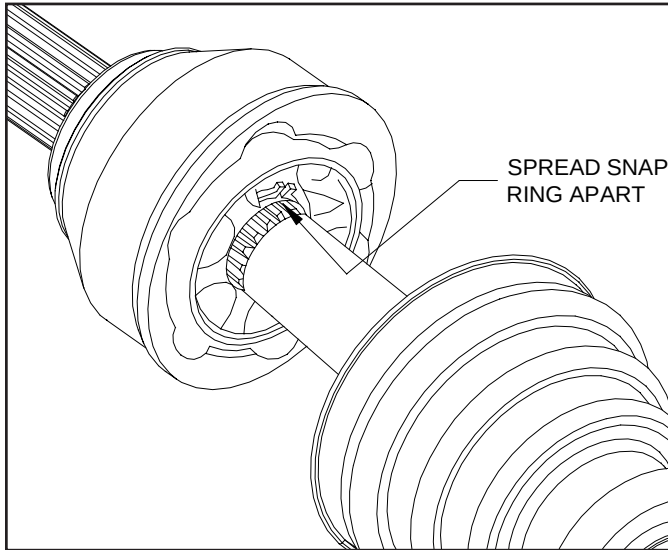


Fig. # 12 Release spindle end of half shaft by spreading snap ring

6. Slide the spindle end of half shaft off the axle. Slide the damaged boot off the axle and discard old boot and clamps (See Fig. # 13).

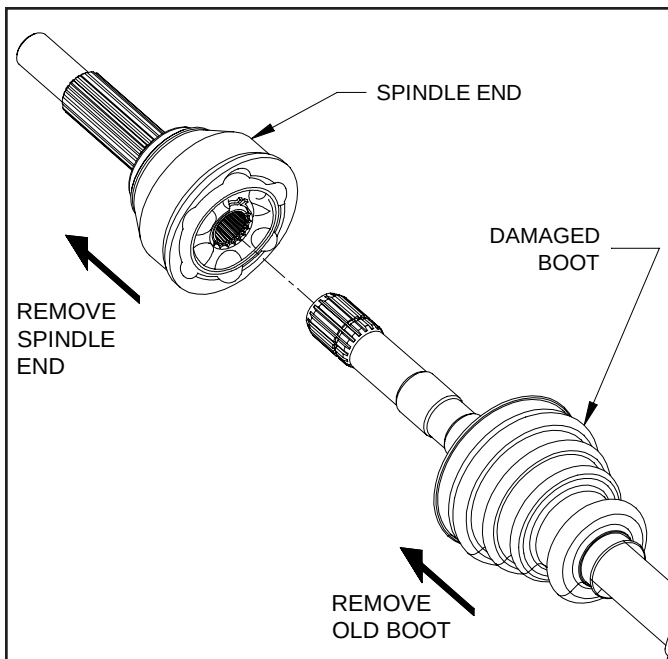


Fig. # 13 Remove spindle end and old boot

7. Clean grease out of the joints and examine the working surfaces carefully. Excessive wear will show up as scoring and pitting. Also look for cracks.

8. Slide new outer half shaft boot onto axle.

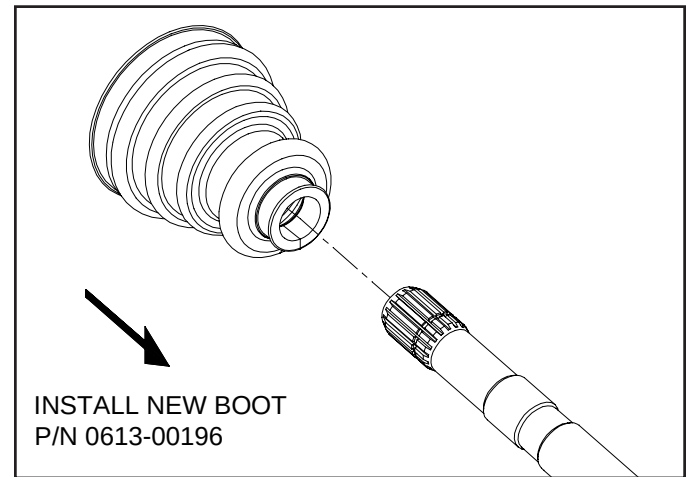


Fig. # 14 Install new boot

9. Repack joints with supplied grease.

IMPORTANT

GEM CV joints require Optimol Olistamoly 2 LN 584 LO grease or equivalent which meets NLGI grade 1 & 2 standards. Never use ordinary chassis or wheel bearing grease.

10. Push the spindle end of half shaft back onto the axle splines and tap the joint until the snap ring is fully seated.
11. Slide large end of boot over spindle end of half shaft.
12. Install new large outer half shaft boot clamp around large end of boot. (See Fig. # 15)

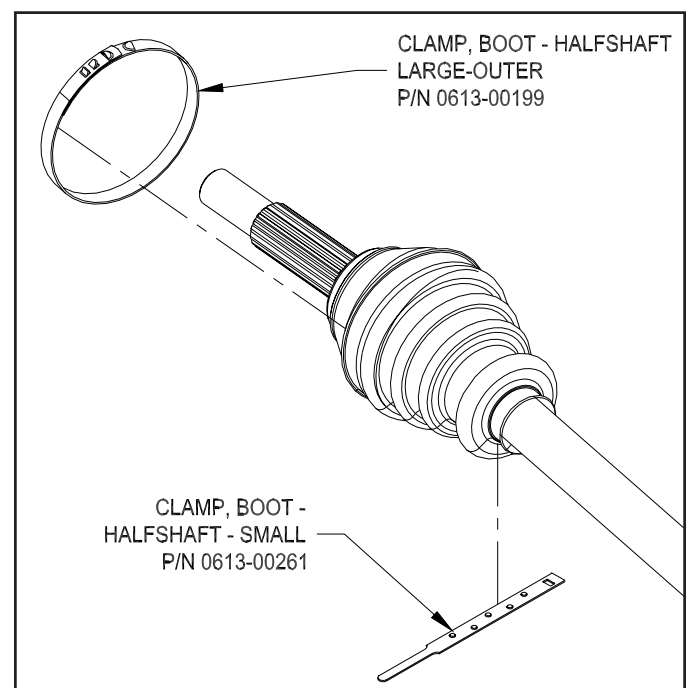


Fig. # 15 Install new clamps

13. Use the Lisle™ CV Boot Clamp Pliers (P/N LIS-30500) to secure clamp in place as shown in (Fig. # 16).

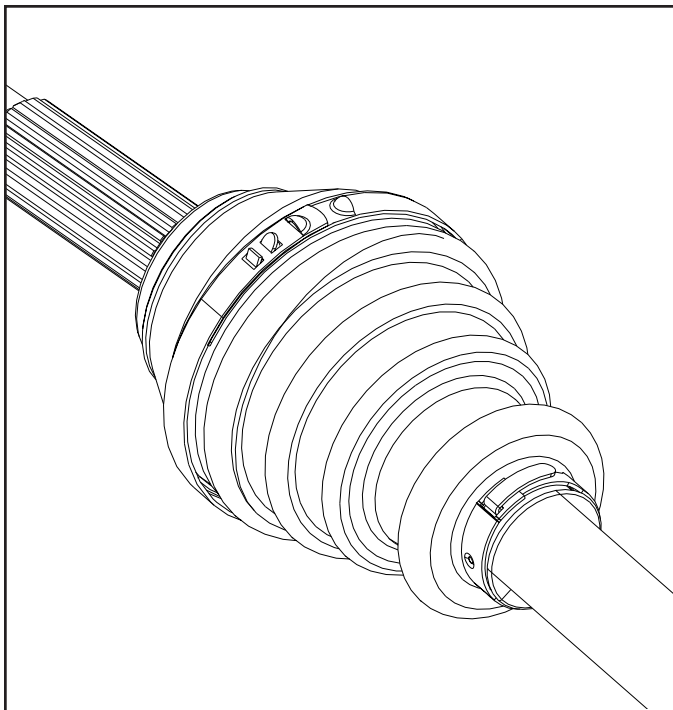


Fig. # 16 Clamp as shown

14. Place new small half shaft boot clamp onto boot with raised punch marks face towards the rubber of the boot. Form the clamp around the boot in a circular shape. (See Fig. # 15)
15. Loop the narrow end of the clamp through the square hole on the other end of the clamp.
16. Use a channel lock pliers to tighten the clamp.

Replacing Inboard CV Boot:

1. Use a small flat screwdriver to remove the small half shaft boot clamp. (See Fig. # 17)
2. Use a small flat screwdriver to remove the large outer half shaft boot clamp. (See Fig. # 17)

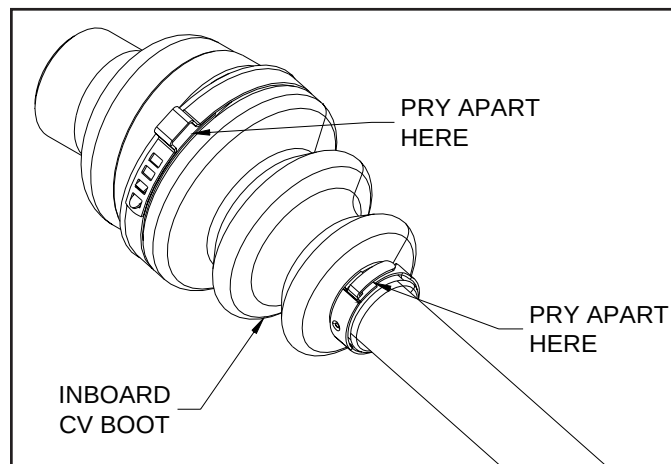


Fig. # 17 Pry apart CV boot clamps

3. Push back CV Boot to expose the snap ring. (See Fig. # 18)

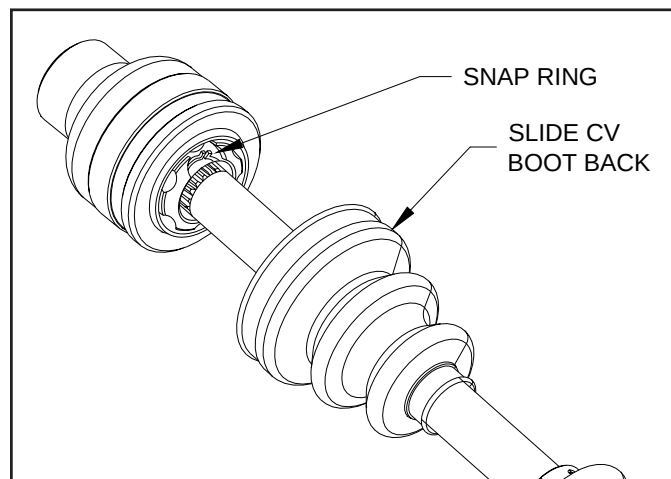


Fig. # 18 Push CV Boot back to expose snap ring

4. Secure the half shaft in a vice.

5. Use a snap ring pliers, to spread apart the snap ring enough to release the inboard joint end of the half shaft. (See Fig. # 19 & 20).

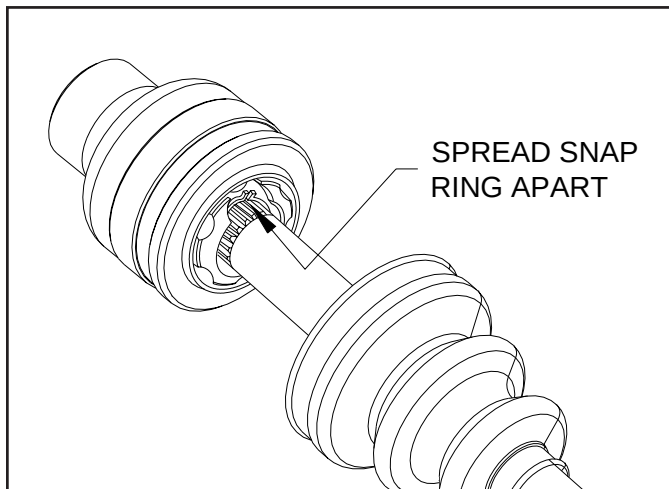


Fig. # 19 Release inboard joint end by spreading snap ring

6. Slide the inboard joint end of the half shaft off the axle. Slide the damaged boot off the axle and discard old boot and clamps (See Fig. # 20).

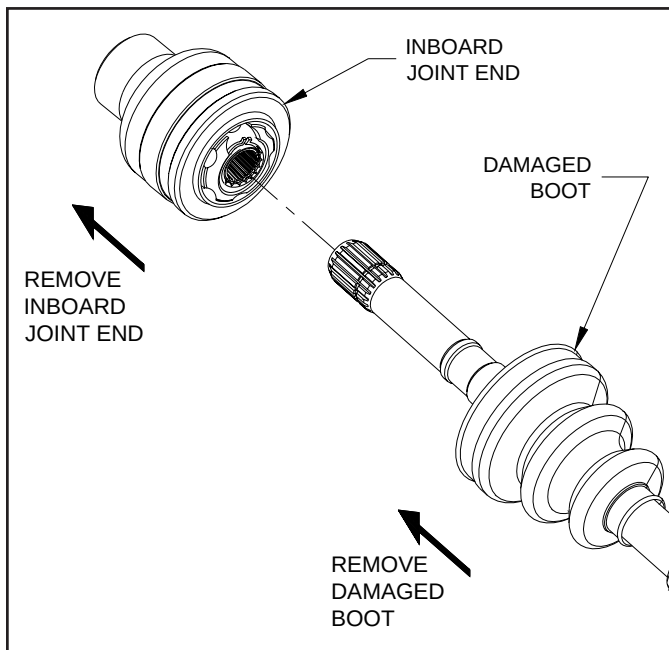


Fig. # 20 Remove inboard end and damaged boot

7. Clean grease out of the joints and examine the working surfaces carefully. Excessive wear will show up as scoring and pitting. Also look for cracks.

8. Slide new outer half shaft boot onto axle. (See Fig. # 21)

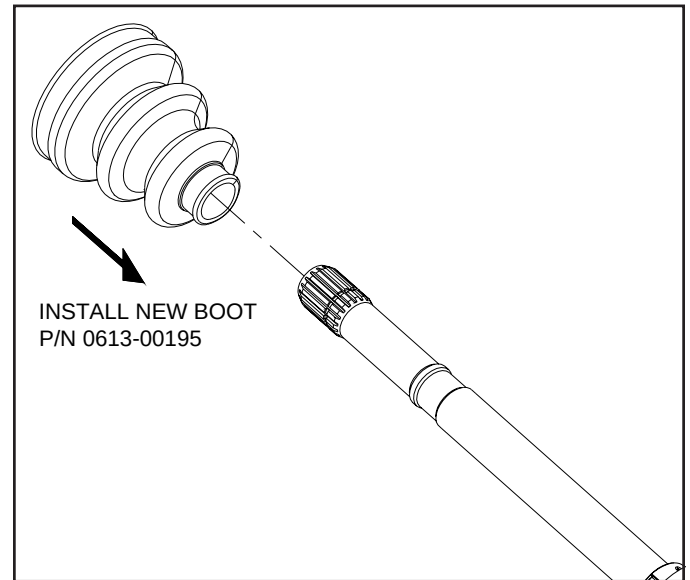


Fig. # 21 Install new boot

9. Repack joints with supplied grease.

IMPORTANT

GEM CV joints require Optimol Olistamoly 2 LN 584 LO grease or equivalent which meets NLGI grade 1 & 2 standards. Never use ordinary chassis or wheel bearing grease.

10. Push the inboard end of half shaft back onto the axle splines and tap the joint until the snap ring is fully seated.
11. Slide large end of boot over inboard end of half shaft.
12. Install new large inner half shaft boot clamp around large end of boot. (See Fig. # 22)

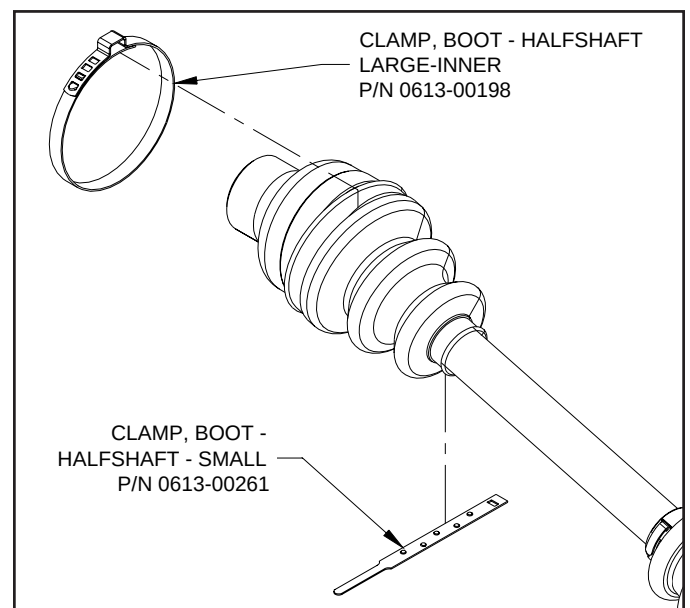


Fig. # 22 Install new clamps

13. Use the Lisle™ CV Boot Clamp Pliers (P/N LIS-30800) to secure clamp in place as shown in (Fig. # 23).

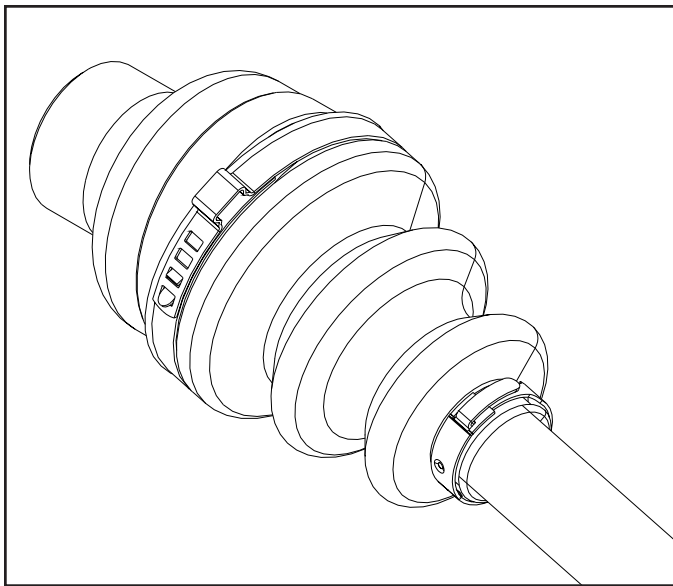


Fig. # 23 Clamp as shown

14. Place new small half shaft boot clamp onto boot with raised punch marks face towards the rubber of the boot. Form the clamp around the boot in a circular shape. (See Fig. # 22)
15. Loop the narrow end of the clamp through the square hole on the other end of the clamp.
16. Use a channel lock pliers to tighten the clamp.

Half Shaft Re-Installation:

1. Apply Valvoline Special Moly Ep grease or equivalent to the splines at the inner and outer end of the half shaft prior to installation.

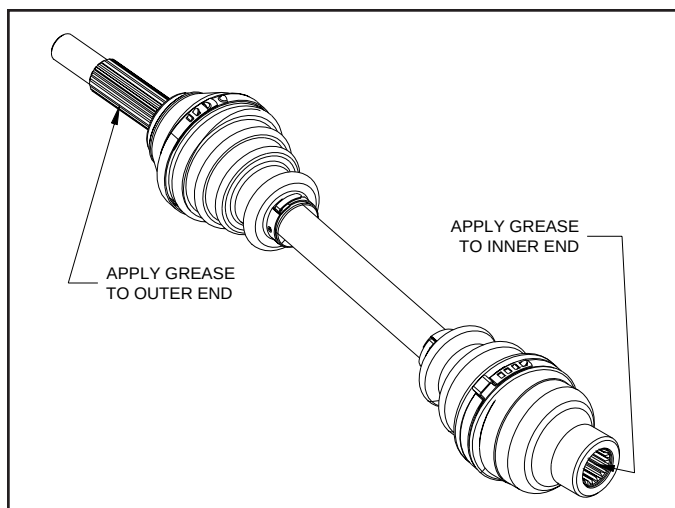


Fig. # 24 Apply grease to inner and outer end of halfshaft

2. Insert the outboard end of the half shaft into the wheel assembly. (See Fig. # 25)

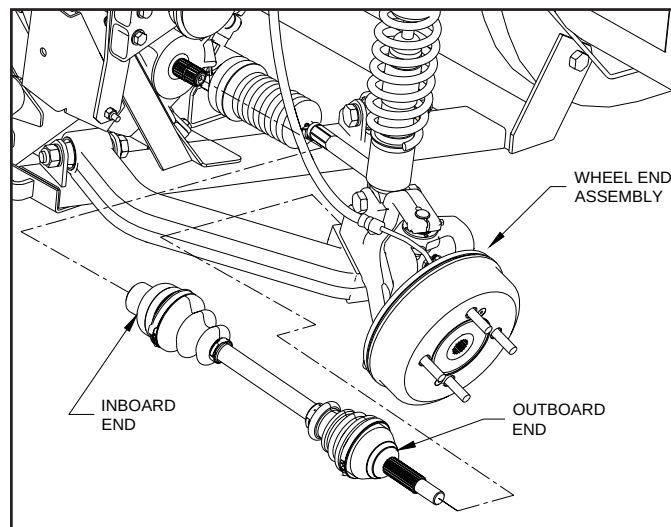


Fig. # 25 Halfshaft installation

3. Make sure the spring clip is still on splined shaft of differential and is not damaged. (See Fig. # 26)

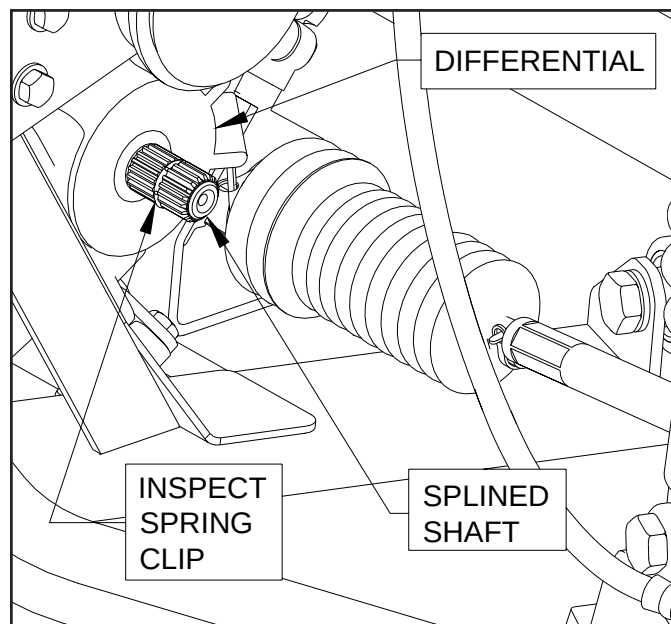
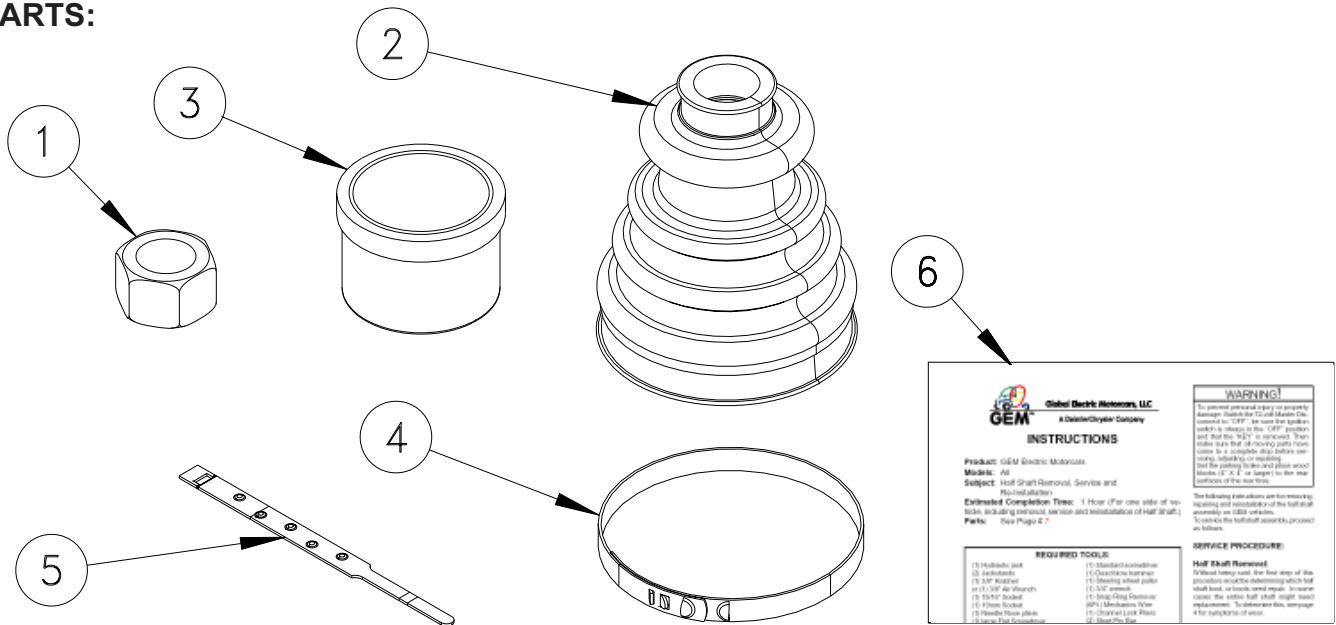


Fig. # 26 Inspect spring clip

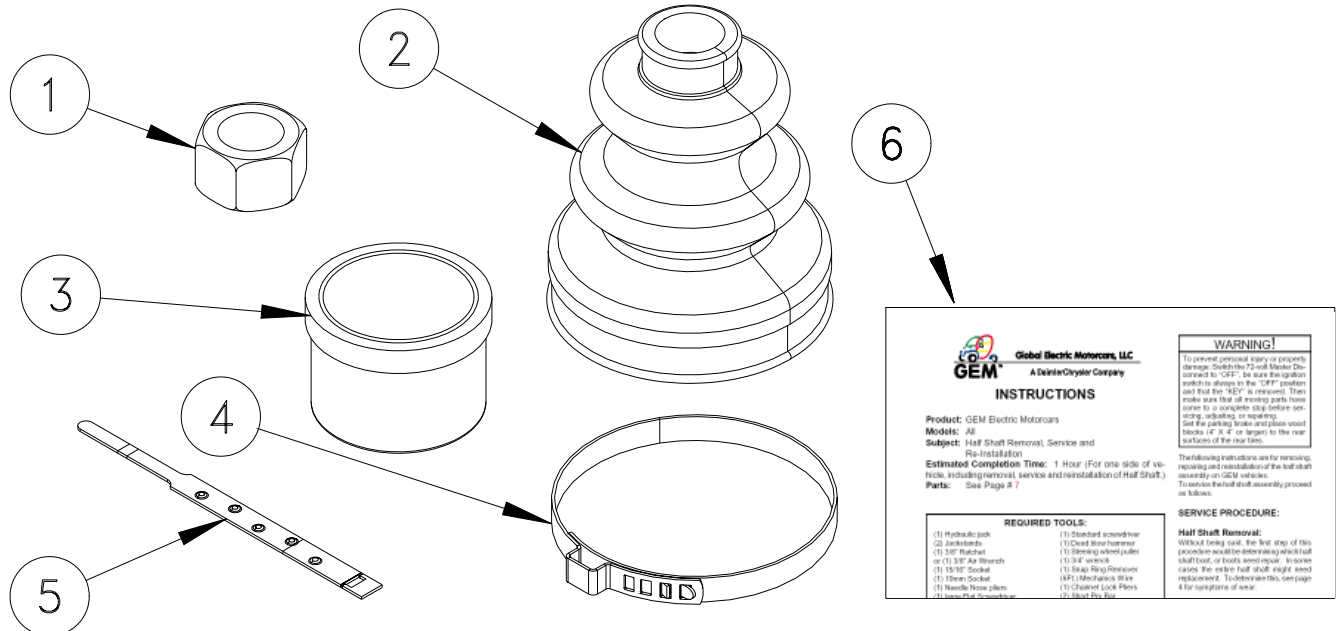
4. Install the inner end of the half shaft over the splined shaft on the differential. Press inward, toward differential until spring clip snaps into place.
5. Install upper front shock mounting bolt just snug.
6. Install washer and new nut (P/N 0521-00035 Nut, Hex-Top Lock-M16 X 1.5 Grade 12) on half shaft outboard end, tighten snug.
7. Install front wheel and front wheel nuts. Tighten wheel lug nuts snug.
8. Lower front of vehicle to ground.

PARTS:



0113-00607 - ASSY, BOOT KIT - HALF SHAFT - OUTER

ITEM	PART NO.	DESCRIPTION	QTY.
1	0521-00035	NUT, HEX - TOP LOCK - M16 X 1.5 GRADE 12	1
2	0613-00196	BOOT, HALF SHAFT - OUTER	1
3	0613-00197	GREASE, OPTIMOL OLISTAMOLY 2 LN 584 LO - 1 OUNCE	1
4	0613-00199	CLAMP, BOOT - HALF SHAFT - LARGE OUTER	1
5	0613-00261	CLAMP, BOOT - HALF SHAFT - SMALL	1
6	1010-00026	INSTRUCTION, HALF SHAFT BOOT REPLACEMENT	1



0113-00630 - ASSY, BOOT KIT - HALF SHAFT - INNER

ITEM	PART NO.	DESCRIPTION	QTY.
1	0521-00035	NUT, HEX - TOP LOCK - M16 X 1.5 GRADE 12	1
2	0613-00195	BOOT, HALF SHAFT - INNER	1
3	0613-00197	GREASE, OPTIMOL OLISTAMOLY 2 LN 584 LO - 1 OUNCE	1
4	0613-00198	CLAMP, BOOT - HALF SHAFT - LARGE INNER	1
5	0613-00261	CLAMP, BOOT - HALF SHAFT - SMALL	1
6	1010-00026	INSTRUCTION, HALF SHAFT BOOT REPLACEMENT	1

9. Tighten spring/shock absorber mounting bolts to 40 foot pounds.
10. Tighten wheel nuts to 30 foot pounds,
11. Add Loctite 242 to half shaft nut and torque half shaft nut to 85 foot pounds.
12. Install wheel cover.

ADDITIONAL INFORMATION

If you have any questions or need assistance in completing these instruction, please contact GEM Technical Support at 866.764.0616

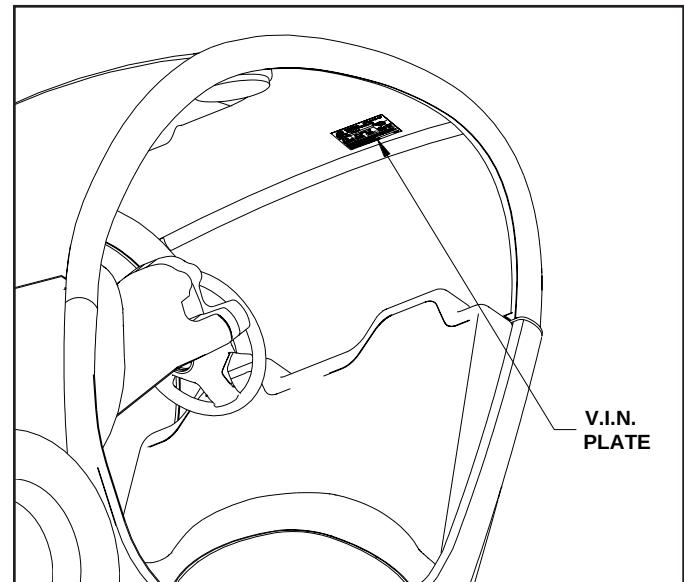


Fig. 27 V.I.N. plate location

		MANUFACTURED BY: U.S. Patent No. Des. 419,107 Global Electric Motorcars, LLC.	
		Web: www.gemcar.com	
GVWR: 953KG (2,100 LBS)		DATE OF MFG: 1/5/01	
GAWR		TIRE - DIMENSION - RIM	
Front 405KG (1,023 LBS)	165/70R-12	T12x4J	COLD INFLATION PRESSURE KPA/PSI SGL/DUAL 207KPA (30PSI) SINGLE 207KPA (30PSI) SINGLE
Rear 496KG (1,077 LBS)	165/70R-12	T12x4J	
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS (FMVSS) IN EFFECT ON THE DATE OF MANUFACTURE SHOWN A V.I.N. XXXXXXXXXXXXXXXX XXXX			
TYPE OF VEHICLE:		U.S. VIN	

LAST SIX NUMBERS
OF V.I.N.

Fig. # 28 V.I.N. use last six numbers



Global Electric Motorcars, LLC

A DaimlerChrysler Company

Toll Free: 866.764.0616

Fax: 701.446.0105

e-mail: service@gemcar.com

Web Site: www.gemcar.com