



Number: FS-2016-06

Date: December 20, 2016

Model: 29', 35' & 40' Low Floor Buses

Model Years: 1997 - 2016

Approved:

Robert L. Birdwell, Executive Director
Quality Control & Field Service

Subject: Inspection Of Steering Gear Mounting Plate

Gillig has received reports of partial cracking in the steering gear mounting plate in some Low Floor buses. This plate is a structural member that supports the steering gear and is located under the driver's area, inboard of the battery box.

Gillig is now requesting that, as part of the standard required inspection of the steering system components outlined in the Service Manual, customers specifically inspect the steering gear mounting plate as outlined in this bulletin, beginning with the vehicle's next preventative maintenance inspection.

Gillig wishes to assure you that there have been no reported failures of the plate in service, nor any injuries, deaths or loss of vehicle control related to this issue. Rather, the partial cracks form and grow very slowly and are easy to detect with visual inspections.

You should inspect the steering gear mounting plates in all Low Floor buses from model year 1997 through June, 2015 per the instructions in this bulletin. Inspections should commence at the next Preventative Maintenance Cycle and continue at every 12,000 mile PM inspection thereafter.

- ★ ***Steering Gear Mounting Plates found to have cracks less than 6 inches in length should be changed out at the earliest opportunity.***
- ★ ***Any bus found to have a Steering Gear Mounting Plate with a crack 6 inches long or longer must be immediately removed from service and the Steering Gear Mounting Plate replaced before reentering service.***
- ★ ***In either event, Gillig will reimburse you for the cost of any replacement plate and the labor required to perform the repair.***

RLB:rlb

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You should replace any cracked Steering Gear Mounting Plate in accordance with the instructions in this Field Service Bulletin.

Upon removal, all cracked plates should be marked with the vehicle identification number, vehicle mileage, and the date that the Steering Gear Mounting Plate was removed from the vehicle. You should then preserve and store the plate until it can be reviewed by Gillig Field Service personnel.

Any vehicle lessor receiving this notice should forward a copy of this bulletin to the lessee within 10 days.

If you have already performed this repair, you may be eligible to receive reimbursement for the cost of performing the repair. For more information, contact Gillig Field Service at 800-735-1500.

If you need Steering Gear Mounting Plates, please order from ["WarrantyParts@gillig.com"](mailto:WarrantyParts@gillig.com). (VIN & Miles needed). The Steering Gear Mounting Plates and all hardware will be provided at no cost to you.

After the repair is completed, you can file for labor reimbursement through the normal warranty process. If you need assistance with filing a claim, you can contact Gillig Warranty at ["WarrantyClaims@gillig.com"](mailto:WarrantyClaims@gillig.com). Gillig estimates the SRT for the repair is 6 hours.

FIELD SERVICE BULLETIN

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GILLIG Low Floor Steering Gear Plate Inspection Procedures

Notes

Access to the underside of the bus is required for part of this procedure. Therefore, the use of a bus lift or service pit is required.

The bus shall be turned off, parking brakes applied, and the Battery Disconnect switched to the OFF position.

Localized cleaning of the Steering Gear Plate may be necessary for proper inspection. Use a suitable cleaner/degreaser to clean plate in the inspection areas, if required.

Tools Required:

1. Flashlight
2. Inspection Mirror

Inspection Interval

Inspection of the Steering Gear Mounting Plate is required at every 12,000 mile maintenance period.

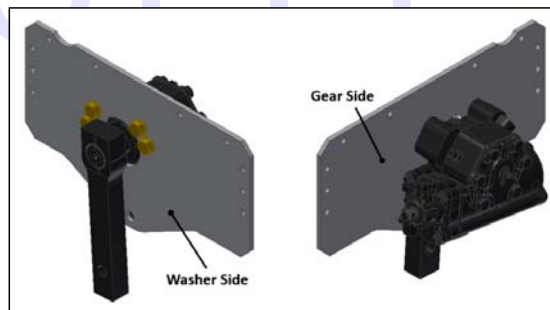
Location and Terminology of Steering Gear and Steering Gear Mounting Plate



Steering Gear is located
behind Battery Box

The steering gear is mounted behind the battery box, which is accessed through the forward-most streetside skirt panel on the bus.

The Steering Gear Mounting Plate has two sides: gear side and washer side. The following detail defines the gear and washer sides.



Terminology of Steering Gear Mounting Plate

Access to the Steering Gear Plate

Each side of the Steering Gear Mounting Plate requires access from different entry points:

- ★ **Gear side access is through the battery box.**
- ★ **Washer side access is from the underside of the bus.**

Access to the gear side of the steering gear mounting plate is through the battery box. For inspection purposes, the top shelf of the battery box is required to be unlocked and slid out. Located at the back of the battery box is a cutout which gives access to the steering gear and the gear side of the steering gear mounting plate.



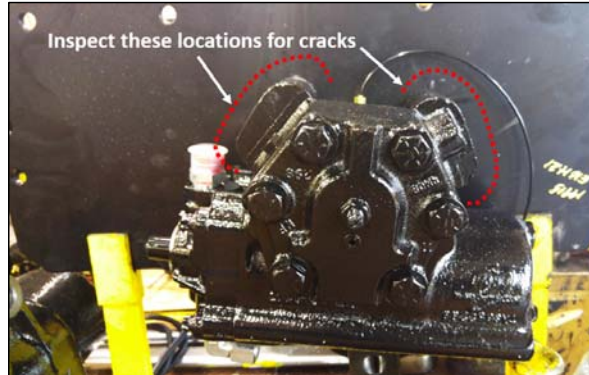
Access to the washer side of the steering gear mounting plate is from the underside of the bus. The use of a bus lift or pit is required for inspecting this side of the steering gear mounting plate.



Steering Gear Access

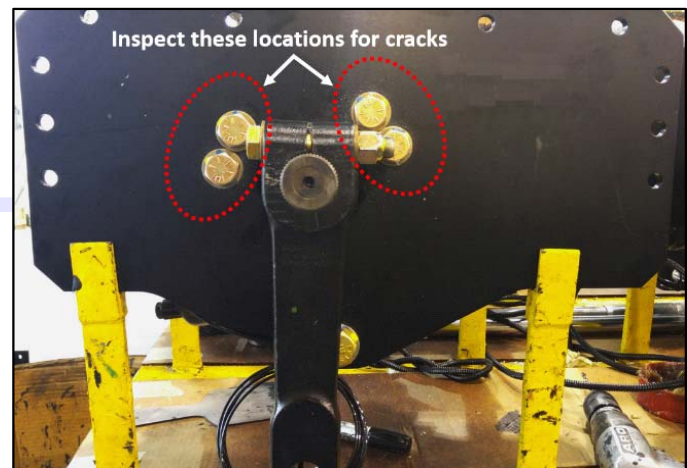
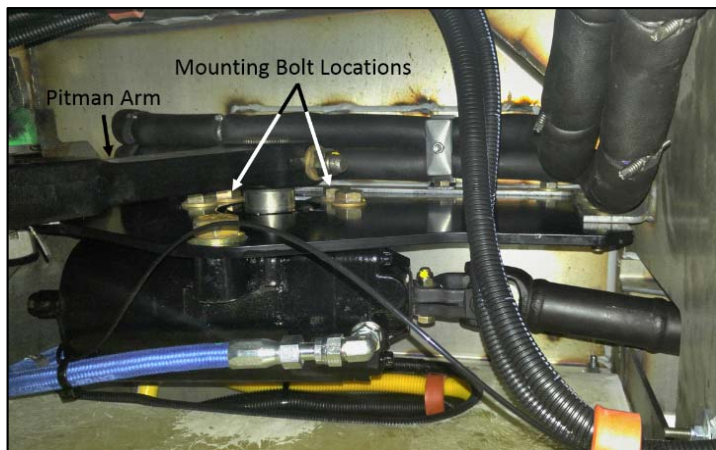
Gear Side Steering Gear Plate Inspection

After pulling the top tray of the battery box out, inspect the steering gear plate where the steering gear bolts to the plate. If required, utilize a flashlight to aid in the inspection of this area. Cracks, if any, should be located at the areas shown in the picture below.



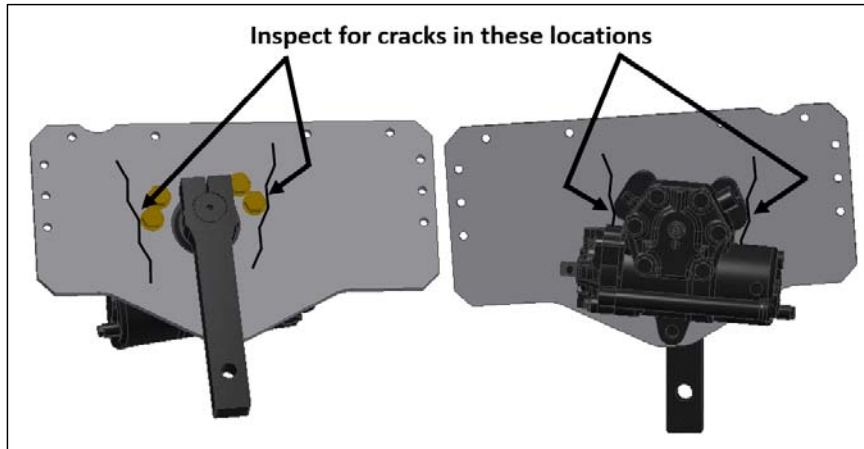
Washer Side Steering Gear Plate Inspection

After gaining access to the underside of the steering gear area of the bus, locate the Pitman Arm on the backside of the Steering Gear. Inspect the two sets of mounting bolts adjacent to the Pitman Arm which mount the Steering Gear to the Steering Gear Plate. An inspection mirror and flashlight may aid in this inspection. Look for cracks in the immediate area of the bolt locations.



Typical Crack Location and Orientation

Cracks, if present, should initiate near the steering gear mounting holes in the plate and propagate towards the top and bottom of the plate.



Crack Identification Detail

Action

- ★ ***Steering gear plates found with cracks less than 6" in length should be changed out at the earliest opportunity.***
- ★ ***Any bus with a plate found to have with a crack 6" or longer must be immediately removed from service and the plate replaced before reentering service.***
- ★ ***Any plate removed must be marked with the vehicle identification number, the vehicle mileage and the date that the plate was removed from vehicle. The plate should then be stored until it can be reviewed by Gillig Field Service personnel.***

GILLIG Low Floor Bus

Steering Gear Mounting Plate Replacement Procedure

Overview Instructions

- 1. This procedure covers the replacement of the existing 3/8" thick steering gear mounting plate with a 3/4" thick mounting plate on all GILLIG Low Floor Buses.**
- 2. A vehicle lift or pit is required to complete this procedure.**
- 3. Refer to your GILLIG Service Manual for any procedures not covered in this document.**
- 4. Always reinstall the same steering gear that was removed, unless the gear needs to be replaced.**
- 5. Do not make any adjustments to the axle stop bolts during this procedure. If any adjustments are made, the steering gear poppets may require possible re-adjustment per TRW Service Bulletin # TAS-101.**

Special Tools & Materials Required

- 1. Torque wrench(s)**
 - A. Min Torque Required is 90 ft-lbs.**
 - B. Max Torque Required is 445 ft-lbs. (with Anti Seize)**
- 2. Lifting fixture for the Steering Gear and Plate**
- 3. Pullers and wedge tools to remove pitman arm and draglink**
- 4. Hose caps or plugs for sealing disconnected hydraulic fittings
#8, #10, and #12 Fittings**
- 5. Bostik Never-Seez Anti-Seize, Regular Grade (K=.13)**
- 6. 3/4-in drive breaker bar**
- 7. 4-6 ft ladder if using a lift**
- 8. Pry bar**

Parts Required

Application	Part Number	Description	QTY	Replaces P/N
29ft Stainless Steel Low Floor w/ Drum Brakes	05-74397-000	Plate, Steering Gear Mounting, 29 SSLF	1	05-63059-000 or 05-50256-000
-OR-				
29ft Stainless Steel Low Floor w/ Disc Brakes	05-74344-000	Plate, Steering Gear Mounting, 76000 LF	1	05-63058-000
-OR-				
29ft Carbon Steel Low Floor w/ Raised Gear	05-74685-000	Plate, Steering Gear Mounting, Mild Steel LF, Raised Gear	1	05-50265-000
-OR-				
35 and 40ft Stainless Steel Low Floor	05-74344-000	Plate, Steering Gear Mounting, 76000 LF	1	05-63058-000 or 05-45365-000
-OR-				
29, 35, and 40ft Carbon Steel Low Floor	05-74636-000	Plate, Steering Gear Mounting, Mild Steel LF	1	05-36841-000
-AND-				
Hardware Kit (required for all plate replacements)	54-74537-000	Kit, Hardware, 3/4THK Steering Gear Plate	1	N/A

Removal of Old Steering Gear Plate

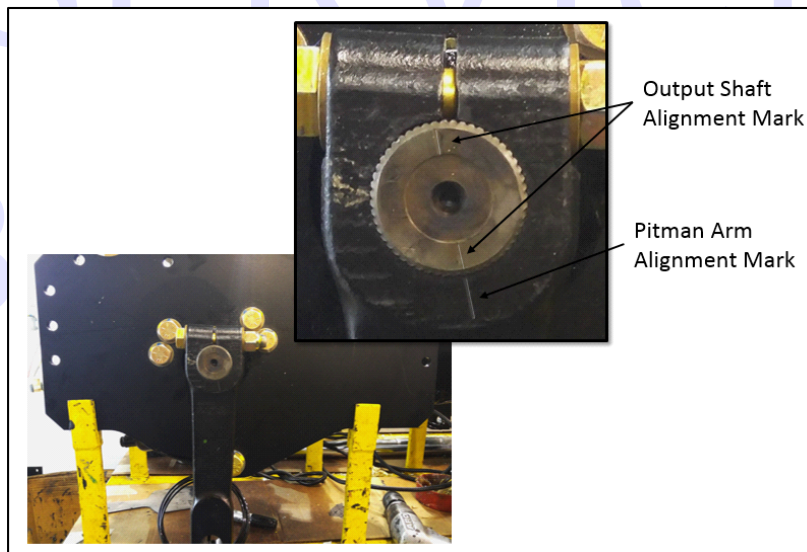
- 1. Use the appropriate personal protective equipment for under-bus maintenance and use of cleaner/de-greaser agents.**
- 2. Safely place bus on vehicle lift or pit. Place front wheels in straight ahead position. If on a lift, do not yet lift the bus until Step 3, Battery Removal, is completed.**
- 3. Ensure parking brakes are applied, engine off, and battery disconnect switch is in the OFF position.**
- 4. Disconnect and remove the battery located on the upper battery tray. Start by removing the negative/chassis ground lead before removing the positive lead. Refer to your GILLIG Service Manual for additional details for battery removal. Note: It is not necessary to remove the battery on the lower tray. Removal of the upper battery will allow access to the gear side of the plate. Always lift the battery with handles or proper lifting devices.**

5. *If using a lift, raise the bus to a sufficient height to reach the steering gear plate and all plate mounting bolts.*
6. *Thoroughly clean off all outside dirt and grease from the steering gear, especially around the hose connections, with a suitable cleaner/de-greaser.*
7. *Remove the draglink from the pitman arm.*
8. *Disconnect the intermediate shaft from the steering gear by loosening the universal joint pinch bolt and sliding the intermediate shaft free from the steering gear. Do NOT hammer or pound the universal joint coupling off the steering gear input shaft, as this can cause damage to the input shaft and/or internal damage to the steering gear.*
9. *Disconnect clamp securing the air line adjacent to the steering gear.*
10. *Loosen the 5 steering gear mounting bolts shown in Detail B but do not remove the hardware. Note: it may be necessary to rotate the pitman arm clear of the lower, 7/8" bolt. If necessary, rotate it just enough to provide clearance to break the bolt loose. Excessive rotation may require resetting the steering gear poppets.*
11. *Place the lifting fixture to hold the steering gear and mounting plate.*
12. *Remove the 10 bolts holding the steering gear mounting plate to the bus chassis. Note: Access is provided to the heads of the steering gear plate mounting bolts through the battery box where the upper battery was removed. The use of a swivel joint and socket extensions may be useful. If using a lift, a 4-6 ft ladder can be used to aid in access through the cut-out in the back of the battery box. A second person should secure the nuts on the backside of the plate to prevent them from spinning.*
13. *Disconnect power steering supply and return hoses at steering gear. Cap both hose ends and steering gear fittings with plugs to prevent contamination and excessive drainage of hydraulic fluid. Note: It may be useful to place a bucket or absorbent material under the steering gear when disconnecting the hydraulic lines for spill containment.*
14. *Lower the steering gear and mounting plate assembly from the chassis. Take special caution to avoid damaging surrounding parts, lines, fittings, or other equipment. In order to avoid these parts, the steering gear plate may need to be slightly rotated prior to lowering out of the chassis.*
15. *Use a suitable device (forklift, hoist, etc.) to remove the steering gear and plate from the fixture and place on a workbench or ground.*
16. *Remove the Pitman arm from the steering gear. Note: The output shaft and Pitman arm have alignment marks stamped into them. These may be hard to see, especially if they are dirty/greasy. If the alignment marks are not easily seen, it may be useful to mark the alignment with an alternative method, like a paint pen, prior to removal. The Pitman arm will be reinstalled in the same position at the end of this procedure. See Detail A.*

Note:

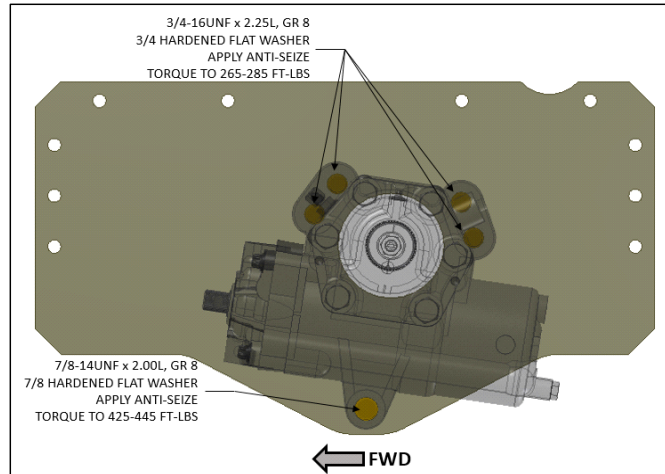
- A. A chisel will help to loosen the pitman arm from the steering output shaft. Use a puller if you cannot remove the pitman arm by hand.
- B. If using a chisel to spread the pitman arm boss to loosen the pitman arm for removal, keep a firm grip on the chisel. Failure to do this may result in the chisel flying loose and causing injury. Never leave the chisel wedged in the pitman arm boss. If you cannot remove the pitman arm from the shaft with a chisel and your hands, remove the chisel from the pitman arm and use a puller.
- C. Once the draglink is removed do not allow the input shaft on the steering gear to rotate more than 1.5 input shaft revolutions from straight ahead position. Rotating the input shaft more than 1.5 rotations from straight ahead with the draglink removed could disrupt the poppet setting set at initial installation. The steering gear is in the straight ahead position when the timing marks on the end of the housing trunnion and the sector shaft are aligned, as shown in Detail A.

- 17. Unbolt the steering gear from the mounting plate.
- 18. Clean the steering gear with a rag moistened with a suitable cleaner or de-greaser, then inspect the steering gear for any signs of wear or damage.
- 19. Clean off the mating surfaces of the steering gear to prepare for mounting to the new 3/4" thick mounting plate.
- 20. Remove all existing steering gear plate fasteners from the chassis to mount the plate. These will be replaced. Note: It may be necessary to remove the clamp securing the coolant/heater lines for proper access to remove the fasteners.



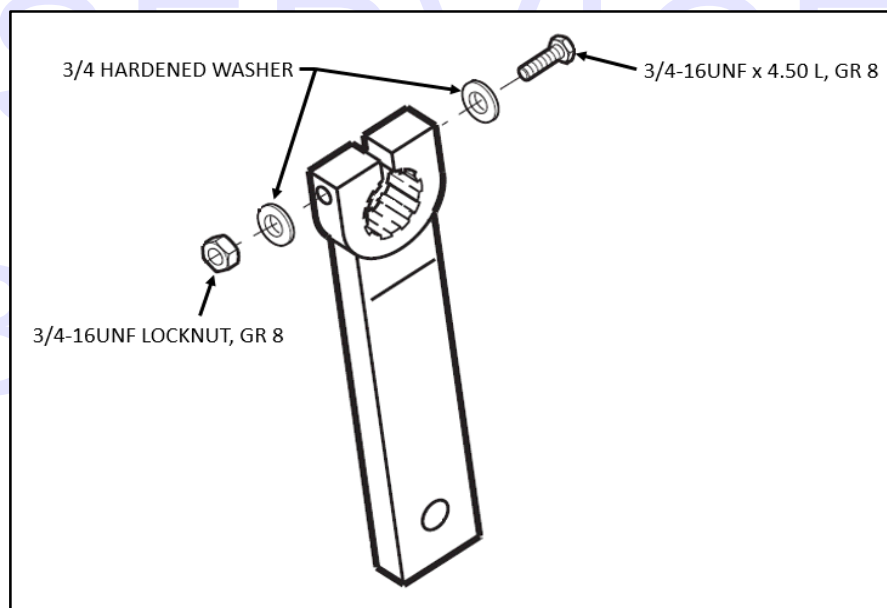
Installation of New Steering Gear Plate

21. **Install the steering gear in reverse order on the new 3/4" thick steering gear mounting plate using anti-seize on all mounting fasteners. See Detail B for installation details and torque values. Do not torque mounting fasteners until Step 28, after re-installation of plate into chassis.**



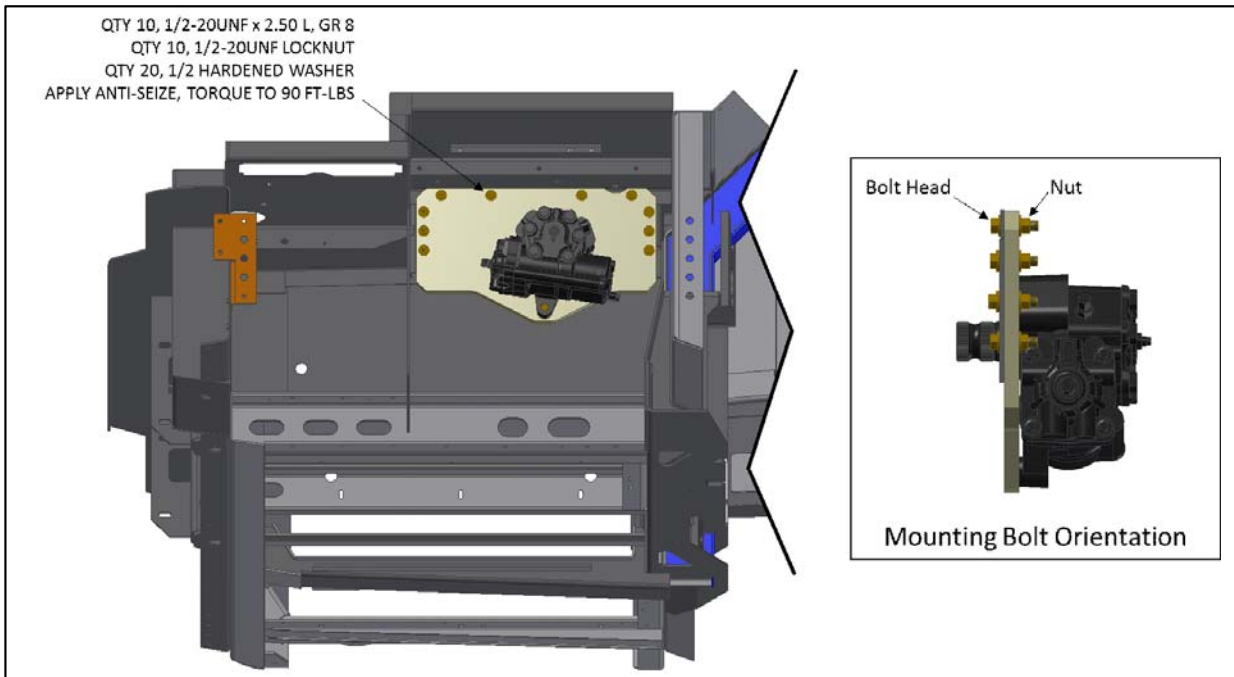
Detail B – Steering Gear Mounting Hardware and Torque

22. **Clean off the steering gear output shaft and clean the spline and bolting surfaces on the Pitman arm. Re-install the pitman arm to the output shaft. Ensure the alignment marks are properly aligned, as shown in Detail A. Apply anti-seize to the new pinch bolt, install, and torque to 260-280 ft-lbs. See Detail C for hardware details.**



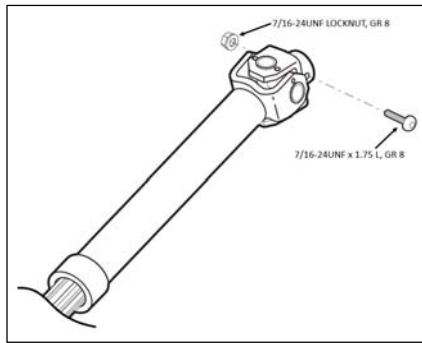
Detail C – Pitman Arm Pinch Bolt Installation

23. **Apply anti-seize to new plate mounting bolts, insert loosely into chassis mounting holes, and reinstall/re-secure coolant lines back into place. See Detail D for installation details.**



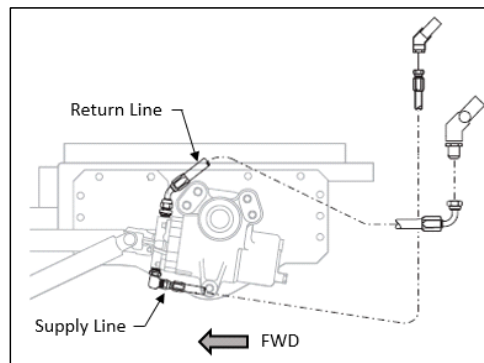
Detail D – Mounting Plate Hardware and Torque

24. **Mount the new steering gear plate with steering gear into the lifting fixture.**
25. **Using the lifting fixture, reinstall the steering gear and plate assembly in the chassis. Take special caution to avoid damaging surrounding parts, lines, fittings, or other equipment. In order to avoid these parts, the steering gear plate may need to be slightly rotated prior to reinstalling into the chassis.**
26. **Remove fixture and torque plate mounting bolts (Detail D) to 90 ft-lbs.**
27. **Verify all mounting plate mounting bolts are properly torqued and apply torque seal.**
28. **Torque steering gear mounting bolts from Step 21 and apply torque seal.**
29. **Clean off the draglink ball joint taper and threaded section and clean off the mating taper in the pitman arm. Re-install the draglink to the Pitman arm and torque the nut to 225 ftlbs. Install a new cotter pin. Anti-Seize is not required at this connection. Note: If required to align castle nut with cotter pin hole, apply additional torque to castle nut. PTorque on castle nut not to exceed 400 ft-lbs.**
30. **Install the intermediate shaft on the steering gear input shaft. Tighten the pinch bolt to 63-75 ft-lbs. Do NOT apply anti-seize to this pinch bolt. See Detail E.**



Detail E – Intermediate Shaft Pinch Bolt Installation

31. **Remove hose plugs, clean off the hose connection fittings and the hose ends.**
32. **Connect the power steering supply and return hoses to the steering gear. See Detail F.**



Detail F – Steering Gear Hydraulic Hoses

33. **Note: If the clamp securing the coolant/heater lines was removed to allow access, secure the lines with the clamp and reattach to its original location.**
34. **Lower the bus if on a lift. Remove lifts from bus.**
35. **Reinstall and connect the battery in the upper tray. Switch the battery disconnect to the ON position.**
36. **Start the engine and check for hydraulic leaks at the steering gear hose connections. Fix any leaks found and retest.**
37. **Top-off hydraulic fluid in reservoir.**
38. **With the bus parked and the engine running, slowly make a full right hand and full left hand turn. Ensure pitman arm and draglink move freely without contacting any of the hoses, wiring or chassis components.**
39. **Bleed the steering gear using the standard bleeding procedure found in the Service Manual under Hydraulic System section, Bleeding the Hydraulic System.**
40. **Test drive the bus to check for proper steering function.**
41. **Return the bus to service if it meets all fleet operating standards.**

Note: Do not dispose of any cracked plate removed from a bus. Removed plates must be marked with vehicle identification number, vehicle mileage and date removed from vehicle, then stored until it can be reviewed by Gillig Field Service personnel.