




Number: FS-2018-01

Date: January 5, 2018

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

Approved: 

Model Years: 1997- 2016

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

Subject: Steering Gear Mounting Plate Replacement Procedure

This is a reissue of a portion of FS-2016-06, (Pages 7 through 13).

The reason for this Field Service Bulletin is that due to varying bolt shoulder length, and tolerance variations, there is a possibility that the bolts used to mount the steering gear mounting plate to the chassis could 'bottom out' prior to full engagement against the plate.

We are therefore modifying the bolt kit available for buses that haven't had the steering gear mounting plate replaced, and releasing another kit for buses that have had the steering gear mounting plate replaced.

54-74537-002 total hardware kit for buses that haven't had the plate replaced.

54-74537-001 bolt replacement kit for buses that have had the plate replaced.

The difference is the length of the ½"-20 Grade 8 bolts from 2-1/2" to 2-1/4".

The significant changes from FS-20106-06 are highlighted in yellow.

If you have any questions, please contact GILLIG Field Service at 1-800-264-5073, or email WarrantyParts@gillig.com.

RLB:rlb

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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***
9. ***White, Green or Yellow Paint Pen***

Parts Required

<i>Application</i>	<i>Part Number</i>	<i>Description</i>	<i>QTY</i>	<i>Replaces P/N</i>
<i>29ft Stainless Steel Low Floor w/ Drum Brakes</i>	<i>05-74397-000</i>	<i>Plate, Steering Gear Mounting, 29 SSLF</i> <i>-OR-</i>	<i>1</i>	<i>05-63059-000</i> <i>or 05-50256-000</i>
<i>29ft Stainless Steel Low Floor w/ Disc Brakes</i>	<i>05-74344-000</i>	<i>Plate, Steering Gear Mounting, 76000 LF</i> <i>-OR-</i>	<i>1</i>	<i>05-63058-000</i>
<i>29ft Carbon Steel Low Floor w/ Raised Gear</i>	<i>05-74685-000</i>	<i>Plate, Steering Gear Mounting, Mild Steel LF, Raised Gear</i> <i>-OR-</i>	<i>1</i>	<i>05-50265-000</i>
<i>35 and 40ft Stainless Steel Low Floor</i>	<i>05-74344-000</i>	<i>Plate, Steering Gear Mounting, 76000 LF</i> <i>-OR-</i>	<i>1</i>	<i>05-63058-000</i> <i>or 05-45365-000</i>
<i>29, 35, and 40ft Carbon Steel Low Floor</i>	<i>05-74636-000</i>	<i>Plate, Steering Gear Mounting, Mild Steel LF</i> <i>-AND-</i>	<i>1</i>	<i>05-36841-000</i>
<i>Hardware Kit</i> <i>(required for all plate replacements)</i>	<i>54-74537-002</i>	<i>Kit, Hardware, 3/4THK Steering Gear Plate</i>	<i>1</i>	<i>N/A</i>

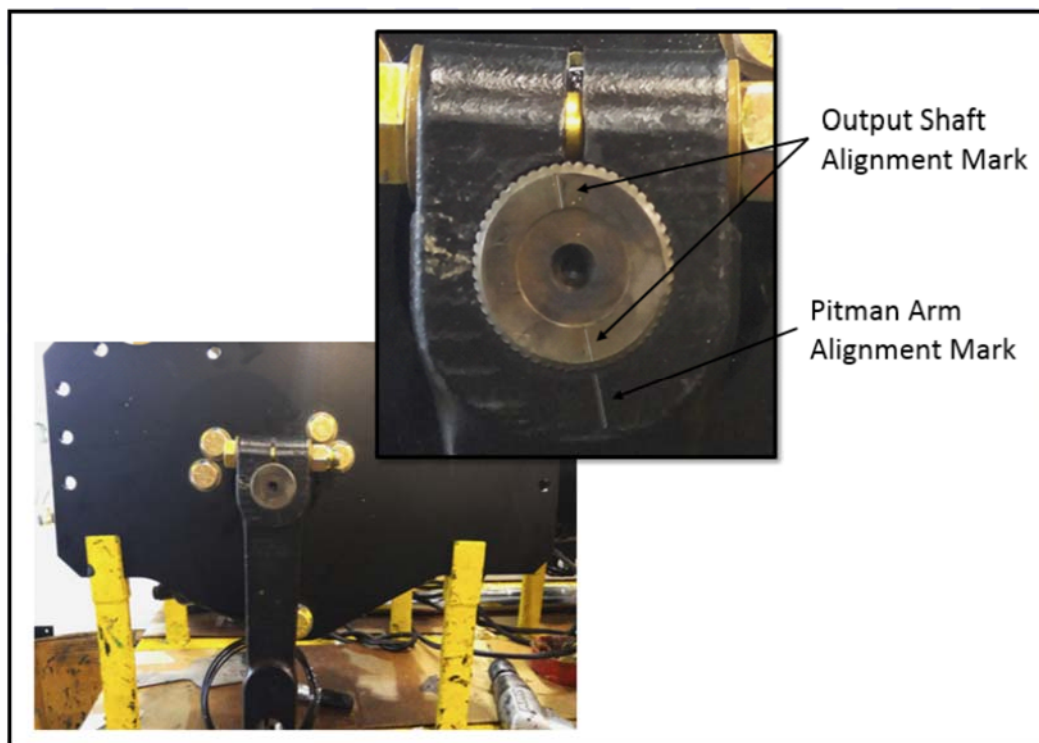
Removal of Old Steering Gear Plate

- 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.***

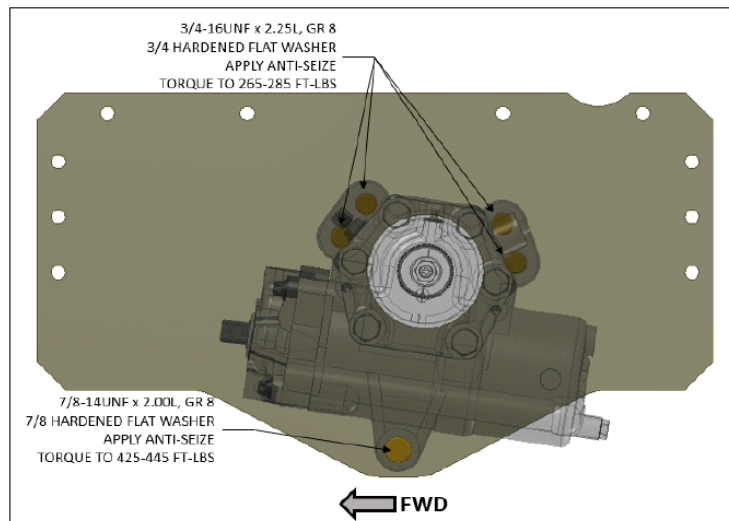
Note:

- 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.***



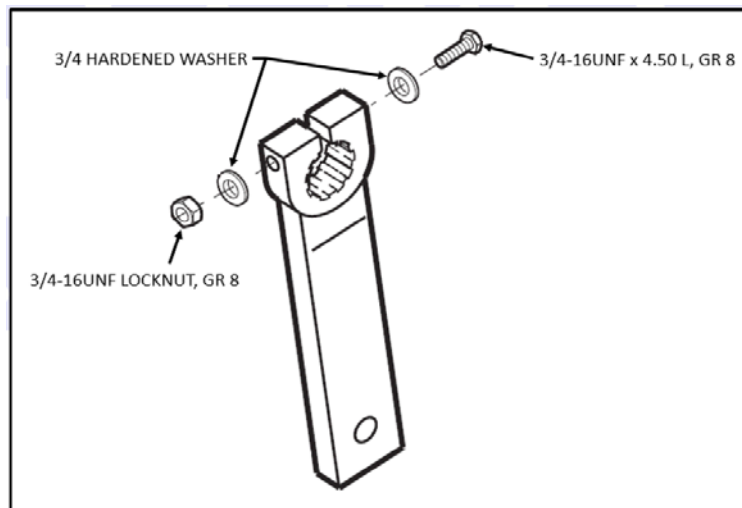
Installation of New Steering Gear Plate

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.**



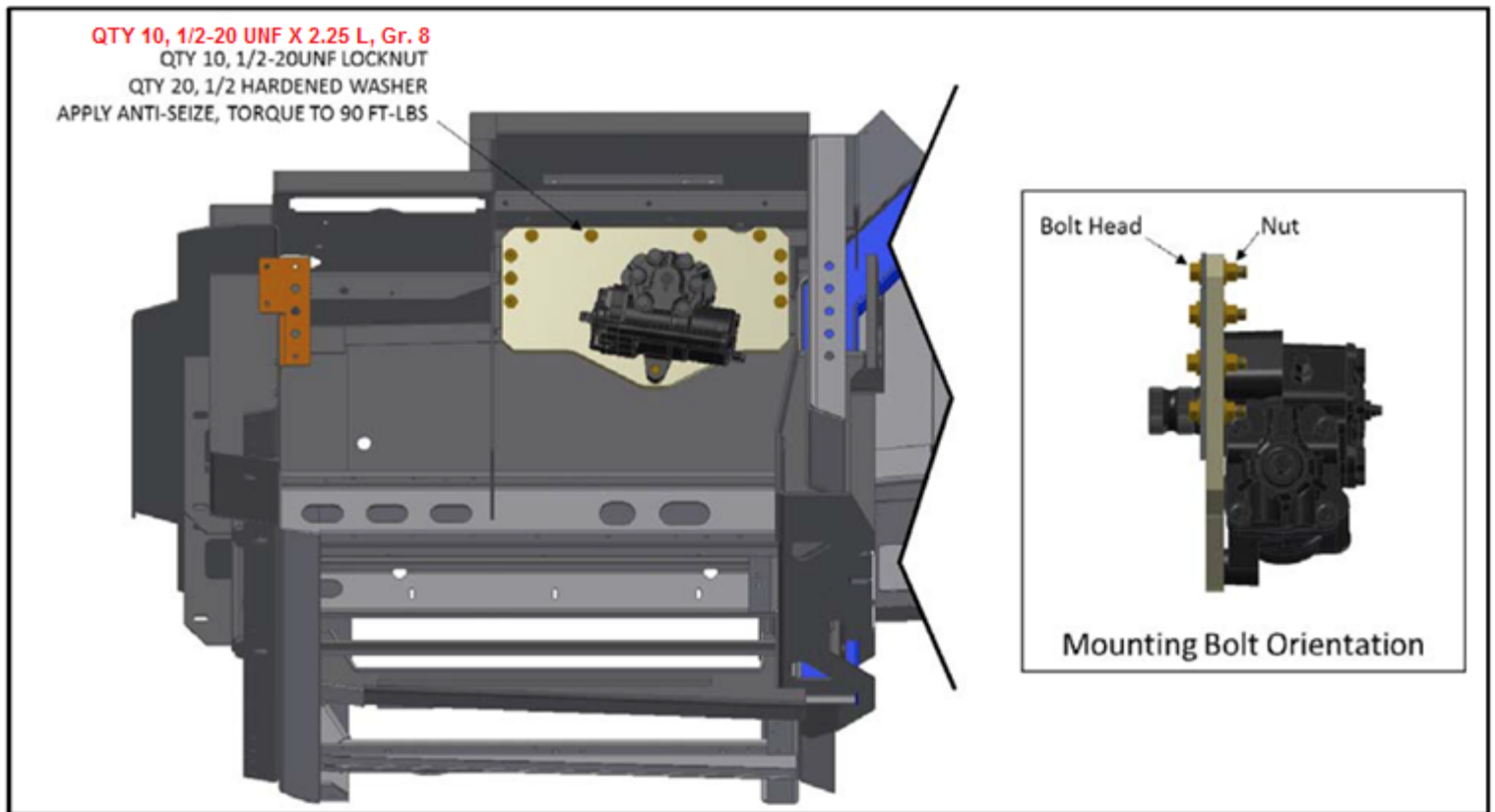
Detail B – Steering Gear Mounting Hardware and Torque

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.**



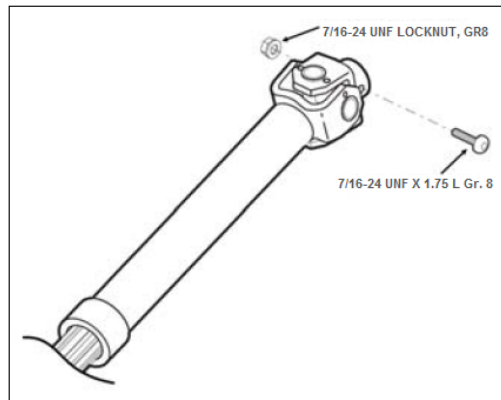
Detail C – Pitman Arm Pinch Bolt Installation

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.**



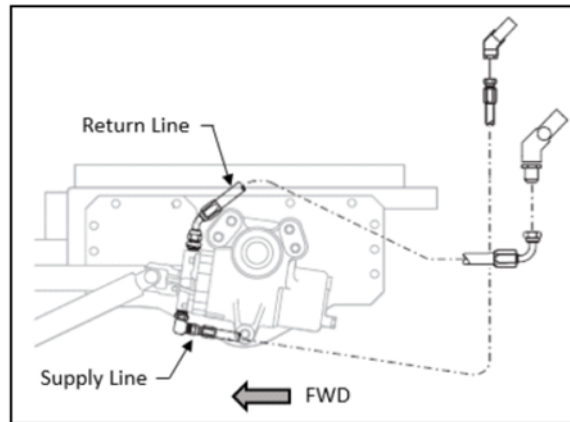
Detail D – Mounting Plate Hardware and Torque

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. **Using a white, yellow or green paint pen, mark the plate with the date completed in an area suitable for visual inspection.**
30. **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.**
31. **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

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



Detail F – Steering Gear Hydraulic Hoses

34. **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.**
35. **Lower the bus if on a lift. Remove lifts from bus.**
36. **Reinstall and connect the battery in the upper tray. Switch the battery disconnect to the ON position.**
37. **Start the engine and check for hydraulic leaks at the steering gear hose connections. Fix any leaks found and retest.**
38. **Top-off hydraulic fluid in reservoir.**
39. **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.**
40. **Bleed the steering gear using the standard bleeding procedure found in the Service Manual under Hydraulic System section, Bleeding the Hydraulic System.**
41. **Test drive the bus to check for proper steering function.**
42. **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.

Total Hardware Kit (54-74537-002)
For use when plate has not yet been changed

<p>NOTES:</p> <p>1) THIS KIT SUPERSEDES KIT 54-74537-000.</p> <p>2) KIT CONTAINS ALL FASTENERS REQUIRED FOR RETROFITTING A 29, 35, OR 40FT STAINLESS STEEL FLOOR BUS TO A 3/4IN THK STEERING GEAR MOUNTING PLATE.</p> <p>3) THIS KIT CONTAINS REPLACEMENT HARDWARE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - STEERING GEAR MOUNTING BOLTS, NUTS, AND WASHERS - STEERING GEAR PLATE MOUNTING BOLTS, NUTS, AND WASHERS - INTERMEDIATE SHAFT PINCH BOLT AND NUT - PITMAN ARM PINCH BOLT, WASHERS, AND NUT - DRAGLINK-TO-PITMAN ARM COTTER PIN 	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="5">REVISIONS</th> </tr> <tr> <th>SYN</th> <th>DWN</th> <th>ZONE</th> <th>DESCRIPTION</th> <th>ISS</th> <th>DATE</th> </tr> <tr> <td>A</td> <td>NRV</td> <td></td> <td>RELEASED FOR PRODUCTION</td> <td>123724</td> <td>08/03/17</td> </tr> </table> <table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <th colspan="4">HARDWARE KIT - 3/4IN THK STEERING GEAR PLATE</th> </tr> <tr> <th>PART NUMBER</th> <th>DESCRIPTION</th> <th>QTY</th> <th>WHERE USED</th> </tr> <tr> <td>54-11347-006</td> <td>BOLT, HEXHEAD, 7/16-20UNF X 1.75IN, GR 8</td> <td>1</td> <td>INTERMEDIATE SHAFT PINCH BOLT</td> </tr> <tr> <td>54-11349-008</td> <td>BOLT, HEXHEAD, 1/2-20UNF X 2.25IN, GR 8</td> <td>10</td> <td>STEERING GEAR PLATE MTG</td> </tr> <tr> <td>54-11355-008</td> <td>BOLT, HEXHEAD, 3/4-16UNF X 2.25IN, GR 8</td> <td>4</td> <td>STEERING GEAR MTG</td> </tr> <tr> <td>54-11355-016</td> <td>BOLT, HEXHEAD, 3/4-16UNF X 4.50IN, GR 8</td> <td>1</td> <td>PITMAN ARM PINCH BOLT</td> </tr> <tr> <td>54-11357-007</td> <td>BOLT, HEXHEAD, 7/8-14UNF X 2.00IN, GR 8</td> <td>1</td> <td>STEERING GEAR MTG</td> </tr> <tr> <td>54-12551-008</td> <td>LOCKNUT, 7/16-20UNF, NYLON INSERT, GR 8</td> <td>1</td> <td>INTERMEDIATE SHAFT PINCH BOLT</td> </tr> <tr> <td>54-12551-009</td> <td>LOCKNUT, 1/2-20UNF, NYLON INSERT, GR 8</td> <td>10</td> <td>STEERING GEAR PLATE MTG</td> </tr> <tr> <td>54-12551-012</td> <td>LOCKNUT, 3/4-16, NYLON INSERT, GR 8</td> <td>1</td> <td>PITMAN ARM PINCH BOLT</td> </tr> <tr> <td>54-12601-010</td> <td>FLATWASHER, 1/2 HARD</td> <td>20</td> <td>STEERING GEAR PLATE MTG</td> </tr> <tr> <td>54-12601-013</td> <td>FLATWASHER, 3/4 HARD</td> <td>6</td> <td>STEERING GEAR MTG, PITMAN ARM PINCH BOLT</td> </tr> <tr> <td>54-12601-014</td> <td>FLATWASHER, 7/8 HARD</td> <td>1</td> <td>STEERING GEAR MTG</td> </tr> <tr> <td>54-13116-013</td> <td>PIN, COTTER, 9/64 X 1.75IN</td> <td>2</td> <td>DRAGLINK CONNECTION</td> </tr> </table> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>ITEM NO</th> <th>DESCRIPTION</th> <th>QTY</th> </tr> <tr> <td style="text-align: center;">2</td> <td> GILIG LLC HAYWARD, CA </td> <td></td> </tr> <tr> <td colspan="3" style="font-size: small;"> PROPRIETARY: THE DRAWING AND THE INFORMATION CONTAINED THEREIN IS THE PROPERTY OF GILIG LLC. 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NO: A</td> <td>ISSUE NO: 54-74537-002</td> </tr> <tr> <td>CAD SCALE: NONE</td> <td></td> <td></td> </tr> </table>	REVISIONS					SYN	DWN	ZONE	DESCRIPTION	ISS	DATE	A	NRV		RELEASED FOR PRODUCTION	123724	08/03/17	HARDWARE KIT - 3/4IN THK STEERING GEAR PLATE				PART NUMBER	DESCRIPTION	QTY	WHERE USED	54-11347-006	BOLT, HEXHEAD, 7/16-20UNF X 1.75IN, GR 8	1	INTERMEDIATE SHAFT PINCH BOLT	54-11349-008	BOLT, HEXHEAD, 1/2-20UNF X 2.25IN, GR 8	10	STEERING GEAR PLATE MTG	54-11355-008	BOLT, HEXHEAD, 3/4-16UNF X 2.25IN, GR 8	4	STEERING GEAR MTG	54-11355-016	BOLT, HEXHEAD, 3/4-16UNF X 4.50IN, GR 8	1	PITMAN ARM PINCH BOLT	54-11357-007	BOLT, HEXHEAD, 7/8-14UNF X 2.00IN, GR 8	1	STEERING GEAR MTG	54-12551-008	LOCKNUT, 7/16-20UNF, NYLON INSERT, GR 8	1	INTERMEDIATE SHAFT PINCH BOLT	54-12551-009	LOCKNUT, 1/2-20UNF, NYLON INSERT, GR 8	10	STEERING GEAR PLATE MTG	54-12551-012	LOCKNUT, 3/4-16, NYLON INSERT, GR 8	1	PITMAN ARM PINCH BOLT	54-12601-010	FLATWASHER, 1/2 HARD	20	STEERING GEAR PLATE MTG	54-12601-013	FLATWASHER, 3/4 HARD	6	STEERING GEAR MTG, PITMAN ARM PINCH BOLT	54-12601-014	FLATWASHER, 7/8 HARD	1	STEERING GEAR MTG	54-13116-013	PIN, COTTER, 9/64 X 1.75IN	2	DRAGLINK CONNECTION	ITEM NO	DESCRIPTION	QTY	2	GILIG LLC HAYWARD, CA		PROPRIETARY: THE DRAWING AND THE INFORMATION CONTAINED THEREIN IS THE PROPERTY OF GILIG LLC. 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Bolt Replacement Kit (54-74537-001)
For use when plate has already been changed

REVISIONS					
SYM	BY	DATE	DESCRIPTION	NO	DATE
A	SRV		RELEASED FOR PRODUCTION	083784	08/03/17

NOTES:

- 1) THIS KIT IS ONLY A SUPPLEMENTAL KIT THAT REPLACES THE 1/2-20UNF BOLTS AND LOCKNUTS IN HARDWARE KIT 54-74537-000.
- 2) THIS KIT ONLY CONTAINS THE STEERING GEAR PLATE MOUNTING BOLTS
- 2) THIS KIT DOES NOT CONTAIN REPLACEMENT HARDWARE FOR THE FOLLOWING AND MUST BE USED IN CONJUNCTION WITH THE 54-74537-000 KIT:
 - STEERING GEAR MOUNTING BOLTS, NUTS, AND WASHERS
 - STEERING GEAR PLATE NUTS, AND WASHERS
 - INTERMEDIATE SHAFT PINCH BOLT AND NUT
 - PITMAN ARM PINCH BOLT, WASHERS, AND NUT
 - DRAGLINK-TO-PITMAN ARM COTTER PIN

HARDWARE KIT - 1/2-20UNF			
PART NUMBER	DESCRIPTION	QTY	WHERE USED
54-11349-008	BOLT, HEXHEAD, 1/2-20UNF X 2.25IN, GR 8	10	STEERING GEAR MTG
54-12551-009	LOCKNUT, 1/2-20UNF, NYLON INSERT, GR 8	10	STEERING GEAR MTG

	GILLO LLC HAYWARD, CA	(LR AS SHOWN, RH OPPOSITE SIDE)
TITLE KIT-HARDWARE 1/2-20 X 2.25" LONG BOLTS		
DWN K. VORSATZ	DATE 08/03/17	DATE 08/03/17
CHECK'S DUTY DATE	DATE 08/03/17	DATE 08/03/17
APPR'S DUTY DATE	DATE 08/03/17	DATE 08/03/17
DESG. NO. 123724	SUB. NO. A	PART NO. 54-74537-001
CAD SCALE NONE	SHEET 1	