



TECHNICAL SERVICE BULLETIN

ORIGINAL CREATION DATE:	11/19/2022
SERVICE BULLETIN SUBJECT:	Steering Gearbox Mechanically Locking Fastener Retrofit (NON-TPI)
VINs or MODELS AFFECTED:	Service Specified Buses
COMPLETE BY:	Next Service Opportunity
SERVICE BULLETIN #:	SC-22-155
LABOR OP CODE:	N/A

NOTICE! It is expected that this process may require up to two hours per bus. Please schedule appropriately to minimize vehicle downtime.

STEERING GEARBOX MECHANICAL LOCKING FASTENER RETROFIT

Retrofit Description:

This procedure describes the process of adding mechanical locking fasteners to the steering gearbox to eliminate the possibility of the bolts loosening and creating steering issues.

Tools/Parts Required:

Tools and Supplies Required:

- Wheel Lifts (4 Each)
- Jack Stands (4 Each)
- Battery Impact Tool
- Calibrated Torque Wrench
- Ratchet
- 1-5/16 Inch Socket
- 7/8-Inch 12-Point Socket
- External Snap Ring Pliers
- Alcohol
- Shop Towels
- Orange Torque Stripe Paint
- Feeler Gauge Set

Kit Parts Required:

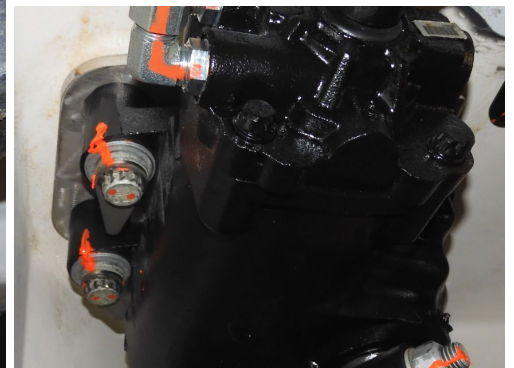
- 061085 SERVICE KIT, MECHANICAL LOCKING FASTENER UPDATE (Consisting of)
 - 167-0916 SCREW, 12 POINT FLG, 7/8"-9X4.5"X2.5", STL, GR8 4 EA

Procedure:

1. Complete the Proterra approved Lockout/Tagout procedure to make the bus safe for work.
2. Using four Wheel Lifts, raise the bus into the air. Using four Jack Stands, support the bus for safety.

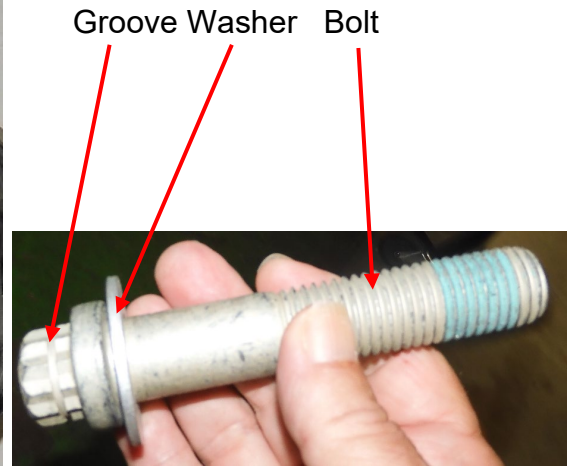


3. Access the Steering Gearbox underneath the bus. If the Steering Gearbox has the Hex Head Bolts shown in the first photograph, they will be replaced with the parts in the Kit. If the Gearbox already has 12-Point Bolts as shown in the second photograph, the retrofit has already been completed. Do not replace any 12-Point Bolts.

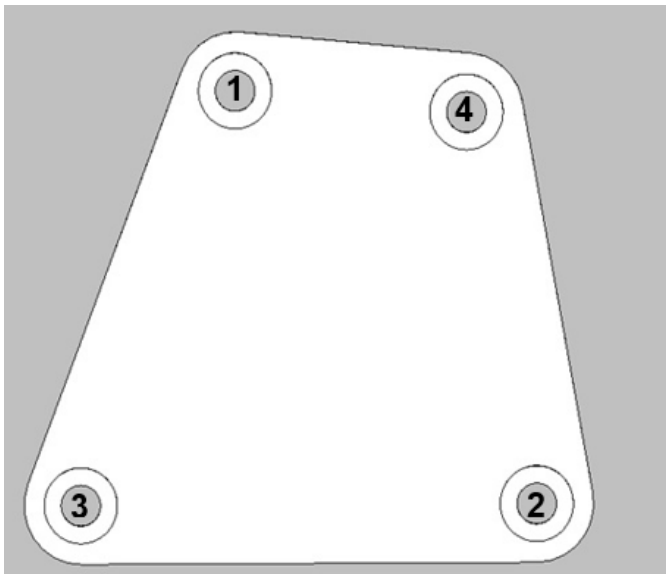


4. Using Isopropyl Alcohol and Shop Towels, remove any existing Torque Stripe Paint that may have been applied previously.

5. Using a Battery Impact Tool with a 1-5/16 Inch Socket, remove one of the four bolts that secure the Steering Gearbox to the bus.
6. Using a Battery Impact Tool with a 7/8-Inch 12-Point Socket, replace that bolt that was removed with a new Bolt from the Kit **(061085)** and the original washer. The bolt should be tight enough to keep the Gearbox against the body as other Bolts are replaced.



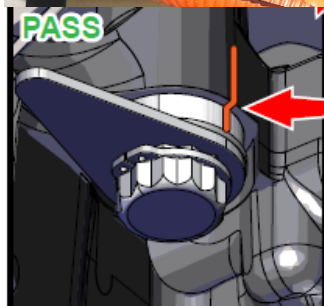
7. Using a Calibrated Torque Wrench with a 7/8-Inch 12-Point Socket, **torque the bolt to 150 Foot-Pounds.**
8. Repeat the process to remove and replace the three remaining hex head bolts with new Bolts and Washers from the Kit **(061085)**. Replace and torque each bolt in the sequence shown below, one at a time.



9. Repeat the process to cross-torque the bolts to **300 Foot-Pounds** using the pattern shown above.

10. Using a Calibrated Torque Wrench with a 7/8-Inch 12-Point Socket and the cross-torque sequence shown in the previous illustration, working one bolt at a time:
 - a. **Achieve a final torque of 600 Foot-Pounds on bolt #1.**
 - b. Using Orange Torque Stripe Paint, torque stripe bolt #1, ensuring the torque stripe is continuous across the flange of the bolt and onto the surface of the Steering Gearbox.
 - c. **Achieve a final torque of 600 Foot-Pounds on bolt #2.**
 - d. Using Orange Torque Stripe Paint, torque stripe bolt #2, ensuring the torque stripe is continuous across the flange of the bolt and onto the surface of the Steering Gearbox.
 - e. **Achieve a final torque of 600 Foot-Pounds on bolt #3.**
 - f. Using Orange Torque Stripe Paint, torque stripe bolt #3, ensuring the torque stripe is continuous across the flange of the bolt and onto the surface of the Steering Gearbox.
 - g. **Achieve a final torque of 600 Foot-Pounds on bolt #4.**
 - h. Using Orange Torque Stripe Paint, torque stripe bolt #4, ensuring the torque stripe is continuous across the flange of the bolt and onto the surface of the Steering Gearbox.

11. Once all securement bolts have been properly torqued, install the Pointers from the kit onto the heads of the bolts. The Pointers should be oriented so that they are turned as far counterclockwise as possible on the bolts. This will prevent the bolts from loosening.



Example of a Good Unbroken Torque Stripe. The torque stripe is intact.

12. Using Internal Snap Ring Pliers, install a Snap Ring on each of the Bolt heads to secure the Pointers. Ensure that the Snap Ring is free to rotate in the groove on the Bolt.

13. Using Orange Torque Stripe Paint, mark the fasteners as shown in the previous photograph and graphic. Do not extend the torque stripe down across the Pointer and Snap Ring.

14. Using a 0.2mm Feeler Gauge, check for the presence of a gap at the four corners of the spacer plate near the bolts on the Steering Gear. The 0.2mm Feeler Gauge should not be able to enter a gap between the gearbox and spacer plate. The spacer plate has a slight bevel so the Feeler Gauge may slide in for a small distance. If the Feeler Gauge goes in 12mm or more, the test is bad. Notify Proterra Service if the Feeler Gauge test is bad.



15. Remove the four Jack Stands.
16. Using the Four-Wheel Lifts, lower the bus to the ground.
17. Remove the Lockout/Tagout devices and return the bus to service.