



PROTERRA



TECHNICAL SERVICE BULLETIN

ISSUE DATE:	11-16-2022
SERVICE BULLETIN SUBJECT:	Steering TLP Shim Retrofit
VINs or MODELS AFFECTED:	Service Specified Buses
COMPLETE BY:	Next Service Opportunity
SERVICE BULLETIN #:	SC-22-150
LABOR OPERATION CODE:	N/A

NOTICE! It is expected that this process will require up to two hours per bus.

STEERING TLP SHIM RETROFIT

Retrofit Description:

This procedure describes the process of adding additional adhesive and a shim to the Steering Gearbox to improve clamping force on the gearbox.

Tools/Parts Required:

- Wheel Lifts (Four Required)
- Jack Stands (Four Required)
- Impact Tool
- Ratchet
- 1-5/16 Inch Socket
- 7/8-Inch 12 Point Socket
- 1-1/16 Inch Socket
- 11/16 Inch Socket
- 1-1/16 Inch Combination Wrench
- 3/8 Inch Combination Wrench
- Large Flat Blade Screwdriver
- Permanent Marker
- Transmission Jack
- Depth Gauge or Feeler Gauges

Kit Parts Required:

- 063287 Service Kit - Steering Gearbox (Consisting of)
- 167-0916 SCREW, 12 POINT FLG, 7/8"-9X4.5"X2.5, STAGE8 LOCKING 4 EA
- 180-1889 SHIM, PLATE, STEERING GEAR BOX, 1.4MM, SS 1 EA

Procedure:

1. Complete the Proterra approved Lockout/Tagout procedure to make the bus safe for work.
2. Using four Wheel Lifts, safely raise the bus to access the Steering Gearbox.
3. Using four Jack Stands, support the bus at the lifting points.
4. Using an Impact Tool with a 1-1/16 Inch Socket and a 1-1/16 Inch Combination Wrench, remove the bolt and nut that secures the Pittman Arm to the gearbox.

- Using a Permanent Marker, mark the Pittman Arm and gearbox shaft so that the Pittman Arm can be reinstalled in the same position where it was removed.



- Using a large Flat Blade Screwdriver, spread the slot in the Pittman Arm to ease its removal from the gearbox. Remove the Pittman Arm from the gearbox shaft.



7. Using an Impact Tool with a 11/16 Inch Socket and a 3/8 Inch Combination Wrench, remove the bolt and nut that secures the steering shaft to the gearbox.



8. Using a large Flat Blade Screwdriver, remove the steering shaft from the gearbox.



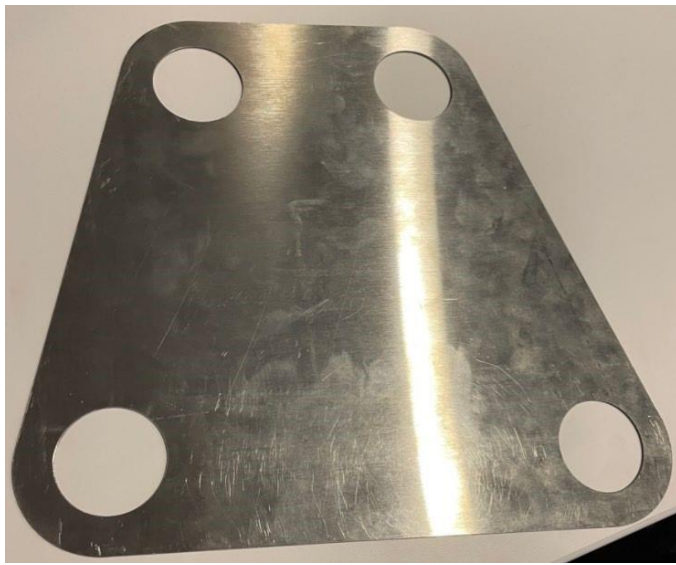
9. Place a Transmission Jack underneath the Steering Gearbox to support it.



10. Remove the four bolts that secure the Steering Gearbox to the bus. This will require an impact tool with a 1-5/16 Inch Socket or a 7/8-Inch 12-Point Socket depending on the fasteners used. Retain the four flat washers for reuse.



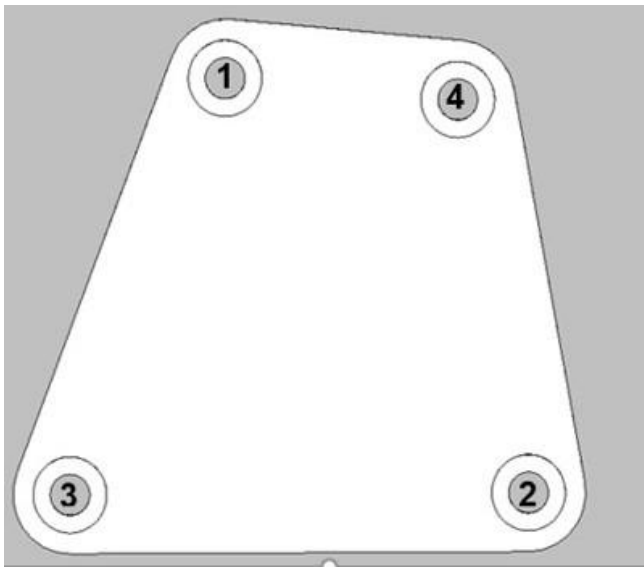
11. Carefully lower the Steering Gearbox using the Transmission Jack to access the TLP bosses.
12. Using a Depth Gauge or Feeler Gauges, measure the recess/flushness of the TLP Bosses.
13. If the bosses are recess by 0.4 mm or less, proceed to step 15.
14. If the bosses are recessed by 0.4mm or more, proceed to step 17.
15. Place a Shim (**180-1889**) against the body over the TLP bosses.



16. Using a Depth Gauge or Feeler Gauges, ensure that the TLP bosses are recessed behind the Shim **(180-1889)**. Contact Proterra Service if the bosses are not recessed.
17. Using the Transmission Jack, raise the Steering Gearbox to the bus body.
18. Start the new Bolts **(167-0916)** by hand. Use the original washer that was removed earlier on each Bolt.
19. Using Isopropyl Alcohol and Shop Towels, remove any existing Torque Stripe Paint that may have been applied previously.
20. Using a Battery Impact Tool with a 7/8-Inch 12-Point Socket, tighten the four Bolts **(1670916)**.



21. Using a Calibrated Torque Wrench with a 7/8-Inch 12-Point Socket, cross torque the four bolts to **150 Foot-Pounds** using the pattern shown below.



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

23. 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.



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

24. 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.
25. 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.
26. Reinstall the Pittman Arm on the Steering Gearbox. Leave the Flat Blade Screwdriver in place to spread the gap in the arm. Tap the Pittman arm onto the Steering box with a Dead Blow Hammer. Ensure that the alignment mark is properly positioned.



27. Using an Impact Tool with a 1-1/16 Inch Socket and a 1-1/16 Inch Combination Wrench, reinstall the bolt and nut that attach the Pittman Arm to the Steering Gearbox. The Connecting Rod should be at a 90-degree angle to the Pittman Arm.

NOTE: The 90-degree angle is a critical dimension. Contact Proterra Service if this angle is not achieved.



28. Using a Torque Wrench with a 1-1/16-Inch Socket and a 1-1/16-Inch Combination Wrench, **torque the Nut to 238 foot-pounds.**



29. Using Orange Torque Stripe Paint, mark the properly torqued fasteners.
30. Using an Impact Tool with a 11/16 Inch Socket and a 3/8-Inch Combination Wrench, reinstall the steering shaft to the gearbox using the original fasteners.



31. Using a Calibrated Torque Wrench with a 11/16-Inch Socket and a 3/8-Inch Combination Wrench, **torque the fasteners to 60 foot-pounds.**
32. Using Orange Torque Stripe Paint, mark the properly torqued fasteners.
33. Lower and remove the Transmission Jack.
34. Remove the four Jack Stands.
35. Using the Four-Wheel Lifts, lower the bus to the ground.
36. Remove the Lockout/Tagout devices and return the bus to service.