WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

CARMEN TURNER FACILITY HOMT REHABILITATION GUIDE

NEW FLYER 2015-2016

XCELSIOR DIESEL-ELECTRIC 40 FT. TRANSIT BUS

Models: SR1946

Fleets: 56

Bus Numbers: Pilot Buses 7300-7355

Bus Number: _____

BUS FLEET ENGINEERING

BUS FLEET MAINTENANCE

WARNING

The following are basic guidelines that apply to all shop practices and procedures.

- To prevent eye injury, always wear eye protection - safety glasses or face shields when performing vehicle maintenance, service, or body repair.
- Always wear a face shield with appropriate light filters when welding. Prolonged unprotected exposure to the intense light generated by arc welding can cause severe and permanent retinal damage. Welding area should be sectioned off with filtered panels to prevent inadvertent damage.
- Always wear a face shield when grinding or performing work beneath the vehicle.
- Always wear appropriate ear protection; plugs or headgear.
- Always secure or remove jewelry, watches, loose clothing and / or hair when operating power tools or repairing components with moving parts.
- Always wear an appropriate respirator, cartridge mask or HEPA type filter mask when sanding by hand or with power tools.
- Avoid ingesting the dust spray or fumes of cured/uncured substances.
- Always wear a 100 % air mask hood positive-pressure supplied respirator (NIOSH/MSHA TC- 19C), eye protection, gloves and protective clothing when mixing components, during application of paint and topcoats, and until all vapor and mist are exhausted.
- Never attempt to operate a piece of equipment or power tool if you are unsure how to use it safely. Consult your supervisor.
- Wear protective clothing.
- Always refer to your Safety Data Sheets and/or product documentation provided with the products for safety information. Always be aware of the potential hazards when working with any chemical substances. Improper handling of some products can cause severe illness. personal injury and/or death.
- Always ensure that a portable fire extinguisher is within reach, in the event of an emergency and ensure that is in operating condition.
- Dispose of hazard waste in proper containers in compliance with standards, through the services of a qualified waste treatment company.

Bus No. _____
Work Order No._____

SAFETY PROVISIONS
ALL WORK MUST BE CONDUCTED IN A SAFE MANNER AND IN ACCORDANCE WITH ALL BMNT SAFETY RULES AND STANDARD OPERATING PROCEDURES.

ALL WORK SHALL BE PERFORMED IN SUCH A WAY AS TO PRECLUDE ANY DANGER TO PERSONNEL, OR DAMAGE TO WMATA PROPERTY.

WARNING ***Refer to "High Voltage Safety" safety requirements before performing any maintenance or repair on the Allison H40EP Systems™ Service Manual.***

Minimum safety requirements for these procedures should include the following personal protection equipment (PPE):

- **Hearing Protection**
- **Fall Protection**
- **Proper Footwear**
- **Eye Protection**
- **Gloves (Class 0 isolation)**
- **Bump Cap**

Note: *Many items may need only to be repaired, and not replaced with a new or remanufactured part. It is the* ***Supervisor's decision and responsibility*** *to ensure that all mechanics are aware of what is to be repaired, and what is to be replaced. Supervisors are to inspect the bus prior to assigning work to a mechanic.*

Refer to the OEM Service manual for safety precautions, replacement procedures, torque specifications, and lubrication application and lubricating specifications.

Attachments

Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Engine Shop Support & Transmission/ Drive Unit Shop Support (ES)

See SB # 22-PT-12-00 Cummins National Overhaul Program (NOW®)

ES-1) CTF – DISASSEMBLE/ REASSEMBLE POWERPLANT; ENGINE TEAR DOWN/ REBUILD, & DYNO-TEST; DRIVE UNIT TEAR DOWN/ REBUILD, & DYNO-TEST/162 HOURS

Note: Combination of CTF - Disassemble Powerplant & CTF - Engine Tear Down is 16 Hours

CTF – Disassemble Powerplant

- ❑ Disassemble powerplant.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF - Engine Tear Down

- ❑ Remove wiring harnesses.
- ❑ Remove coolant pipes, lines, fittings, and brackets.
- ❑ Remove hydraulic pump.
- ❑ Remove air compressor with brackets.
- ❑ Remove alternator with bracket.
- ❑ Disassemble engine.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF - Engine Rebuild/ 50 Hours

- ❑ Rebuild engine per manufacturer specification.
- ❑ Install wiring harness.
- ❑ Torque all fittings, torque coolant constant tensioner clamps, nuts, and bolts per manufacturer specifications and apply torque putty.
- ❑ Install new Bonaco coolant inlet and outlet hoses for air compressor. *See BUSV-BMNT-EMI-24-PT-01-00Cummins ISL9 (CM2350 L101) Air Compressor Stainless Steel Coolant Hose Upgrade.*

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF – Engine Dyno-Test/ 20 Hours

- ❑ Connect engine to the dynamometer.
- ❑ Add fluids and check for leaks.
- ❑ Start engine and allow it to reach operating temperature and recheck for leaks.
- ❑ Bring engine up to 2000 rpms and apply load.
- ❑ Apply load and allow engine to run at load for 1 hour.
- ❑ Print all test results for oil pressure, coolant temperature, sensors, horsepower, and torque rating (330HP @ 2000 rpms).
- ❑ Drain all fluids and remove engine from dynamometer.
- ❑ Place engine on shipping stand.
- ❑ Prepare for paint.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF - Drive Unit Tear Down/ 24 Hours

- ❑ Clean drive unit (pressure washer).
- ❑ Mount drive unit to the stand.
- ❑ Tear down drive unit.
- ❑ Clean parts.

⚠ WARNING
To prevent eye injury, alwayswear eye protection when performing vehicle maintenance or service.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF - Drive Unit Rebuild/ 20 Hours

- ❑ Assemble drive unit per OEM specifications.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF - Drive Unit Dyno-Test/ 20 Hours

- ❑ Connect drive unit to the dynamometer.
- ❑ Add fluids and check for leaks.
- ❑ Allow drive unit to reach operating temperature and recheck for leaks.
- ❑ Check drive unit main pressure.
- ❑ Check the upshift and downshift points.
- ❑ Drain all fluids and remove drive unit from dynamometer.
- ❑ Place drive unit on the stand.

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

CTF – Reassemble Powerplant/ 12 Hours

- ❑ Install hub adapter.
- ❑ Flex-plate assembly.
- ❑ Plate (4), M10 bolts.
- ❑ Flex plates.
- ❑ Adapter assembly, ring gear
- ❑ Plate, wear.
- ❑ Crankshaft Bolts, M6.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

Engine Serial # _____

Drive Unit Serial # _____

Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Small Unit Support (SU)

⚠ WARNING
To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

SU-1) CTF - SURGE TANK TEAR DOWN & REBUILD/ 4 HOURS

- ❑ Replace coolant level sensor.
- ❑ Replace low coolant sensor.
- ❑ Inspect and replace coolant level gauge as needed.
- ❑ Replace surge tank pressure cap.
- ❑ Pressure-check tank.

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Axle Shop Support (AS)

AS-1) CTF - FRONT AXLE TEAR DOWN & REBUILD/ 40 HOURS

- ❑ Replace king pin.
- ❑ Replace brake chambers.
- ❑ Replace foundation brake assembly. ***See SB # 22-CC-12-00 Meritor Calipers Install – Overhaul-Rehabilitation.***
- ❑ Replace inner and outer wheel bearing.
- ❑ Replace seals and gaskets.
- ❑ Replace tie rod ends.

Front Axle Serial # _____

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/ Designee Signature_____**Employee ID #** _____

AS-2) CTF - REAR AXLE / DIFFERENTIAL TEAR DOWN & REBUILD/ 40 HOURS

- ❑ Replace Brake chambers.
- ❑ Replace foundation brake assembly. ***See SB # 22-CC-12-00 Meritor Calipers Install – Overhaul-Rehabilitation.***
- ❑ Replace inner and outer wheel bearing.
- ❑ Replace seals and gaskets.
- ❑ Rebuild Differential Carrier Assembly per OEM specifications.

Rear Axle Serial # _____

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Machine Shop Support (MS)

MS-1) CTF - MACHINE SHOP INSPECTION & REPAIRS / 10 HOURS

- ❑ Crankshaft
- ❑ Block
- ❑ Camshaft
- ❑ Drive Unit - repair threads.
- ❑ Manifold - repair threads.
- ❑ Remove broken bolts.
- ❑ Weld and repair.

> ⚠ **WARNING**
> **To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.**

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Body & Paint Shop Support (BP)

BP- 1) CTF – PAINT ENGINE / 2 HOURS

- ❑ Paint engine.

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/ Designee Signature_____**Employee ID #** _____

Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Body & Paint Shop Support Graphics (GS)

GS- 1) CTF - GRAPHICS: INTERIOR & EXTERIOR DECALS / 20 HOURS

- ❑ Decals

Employee Signature _____ **Employee ID #** _____

Employee Signature _____ **Employee ID #** _____

Supervisor/Designee Signature _____ **Employee ID #** _____

Cummins ISL9 (CM2350 L101) AIR COMPRESSOR STAINLESS STEEL COOLANT HOSE UPGRADE

Bus No.	Fleet No.	Build No.
7300-7355	56	SR1946
7356-7409	57	SR1976

Revision History				
Revision No.	**Revision Date**	**Reviser / Author**	**Document Section No. (if applicable) or N/A**	**Description of Changes**
00	09/27/2024	Marlon Speed	N/A	Initial Release

SOP 3.8 Revision 11 – Bus Change Control Board (BCCB)

LIST OF FIGURES

1.0 PURPOSE

This EMI is designed to improve the reliability of the Cummins air compressor outlet coolant tube by reducing hose failures. This EMI details the replacement of the original problematic air compressor tube.

2.0 BACKGROUND

WMATA's New Flyer Xcelsior fleets 56 and 57 were manufactured with Cummins ISL9 (CM2350 L101) Engines, which came with air compressor coolant hoses that are prone to failure.
Bus Fleet Engineering investigated these failures and found that the OEM hard plastic lines become brittle over time and rupture, leading to service interruptions. Bonaco, an industrial hose manufacturer, has developed a stainless steel braided hose assembly with a PTFE (Teflon) core tube and an additional heat shield cover. This upgraded hose assembly was tested and evaluated on 5 WMATA buses under TCN #23-PT-01-00 with no failures or issues recorded during the 1-year test. The work instructions below are applicable to the rehab process only.

3.0 APPLICABLE BUSES

Bus No.	Fleet No.	Build No.
7300-7355	56	SR1946
7356-7409	57	SR1976

4.0 Job Plan: 9792 Asset List: 6598 Campaign No.: 18799379

5.0 **MATERIAL REQUIRED**

1. Bonaco replacement coolant hose kit P/N 824-55-0907
2. Anti-seize compound P/N 999-65-1026
3. Two 10.9 M12 x 1.75 x 25mm bolts with flat and lock washers. (Fastenal)

6.0 **TOOLS REQUIRED**

Standard Mechanics Tool Set

CAUTION: ALL WORK MUST BE CONDUCTED IN A SAFE MANNER AND IN ACCORDANCE WITH BUS FLEET SAFETY RULES AND PROCEDURES. ALL WORK SHOULD BE PERFORMED IN SUCH A WAY THAT IT WOULD NOT INVOLVE ANY DANGER TO PERSONNEL OR DAMAGE TO PROPERTY.

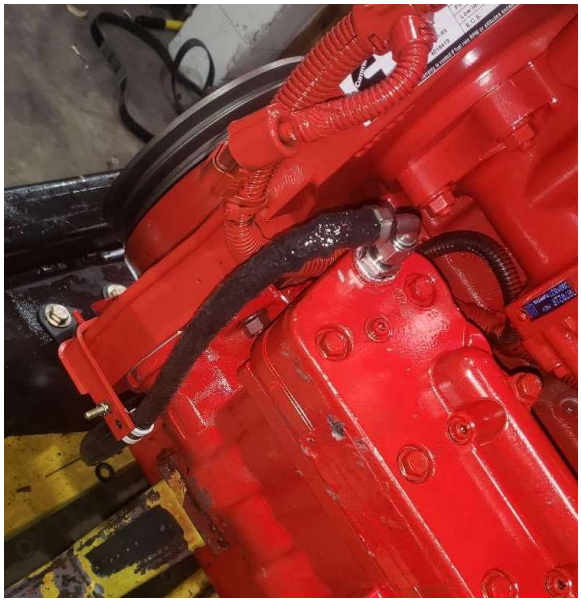


Figure 1: Example of Bonaco Hose Installed

Figure 2: Example of Bonaco Hose Installed

7.0 INSTALLATION PROCEDURE

7.1 If present, remove the factory coolant tube and factory fittings from the air compressor cylinder head (Figure 3) and water outlet tee on the right front side of the engine block (intake side, Figure 4)

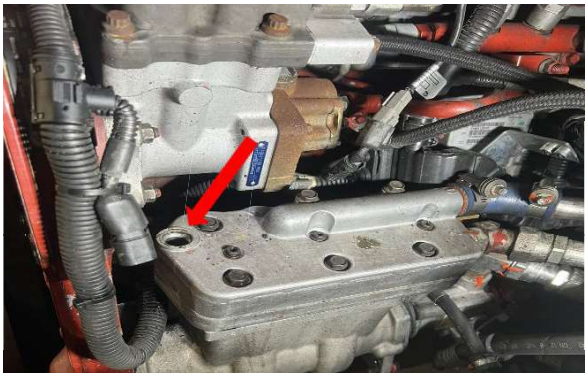


Figure 3: Compressor Fitting Removed

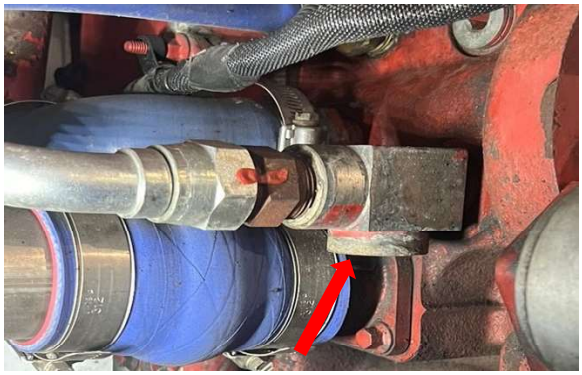


Figure 4: Coolant Tee Fitting Removed

7.2 Remove plastic caps and coat only the threads with an anti-seize compound.

7.3 Install the O-ring side of the supplied fittings into the same holes from where the original fittings were removed (Figure 5, 6). Tighten to 212 in lbs. DO NOT OVERTIGHTEN.

Figure 5: Compressor Hose Fitting Installed

Figure 6: Coolant Tee Hose Fitting Installed

7.4 Install the supplied bracket on the right (exhaust side) of the engine with two 10.9 M12 x 1.75 x 25mm bolts with flat and lock washers. Leave the bolts loose enough to allow bracket adjustment later.

7.5 Install the 1” long bolt into the bracket with threads facing away from the engine (Figure 7). Tighten with the non-locking hex nut. DO NOT INSTALL THE ADEL CLAMP AND WASHER AT THIS TIME.

Figure 7: Supplied Bracket Installed

7.6 On the left (intake side) of the engine, cut the factory tube retainer (plastic clip) from the bracket on the timing cover and remove it. You will use this hole to mount an Adel clamp later.

7.7 Install the 90 degree end of the hose on top of the compressor. Install, but do not fully tighten. It must be able to pivot.

7.8 Route the hose inside the timing cover bracket and in front of the oil pan, following the same routing as the factory tube.

7.9 Route the hose to the other fitting on the coolant tee connection outside the supplied bracket. Tighten the straight end of the hose.

7.10 The 90 degree hose end will have a gentle sweeping bend to the inside of the bracket. Do not pull the hose tight (Figure 1).

7.11 Secure the hose with an Adel clamp with a flat washer on each side. Using the ¾ inch-long bolt and nylon locking nut on the timing cover bracket located on the intake side of the engine (Figure 8). Do not tighten.

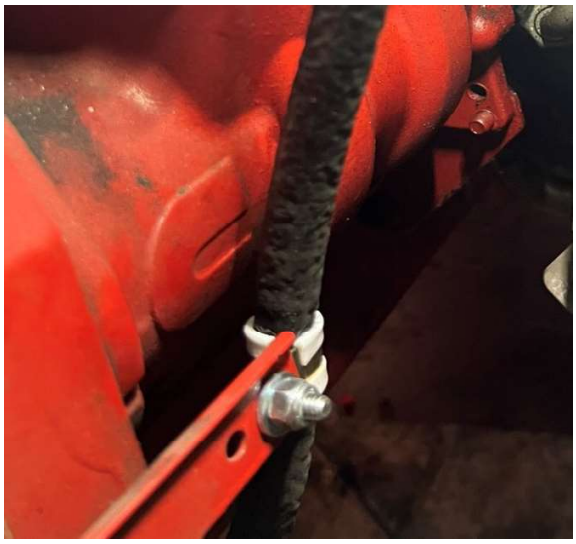


Figure 8: Adel Clamp Installed

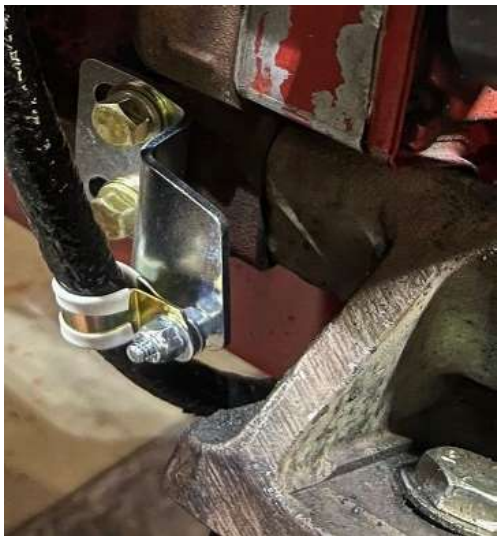


Figure 9: Adel Clamp Installed on Supplied Bracket

7.12 Install the Adel clamp with a flat washer on each side on the 1" long bolt and nut installed in step 7.5 using the nylon locking nut (Figure 9). Do not tighten.

7.13 The hose should have a gentle curve underneath, between the engine oil pan and frame rail (Figure 1, 2). The hose can not rub on the frame, oil pan, or other components.

7.14 Adjust clamps as necessary and tighten.

7.15 Adjust and tighten the supplied bracket and tighten the 90 degree hose end.

8.0 TEST PROCEDURES

The complete coolant system will be pressure tested and checked for leaks**.**

9.0 PERIODIC INSPECTION AND MAINTENANCE

The cooling system will be pressure tested and checked for leaks at every 6000 PMA interval.

Washington Metropolitan Area Transit Authority

BMNT SERVICE BULLETIN

Subject: Cummins National Overhaul Warranty Program (NOW®)

Date: 5/23/2022

SB #: 22-PT-12-00

FROM: Frances Jallu | Jerry Guaracino
THRU: Raphael Alfred Raphael W Alfred
Raphael W Alfred (Jun 10, 2022 09:14 EDT)

TO: Distribution

APPLIES TO: All Revenue Fleets with engines overhauled under the Cummins NOW® Program during Midlife Overhaul.

This Service Bulletin Supersedes SB #14-S-003

As of July 2013, Bus Maintenance enrolled in the Cummins NOW® Overhaul Program. The NOW® program will reduce the cost of engine overhauls and will provide WMATA with a 2 year/100,000 mile/3,600-hour engine warranty.

WMATA Component Overhaul Technicians in the Heavy Overhaul Shop have received extensive training and are NOW® Overhaul Certified by Cummins. During the NOW® overhaul training, these technicians were trained in the inspection/reuse criteria of specific parts and the requirements for their replacement.

For the first 90 days after the bus is placed back in service, any workmanship failures are WMATA's responsibility. After 90 days in service, the engine is covered for workmanship and parts failures by Cummins NOW® Warranty.

Should there be an engine-related failure or a workmanship issue after 90 days in service, contact the BMNT Warranty Department and follow Standard Operating Procedure (SOP) #2.22 found on the BMNT Website to request warranty repairs from Cummins.

Links:

Cummins National Overhaul Warranty Manual

Washington Metropolitan Area Transit Authority

BMNT SERVICE BULLETIN

Subject: Meritor Calipers Install - Overhaul/ Rehabilitation **Date:** 12/31/2022
SB #: 22-CC-12-00

FROM: Abiodun Animashawun | Jerry Guaracino
THRU: Raphael Alfred Raphael W Alfred (Feb 28, 2023 09:38 EST)
TO: Distribution

Applies To: New Flyer Xcelsior Bus Fleets 56 and Newer

The New Flyer Xcelsior bus fleets come equipped with Knorr-Bremse calipers. However, starting with **Fleets 56 (7300-7355)** and **57 (7356-7409)**, the Knorr-Bremse calipers will be replaced with **Meritor EX225 calipers** on all axles during the buses' midlife overhaul/ rehabilitation.

These Meritor calipers are a direct replacement for the Knorr-Bremse calipers. They have been adapted to fit onto the wheel ends of the MAN VOK-07-F steer axle and the MAN HY-1350-F rear axle. **Note: They are not interchangeable with the Meritor calipers used on the Orion or NABI fleets.**

The Meritor caliper kits for overhaul/ rehabilitation consist of the following:

WMATA P/N	MERITOR CALIPER KIT COMPONENTS	AXLES
921720288	CALIPERS (2), BRAKE PAD KITS (1), HARDWARE	FRONT
921720289	CALIPERS (2), BRAKE PAD KIT (1), HARDWARE	REAR

Note the following specifications and procedures for caliper installation and inspection:

- **Caliper (or Carrier) Mounting Bolts Torque Value:**
  - **Front & Rear Axle Caliper Bolts: 288 ft-lb (same as Knorr-Bremse)**
- **Manual Adjustment Procedure**. After brake pad installation, use a 10 mm box-end wrench or socket to tighten the adjusting nut (clockwise) until the pads contact the rotor. Then back off the nut (counterclockwise) **½ turn**. **Caution: Do not exceed 30 ft-lb when turning the adjusting nut in either direction.** Apply the brakes multiple times before measuring the running clearance.
  - **Note**: There is no "clicking" when backing off the adjusting nut on this caliper, but there should be resistance.
- **Brake Temperature Chart**. When measuring brake temperatures, use the MAN-ZF Axle Bus Fleets (Estimated) Rotor Temperatures Chart (See link).

For further information on the Meritor EX225 caliper, refer to Meritor Maintenance Manual MM-0467 EX+™ Air Disc Brake L and H Models (See link).

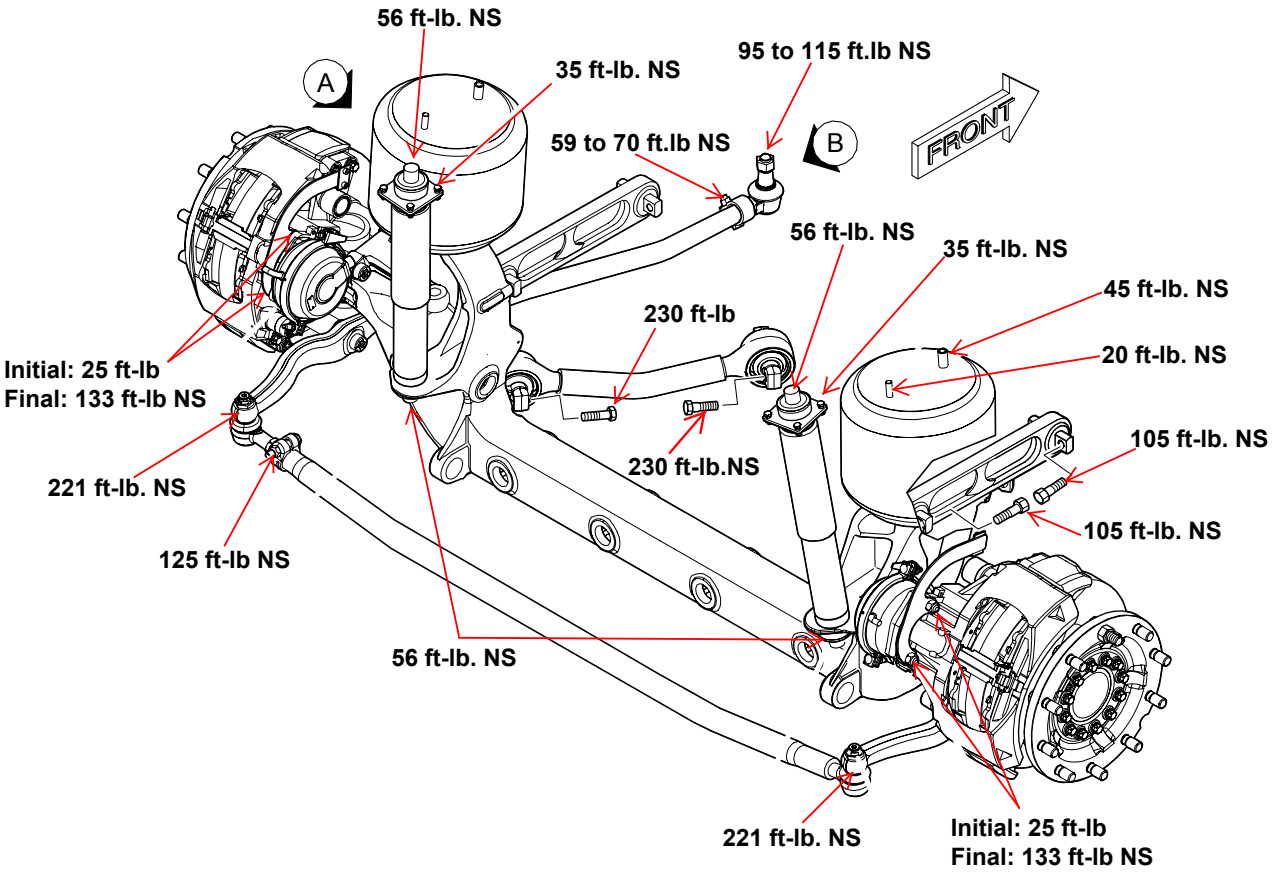
The PM line cards and brake reline job plans of the respective fleets will be updated to reflect the caliper replacement upon completion of the overhaul/ rehabilitation.

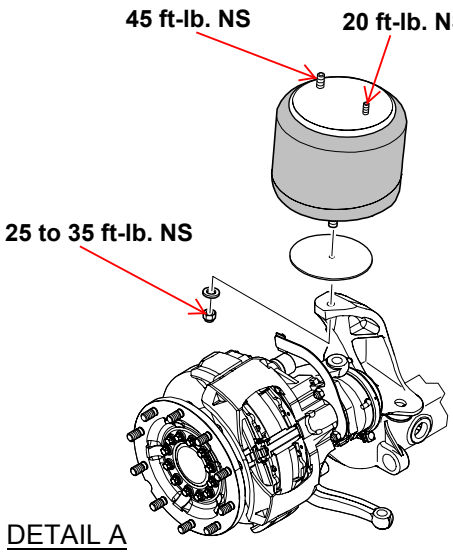
Links:

MAN-ZF Axle Bus Fleets (Estimated) Rotor Temperatures

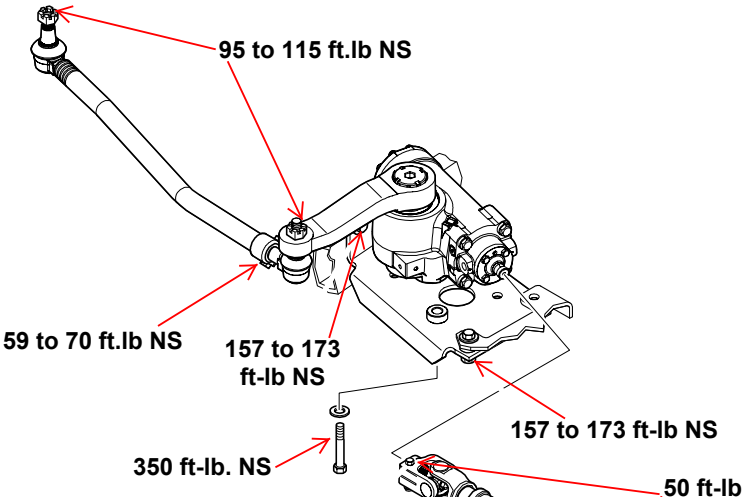
Meritor MM-0467 EX+™ Air Disc Brake L and H Models

7300-7355,
7356-7409
Never-Seez = NS





DETAIL A



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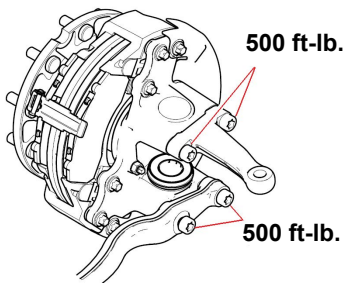
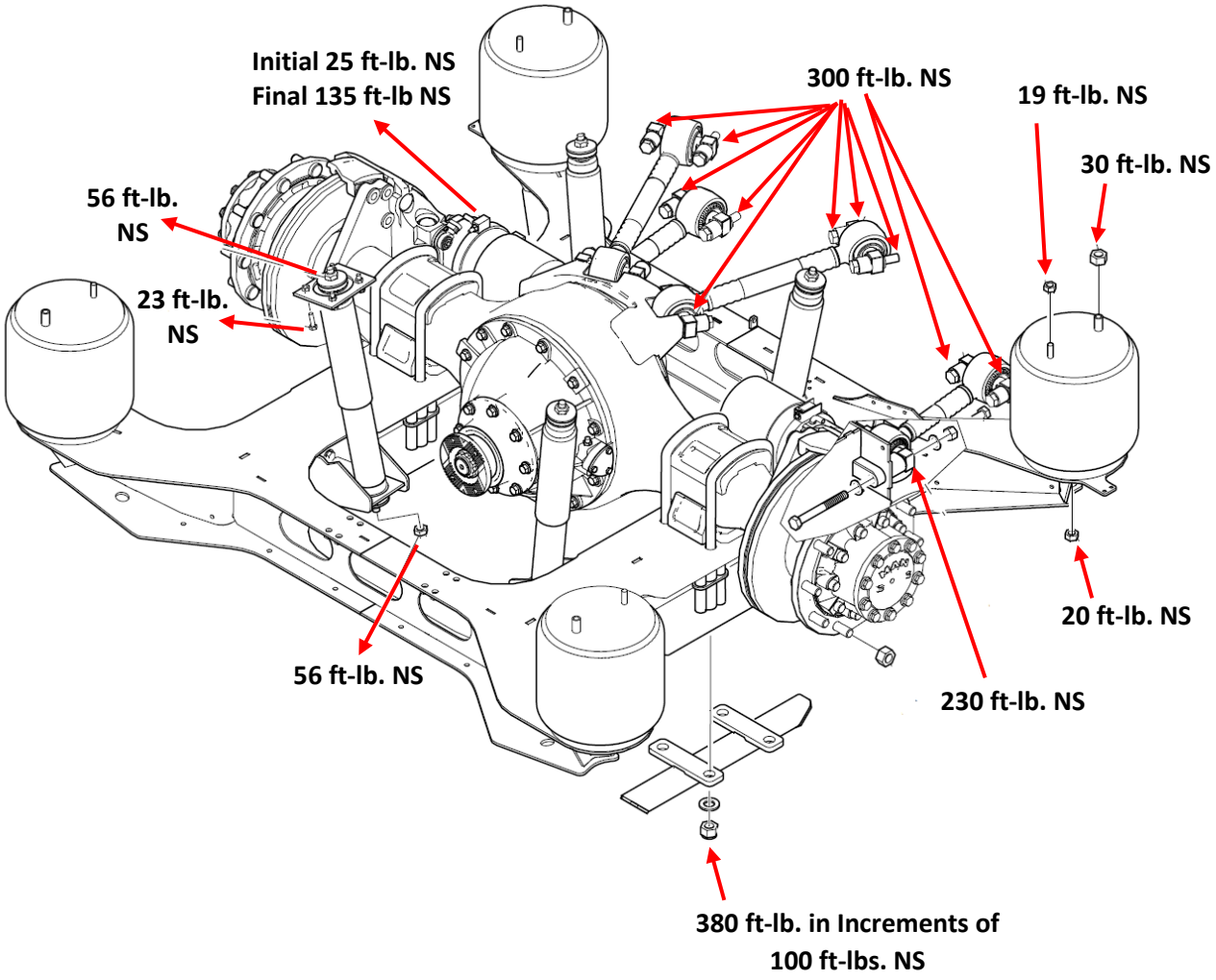


DETAIL B

7300-7409
Never-Seez = NS



7300-7409 Engine Mount Torque

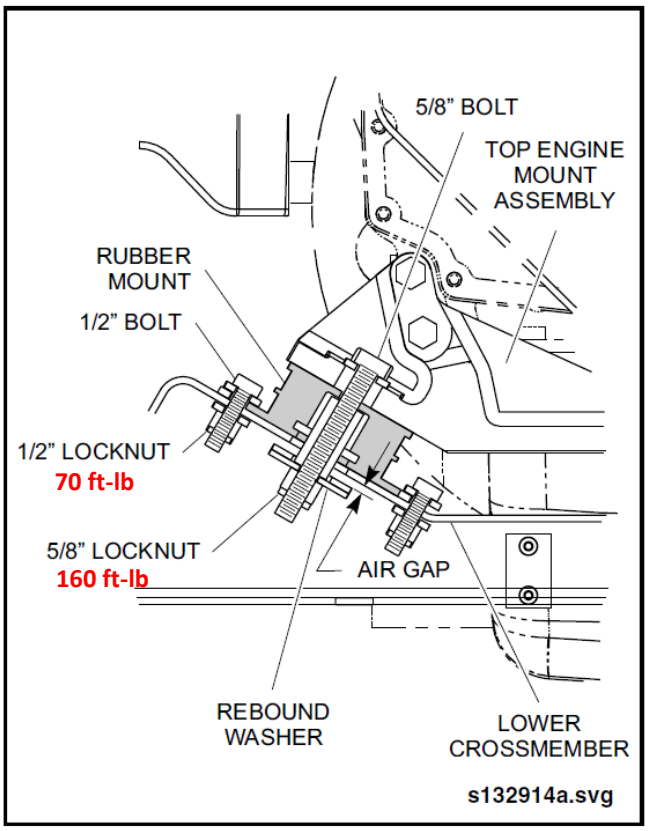


Fig. 4-9: Front Engine Mount Cross-Section

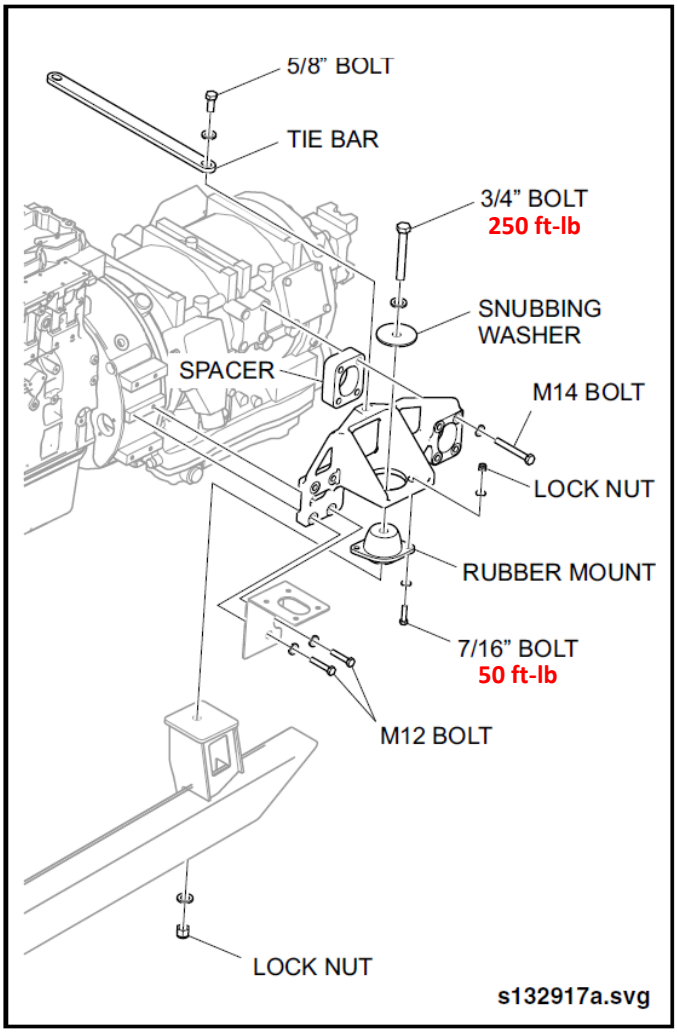


Fig. 4-10: Rear Engine Mount