

GE Transportation

Truck/Bogie Maintenance, PH37ACmi PowerHaul[®] Series Locomotive

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GEK-114519C
Truck/Bogie Maintenance, PH37ACmi PowerHaul® Series Locomotive

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Revision History

Rev	Date	By	Description
NEW	Sep-2009	DAT	Initial release of publication.
A	Jun-2010	JTL	
B	Nov-2010	MDB	
C	Dec-2012	GEM	Revision to section 5.1.9. as per Workflow 77314213 .

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1. GENERAL INFORMATION

1.1. INTRODUCTION

The General Electric PH37ACmi, PowerHaul® Series Locomotive truck is a three-motor, three-axle, high-adhesion-type truck designed to carry one-half the weight of the locomotive (Figure 1).


1.2. RELATED PUBLICATIONS


Table 1. RELATED PUBLICATIONS

Locomotive Wheel Technical Information	GEK-76395
FAG Journal Bearings	GEK-114630
Traction Motor Combo, PH37ACmi PowerHaul® Series Locomotive	GEK-114520
Scheduled Maintenance, PH37ACmi PowerHaul® Series Locomotive	GEK-114501

1.3. SAFETY INFORMATION

Safety precautions that must be observed when working on the PH37ACmi, PowerHaul® Series Locomotive appear throughout this publication. All local safety requirements should be reviewed before beginning maintenance work, and followed.

 **WARNING** Indicates the potential for personal injury.

 **CAUTION** Indicates the potential for equipment damage.

1.3.1. Personal Protective Equipment (PPE)

Appropriate personal protective equipment (PPE) must be worn when working. Follow all work facility recommendations and comply with all regulating agency requirements.

- Safety glasses must be worn at ALL times.
- Latex gloves must be worn to protect the hands when working with fuel, oil, and other lubricants or fluids.
- Suitable ear plugs must be worn to prevent hearing damage when using air-operated tools.
- Knee pads should be worn when kneeling for extended periods of time.

Revisions are indicated by margin bars.

1.3.2. Tool Safety and Use

To ensure the safety of all workers, proper care must be taken when using all hand tools:

- Watch finger clearance when using hand tools.
- Pull hand tools (ratchets, wrenches) towards yourself for better control.
- If unable to pull hand tools, push with an open palm.

Do not use torque wrenches to break bolts loose.

1.3.3. Hydraulic Tool Safety

Hydraulic tools often times use very high pressure. The following precautions must be taken when using hydraulic tools:

- Do not stand directly in front of hydraulic lines.
- Do not check for possible leaks with hands.
- Watch placement of hands and avoid pinch points.
- Be careful when walking near hydraulic tools. Hydraulic supply lines could pose possible tripping hazards.

Ensure hydraulic supply lines are securely attached.

2. CONTROLS AND INDICATORS

Not Applicable

3. FUNCTIONAL DESCRIPTION

Components and features of the truck (Figure 1) include the following elements:

- All three wheel and axle assemblies are powered by a traction motor. Outboard roller bearing axleboxes transfer vertical loads from the frame to the axles and wheels.
- The welded steel frame is supported by twelve coil-compression spring-sets; one spring-set (outer sprinklings direction right, inner sprinklings direction left) located on each side of each axlebox. Four vertical hydraulic dampers are mounted in parallel with the axle springs and are used to dampen spring oscillations. The dampers are mounted at the outboard-axes.
- A center pin on the underside of the locomotive platform fits into a center bearing assembly in the truck frame. The bearing assembly and center pin transmit the tractive force from the truck to the locomotive platform.
- Four laminated side bearers support the vertical load and provide controlled lateral motion between the locomotive and truck. Horizontal dampers mounted between the truck frame and the underside of the locomotive platform provide damping of lateral motions.
- Six air-operated brake cylinders provide braking at each of the truck wheels through composition brake shoes.
- Manual and automatic mechanical slack adjustment to compensate for brake linkage, shoe and wheel wear.
- Two parking brake units are activated and released by the air brake system. They can also be released by a handle located downside of the traction-link support.
- Two front sanding pipes are mounted on railguard brackets on the leading axle.
- Two rear sanding pipes are mounted on the transom of the truck frame on the leading axle.
- Two antennas (TPWS CAH antenna for truck 2 and AWS/TPWS receiver for truck 1) are located below the lifting bracket.

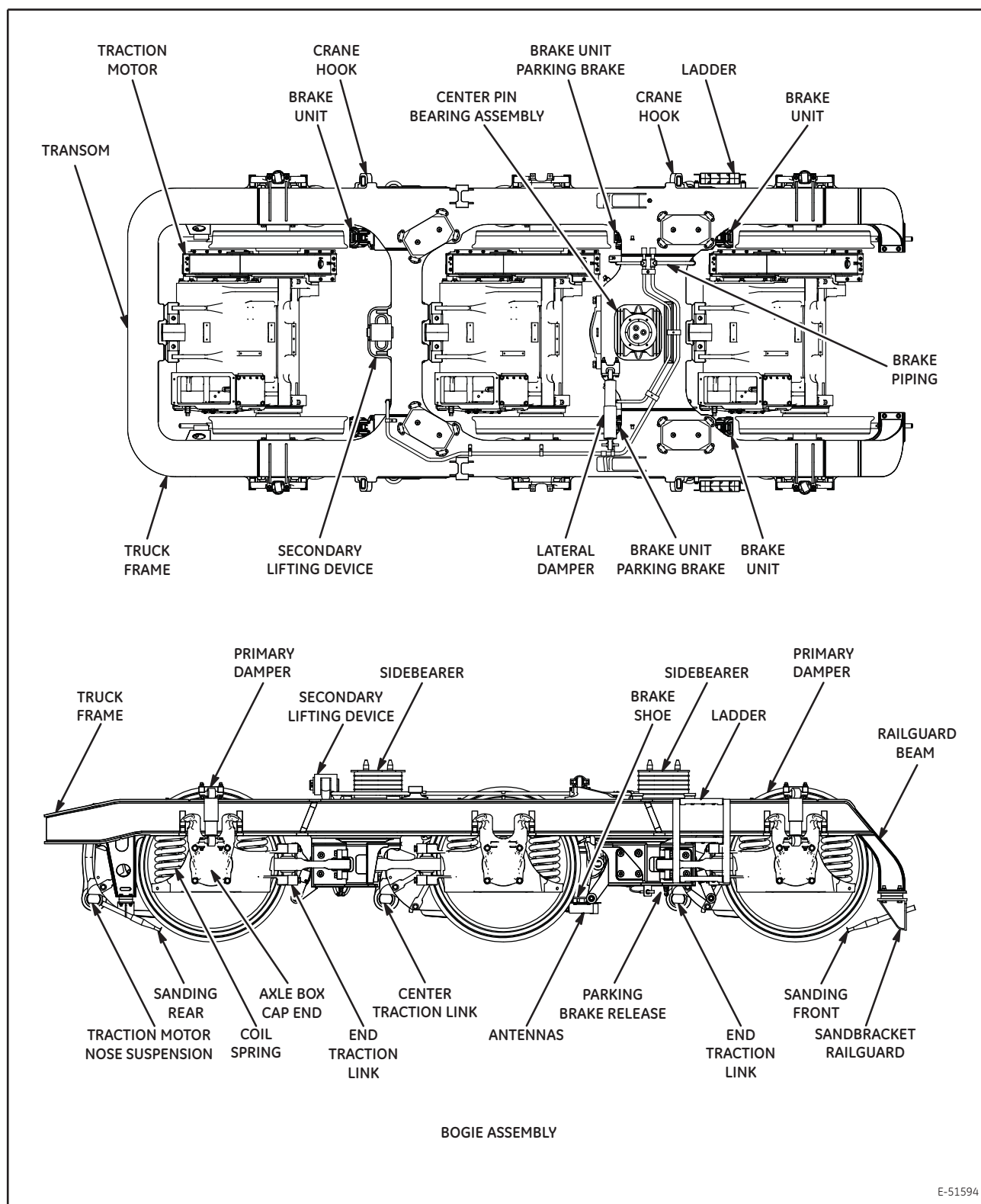


Figure 1. Truck/Bogie Assembly

4. SCHEDULED MAINTENANCE

Not Applicable

5. REMOVAL AND REPLACEMENT

5.1. RUNNING MAINTENANCE

Between scheduled overhauls, perform inspection, service and repair, or refitting/renewing of truck assembly components according to the publications listed in section 1.2., *RELATED PUBLICATIONS*.

5.1.1. Traction Motors

Refer to Section 5.5.1., REMOVE TRACTION MOTOR ASSEMBLY FROM INSTALLED TRUCK, of this publication for instructions for the removal of a motor, wheel and axle assembly from an installed truck.

5.1.2. Wheels

Refer to GE publication **GEK-76395, LOCOMOTIVE WHEEL TECHNICAL INFORMATION**, for locomotive wheel maintenance information.

5.1.2.1. Shimming

Weight distribution on each axle of the truck is nearly equal when new wheels have been applied. Wear and wheel change-outs may cause wheel diameter to become unequal resulting in greater differences in weight distribution between the axles. Use of shims allows greater differences in wheel diameter between the axles while keeping axle loading uniform.

NOTE: The diameter of a wheel set is the average diameter of the two wheels on an axle.

Differences in diameter between any two wheel sets in a truck should be less than 19.1mm (0.75 in.) if shimming is not used.

A difference up to 31.8mm (1.25 in.) is allowed if shims are used at the primary springs. The same 31.8mm (1.25 inch.) difference is allowed between any two wheel sets on different trucks.

NOTE: Although 31.8 mm (1.25 in.) difference in wheel diameter is acceptable as a limit, wheel diameter variations greater than 25 mm (1.0 inch) can reduce locomotive performance.

The following important factors pertaining to shimming must be understood and observed:

1. Any mismatch in traction motor electrical characteristics is magnified as differences in wheel diameters increase. This may lead to possible traction motor overloading.
2. Wheel slip is detected by comparing axle speeds (revolutions per minute) or by comparing motor currents. Both values are directly related to wheel diameter. The greater the difference in diameters, the more any differences in axle speeds or motor currents are exaggerated. Thus, reduced locomotive performance from false wheel slip indications becomes more likely. GE therefore recommends that wheel diameter variations must never exceed 25 mm (1.0 in.).

3. Wheel set shimming, if used, must be carefully and accurately readjusted each time wheels are turned or wheels sets changed out.

NOTE: Each shim consists of outer-shim and inner-shim.

With shims inserted between the coil springs and the truck frame, equal axle loading can be maintained up to 31.8 mm (1.25 in.) difference in wheel diameter. Determine the proper amount of shimming at each axle as follows:

1. Measure all the wheels on the locomotive. The average RADIUS for each wheel set is used.
2. Determine the RADIAL differences between the largest wheel set and each of the other wheel sets. No shims will be applied to the largest diameter wheel set.
3. Using the RADIAL differences, consult Table 2 to determine the thickness of shims to be used on each of the other axles. The same size shim combination must be used on both ends of each axle. Consult Table 3 for shim dimensions and part numbers.

Table 2. SHIM SELECTION

WHEEL SET RADIAL DIFFERENCE MM (IN.)	SHIM THICKNESS REQUIRED MM (IN.)	RESULTING EFFECTIVE DIFFERENCE
0	0	0
3.2 (0.12)	3.2 (0.12)	0
3.2 (0.12)	3.2 (0.12)	0
7.9 (0.31)	7.9 (0.31)	0
9.5 (0.37)	6.3 (0.25)+ 3.2 (0.12)	0
11.1 (0.44)	7.9 (0.31)+ 3.2 (0.12)	0
*11.1 (0.44)	11.1 (0.44) or 7.9 (0.31) + 3.2 (0.12)	0
* Maximum thickness of shims is 11.1 mm (0.44 in.)		

Table 3. SHIMS

*SHIM QUANTITY	*SHIM THICKNESS MM (IN.)
4 shim sets required per wheel set	3.2 (0.12)
	6.3 (0.25)
	7.9 (0.31)
	11.1 (0.44)
* All shims are mild steel	

Shims are inserted between the coil springs and truck frame as follows:

1. Remove the axlebox, disassemble the hexagon mounting bolts of the traction link at the side of axlebox Figure 2, lower the traction motor, wheel and axle set until the coil springs can be removed.
2. Place the shims as required between the coil springs (inner and outer shim) and truck frame (Figure 3). Ensure that the inner and outer shim have the same thickness.
3. Reinstall the coil springs and raise the traction motor, wheel, and axle set into position.
4. Remount the axle bearing with axlebox and outer cover, tightening the bolts from the traction links and other bolts shown in section 6., SUMMARY DATA, of this publication.

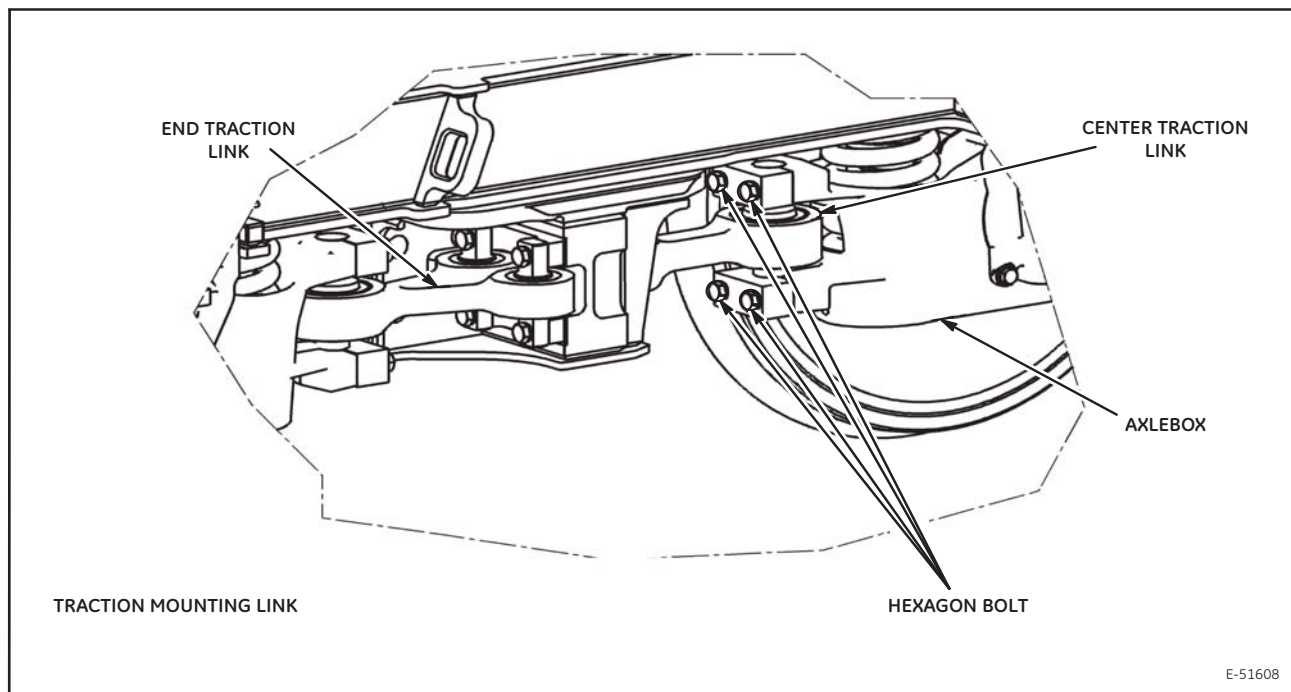


Figure 2. Traction Mounting Link

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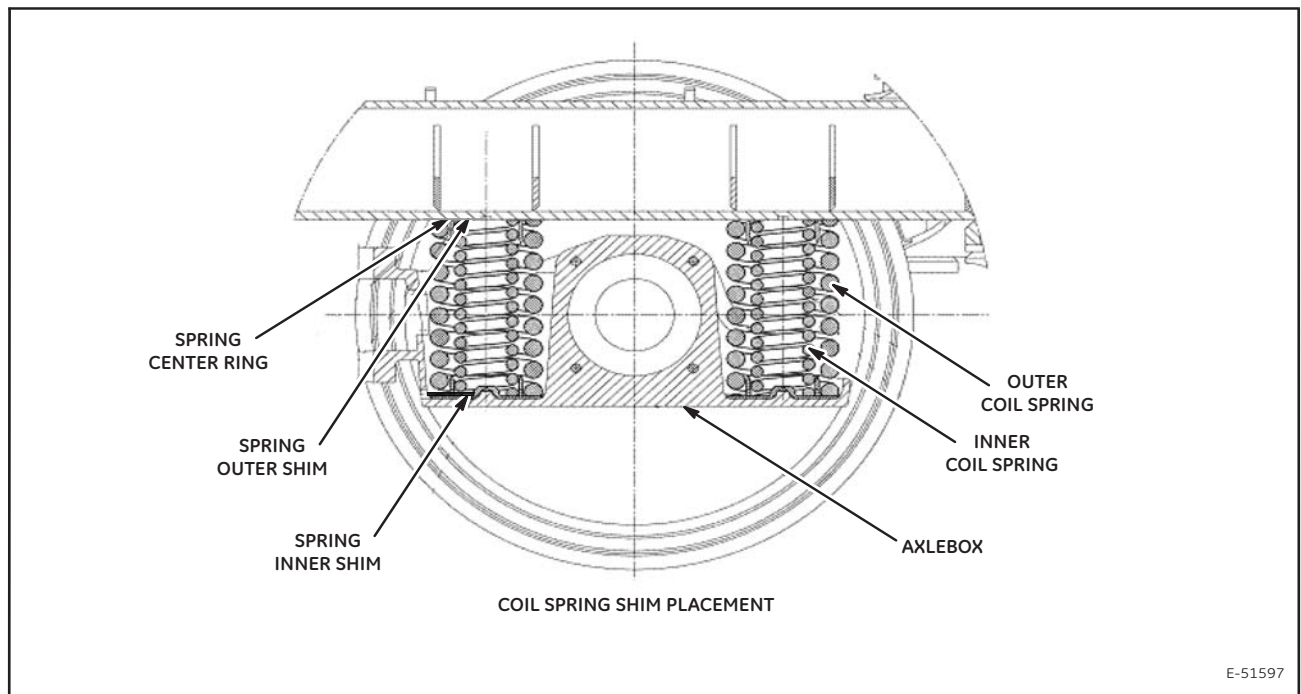


Figure 3. Coil Spring Shim Placement

5.1.3. Traction Links

The wheel sets are guided by traction links between the axlebox and the truck frame.

The end axles have triangle traction links, the middle axles have straight traction links (Figure 4).

The traction links stabilize the axles against braking and power transmission forces. The straight link contains two rubber bushings, the triangle link contains three rubber bushings.

The rubber bushings are maintenance-free.

5.1.3.1. Inspection

Periodically check the tightness of the hexagon bolts (Figure 3). For torque, refer to section 6., SUMMARY DATA, of this publication.

NOTE: Visually check the rubber bushings for damage, scratches in the rubber structure and crumbles.

5.1.3.2. Replace or Renew

Due to the influence of UV radiation and environment, rubber components have a limited durability. During overhaul all rubber bushings must be replaced/renewed.

5.1.4. Brake Shoes And Rigging



Do NOT lubricate brake rigging pins, bushings or wear plates. Grease or oil on exposed wear surfaces collects sand, dirt and grit, which causes wear surfaces to wear more rapidly.

5.1.4.1. Inspection

Inspect adjustment and condition of the brake rigging components per the following instructions. Make adjustments and repairs as required.

1. Check all brake shoes for wear periodically. If the brake pad thickness is worn to less than 13 mm (0.5 in.) at any point, replace the brake shoe according to section 5.2., BRAKE SHOE RENEW/REFIT, of this publication.
2. Check that the brake shoes are not binding against the wheel tread surface or flange. Correct any binding conditions found.
3. Inspect the brake linkage for missing, broken or loose parts. Also inspect for badly worn pins, bushings, or wear plates.

NOTE: If the brake units are not functional, remove the hexagon bolts as shown in Figure 6, and remove the brake-unit. Renew/refit the brake-units as required.

4. Check the clearance between brake shoes and wheels. If clearance is more is more than 10 mm (0.40 in.) readjust according to section 4.5.2., BRAKE SYSTEM ADJUSTMENT, of this publication.

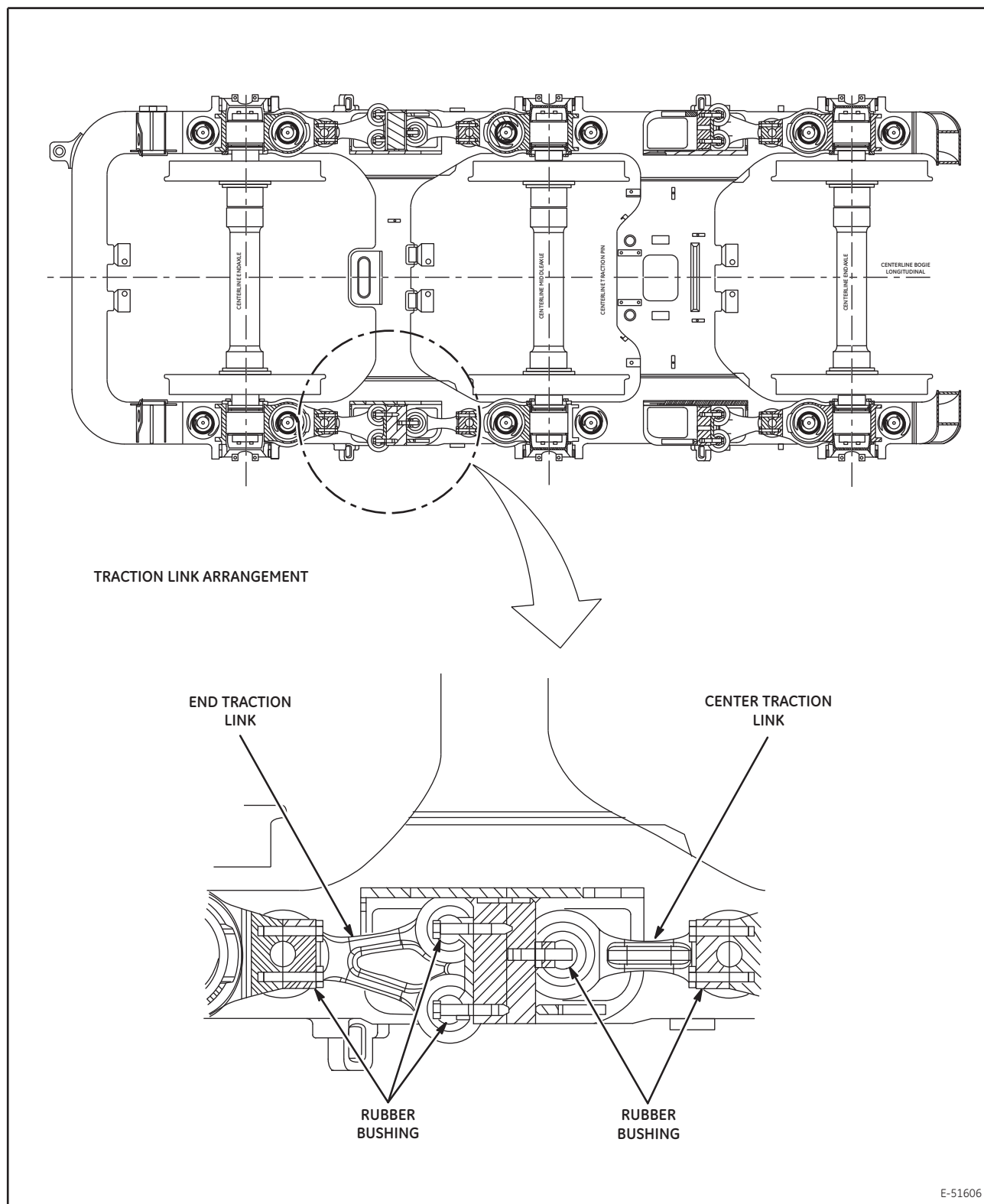


Figure 4. Traction Link Arrangement

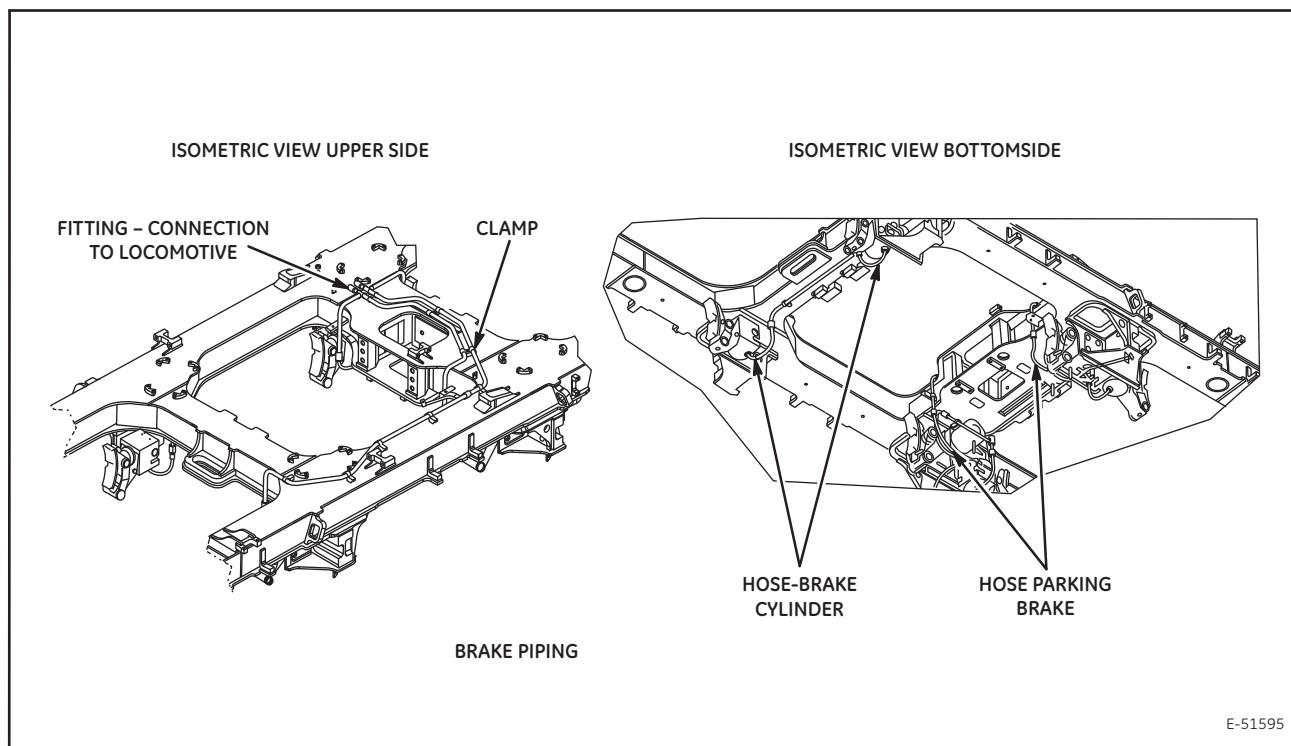


Figure 5. Brake Piping

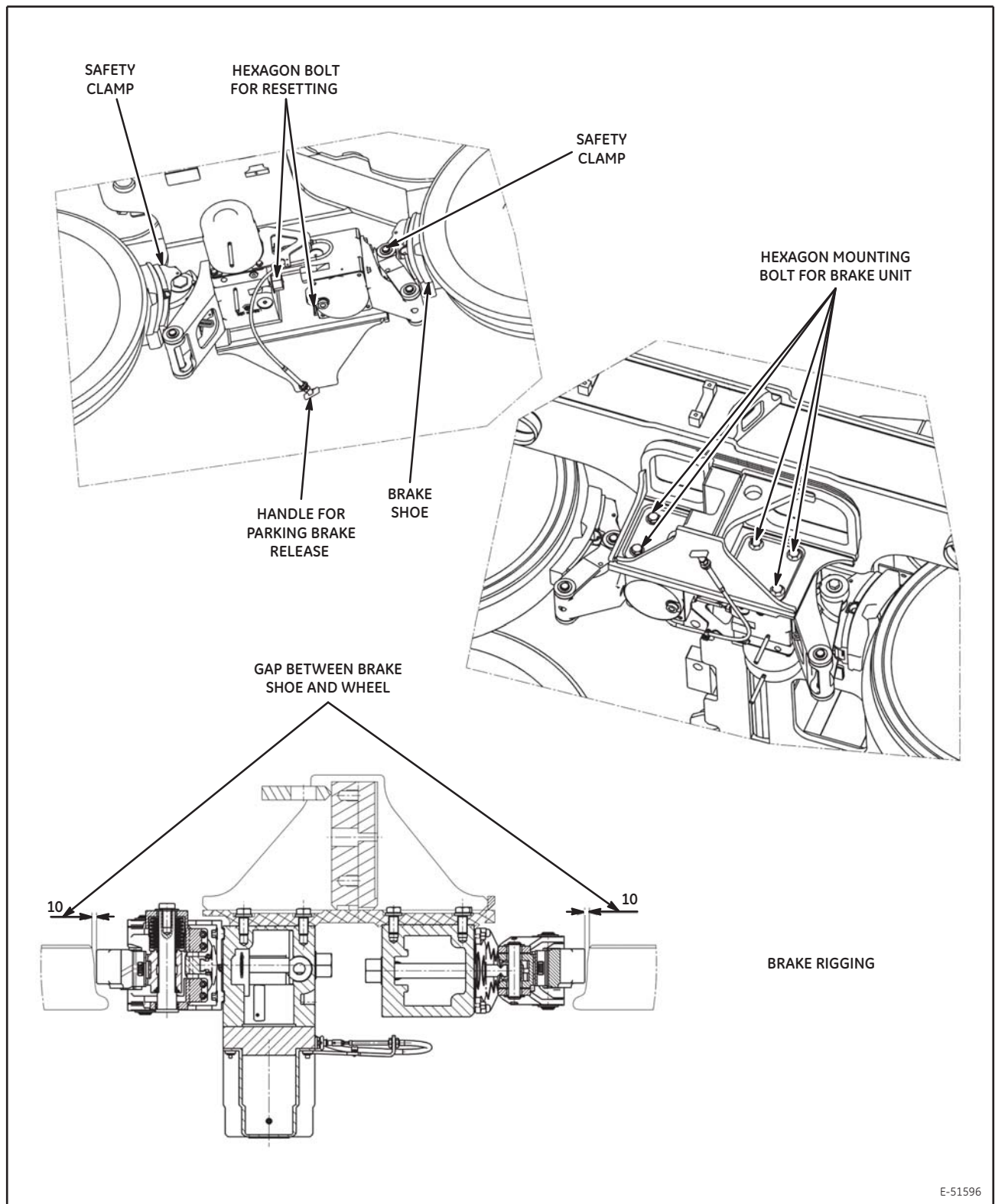


Figure 6. Brake Rigging

5.1.4.2. Brake System Adjustment

1. Chock at least two sets of truck wheels to prevent locomotive from rolling in either direction.
2. Release the parking brake (if set), and allow time for the truck wheels to seat against the wheel chocks. Refer to (Figure 6).

WARNING

Ensure the truck wheels are chocked and release the parking brake before cutting out the brake cylinder air. Also, ensure air is cut out to only one truck at a time. Unexpected motion can occur if the wheels are not chocked, if the parking brake is set when brake air is released, or if the air is cut off to both trucks at one time. Unexpected rolling of the locomotive can cause personal injury or death.

3. With the locomotive secure, locate the truck air cut-out cock on the truck. Close only the truck cut-out cock for the truck being worked on and exhaust the air from the brake cylinders of that truck.
4. To adjust the brake system, turn the hexagon resetting bolt. Adjust at the backside of the brake unit (right hand) until the clearance between the brake shoe and the wheel is nearly 10mm (0.40 in.) Refer to Figure 6.
5. Perform a function control (apply and release), then check the clearance between brake shoe and wheel.

NOTE: If slack adjuster is near the adjustment limit, check for excessively-worn brake shoes or brake linkage components. Replace any parts that are no longer serviceable.

6. Check the adjustments and brake-clearance at all other truck wheels.
7. Open the truck air cut-out cock to supply air pressure to the brake system. Check for proper operation of the adjusted air brakes.

NOTE: Refer to GEJ-7021, section 3.4.1. Manual Park Brake Release, for additional information.

5.1.5. Brake Piping

Perform the following inspections at 12 month intervals:

1. Visually check the weld fittings for damage, deformation, displacement, and tightness. If any defects exist, replace the defective part(s).
2. Check that all clamps and adaptors are securely fastened.
3. Check the hoses for deformation, any damage, scratches in the rubber structure, and crumbling.

NOTE: After a period of six years replace all hoses and perform a tightness-test.

5.1.6. Traction Motor Nose Suspension

Inspect the traction motor nose suspension assemblies (Figure 5) for separation of laminations, badly eroded rubber laminations or cracked or broken parts.

Visually inspect each suspension link for defective rubber mounting bushings. If the mounting bushings are worn, binding, badly eroded, or missing, replace the suspension link. Also, check for loose or missing mounting hardware.

⚠ CAUTION

The suspension link is disconnected by cutting the CAMCAR with a torch or hydraulic splitter. If a torch is used, form a shield to protect the rubber parts of the suspension link from heat damage, and use extreme care. Do NOT reuse the bolts, washers or nuts.

⚠ CAUTION

Do NOT replace CAMCAR bolts and nuts with ordinary fastener bolts and nuts. Bolts and nuts may loosen during locomotive operation, and cause the traction motor to fail and/or cause other equipment damage. Refer to the applicable GE parts bulletin for recommended replacement parts.

5.1.7. Traction Pin Arrangement

5.1.7.1. Mounting or Dismounting

The traction pin fits into a center bushing mounted in the truck frame. The center bushing is supported on both sides by traction pads to transmit the tractive and brake-forces from the truck to the locomotive platform.

In dismount condition, the height of the traction pad is increased to achieve dynamic stabilization.

The Traction Pin Assembly is shown in Figure 7:

1. To compress the traction pads on both sides of the traction bracket, screw in the mounting bolts [length 200 mm (7.87 in.)].
2. In two to four increments, press the traction bracket into the traction pin.
3. Afterwards, tighten the hexagon bolts and torque to the value given in section 6., SUMMARY DATA, of this publication.
4. Install the traction pads assembly in the reverse order of removal.

5.1.7.2. Inspection

Visually check the center block, traction-pads, retainer-bushing and lateral bumper for deformation, partial damage, scratches in the rubber structure, and crumbles.

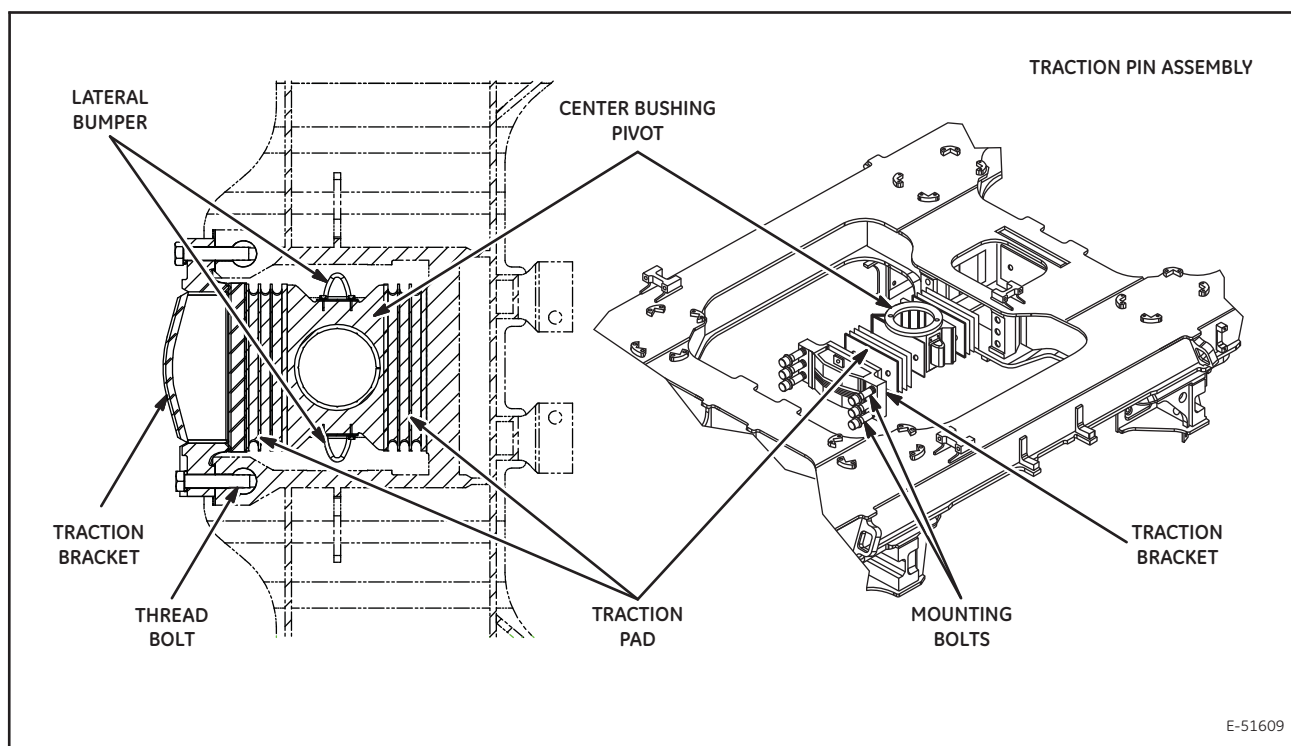


Figure 7. Traction Pin Assembly

Also, check that the mounting bolts for the traction bracket are securely fastened. Check the torque, refer to section 6., SUMMARY DATA, of this publication.

NOTE: During overhaul traction pads and lateral bumpers must be replaced.

5.1.8. Sidebearers

The rubber side bearers (Figure 8) consist of alternate layers of steel laminations and rubber which are bonded together and function to transmit the weight of the locomotive to the trucks, while permitting controlled lateral motion of the trucks relative to the locomotive platform.

The side bearers are installed on the top of the upside of the truck frame.

5.1.8.1. Inspection

Visually check the side bearers for extreme wear or separations of the rubber and steel laminations. Look for deformation, partial damage, scratches in the rubber structure, and deterioration.

Replace any defective side bearers. Obtain correct procedures for defective side bearer replacement from your GE Field Service representative.

NOTE: Due to the effects of UV-radiation and environmental conditions rubber components have a limited durability. During overhaul all rubber bushings must be replaced.

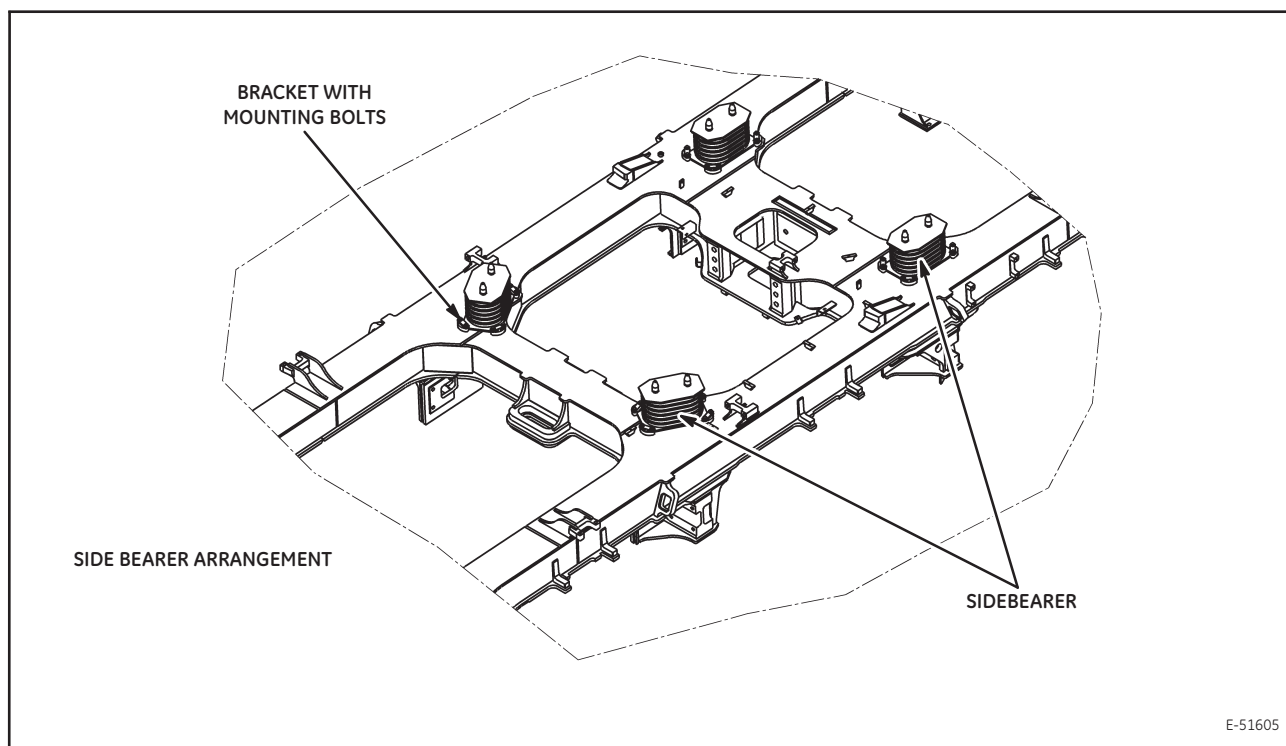


Figure 8. Sidebearer Arrangement

5.1.9. Dampers

5.1.9.1. Visual Inspection

1. **Dirt and Oil.** Rail operations expose locomotive dampers to dirt, oil and particulates from outside sources. The accumulation covering the outer surface of the damper is normal and has no adverse effects on the damper's performance. The dampers dust cover and rubber bellow protect the piston rod and rod seals.
2. **Oil leakage.** New locomotive dampers will show oil lost during the first service period and as a result are suspected of leakage. In most cases this is assembly lube which has nothing to do with oil leakage.
3. **Assembly Oil.** Several different lubricants and fluids are used in the construction of locomotive dampers. Assembly oils or greases are yellow, black or white in color, and can be easily distinguished from the red hydraulic damping fluid. When the damper is new, the assembly lube may cause a slightly moist rod or body. If this occurs, simply wipe off the excess oil and return the damper to service. If a new damper has red oil droplets, the damper should not be installed.
4. **Sweating.** For a long service life, it is necessary for the rod oil seal to remain lubricated. The continuous inward and outward movement of the piston rod may cause oil "sweat" from the rod oil seal. This loss of oil can be recognized by the outside of the damper being slightly moist and dirty. A slight oil sweating will not affect the damping force and the damper may remain in service.
5. **Droplets.** If red droplets of oil are clearly formed or the damper body is wet with hydraulic fluid, the damper must be replaced.



Figure 9. Dampers

5.1.10. Lateral Damper

NOTE: Lateral hydraulic dampers are sealed at manufacture and cannot be refilled with fluid. Leaky dampers must be replaced.

The Lateral Damper Arrangement is shown in Figure 9.

5.1.10.1. Inspection

Visually inspect the lateral hydraulic damper for leakage or defective rubber mounting bushings. A light film of hydraulic fluid on the body is normal. If the body is wet with fluid, or the mounting bushings are damaged, worn, or binding, replace the lateral damper.

Refer to the applicable GE Parts Bulletin for the recommended replacement part number.

5.1.11. Vertical Dampers

The vertical dampers (or primary dampers) are located only at the end axles, parallel between the primary coil springs mounted on the outer cover (Figure 10).

NOTE: Vertical hydraulic dampers are sealed at manufacture and cannot be refilled with fluid. Leaky dampers must be replaced.

5.1.11.1. Inspection

Visually inspect the vertical hydraulic damper for leakage or defective rubber mounting bushings. A light film of hydraulic fluid on the body is normal. If the body is wet with fluid, or the mounting bushings are damaged, worn, or binding, replace the vertical damper.

Refer to the applicable GE Parts Bulletin for the recommended replacement part number.

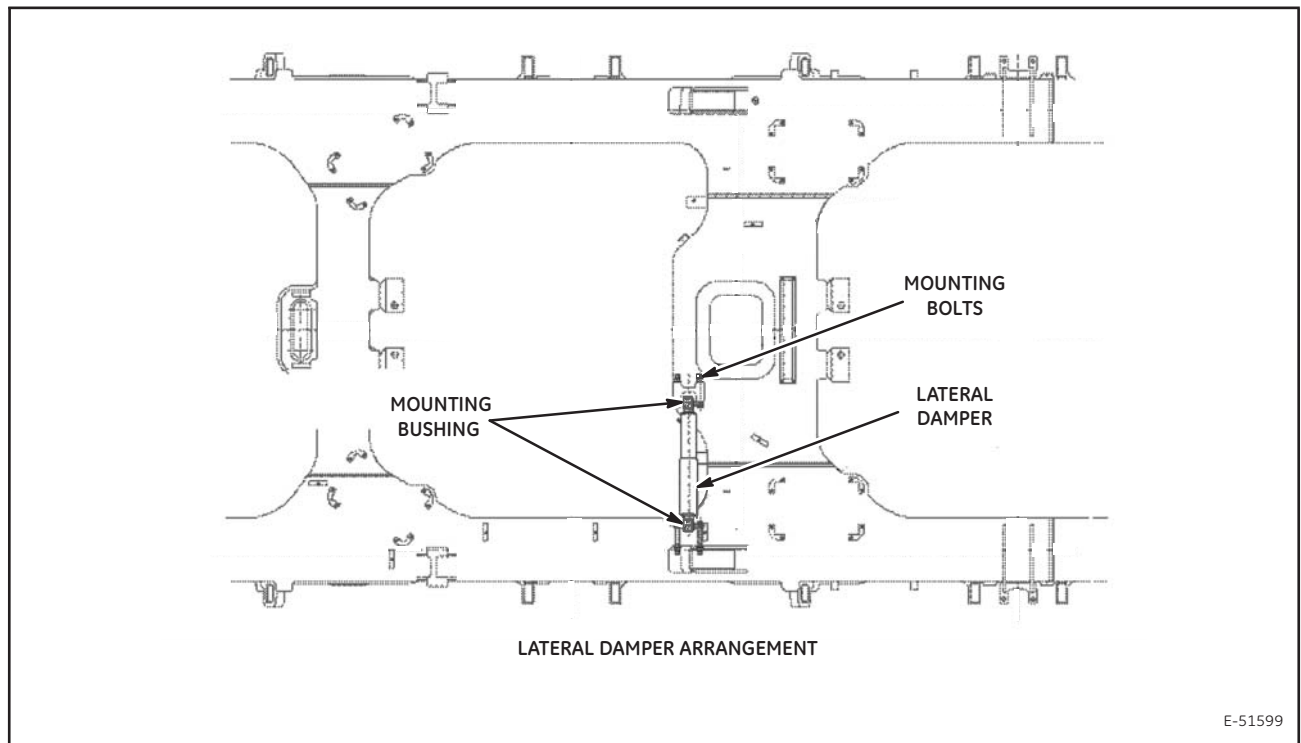


Figure 10. Lateral Damper Arrangement

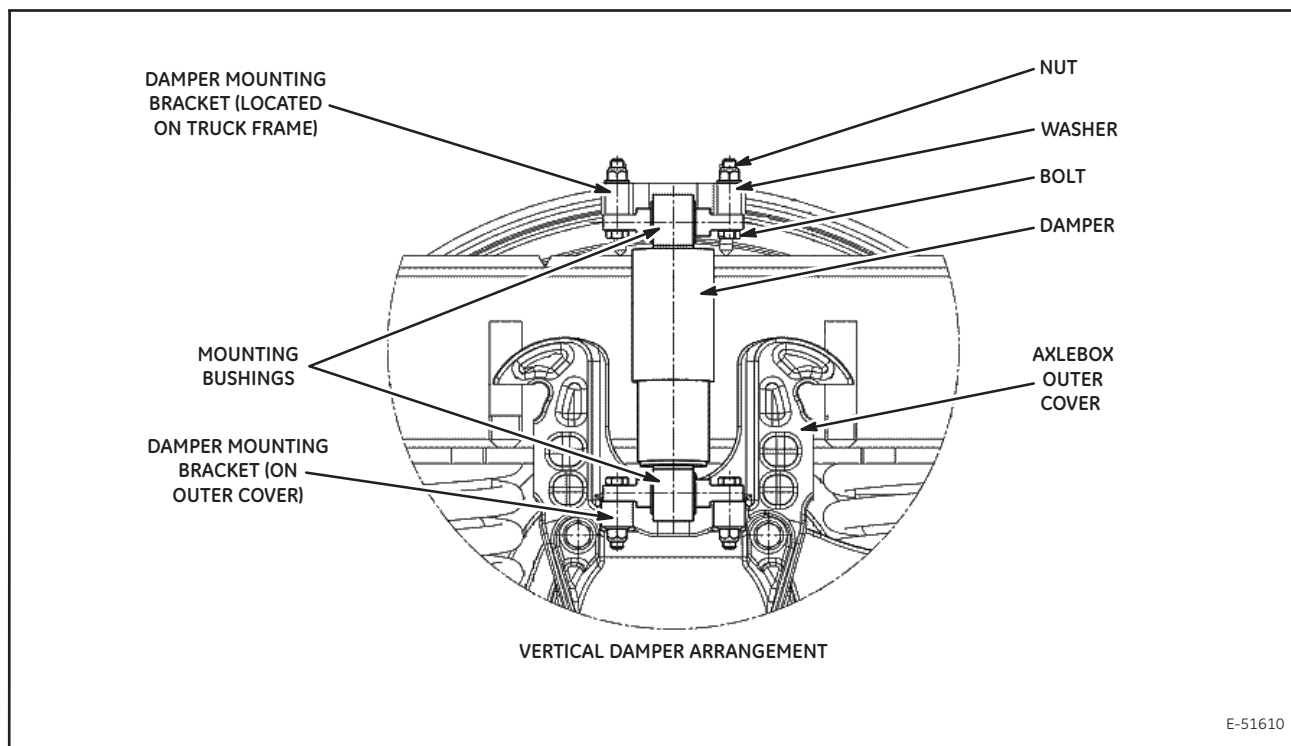


Figure 11. Vertical Damper Arrangement

5.1.12. Coil Springs

NOTE: Removal of the coil springs is performed as a part of the motor, wheel and axle removal procedure to follow. For purpose of visual inspection, raise the weight of the locomotive and truck from the axles to expose the springs for viewing.

5.1.12.1. Inspection

Visually inspect the spring coils for breaks, cracks, vertical wear flats, deep nicks, gouges or other signs of spring damage. If visible damage to the spring coils indicates that the useful life or performance of the springs may be limited, replace the springs.

After replacing, check the springs for the correct position (Figure 11).

5.1.13. Safety Hooks – Lifting Device

Figure 12 and Figure 13 display Safety Hooks and Lifting Devices.

Safety hooks (or wheelbase, Figure 12) for wheelbase are located on each axlebox at the outer cover.

On the truck there are (Figure 13):

- Lifting brackets below the traction pin arrangements.
- A lifting rod in combination with transom between middle and end axle.

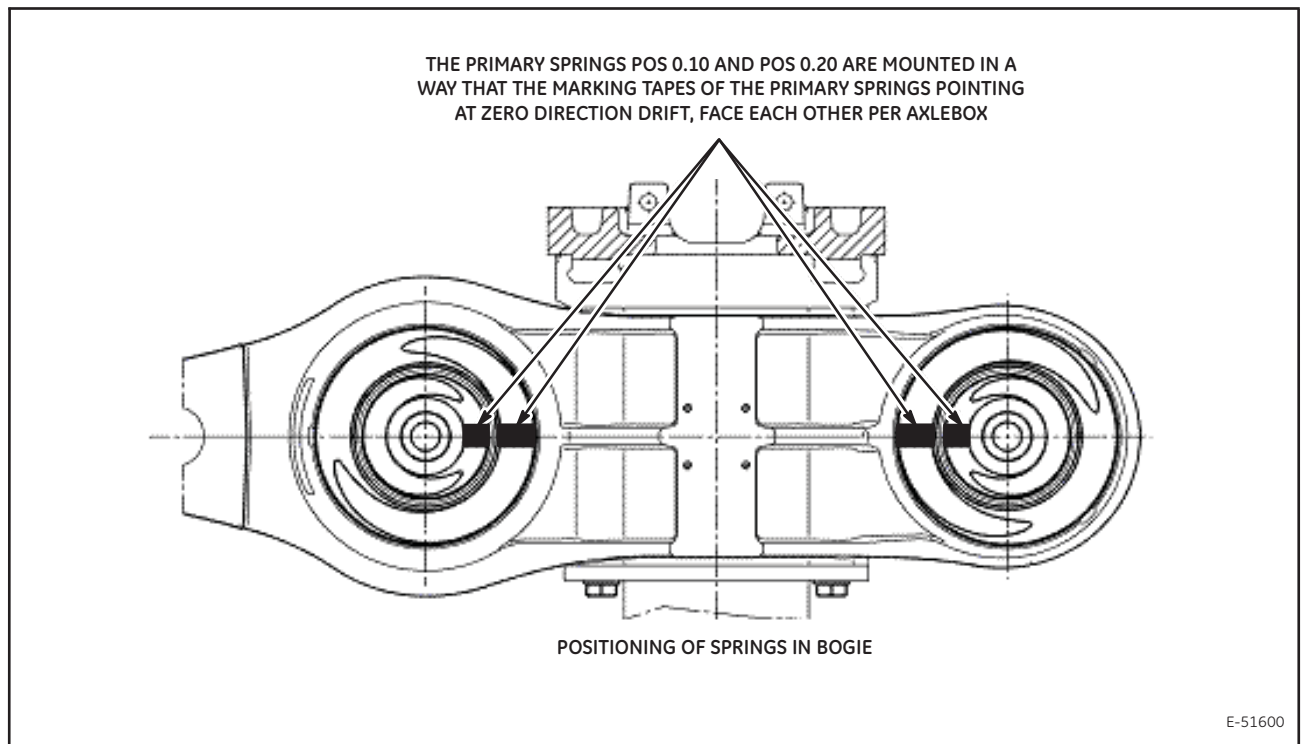


Figure 12. Positioning of Springs In The Truck

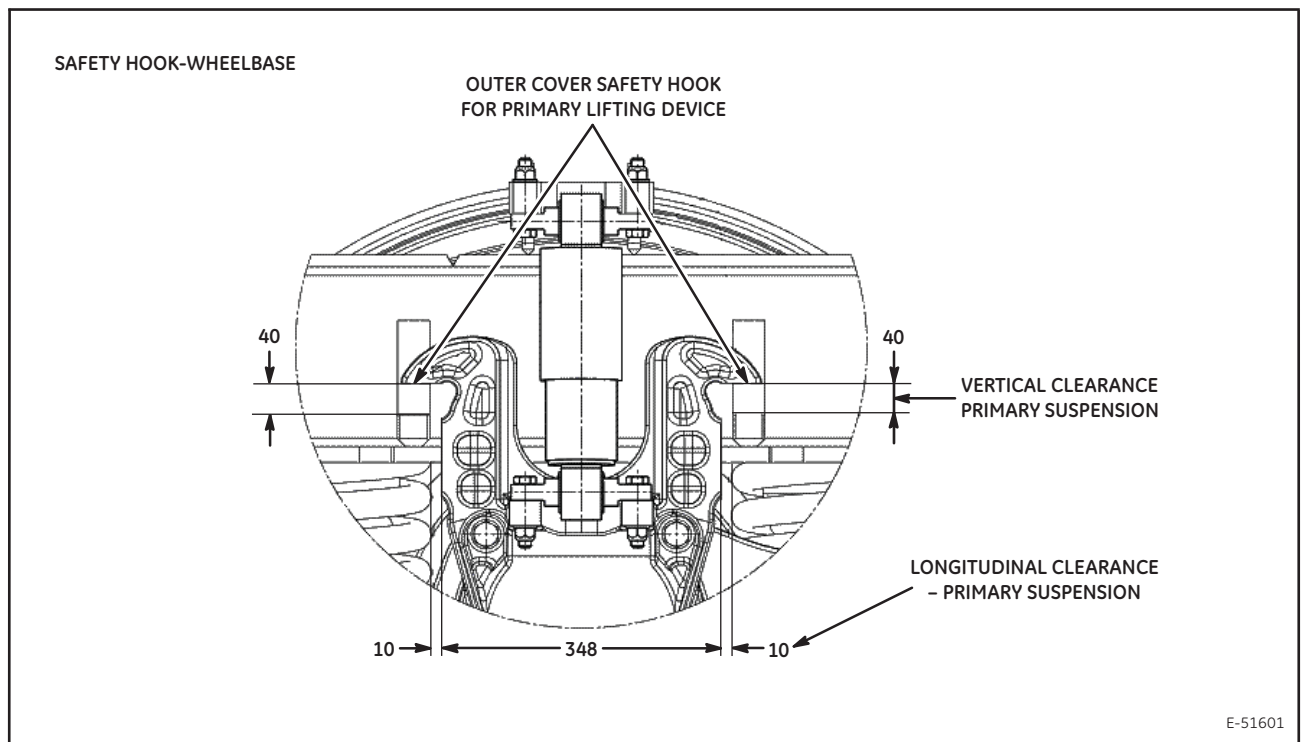


Figure 13. Safety Hook-Wheelbase

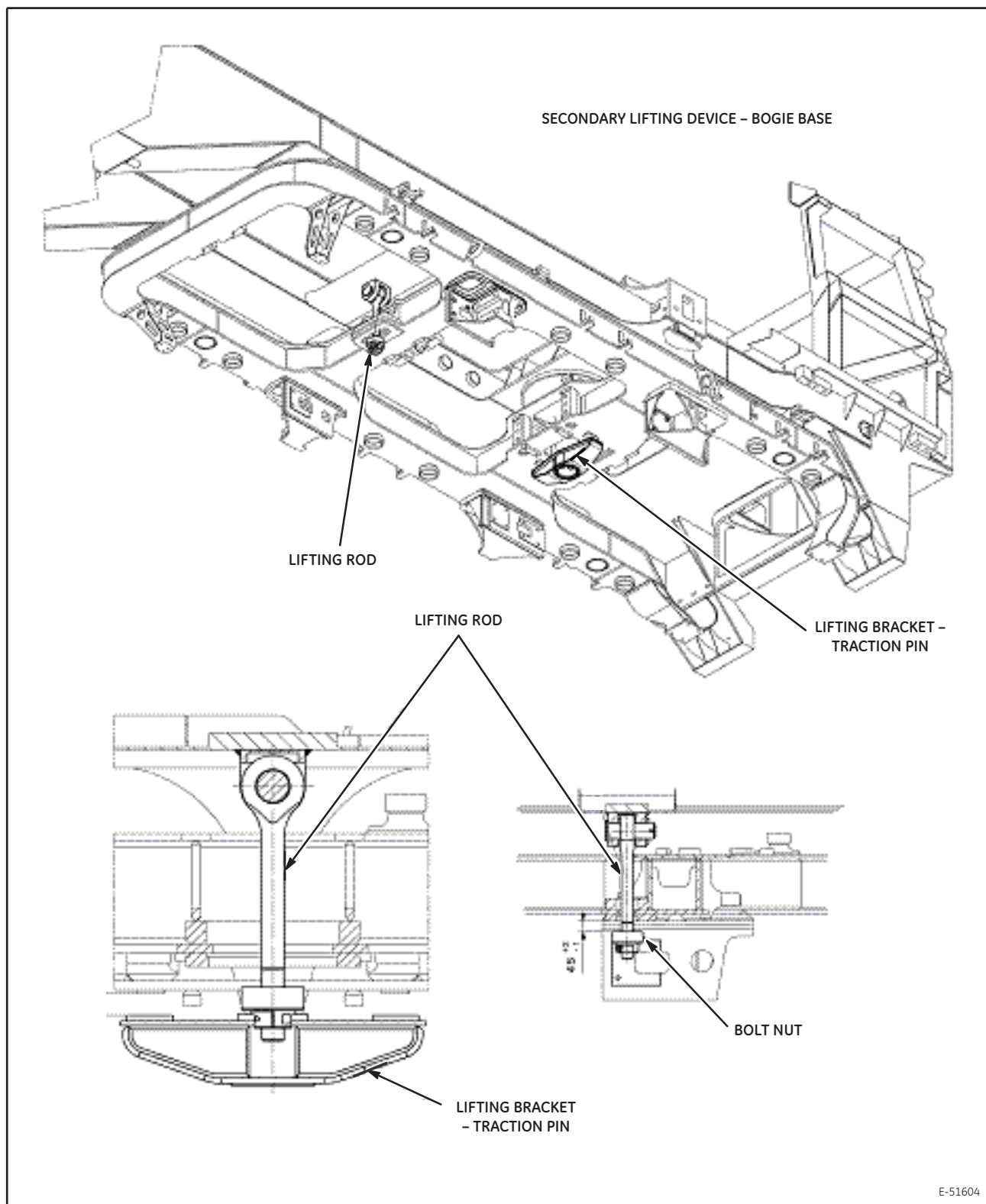


Figure 14. Secondary Lifting Device-Truck Base

5.1.13.1. Inspection

1. Visually check the clearance of the safety hooks in Figure 12 and Figure 13.

NOTE: The vertical clearance — primary suspension 40 mm (1.57 in.) is relevant for new truck and new wheel diameter. If the wheels are worn refer to section 4.3.1., SHIMMING. After addition of the shims, subtract 40 mm (1.57 in.) from the thickness of shims. The result is the actual vertical clearance.

2. Check the clearance of lifting bracket [47.6 mm (1.87 in.)] and lifting rod [45 mm (1.77 in.)].

5.1.14. Sanding Front

There are four sanding pipes located at the outboard wheels of each truck. Refer to Figure 14.

NOTE: For wheel wear and wheel change-outs, sanding bracket and railguard beam of the truck frame shims need to be adjusted. According with wheel wear remove shims and place them below the sanding bracket at the hexagon bolt head. The same bolt length will be used.

5.1.14.1. Sanding Rear

There are four sanding pipes located at the inboard wheels (pointing to the middle of the locomotive) of each truck at the transom. Refer to Figure 15.

NOTE: For wheel wear and wheel change-outs, sanding bracket and railguard beam of the truck frame shims need to be adjusted. According with wheel wear remove shims and place them below the sanding bracket at the hexagon bolt head. The same bolt length will be used.

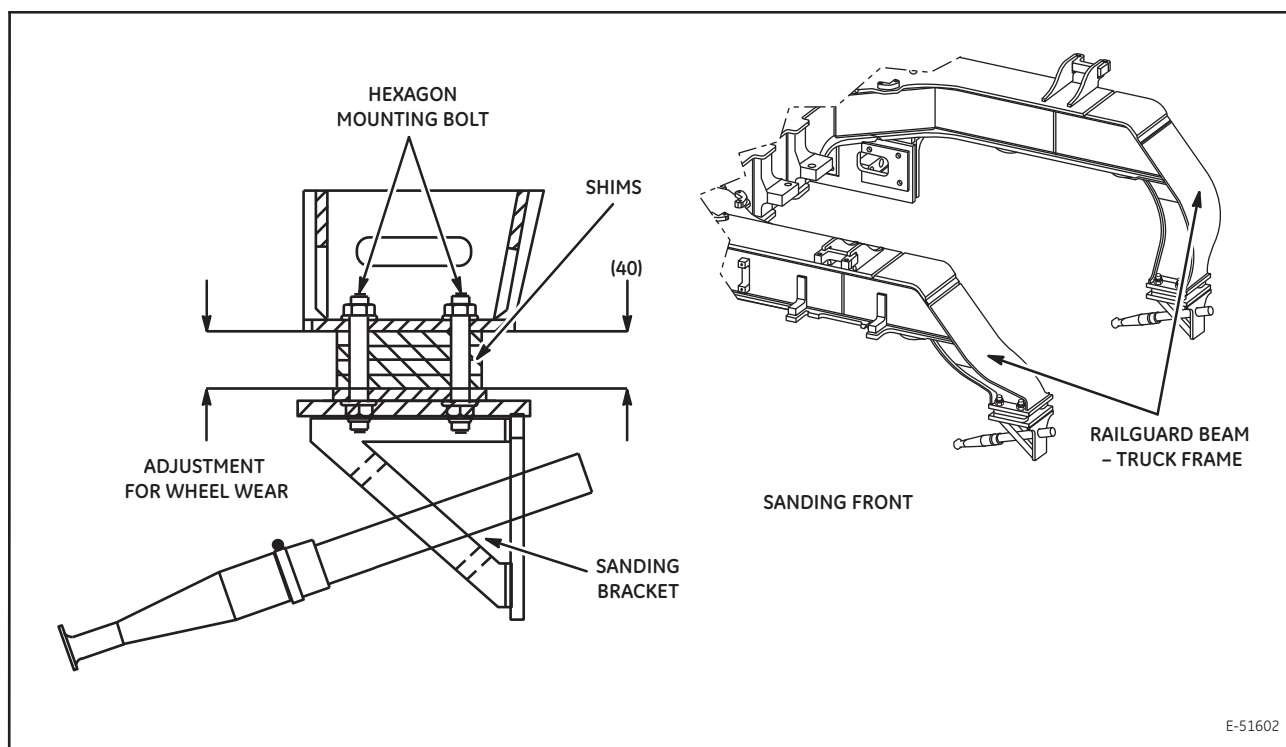


Figure 15. Sanding Front

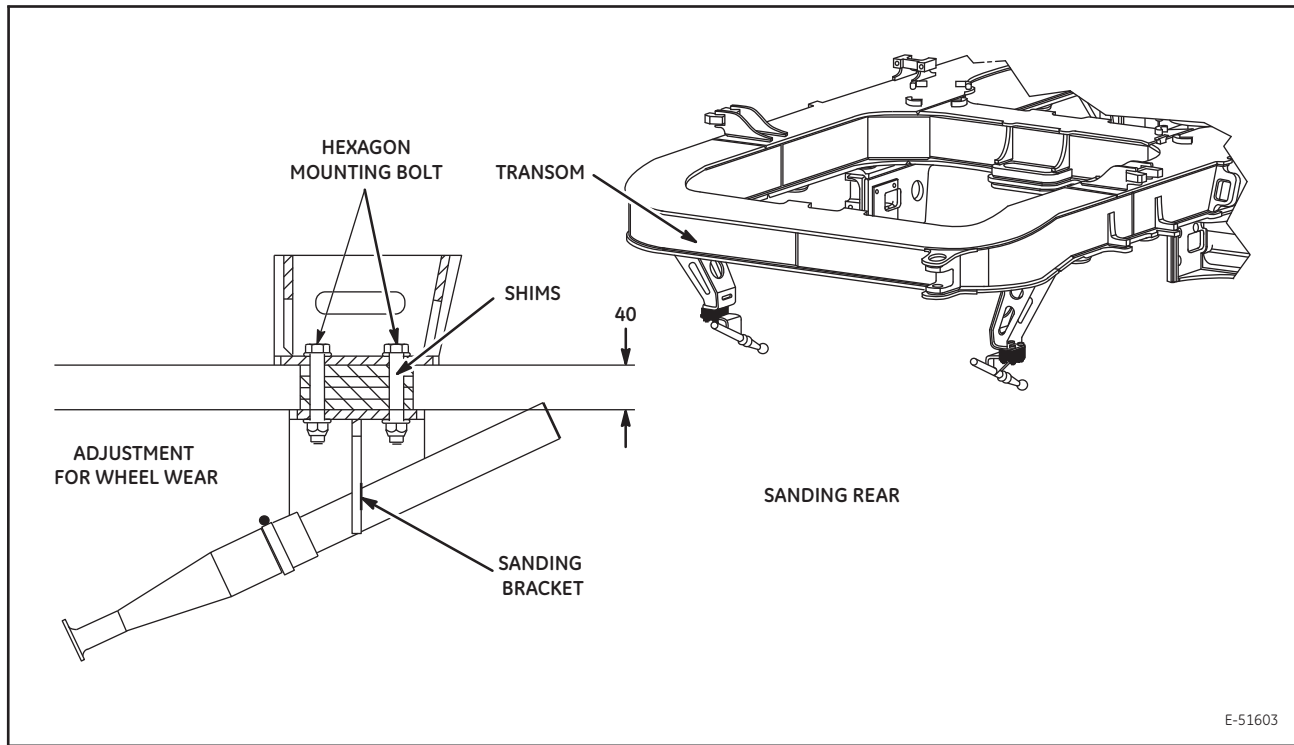


Figure 16. Sanding Rear

5.2. REMOVE RENEW AND REFIT

5.2.1. Traction Links

NOTE: Due to the effects of UV-radiation and environmental conditions rubber components have a limited durability. During overhaul all rubber bushings must be replaced.

5.2.2. Brake Shoes

1. Chock at least two sets of truck wheels to prevent locomotive from rolling in either direction.
2. Release the parking brake (if set), and allow time for the truck wheels to seat against the wheel chocks.

⚠ WARNING

Ensure the truck wheels are chocked and release the parking brake before cutting out the brake cylinder air. Also ensure air is cut to only one truck at a time. Unexpected motion can occur if the wheels are not chocked, if the parking brake is set when brake air is released, or if the air is cut off to both trucks at one time. Unexpected rolling of the locomotive can cause serious injuries or death.

3. Close only the truck cut-out cock for the truck being worked, and exhaust the air from the brake cylinders of that truck.
4. Move the brake shoes as far as possible from the wheel tread, for this purpose turn the hexagon bolt for resetting at the backside of the brake-unit (Figure 6) counter-clockwise. Pull out the safety clamp, remove the retaining key, and remove worn brake shoe from the brake head.



Brake shoes and brake units with parking brake units are matched for proper braking according to locomotive weight. Do NOT replace composition-type brake shoes with cast-iron shoes. Failure to use the proper replacement shoes may result in over-braking, under-braking, or an unbalanced braking condition.

5. Install the new shoe in the brake head, line-up the keyway, and drive the retaining key to seat tight in the keyway. Check the new brake shoe for a tight fit in the brake head. If the shoe is loose with the key tight in the keyway, the brake head is probably worn and should be replaced.
6. Reinstall the safety clamps and lock them into place. Adjust the hexagon resetting bolt per section 4.5.2., BRAKE SYSTEM ADJUSTMENT, of this publication.
7. Open the truck air cut-out cock.

5.2.3. REMOVAL AND REPLACEMENT Traction Motor Nose Suspension

5.2.3.1. Traction Motor Nose Suspension Removal

If parts are defective, remove and renew/refit the traction motor nose suspension as follows:

1. Disassemble the hexagonal bolt from the traction link at the axlebox and the support for traction link. Remove both traction links from the axlebox (refer to Figure 4).
2. Remove the brake shoes on both sides of the wheel set.
3. Disassemble the mounting bolts for suspension link (Figure 5).
4. Jack or lift the motor nose and lower the traction motor unit and simultaneously turn it approximately 3 to 5 degrees to remove the safety fence nose from the truck frame.
5. Lower the motor slightly. Remove the cotter pins and the retaining pins. Replace damaged rubber bushings or connection link (Figure 16).

5.2.3.2. Traction Motor Nose Suspension Installation

1. Raise the motor slightly. Install the cotter and retaining pins and install the rubber bushings and connection link (Figure 16).
2. Lower the motor nose and raise the traction motor unit. Simultaneously turn it approximately 3 to 5 degrees so the safety fence nose can enter the bracket of the truck frame.
3. Install the mounting bolts for suspension link (Figure 5).
4. Install the brake shoes on both sides of the wheel set.
5. Install both traction links to the axlebox (refer to Figure 4). Install the hexagonal bolt in the traction link at the axlebox and the support for traction link.

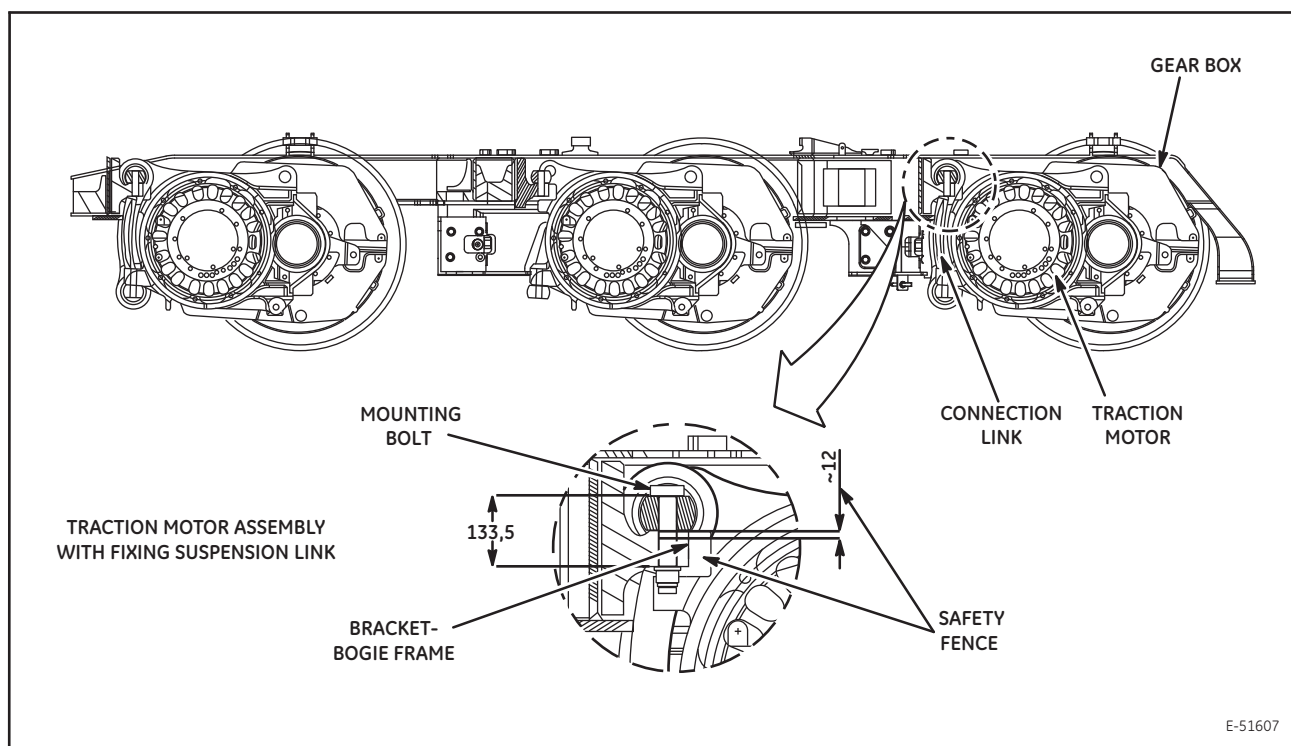


Figure 17. Traction Motor Assembly with Fixing Suspension Link

5.2.4. Vertical Damper

5.2.4.1. Vertical Damper Removal

1. Remove all four bolts and washers from each set of damper mounting bosses (Figure 10).
2. Remove and discard both used vertical hydraulic dampers.

5.2.4.2. Vertical Damper Installation

1. Install new dampers. Refer to the applicable GE Parts Bulletin for the recommended replacement part number. The mating surfaces and threads of the dampers must be clean and free of any oil.
2. Reinstall the bolts and washers on each set of damper mounting bosses. Torque the bolts to the value given in section 6., SUMMARY DATA, of this publication.

5.2.5. Traction Motor Assembly From Installed Truck

5.2.5.1. Remove Traction Motor Assembly From Installed Truck

To remove the traction motor assembly (traction motor, motor support housing, axle, wheels and gear box) from the truck:

1. Position the traction motor assembly to be removed over a single-axle drop table.

⚠ WARNING

High voltages may be present on some circuits in the Control Areas. Before accessing these areas, shut down the locomotive, open the bottom row of circuit breakers on the EC panel, and open the battery knife switch and maintenance battery switch. Verify that the Capacitor Charge Lights (CCL), above each Control Area, are not illuminated before removing the panels to the high-voltage area or the high-voltage contactor area. Failure to observe this precaution may result in serious personal injury or death.

2. Set the locomotive wheel brakes and chock the wheels on the truck NOT being worked. Then manually release the brakes on the wheels of the assembly to be removed by closing the cut-out cock in the air line for that truck.

NOTE: *At the outboard axles, on the top of the axlebox, rubber buffer are mounted on both sides at the top of the axlebox safety blocks.*

3. Apply safety blocks [steel blocks 35 mm (1.37 in.)] between the top of the axlebox and the truck frame – longitudinal beam lower sheet. The safety blocks prevent unnecessary spring compression on the remaining axles.
4. Disconnect all power cables and the motor ground cable of the traction motor assembly to be removed from the carbody cable connections under the locomotive.

NOTE: *Ensure that both the traction motor leads and connecting cables are properly marked to assure correct re-connection.*

5. Disconnect the speed-sensor cable of the traction motor assembly to be removed from the cable connection under the locomotive platform. Do NOT disconnect the speed-sensor cable from the traction motor. If equipped, disconnect the support bearing temperature sensor cables of the traction motor assembly to be removed.
6. Turn the hexagon resetting bolt of the slack adjuster left hand, to make maximum clearance of the brake shoes to the wheels. Disassemble the safety clamp. Remove the brake shoes by removing the retaining keys from the brake heads.
7. If the traction motor assembly to be removed is one of the end assemblies on the truck, loosen and remove all but one of the sand bracket bolts at both ends of the truck frame, and swing the sand brackets away to clear the wheel. Disconnect the axle (primary) dampers from the axle box at both ends of the end axles.
8. Remove the flange bolts and disconnect the air duct boot from the top of the traction motor.
9. Remove the traction motor nose suspension per section 4.7. TRACTION MOTOR NOSE SUSPENSION, of this publication.

⚠ CAUTION

The suspension links are disconnected by cutting the CAMCAR bolts with a torch or hydraulic splitter. If a torch is used, from a shield to protect the rubber parts of the suspension link from heat damage and use extreme care. Do NOT reuse the bolts, washers or nuts.

10. Raise the drop table 50 mm (2.0 in.) to compress the coil springs. Remove the two traction links and the primary dampers.
11. For the four coil spring sets at the traction motor assembly to be removed, place a spring retaining strap around the truck frame, UNDER the air piping and THROUGH the nested coil spring but around the OUTER or LARGER coils springs only at approximately the fifth coil. Join the strap ends, leaving at least 300 mm (12.0 in.) of slack in the straps (Figure 17).

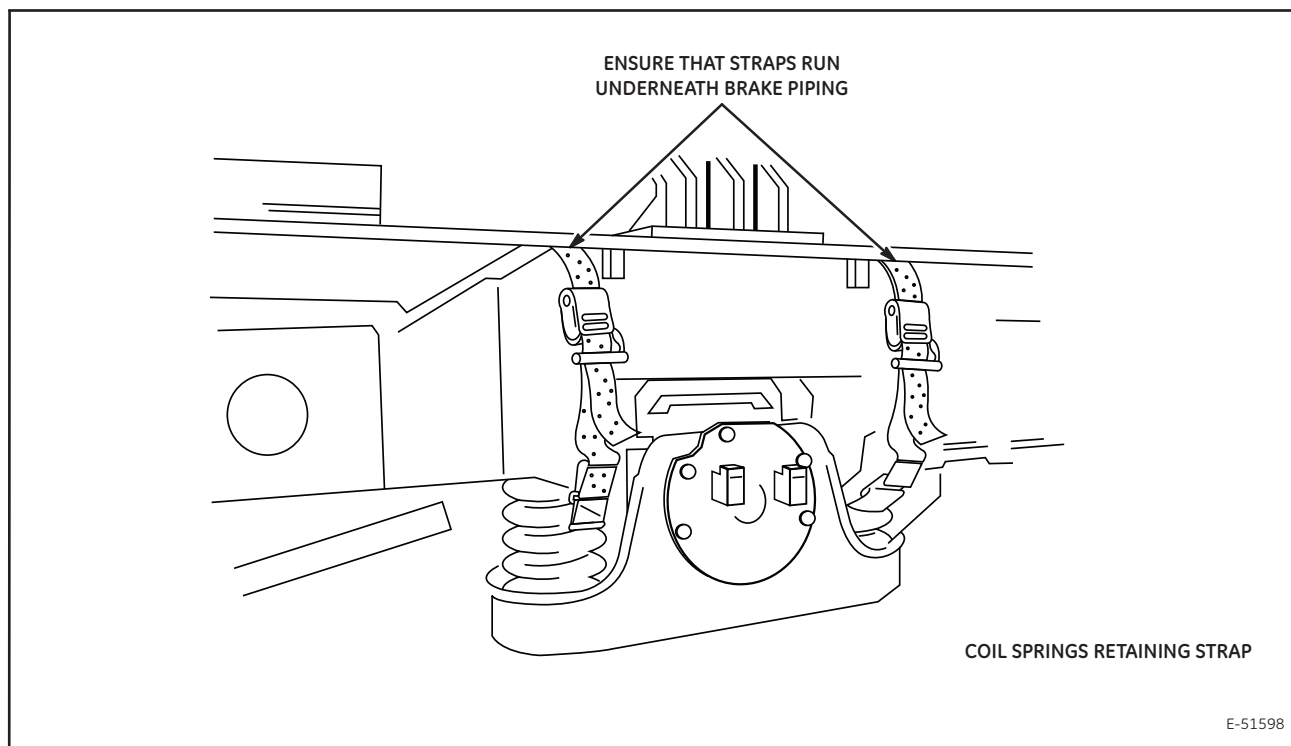


Figure 18. Coil Springs Retaining Strap

12. Apply C-clamps on each wheel rim below each side of the axlebox to prevent it from rotating during the traction motor assembly removal.
13. Verify truck support blocks are securely in place. Raise the traction motor nose up to clear the suspension link and/or truck frame as the motor is lowered. Support the nose with blocks suitably placed under the magnet frame.
14. Then tighten the coil spring retaining straps to remove any remaining slack. Lower the drop table until the space between the top of the axlebox and the truck frame is approximately 175 mm (7.0 in.).

NOTE: Lower the traction motor unit and simultaneously turn it approximately 3 to 5 degrees to remove the safety fence nose from the truck frame. Refer to section 4.7., TRACTION MOTOR NOSE SUSPENSION, in this publication.

15. Lower the drop table until the traction motor assembly clears the truck. Move the traction motor assembly from beneath the truck and locomotive.



CAUTION Cover the traction motor air inlet opening to prevent entry of foreign material.

5.2.5.2. Install Traction Motor Assembly Into Installed Truck

To install the traction motor assembly (traction motor, traction links, axle, wheels and gear case) in the truck:

1. Remove all dirt, grime and weld splatter from the traction motor suspension lugs and the motor suspension area of the truck frame.
2. Transfer the traction motor assembly to the drop table, placing suitable blocking under the motor frame to raise the motor nose.

NOTE: The traction motor nose must be raised so that the motor safety lugs engage the truck frame. Turn the traction motor unit simultaneous approximately 3 to 5 degrees so the safety fence nose engages the truck frame. Refer to section 4.7., TRACTION MOTOR NOSE SUSPENSION, in this publication.

3. Position the drop table and traction motor assembly under the truck with the axleboxes aligned with the journal housings in the truck. Level the axleboxes, and apply C-clamps on each wheel rim below each side of the axlebox to prevent the box from rotating during the traction motor assembly installation. Ensure that the coil spring seats are in correct coil end position on the axleboxes.
4. Raise the drop table with the traction motor assembly. Install the traction links and ensure that the coil springs seat properly as the assembly is raised. Raise the drop table until the axleboxes are completely in place with the drop table assuming part of the weight of the truck.
5. Install the two outer covers at the axleboxes and the primary dampers. Torque the hexagon bolts to the value given in section 6., SUMMARY DATA, of this publication.
6. Remove the four coil spring retaining straps.

⚠ CAUTION

Do NOT replace CAMCAR bolts and nuts with ordinary fastener bolts and nuts. Bolts and nuts may loosen during locomotive operation, and cause the traction motor to fail and/or cause other equipment damage. Refer to the applicable GE parts bulletin for recommended replacement parts.

7. Connect the suspension link to the motor with new CAMCAR bolts, washers and nuts. A special socket (CAM-CARTX 8122--E22) must be used to tighten the CAMCAR bolts until the bolt head tang breaks off.
8. Lower the jacks and remove all blocks from under the motor and the truck.
9. If the traction motor assembly installed is one of the end assemblies on the truck, swing the sand brackets at both ends of the truck frame into position and replace and tighten all bolts to the value given in section 6., SUMMARY DATA, of this publication.
10. Assemble the axle dampers to the axlebox adapters at both ends of the axle. Torque the damper bolts to the value given in section 6., SUMMARY DATA, of this publication.
11. Connect the air duct boot to the top of the traction motor. Torque the air duct bolts to the value given in section 6., SUMMARY DATA, of this publication.
12. If equipped, connect the support bearing temperature sensor cables.
13. Connect the speed-sensor cable of the traction motor assembly to the cable connection under the locomotive platform.
14. Connect all power cables and the motor ground cable to the carbody cable connections under the locomotive.
15. Check the level of lubricant in the gear case and add lubricant as required. Refer to **GEK-114520, TRACTION MOTOR COMBO, PH37ACmi, PowerHaul® SERIES LOCOMOTIVE**.

⚠ WARNING

High voltages may be present on some circuits in the Control Areas. Before accessing these areas, shut down the locomotive, open the bottom row of circuit breakers on the EC panel, and open the battery knife switch and maintenance battery switch. Verify that the Capacitor Charge Lights (CCL), above each Control Area, are not illuminated before removing the panels to the high-voltage area or the high-voltage contactor area. Failure to observe this precaution may result in serious personal injury or death.

16. Activate the air brakes by opening the truck cut-off cocks. Install the brake shoes. Turn the hexagon resetting bolt to proper clearance between brake shoe and wheel. Refer to section 4.5., BRAKE SHOES AND RIGGING, of this publication.
17. Remove the safety blocks above the axleboxes NOT being worked. Remove all chocking from the wheels

5.2.6. Remove and Replace Truck

5.2.6.1. Truck Removal

1. Chock at least two sets of wheels on both trucks to prevent the locomotive from rolling in either direction.
2. Release the parking brake (if set), and allow time for the truck wheels to seat against the wheel chocks.

⚠ WARNING

Ensure the truck wheels are chocked and release the parking brake before cutting out the brake cylinder air. Also, ensure air is cut out to only one truck at a time. Unexpected motion can occur if the wheels are not chocked, if the parking brake is set when brake air is released, or if the air is cut off to both trucks at one time. Unexpected rolling of the locomotive can cause serious injuries or death.

3. With the locomotive secure, locate the truck air cut-out cock. Close only the truck cut-out cock for the truck(s) being removed. Disconnect the hose to that truck's brake cylinders only after all air has been exhausted from the truck air lines.

⚠ WARNING

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4. Disconnect the traction motor leads, ground cable and speed sensor cable at each traction motor.
5. Disconnect the ground cable between the truck and the platform.

⚠ CAUTION

Cover the traction motor openings to prevent entrance of foreign material.

6. Disconnect the traction motor air ducts from the top of the traction motors.
7. Disconnect the speed-sensor cable of the traction motor assembly to be removed from the cable connection under the locomotive platform. Do NOT disconnect the speed-sensor cable from the traction motor.

8. Disconnect all sander hoses from the sander brackets on the truck.
9. Disconnect the horizontal (lateral) damper on the platform side.
10. Remove lifting rod and lifting bracket from the secondary lifting device.
11. Raise the locomotive platform clear of the truck with jacks or crane, or lower the truck on a drop table. Watch to ensure that the cables, air ducts, and hoses are not damaged. If the truck is to be pulled out sideways, the locomotive platform will have to be raised (or truck lowered) at least 254mm(10.0 in.).



CAUTION *After the truck is removed from under the locomotive, cover the truck center-pin bearing to prevent contamination with dirt and other foreign materials.*

5.2.6.2. Truck Installation

1. Space the trucks for a truck center block to center block spacing of 14462 mm (47 ft. 5.37 in.).

NOTE: *When installed on the locomotive, the transom ends of the trucks must be facing each other.*

2. Remove the temporary dust covers from the traction motor air duct openings. Inspect the traction motor air ducts between the locomotive platform and the truck; replace any air ducts that are cracked or torn.
3. Lower the platform onto the truck (or raise the truck on the drop table). Carefully mate the center pin with the center-pin bearing. Ensure that the two tangs atop each of the four side bearers per truck register properly in the locomotive platform.
4. Install the lifting rod and lifting bracket from the secondary lifting device.
5. Install the horizontal (lateral) damper.
6. Install the hoses from the sand pipes on the platform to the sander brackets on the trucks.
7. Connect the speed-sensor cable of the traction motor assembly to the cable connection under the locomotive platform.
8. Install the traction motor air duct to each of the traction motors.
9. Connect the ground cable between the truck and the platform.



WARNING *High voltages may be present on some circuits in the Control Areas. Before accessing these areas, shut down the locomotive, open the bottom row of circuit breakers on the EC panel, and open the battery knife switch and maintenance battery switch. Verify that the Capacitor Charge Lights (CCL), above each Control Area, are not illuminated before removing the panels to the high-voltage area or the high-voltage contactor area. Failure to observe this precaution may result in serious personal injury or death.*

10. Connect the traction motor leads, ground cable and speed sensor cable at each traction motor.
11. Connect the air brake hoses from the locomotive platform to the brake cylinder piping on the truck. Be sure to open the truck cut-out cocks located under the platform before returning the locomotive to service.
12. Adjust the truck brake rigging.

13. Ensure the traction motor gear cases and traction motor support bearings have been lubricated before moving.

14. Check the motor rotation.

6. SUMMARY DATA

Table 4. TORQUE VALUES

ITEM	BOLT QUALITY	ENGLISH (lb-ft)		METRIC (Nm)	
Air duct	Grade 5	60		81	
Axlebox outer cover retainer bolts	Grade 5	306		415	
Vertical damper bolts	Grade 5	156		211	
Lateral damper bolts	Grade 5	156		211	
Sand bracket (front and rear) mounting bolts	Grade 5	59		80	
Antennas mounting bolts		M6	7	M6	9.5
		M12	59	M12	80
		M16	156	M16	211
Sidebearer clamp mounting bolts	Grade 5	63		85	
Traction pin – traction bracket hexagon mounting bolts		885		1200	
Secondary lifting device – lifting bracket hexagon mounting bolts		527		714	
Secondary lifting device – lifting bolt-nut		59		80	
Traction links mounting bolts		625		848	
Brake rigging – brake unit mounting bolts		280		380	
Ladder mounting bolts	Grade 5	63		85	