en **Service Manual**

Haul Truck

T 264-533-06583

Document ID

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Product ID

Manufacturer	Liebherr Mining Equipment Newport News Co.
Address	4100 Chestnut Avenue Newport News, Virginia 23607 USA

Conformity

Customer

Customer	SDS
Model	T 264
Serial no. from	533-06583

LME/12222495/2020-06-19/en

LME/12222495/2020-06-19/en

Suspensions System

Front	Double A-Arm with inclined king pin pivot, spindle, and nitrogen over oil suspensions with integral damping
Rear	Three bar linkage comprised of triangular upper link plus two bottom drag links and nitrogen over oil suspensions with integral damping

Tires

Tires	46/90 R57 Standard 40.00 R57 Optional
Rims	29" x 57" bolt on rims

Frame

Design	Closed box structure with multiple torque tube cross members, internal stiffeners and integrated front bumper. Steel castings are used in high stress areas.
Welding	Frame girders welded inside and out with ultrasonic inspection aligned with AWS D1.1

Cab

Deluxe cab with integrated ROPS, FOPS, and double wall design for optimum insulation. Fully adjustable air suspension operator seat with double lumbar support and full-size second seat for training requirements. Operator comfort controls include a tilt and telescoping steering wheel, heater, defroster and standard AC. Real-time vital truck information is easily displayed to the operator and also recorded for download.

Body

Body sizes are custom designed to fit Customer requirements and specific applications. Please contact factory for options.

Sound

Interior cab noise level (per ISO 6394:2008)	75 dB(A) sound pressure

Weights

With standard 46/90 R57 tires

Nominal Payload	228 t / 251 ton
Gross Vehicle Weight (GVW)	393 t / 433 ton
Chassis weight *	139 t / 153 ton
Body weight	26t / 29 ton
Weight distribution	Empty – front 50 % / rear 50 % Loaded – front 33 % / rear 67 %

* Standard truck (less options), 100% fluids (fuel tanks, hydraulic tank, gears, suspensions, crankcase, coolant, grease and charged accumulators)

With optional 40.00 R57 tires

Nominal Payload	222 t / 244 ton
Gross Vehicle Weight (GVW)	385 t / 424 ton
Chassis weight *	137 t / 151 ton
Body weight	26t / 29 ton
Weight distribution	Empty – front 50 % / rear 50 % Loaded – front 33 % / rear 67 %

* Standard truck (less options), 100% fluids (fuel tanks, hydraulic tank, gears, suspensions, crankcase, coolant, grease and charged accumulators)

Fluid Capacities

Fuel tank	3,028 l / 800 gal
Hydraulic system (brake, steering and hoist)	
– Tank	969 l / 256 gal
– System	1,060 l / 280 gal
Planetary gear sets, each (2)	175 l / 46.2 gal
Front wheels, each (2)	52 l / 13.7 gal
Grease tank	55 kg / 120 lb

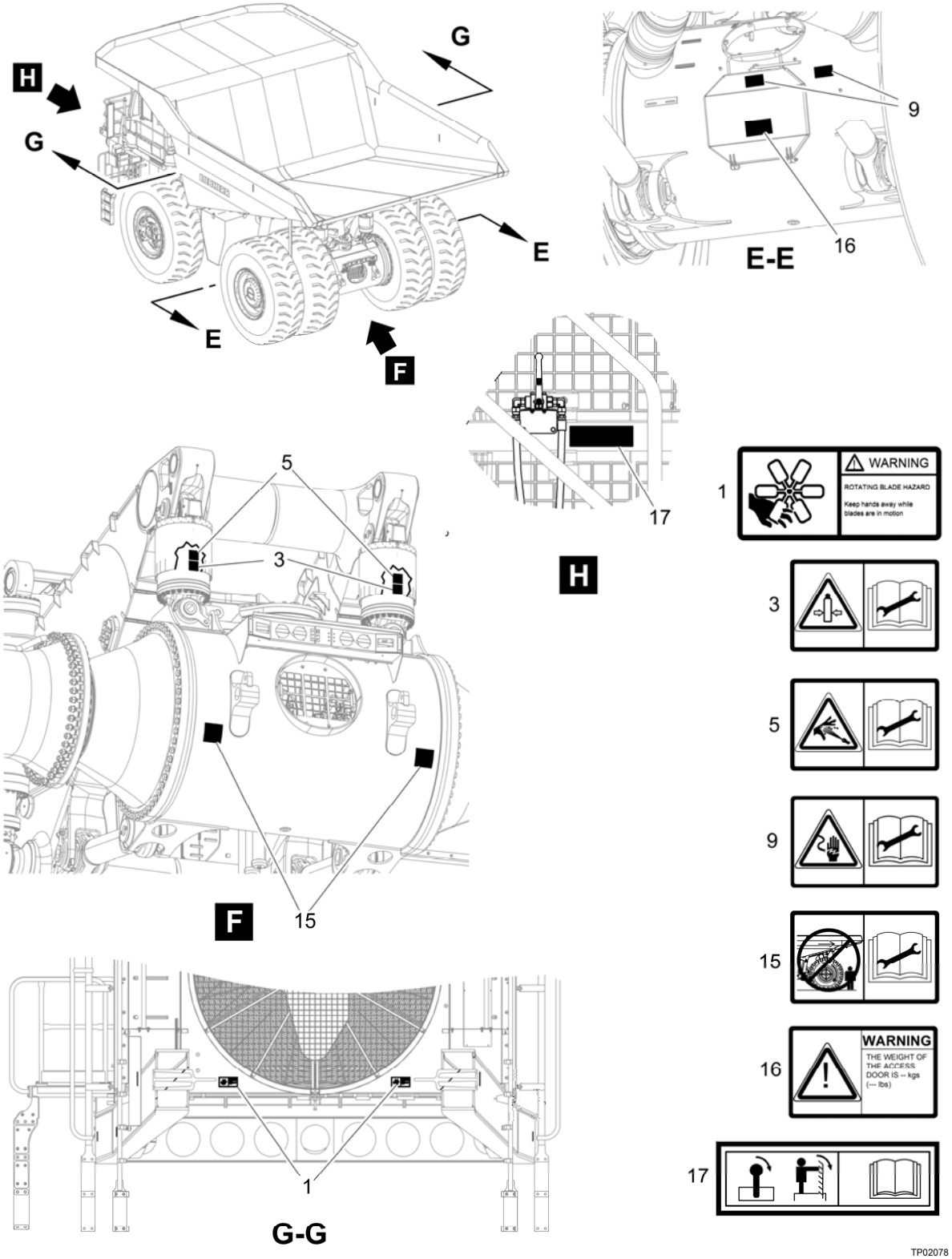

Fig. .1-4: Visual Safety Alerts on the Haul Truck (Page 4 of 6)

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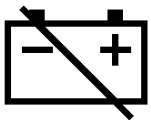
Coolant

- The engine coolant is hot when the engine is in operation. The coolant is also under pressure. The radiator and the lines to the heaters or the engine contains hot coolant.
- Contact with hot coolant or steam can cause burns. Allow the cooling system components to cool before the cooling system is drained. Check the coolant level only after the engine has been stopped.
- Follow the site procedures to remove the filler cap. Make sure the filler cap is cool before the cap is removed.
- For coolant leaks or spills, use approved materials to contain the spills.
- Do not combine used coolant with other chemicals.

Chemicals

- Follow the manufacturer instructions for the correct directions of use for specified chemicals.
- Make sure you know the site system for identifying hazardous chemicals. Know and understand the specific health and safety hazards of the chemicals with which you work and follow the recommended safety precautions.
- Make sure you get the necessary training in chemical storage and disposal procedures and know what to do for first aid and emergencies.
- The air condition system contains alkali. Alkali can cause injury. Do not allow the alkali to touch the skin, the eyes, or the mouth. If alkali contacts the skin, eyes, or mouth, get immediate emergency medical attention.
- Use appropriate PPE and equipment, as required or as necessary.

Batteries



- Some batteries can contain dangerous acids and gases. If the battery acid or gas get into the eyes, or touches the skin, immediately flush the area with clean water. Get medical attention while you continue to flush the area.
- An expansion at the end of a battery indicates the battery is frozen. Carefully follow the battery manufacturer repair, service, and maintenance instructions.

Brake Safety

- Follow the procedures, limits, and safety information provided by the manufacturer when you do service, repairs, and maintenance of the brakes.
- Install wheel chocks on all of the wheels when you do procedures that include the brakes.

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Haul Truck Stability

In conditions such as maintenance, assembly or disassembly, the haul truck must be secured to prevent the risk of movement. This may include, but not limited to, the use of wheel chocks, jack stands, cribbing, parking ditch, or similar. Make sure that the haul truck is put on a hard, level ground surface only, such as concrete or dirt/gravel areas applicable for the weight of the haul truck and necessary tools. Do not do work or service on the haul truck in incorrect or unsafe conditions. Contact the local factory representative if you are not sure of the applicable conditions at the work site.

Component Preparation

- Remove all dirt from components before any service, repair, or maintenance of the components.
- Do not clean the haul tuck with the engine in operation.
- Put on the approved PPE for the specified task.
- Do not direct spray, or discharge steam or water on the electrical systems, or electrical components.
- Do not direct spray, or discharge steam or water on the seals of the hydraulic components.

Safety During Installation

- Unless otherwise required for testing or adjusting purposes, always isolate the power from the system being worked on before you begin the installation, electrical or mechanical work on a system. Failure to correctly isolate the power supply can lead to loss of life, injury, or damage to equipment.
- Follow the site specific tag-out and lockout procedures.
- Do not bleed any pressurized lines by loosening a fitting.
- Check the electrical harness, wiring and hydraulic lines for damage regularly during installation procedures.
- Follow standard procedures to prevent possible contamination during installation.
- Hydraulic systems have safety pressure relief valve, make sure the valve is correctly pressure relief position before you work on any hydraulic system.

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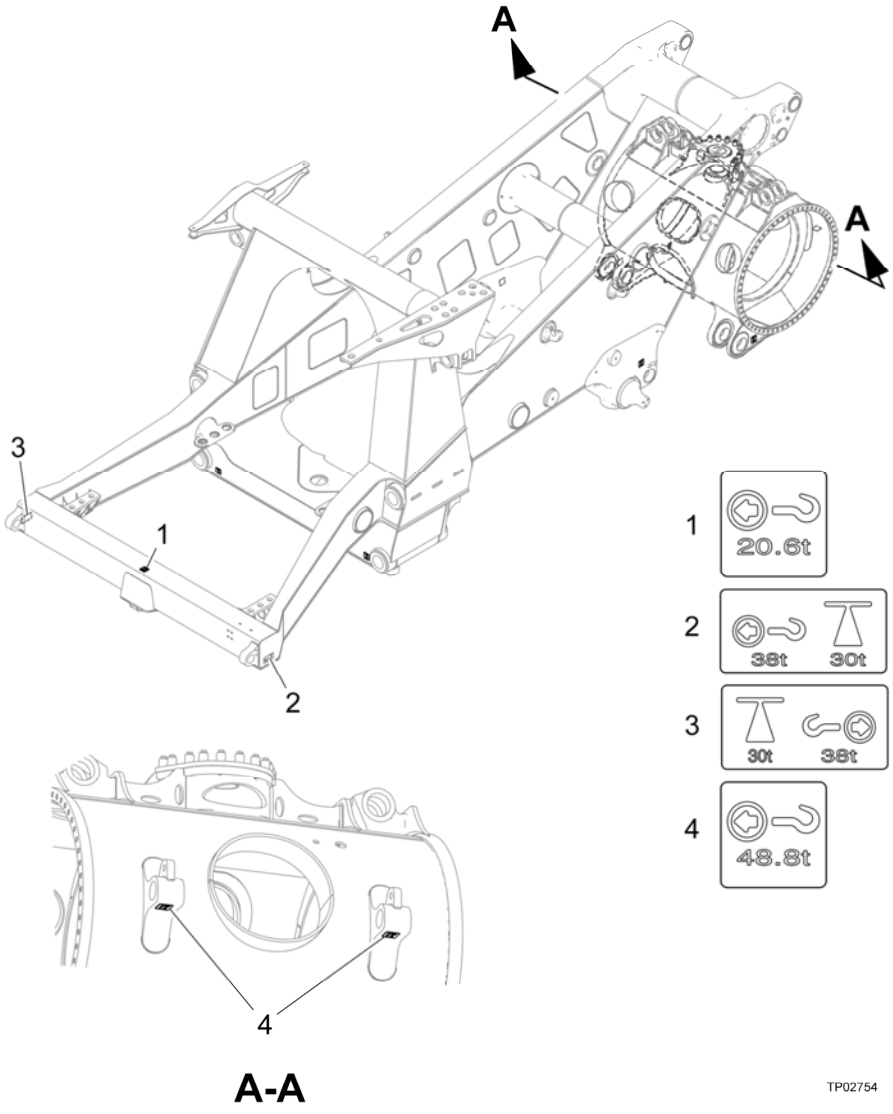
Fraction of One Inch	Working Equivalent	Exact Decimal
3/8	.375	.375000
25/64	.391	.390625
13/32	.406	.406250
27/64	.422	.421875
7/16	.438	.437500
29/64	.453	.453125
15/32	.469	.468750
31/64	.484	.484375
1/2	.500	.500000
33/64	.516	.515625
17/32	.531	.531250
35/64	.547	.546875
9/16	.562	.562500
37/64	.578	.578125
19/32	.594	.593750
39/64	.609	.609375
5/8	.625	.625000
41/64	.641	.640625
21/32	.656	.656250
43/64	.672	.671875
11/16	.688	.687500
45/64	.703	.703125
23/32	.719	.718750
47/64	.734	.734375
3/4	.750	.750000
49/64	.766	.765625
25/32	.781	.781250

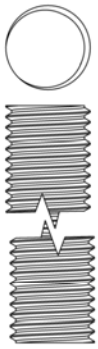
Towing Label Location and Identification



Towing Label Locations

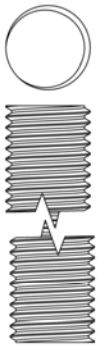
11660849	2	Threaded rod

M20 Threaded Rod 11660850



This M20 threaded rod is used along with the M20 nut 10026194 during the assembly of the haul truck.

M16 Threaded Rod 11660851

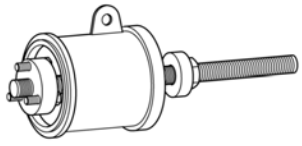


This M16 threaded rod is used along with the M16 nut 10026193 during the assembly of the haul truck.

Hardware Assembly Kit 11661118

This hardware kit is used during the initial assembly of the haul truck.

Pin Puller 11662282



The pin puller is used to remove the pins from the control arms. The maximum capacity of the pin puller is 90.72 t (100 tn).

5. Use the lever arm (2) to orient the upper eye perpendicular to the lower eye.

NOTICE
The minimum weight of each filled rear suspension is 536 kg (1182 lb).

Use an approved lift device that can safely lift and support the component weight.

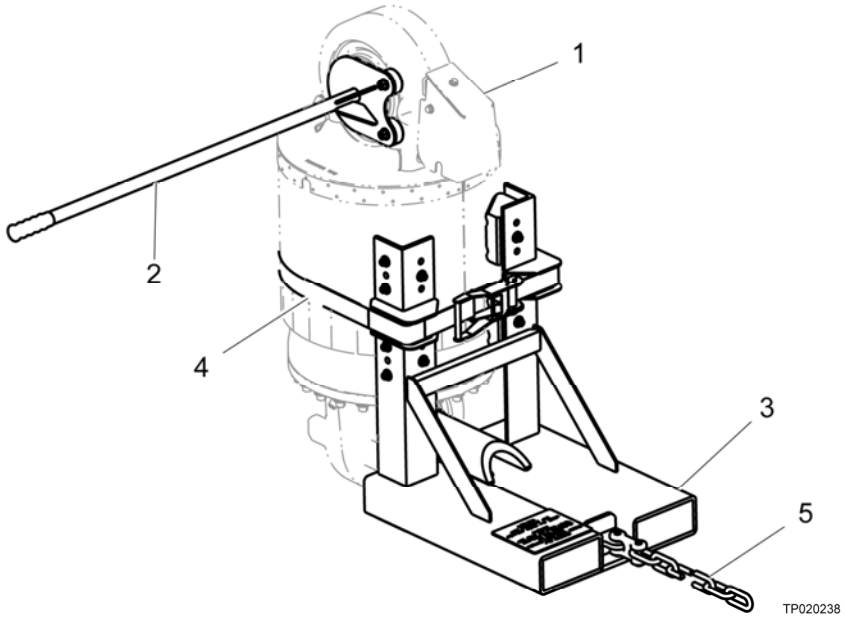


Fig. .2-34: Fully Assembled Rear Suspension Handling Tool with Rear Suspension

Legend:

1. Rear Suspension
2. Rear Suspension Handling Tool Lever Arm
3. Rear Suspension Handling Tool
4. Suspension Handling Tool Security Strap
5. Chain Link

4.2.8 Pin Puller 11662282

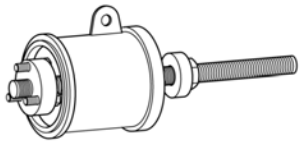


Fig. .2-35: Pin Puller 11662282

NOTICE
The minimum weights of the pin puller is 86 kg (190 lb) .

Use an approved lift device that can safely lift and support the component weight.

5.2 Fill Quantities and Lubrication Chart

5.2.1 Fill Quantities

Lubricants

Designation	Quantity
Diesel engine — engine oil Cummins MTU Liebherr	260 L (68.7 gal) 300 L (79.3 gal) 346 L (91.4 gal)
Hydraulic reservoir	969 L (256 gal)
Hydraulic accumulator — brake	Front 27 L (7.1 gal) Rear 7.6 L (2 gal)
Pilot accumulator	4 L (1.1 gal)
Hydraulic accumulator — steering	88 L (23.2 gal)
Front wheels	53 L (14 gal) each
Rear drive	175 L (46.2 gal) each
Hoist cylinders Total base side Total rod side	160.5 L (42.4 gal) 40.1 L (10.6 gal)
Suspension — front	43.5 L (11.5 gal)
Suspension — rear	37 L (9.8 gal)

Fuel and Operating Fluids

Designation	Quantity
Fuel tanks — diesel fuel Driver side Off-driver side	1559.6 L (412 gal) 1559.6 L (412 gal)
Cooling system — engine, radiator, pipes Cummins MTU MTU Tier 4 Liebherr	976 L (257.8 gal) 996 L (263.1 gal) 885.8 L (234 gal) 900.9 L (238 gal)
Cooling system — control box	60 L (15.9 gal)

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5.3.4 Control Box Inspection and Checks

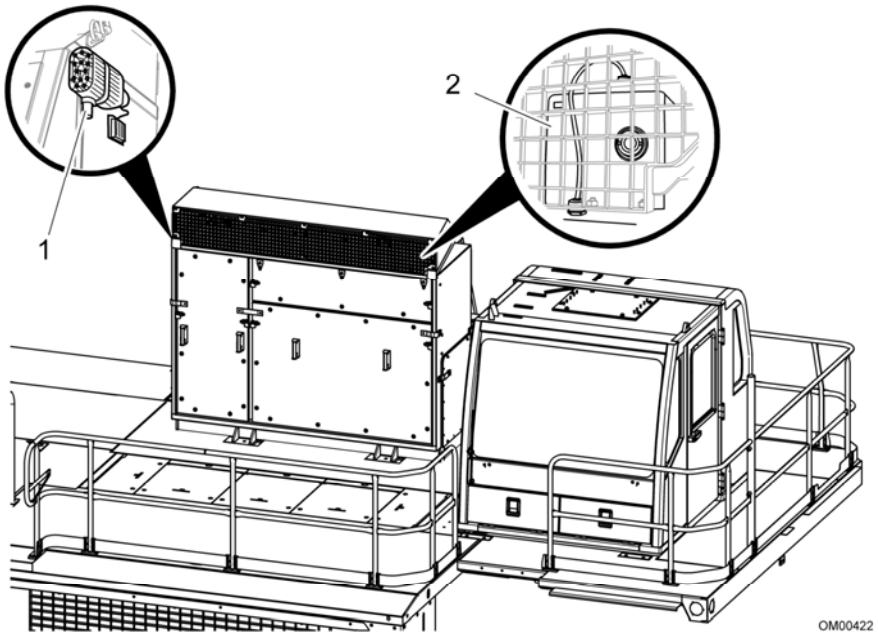

Fig. .3-44: Control Box Inspection Areas

Legend:

1. Control Box Pressurizing Fan Filter
2. Control Box Coolant Sight Gauge

1. Make sure that the controls box and grid box are free of obstruction and that all doors are securely closed.

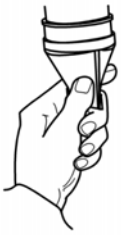

Fig. .3-45: Control Box Pressurizing Fan Filter

2. Check the control box coolant level.
   - Press the rubber lips on the Control Box Pressurizing Fan Filter **1** on the left side of the control box to remove any caked dust deposits.
3. Do a visual check of the Control Box Coolant Sight Gauge **2** to make sure that the control box coolant is at an acceptable level.

5.3.5 Upper Deck and Platform Checks

1. Operate the off-driver side (ODS), and driver-side (DS) hydraulic stair switches, if equipped, to make sure the horn sounds during stair movement.
2. Clean and adjust the mirrors as applicable.
3. Examine the cab air vent and replace the filter if necessary.

Coolant Analysis Thresholds

Description	Tolerance and Unit
Total sum of alkaline earth metals (water hardness)	0.6 to 3.6 mmol/dm^3 (3 to 20°dH)
pH-value at 20°C (68°F)	6.5 to 8.5
Conductivity	< 2200 µS
Water hardness	0–3.5 mmol/dm^3
Suspended particles	< 3mg/dm$_3$
Chloride-content	< 80mg/dm^3
Sulfate-content	< 100mg/dm^3
Free carbon dioxide	8–5 mg/dm^3 no aggressive CO_2
Micro organisms	none

5.7.2 Sample Pump Method

TIP
Samples should be taken from the middle of the compartment oil level when using the pump method.

1. Cut a new sample tube to desired length.

NOTE
Sample tube length for each compartment should be the same each time sampled, consider recording and labeling the length on each component.

2. Insert sample tube into silver disk on top of pump so that the tube protrudes from bottom (sample bottle side) of pump approximately one-half inch.
3. Tighten silver disk to secure tube.
4. Remove the sample bottle cap and secure the bottle to the sample pump. Keep the removed cap in your hand to prevent contamination from other sources.
5. Clean the area where the valve, plug or port will be removed to perform the sampling.
6. Remove cap/plug on component sample port and insert tubing to the desired depth of oil level.
7. Make a vacuum on the pump by pulling the pump handle 1 to 3 times.
8. Allow the sample bottle to fill (you will not need to continue to pull handle to maintain sample flow). Make sure to hold the pump upright while taking the sample.
9. Fill the sample bottle half full, disconnect from the pump and discard the oil to remove contaminates that may have been in the bottle.

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Rear Wheel

Assembly	Locations to Inspect	Corrective Action
• rear wheel assembly to axle box *(with heightened focus on the fasteners in the five to seven o'clock positions)* • service and park brake calipers • rear brake adapter and discs	Check each location in accordance to the inspection procedure. Any issues that are discovered as a result of this inspection must be corrected.	• Disassemble and re-establish the entire joint using a new set of fastener hardware following the installation instructions provided in the Service Manual (or the latest Service Information Bulletin when applicable). • Record the inspection findings and corrective action using the tracking method in place of your location.

Rear Control Arm

Assembly	Locations to Inspect	Corrective Action
• rear control arm (A-arm) to frame • rear control arm (A-arm) to axle box • top plate to axle box (pin retainer cover)	Check each location in accordance to the inspection procedure. Any issues that are discovered as a result of this inspection must be corrected.	• Disassemble and re-establish the entire joint using a new set of fastener hardware following the installation instructions provided in the Service Manual (or the latest Service Information Bulletin when applicable). • Record the inspection findings and corrective action using the tracking method in place at your location.

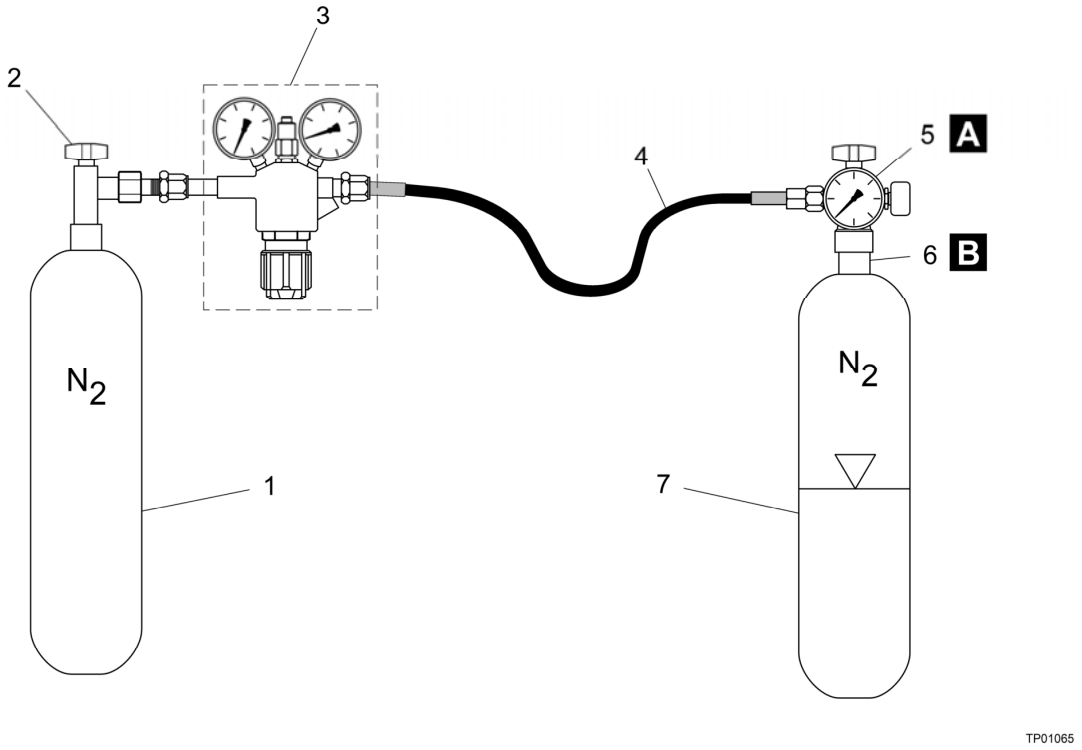


Fig. .16-59: Nitrogen Charging Kit (1 of 2)

5. If the measurements are within the acceptable limits this procedure is complete.

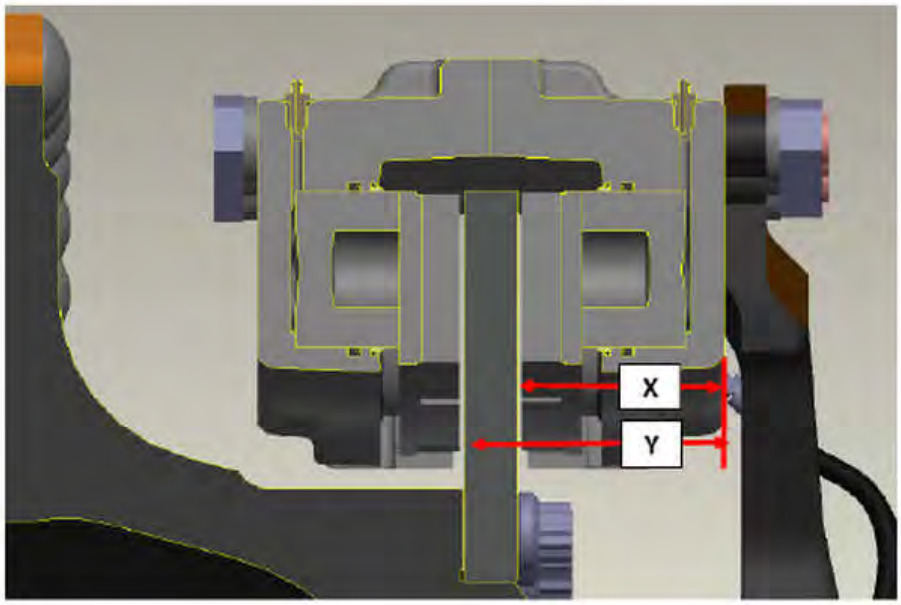


Fig. .18-67: Cross Section of Front Brake Configurations SCL19/SCL19HC (Fig. 3)

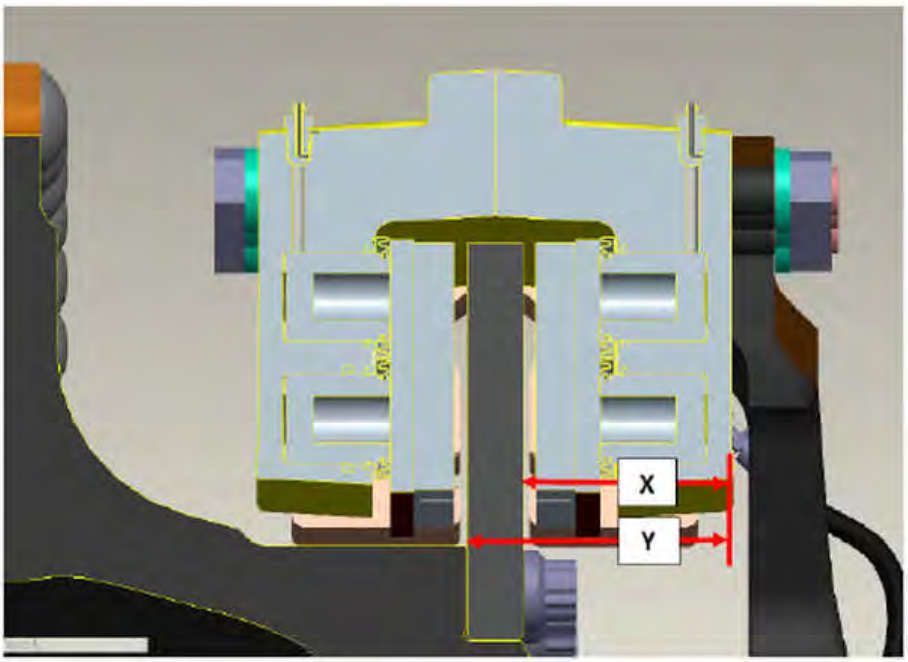


Fig. .18-68: Cross Section of Front Brake Configuration SCL56Hy/SCL56HC (Fig. 4)

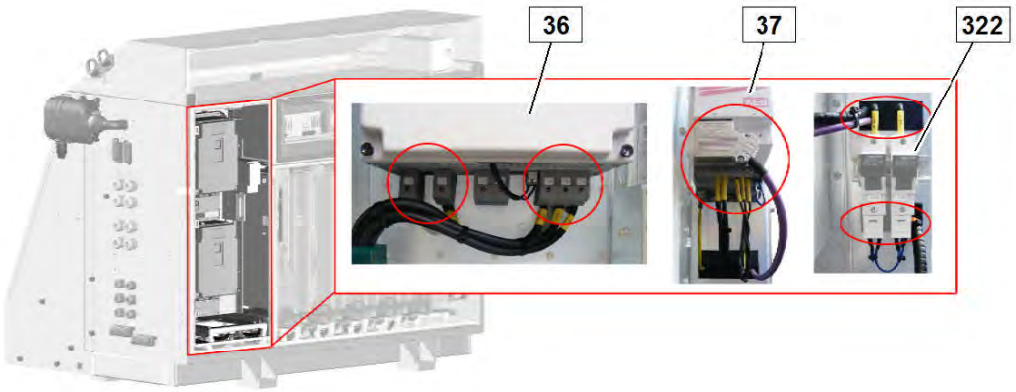
5.22 Check the Electrical Connections [LME-100-07-00]

Use the following procedure to check the electrical connections of the Litronic plus® Control Box.

WARNING
This equipment contains high voltage that can cause serious or fatal injury.

► Only qualified personnel should perform service on electrical equipment.

1. Check all of the connections and cables to the control box. The connections and cables must be tightly installed to the respective component.



Check the swivel range

36. Frequency converter
37. Frequency converter
322. Fusible link

2. Check the electrical connections (screw terminals +,-,U,V,W) on the auxiliary frequency converters (36) and (37).
3. Check the electrical connections between the fusible links (322).

5.29 Exhaust Bellows and Blankets Inspection [LME-10-01-01]

- Follow the haul truck safety precautions. [Reference: Safety, page 52]

1. Remove the exhaust blankets from the expansion joints.
2. Visually inspect each expansion joint, as follows:
   - Inspect the external surface for signs of carbon soot. This can indicate leakage of exhaust gases.
   - Inspect the external surface for signs of damage caused by metal-to-metal contact. Wear locations will appear more shiny or polished than the surrounding area.
   - Inspect each of the expansion joints for holes and cracks.
   - If the expansion joint is damaged, replace it.
3. Visually inspect the exhaust blankets, as follows:
   - Inspect the inner and outer shell of the blankets for damage.
   - Inspect the excessive wear and age deterioration (tears and gouges, seam separation, contamination, etc.).
   - Inspect for compression of the insulation material.
   - If a blanket is determined to be damaged or worn out, replace it.

DANGER
Leakage from the exhaust can cause fire.

► Make sure the exhaust system components and insulation is correctly installed.

4. Reinstall the exhaust blankets to the expansion joints.

5.37 2500-Hour Preventive Maintenance References

The following procedures are linked to the 2500-hour preventive maintenance (PM) tasks. Use this as supporting material when performing the associated PM task.

Procedure	Title
LME-30-04-01	[Reference: LME-30-04-01 - Idler Arm Wear Limit Check, page 268]
LME-30-05-01	[Reference: LME-30-05-01 - Drag Links, Hoist Cylinders, and Rear Control Arm Wear Limit Check, page 202]
LME-80-17-01	[Reference: LME-80-17-01 - Front Control Arm Wear Check, page 281]
LME-100-04-00	[Reference: LME-100-04-00 - Secondary Filter Replacement, page 285]
264-30-06-01	[Reference: 264-30-06-01 - Steering Assembly Wear Limit Check, page 277]
264-30-07-01	[Reference: 264-30-07-01 - Chassis and Axle Box Inspection Guideline, page 288]

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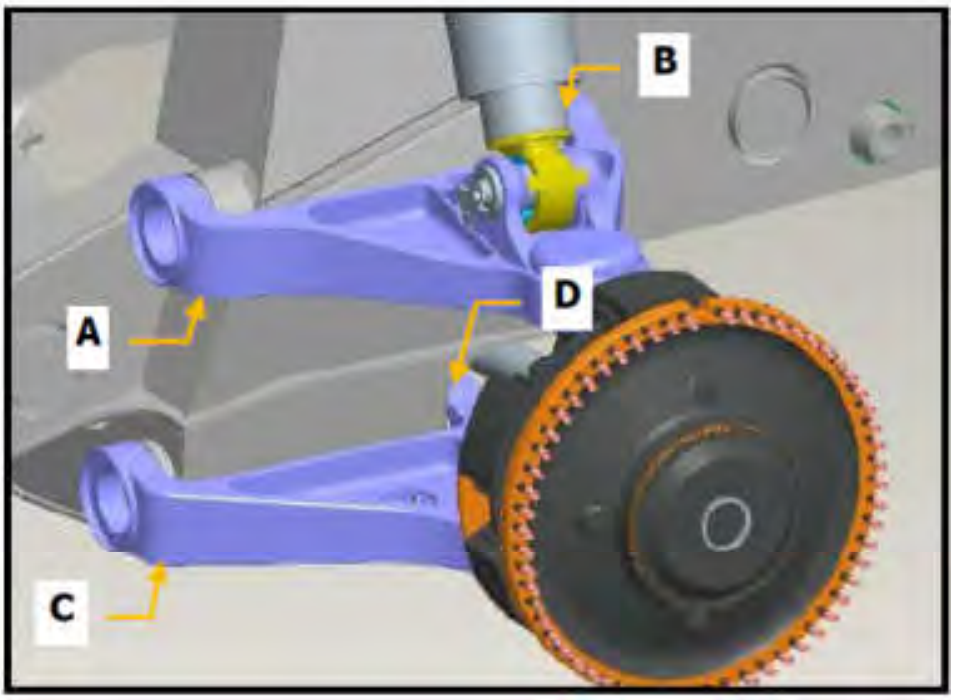
5.41 Front Control Arm Wear Check [LME-80-17-01]

Use the following procedure to assess front control arm bushing wear.

- Follow the haul truck safety precautions. [Reference: Safety, page 52]

5.41.1 Axial Clearance Check

1. Clean accumulated grease/dirt from the upper and lower control arm joints, as necessary. [See Illustration , page 281]



2. Using feeler gages, sweep the lower half of each control arm joint, measuring the clearance between the bearing and the frame flange for the control arm pin penetration. [See Illustration , page 281] shows the exact measurement location.
3. Use the largest gage that will fully sweep the lower half of the joint as the recorded dimension. Record the measured results below.

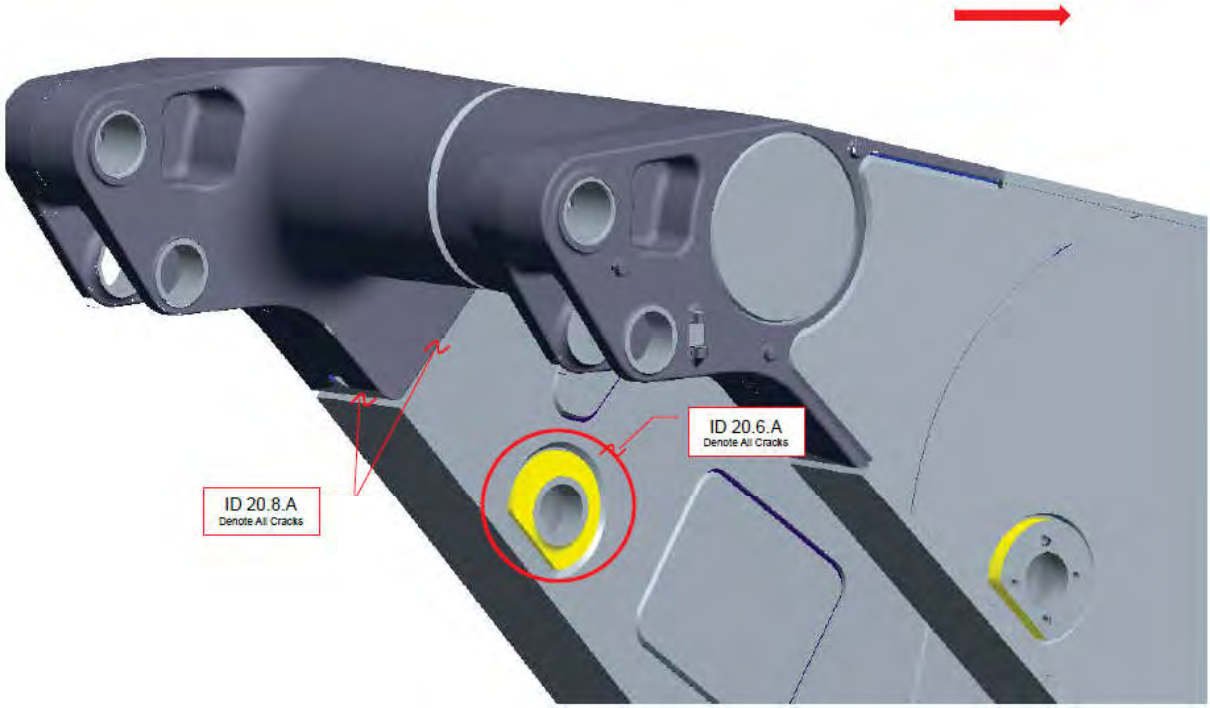


Fig. .43-104: Chassis Inspection Guideline: Driver Side Inside Rear A-Arm Boss

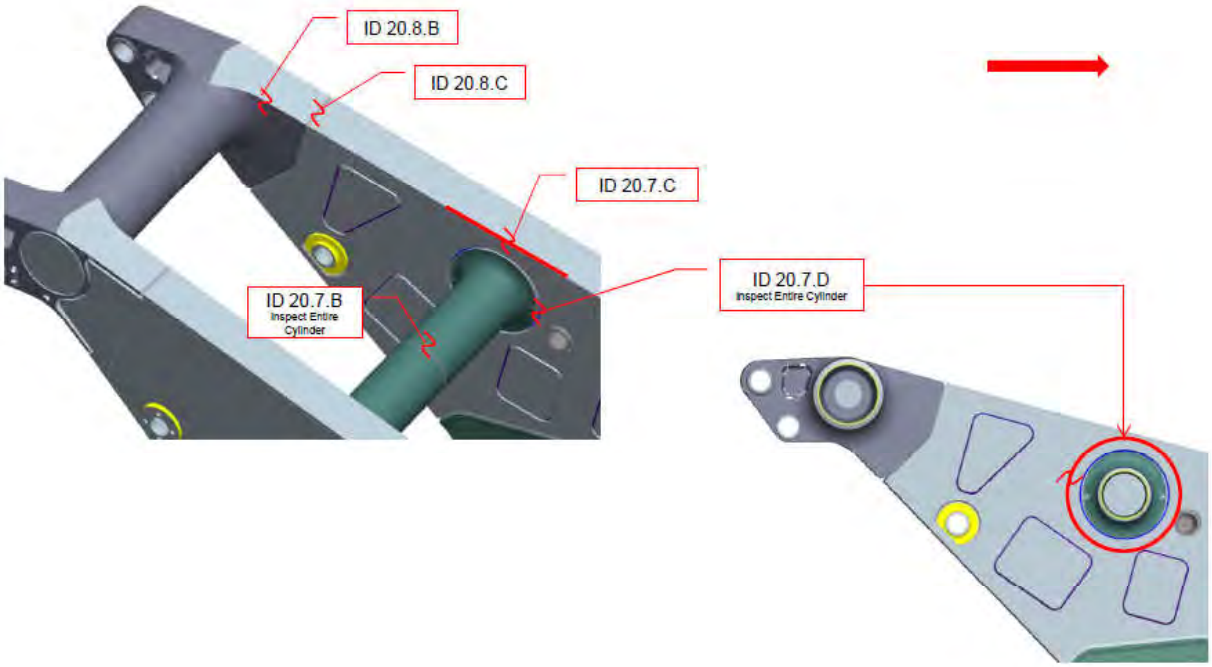


Fig. .43-105: Chassis Inspection Guideline: Driver Side Upper Mid Tube and Dump Pivot Castings

533 Frame Inspection Guideline Supplement									
Customer:		Miles/KM:		Site S/N:		SMU:		Date:	
Mine Site:		# Dump Cycles		Metric/Std. ("m" or "s")		Units of Measure:		Inspectors:	
Sheet #	ID#	Description of location, and (DS or ODS)	Length of indication	Previous Repair? Y/N	# of Previous Repairs	Crack Length Threshold I (mm)	Crack Length Threshold II (mm)	Comments	
6	20.6.B.1	Control Arm boss to web outer DS				25	75		
6	20.6.B.2	Control Arm boss to web outer ODS				25	75		
20.7 Upper Mid Tube									
6	20.7.A.1	Upper mid tube to outside web, outboard DS				25	75		
6	20.7.A.2	Upper mid tube to outside web, outboard ODS				25	75		
11	20.7.B.1	Upper mid tube center joint				25	50		
11	20.7.C.1	Flange to web above tube DS				25	50		
11	20.7.C.2	Flange to web above tube ODS				25	50		
11	20.7.D.1	Upper mid tube to inside web, top DS				25	50		
11	20.7.D.2	Upper mid tube to inside web, top ODS				25	50		
20.8 Dump Pivot Casting									
10	20.8.A.1	Web to dump pivot casting (inner) DS				25	50		
10	20.8.A.2	Web to dump pivot casting (inner) ODS				25	50		
11	20.8.B.1	Dump Pivot casting tube inside corner DS				25	50		
11	20.8.B.2	Dump Pivot casting tube inside corner ODS				25	50		
11	20.8.C.1	Dump Pivot casting to upper frame flange DS				25	50		
11	20.8.C.2	Dump Pivot casting to upper frame flange ODS				25	50		
12	20.8.D.1	Dump Pivot casting pocket inside corner 1 (outboard) DS				10	25		
12	20.8.D.2	Dump Pivot casting pocket inside corner 1 (outboard) ODS				10	25		
12	20.8.E.1	Dump Pivot casting pocket inside corner 2 (outboard) DS				10	25		
12	20.8.E.2	Dump Pivot casting pocket inside corner 2 (outboard) ODS				10	25		
12	20.8.F.1	Dump Pivot casting pocket inside corner 3 (outboard) DS				10	25		
12	20.8.F.2	Dump Pivot casting pocket inside corner 3 (outboard) ODS				10	25		
12	20.8.G.1	Dump Pivot casting pocket inside corner 4 (outboard) DS				10	25		
12	20.8.G.2	Dump Pivot casting pocket inside corner 4 (outboard) ODS				10	25		
12	20.8.H.1	Web to dump pivot casting (outboard) DS				50	100		
12	20.8.H.2	Web to dump pivot casting (outboard) ODS				50	100		

5.49 15000-Hour Preventive Maintenance References

The following procedures are linked to the 15000-hour preventive maintenance (PM) tasks. Use this as supporting material when performing the associated PM task.

Procedure	Title
LME-100–02–01	[Reference: LME-100-02-01 - Coolant Drain and Replace Procedure, page 324]

6.1 Power Module

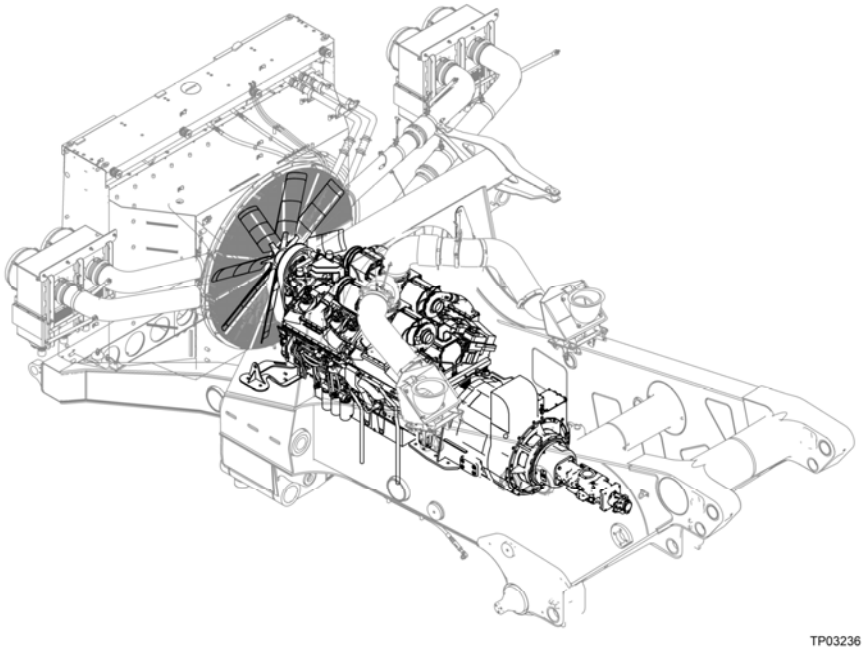


Fig. .1-136: Power Module

6.1.1 System Description and Function

The power module assembly is in the engine compartment on the haul truck. The power module assembly is installed as a unit. A rollout assembly can attach to the chassis for removal of the power module unit.

The power module is kept from contact with the haul truck chassis by rubber isolator mounts. The rubber isolator mounts are installed between the power module and the chassis.

Service personnel can access the module by the ladders on each side of the engine compartment.

The power module assembly has the components that follow:

- [Reference: Engine, page 353]
- [Reference: Traction Alternator, page 401]
- [Reference: Main Hydraulic Pumps Assembly, page 639]

The power module assembly connects to the systems that follow:

- [Reference: Radiator, page 432]
- [Reference: AC Drive Cooling System Assembly, page 449]
- [Reference: Exhaust System, page 384]
- [Reference: Hydraulic Reservoir, page 654]
- [Reference: Engine Air Cleaner, page 397]
- [Reference: AC Drive System, page 535]

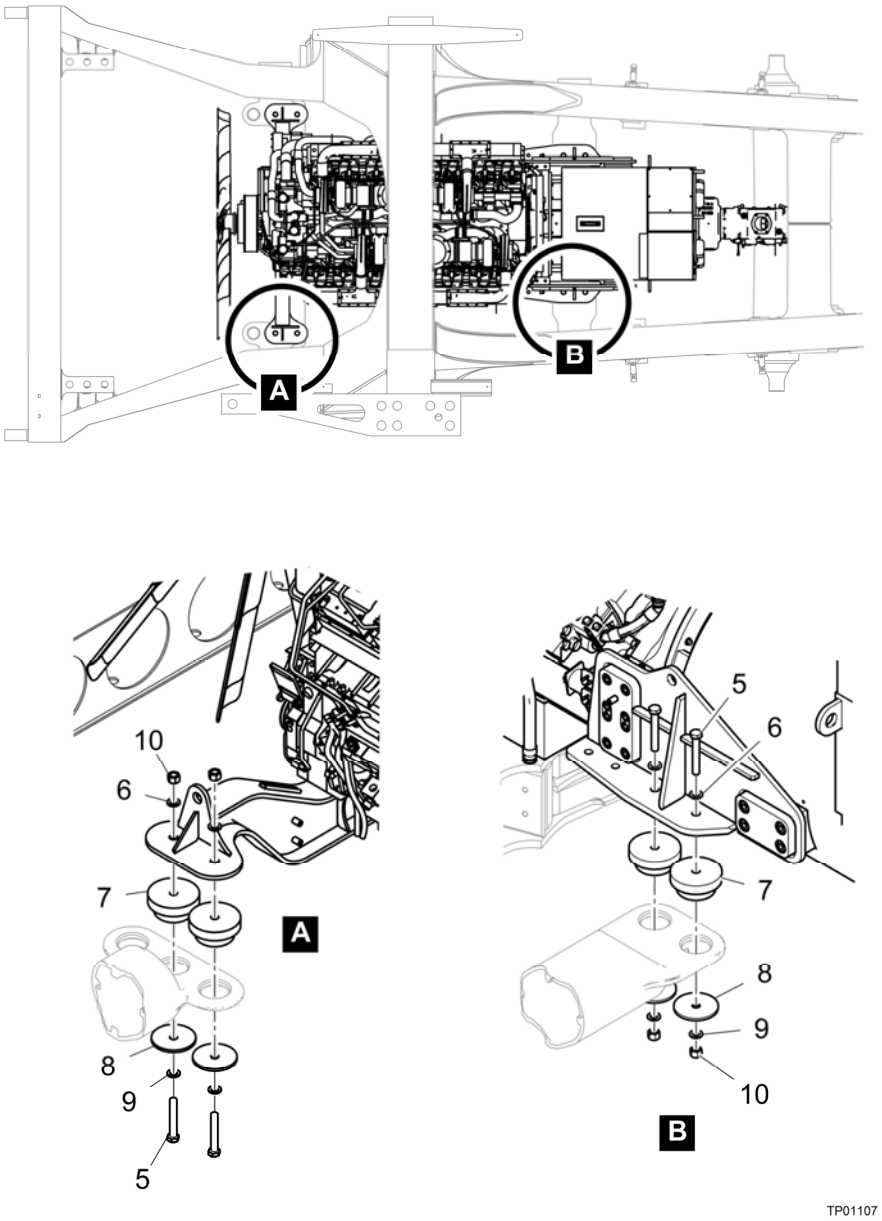


Fig. .1-147: Power Module Assembly Removal/Installation

13. Install the spacer (6), radiator fan (5), washers (4), and cap screws (3).
14. Torque cap screws (3) to 95 N·m (70 lbf ft).
15. Install the traction alternator to the engine, if removed. [Reference: Traction Alternator Installation, page 405]
16. Do the engine endplay measurements and traction alternator measurements. [Reference: Traction Alternator to Engine Coupling Instructions, page 407]
17. Install the main hydraulic pumps assembly and the hydraulic A/C variable displacement pump to the traction alternator, if removed. [Reference: Main Hydraulic Pumps Assembly Installation, page 646]
18. Install the power module assembly. [Reference: Power Module Assembly Installation, page 346]

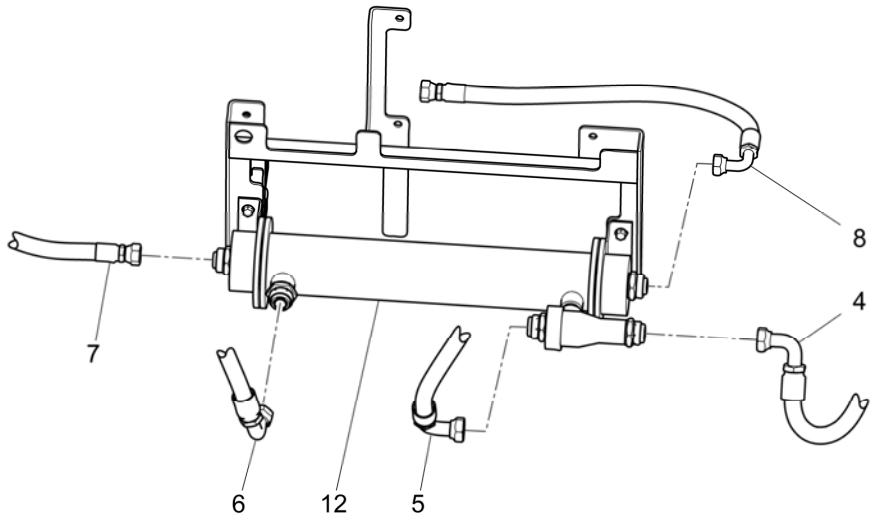


Fig. .4-167: Fuel Heater Removal/Installation (1 of 2)

3. Disconnect the diesel fuel supply line (4) from the thermostatic valve and drain the diesel into an applicable container.
4. Put an applicable container under the diesel fuel bypass line (5).
5. Disconnect the diesel fuel bypass line (5) from the thermostatic valve and drain the diesel into an applicable container.
6. Put an applicable container under the warm diesel supply line (6).
7. Disconnect the warm diesel line (6) from the fuel heater (12) and drain the diesel into an applicable container.

6.5.3 Exhaust System Installation

- Follow the haul truck safety precautions. [Reference: Safety, page 52]
- Follow the mine-specific lockout and tagout procedures.
- Use a safety harness when you do service above the ground. [Reference: Safety Harness, page 83]

Follow the specific haul truck safe work procedure(s):

Required Documents

Safe Work Procedure(s)
LME-SWP–00022 • [Reference: LME-SWP-00022 - Exhaust System Assembly, page 1403]

Required Tools and Materials

Tools and Materials	Liebherr Part Number	Notes
Lockout device	N/A	Commercially available

NOTE
The initial installation of the assembly is done in the field during the dump body assembly.

► Elbow (49) and components are installed to the dump body at that time. [Reference: Dump Body Exhaust Installation, page 1063]

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6.8 Traction Alternator to Engine Coupling Instructions

The purpose of this Technical Instruction (TI) is to detail the steps required to couple the main traction alternator to the diesel engine. Proper alignment, shimming, and spacing of the alternator with respect to the diesel engine is critical to ensure robust operation of the engine-alternator assembly. Failure to follow this TI every time an alternator is coupled to an engine can lead to premature component failure.

This TI—2000–D specifically applies to the axial offset of the alternator flexplate and the engine flywheel. Radial alignment of the alternator flex plate to the engine flywheel is controlled via flex plate and flywheel machining tolerances as the flex plate indexes into a counterbore of the flywheel. The axial offset is considered the nominal difference between the engine flywheel interface to flywheel housing interface and the alternator flexplate interface to stator housing interface. Ideally the difference between these two dimensions would be absolutely zero. The result then would be an alternator which, when attached to the engine flywheel housing interface, will require no axial offset correction from nominal of the flexplate location to couple the flywheel. Nominally, the alternator and engine manufacturer will design and attempt to produce their respective complete component such that the interface components mentioned above will be co-planar (no offset). Manufacturing and assembly tolerances of the completed components, however, lead to deviations of interface surfaces and resulting axial offset. Generally a haul truck alternator is constructed with a ball bearing supporting only the rear of the rotor shaft. This bearing allows no axial movement. The haul truck diesel engine is constructed with fluid film bearings supporting the crankshaft, which the flywheel is attached to. These bearings allow a small, defined, amount of crankshaft axial movement. The engine manufacturer will publish the nominal crankshaft bearing axial clearance limits. During installation of the alternator to the engine, it is of utmost importance that the alternator flexplate not be allowed to force the engine crankshaft to the extents (or beyond) of the fluid film bearing axial clearance limits. During subsequent operation, damage to the alternator bearing will result and damage to the engine bearings and flexplate could result.

There are two different tools which may be used to quantify the axial misalignment of the alternator flexplate and engine flywheel. Tool T-481 is designed to be used with a traditional manual read out depth micrometer. The user must supply their own micrometer(s) when using this tool. Tool 10880099 is designed to use an electronic indicator. The tool is delivered with electronic indicators included. Tool 11002203 is a certified straight edge which must be used with either of the two tools above. A magnetic base indicator holder is also required when using either of the two tools above. This instruction should be completed with either the T-481 tool or 10880099 tool and the proper section of the instruction must be followed based on tool selection.

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6.9.5 Fuel Level Sensor

System Description and Function

The fuel level sensor is located on the top of the fuel reservoir, and monitors the volume of fuel in the fuel reservoir.

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[See Illustration Radiator Removal/Installation (Page 2 of 4), page 438]

4. Close the shutoff valves (20).

7.2 AC Drive Cooling System Assembly

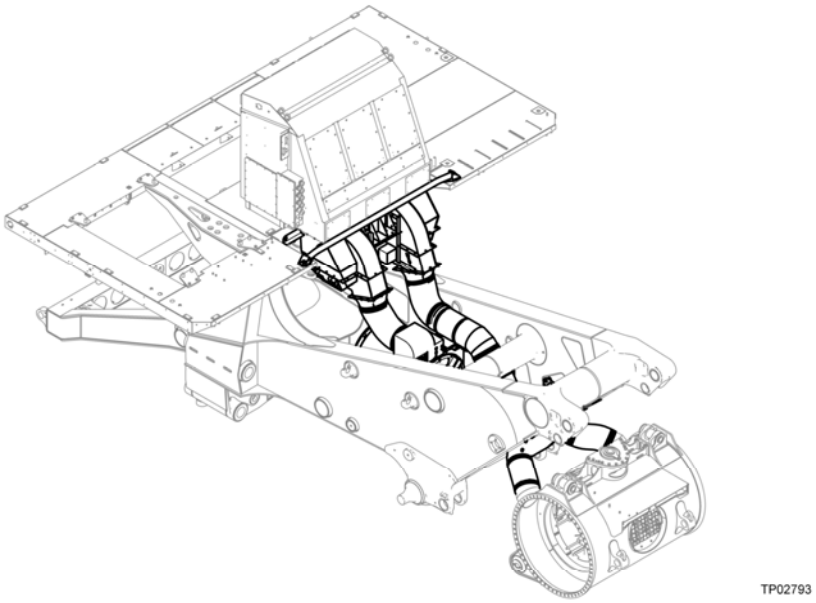

Fig. .2-200: Wheel Motor Cooling Assembly

7.2.1 System Description and Function

The function of the AC drive cooling system is to cool the control box, traction alternator, and traction motors.

The main blower assembly attaches below and aft of the control box above the traction alternator. The main blower assembly cools the traction alternator and traction motors. Air drawn in to the main blower through the control box also cools an air/water-heat exchanger. The 75 kW motor connects to two fans in the main blower assembly.

Blower speed is controlled by the PLC, the traction motor, alternator and cooling fluid temperatures. If a ground fault occurs, the blower automatically operates at full speed to remove unwanted moisture from the system.

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8.2 A/C Hydraulic Components

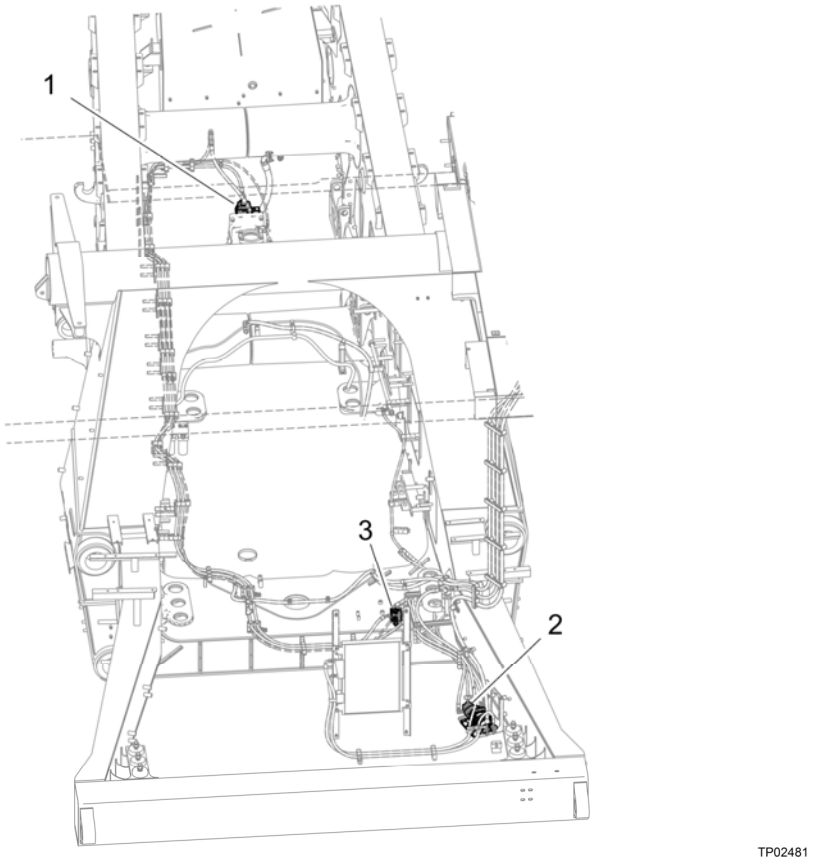

Fig. .2-206: A/C Hydraulic Components Overview

Legend:

1. Variable Displacement Axial Piston Pump
2. Hydraulic Motor
3. Hydraulic Control Manifold

3. Apply Loctite® 243 thread locker (15) to cap screw (8) and torque to 4.5 to 5.0 N.m (40 to 45 lbf in).

8.3.6 Thermostatic Expansion Valve

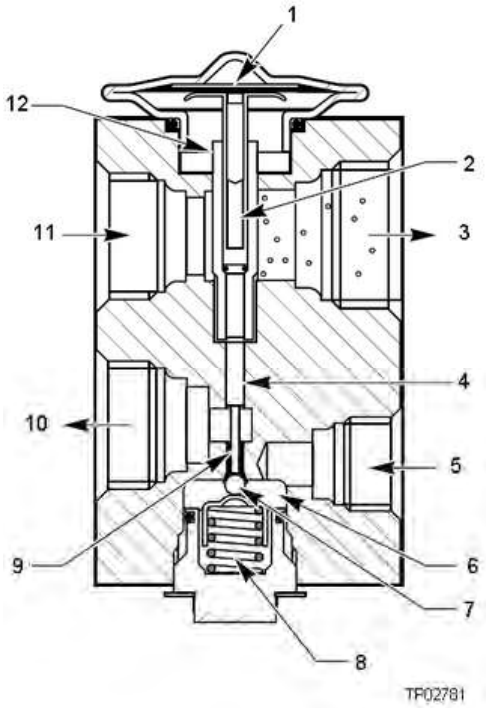

Fig. .3-225: Thermostatic Expansion Valve

Legend:

1. Valve Diaphragm
2. Sealed sensing bulb
3. Outlet to compressor
4. Operating pin
5. Inlet from receiver-dryer
6. High pressure liquid
7. Metering orifice
8. Valve spring
9. When operating pin pushes ball away from ball seat, refrigerant bleeds into evaporator
10. Outlet to evaporator
11. Discharge from evaporator
12. Internal equalization passage

The expansion valve (TXV) is connected to the evaporator coil.

The expansion valve has an inlet and an outlet side that separate the high side of the system from the low side. A small restriction in the valve lets a small amount of refrigerant pass through into the evaporator. The amount of refrigerant that passes through the valve depends on the evaporator temperature. The expansion valve keeps the correct balance between the heat load and the cooling efficiency of the evaporator.

8.3.7 Evaporator Coil and Blower Assembly

The evaporator and blower are installed in the HVAC assembly unit. [Reference: Operator Cab Air Conditioning System , page 494]

The evaporator condenses moisture from the cab air before the air enters the cab air vents. The blower moves warm inlet air from the cab across the evaporator and returns cold air to the cab air vents.

- PB-3
- PC-0
- PD-0
- PE-0
- PF-0

A/C Thermostatic Expansion Valve (TXV)

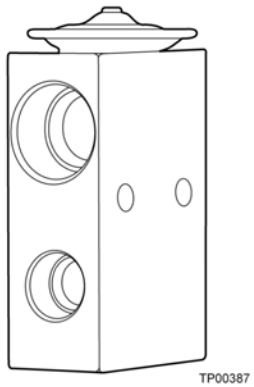

Fig. .6-240: Thermostatic Expansion Valve

The TXV can be tested by freezing the sensing diaphragm disc. The low-side pressure will drop to 0 bar (0 psi) into a vacuum when the sensing diaphragm is chilled. As the TXV warms up, the low-side pressure will then return to the original recorded value.

NOTE
Use electrical freeze spray to freeze the TXV sending disc.

► Do not spray sensing bulb with refrigerant of any kind.

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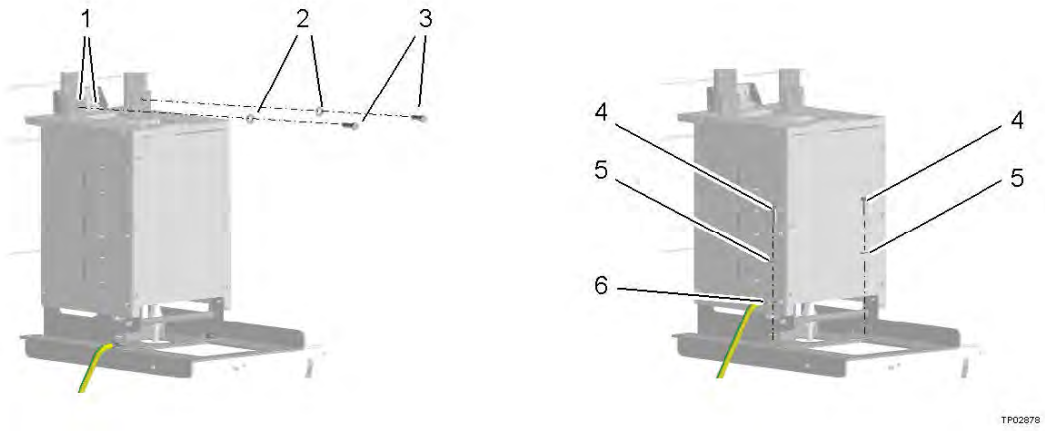


Fig. .4-248: Remove top and bottom screws

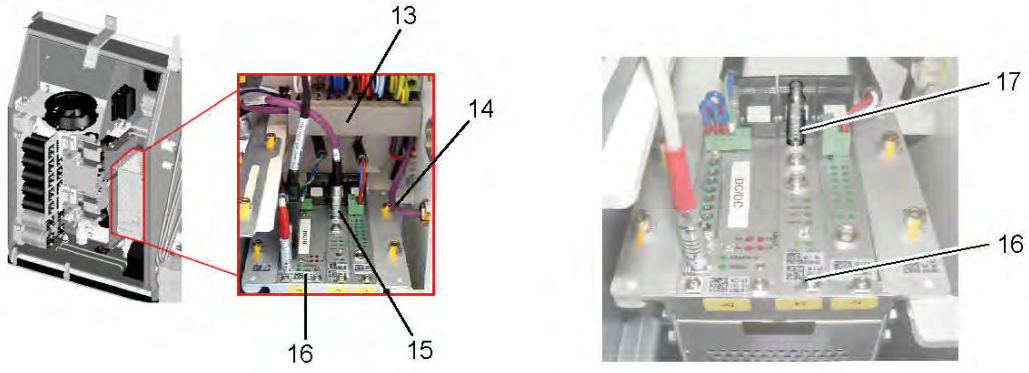
Legend:

1.	Hex head screw M10X30	4.	Hex head screw M10X30
2.	Lock washer	5.	Lock washer
3.	Hex head screw M12X40	6.	Ground cable

DANGER
Electrical power hazard!

- ► Live components are located behind the doors and compartments. If live components are touched it can lead to serious injury, or loss of life.
- ► Power down the control box, and prevent it from being turned on.
- ► Install a tag-out or lockout warning device.
- ► Make sure that the control box is de-energized.

1. Loosen the hex head screws (1). The hex head screws (1) remain in the insulator of the rectifier and do not need to be removed.
2. Remove hex head screws (3) and lock washers (2).
3. Remove hex head screws (4), lock washers (5) and ground cable (6).



Legend:

13.	Cable channel	16.	E-board
14.	Cable	17.	Termination resistor
15.	Cable connector		

18. At the bottom of the DC to DC converter, remove the two coolant supply hoses (18), (19).
    1. Pull the outer sleeve down while at the same time, pull down on the connection.

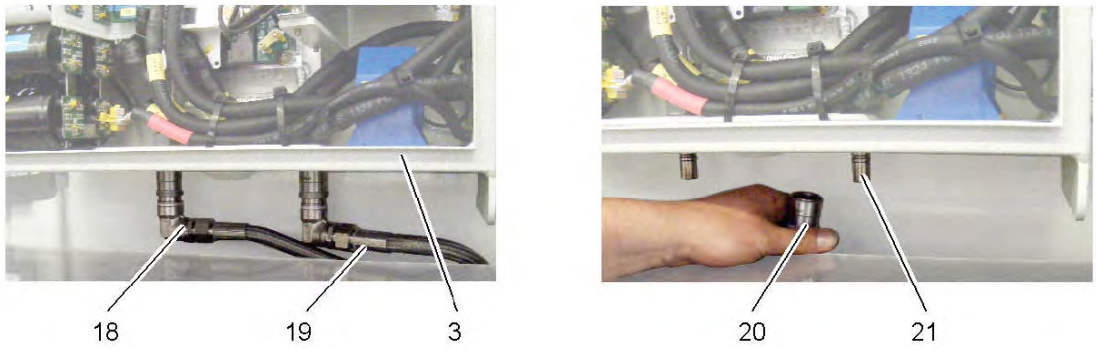


Fig. .5-267: Coolant connections

Legend:

18.	Coolant supply	20.	Coupling
19.	Coolant return	21.	Plug nipple

19. Remove the top mounting screws (23) and lock washers (24) from the left and right side.
20. Install an eyebolt (25) to each side of the DC to DC converter box (3).

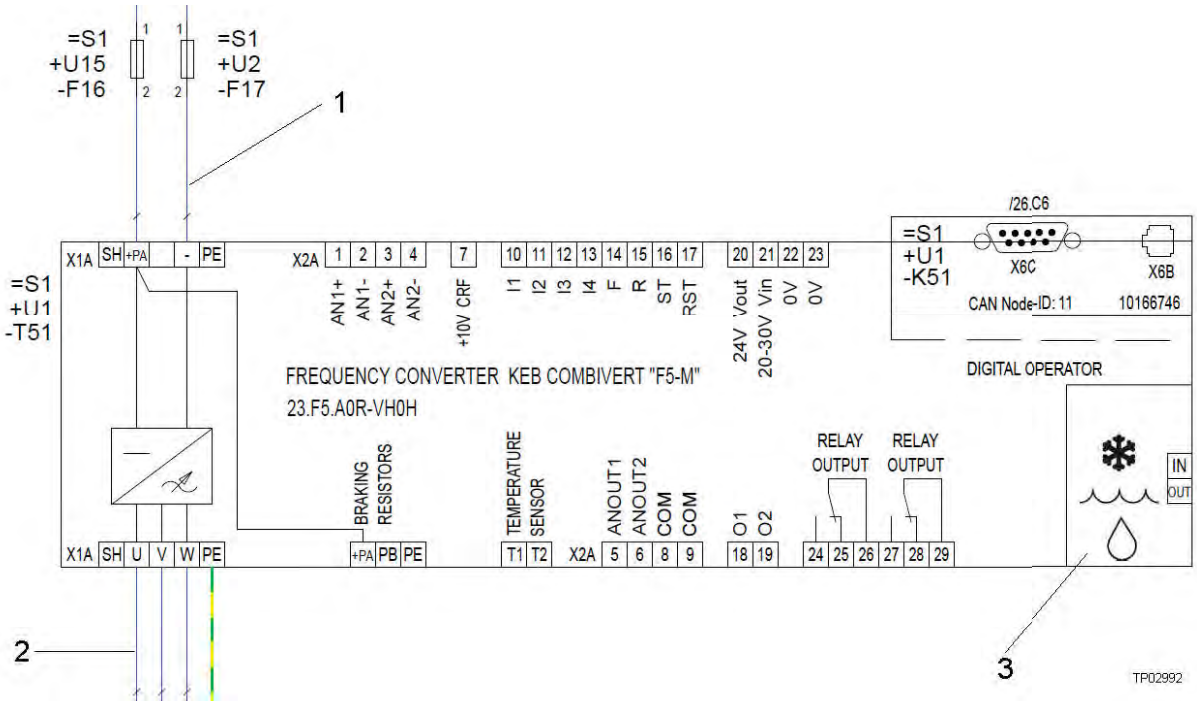


Fig. .6-286: Frequency Converter to Grid Blower

Legend:

1. From DC to DC Converter
2. To Grid Blower Motor
3. Water Cooling

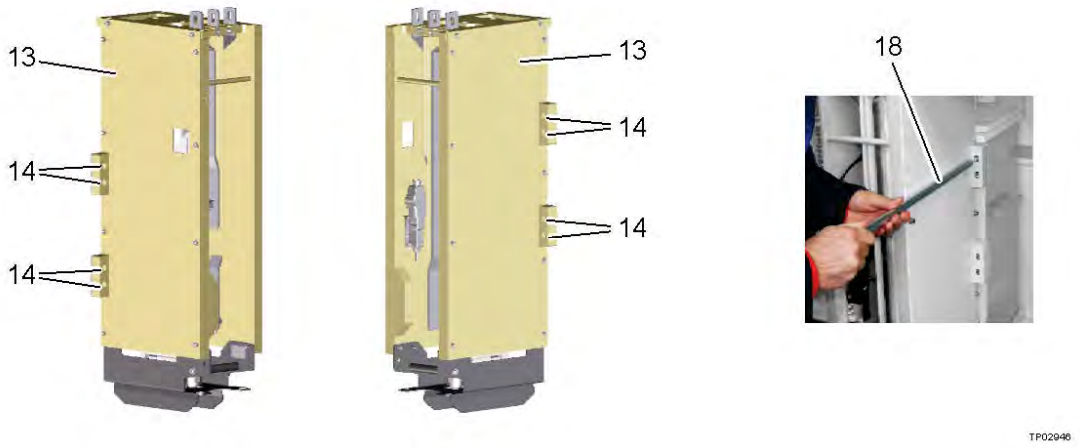


Fig. .7-301: Side socket head screws

Legend:

13.	Inverter (Power Stack)	18.	Socket wrench
14.	M10X20 socket head screws		

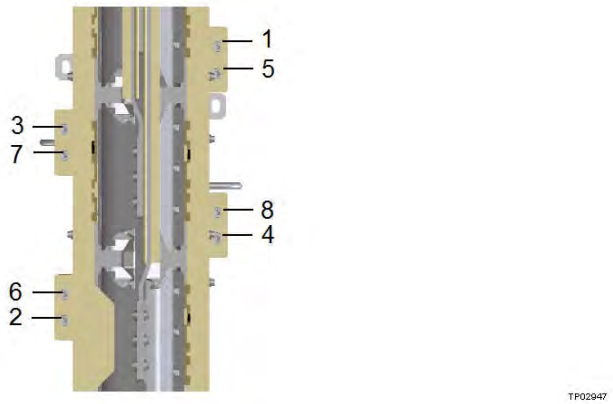


Fig. .7-302: Tightening sequence 1–8

4. Install the hex head screws (10), Nord-Lock washers (11) and the ground cable (12), and torque hex head screws (10) to 50 N·m (37 lbf ft).
   1. Make sure the ground cable is connected and the Nord-Lock washers are put on both sides of the ground cable terminal.

Fig. .8-322: Connect the control connections

Legend:

6.	Control connector	9.	Opening
7.	Lock	10.	Cap
8.	Control connection		

9.14 Independent Power Control

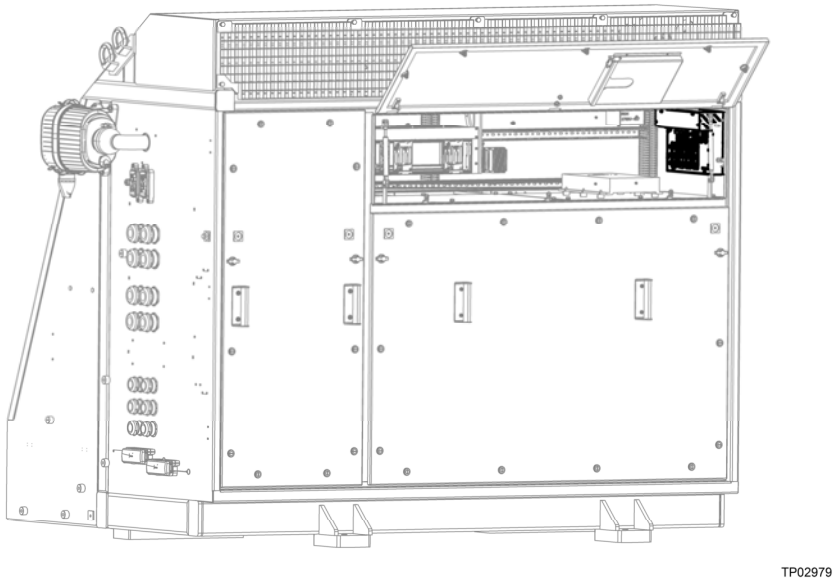


Fig. .14-336: Independent Power Control

9.14.1 System Description and Function

The Independent Power Control (IPC) is located in the upper compartment of the control cabinet. The IPC functions as a signal conditioner and power supply for the voltage sensors and current transducers. The unit also supplies emergency chopper control and exciter disable control. The IPC provides electromagnetic interference shielding to the signals entering and exiting the unit. The IPC also provides for real time error monitoring of the voltage and current sensors and the DC link to the Main Programmable I/O Module. The LED indicators, on the front of the unit, show status of the IPC, DC Link, sensors and emergency chopper.

10.2 Battery Disconnect Box

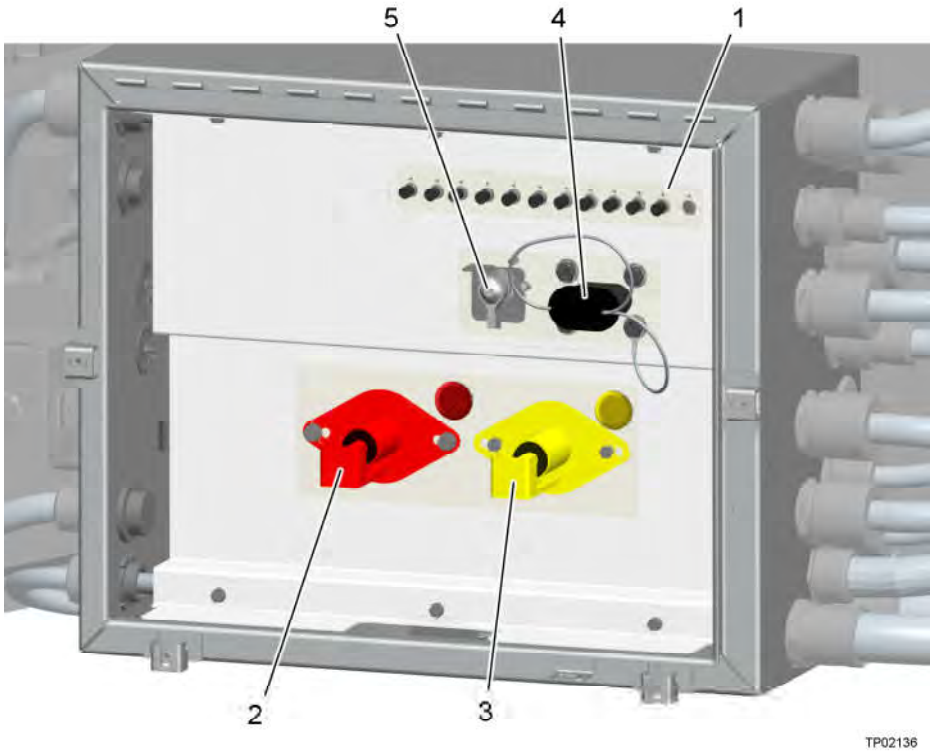


Fig. .2-346: Battery Disconnect Box

Legend:

1. Circuit Breakers
2. 24 VDC Battery Isolator Switch
3. Starter Isolator Switch
4. Battery Charger Receptacle
5. Propulsion Lockout Switch

Follow the specific haul truck safe work procedure(s):

Required Documents

Safe Work Procedure(s)
LME-SWP–00031 • [Reference: LME-SWP-00031 - Battery Disconnect Switch Box, page 1435]

10.2.1 Battery Disconnect Box

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Battery Disconnect Box Circuit Breakers

Circuit Breaker	Location	Electrical Circuit
CB1	BDB*A)/ 90A	Drive Cabinet Control Power
CB1A	BDB / 15A	Engine Start Motor 1

11.1.5 Main Hydraulic Pumps Assembly Installation

- Follow the haul truck safety precautions. [Reference: Safety, page 52]

WARNING
The haul truck must be shut down for this procedure.

► Follow the mine-specific lockout and tag-out procedures.

WARNING
Fall prevention!

► Always put on an approved safety harness and attach it to an applicable anchor-tie-off point when you do any tasks above ground.

Required Tools and Materials

Tools and Materials	Liebherr Part Number	Notes
Lubricant, oil for cap screws	NA	Commercially available
Micrometer or dial calipers	N/A	Commercially available
Grease, for spline shaft	N/A	Commercially available

NOTICE
The minimum weight of the main hydraulic pumps is 285 kg (628 lb).

Use an approved lift device that can safely lift and support the component weight.

1. Attach an applicable lift device that can safely lift and support the weight to the pump unit (1).

ATTENTION

► Incorrect torquing can cause damage to the component.

► Torque all fasteners to the torque values shown in the procedure step.

2. Apply a thin layer of lubricant to the cap screws (11). [Reference: Required Tools and Materials, page 645]
3. Install the flex coupling (12) to the adapter plate with cap screws (11), and torque cap screws (11) to 458 N·m (338 lbf ft).
4. Make sure the bushings in the flex coupling do not become twisted.
5. Turn the alternator shaft so that the radial holes in the flex coupling (12) are in the 3–, 6–, 9–, and 12–o'clock positions.

11.3.3 Hydraulic Reservoir Installation

- Follow the haul truck safety precautions. [Reference: Safety, page 52]
- Follow the mine-specific lockout and tagout procedures.
- Make sure that the hydraulic reservoir is without unwanted material and in serviceable condition.
- Make sure that the haul truck is in the same configuration from the hydraulic reservoir removal procedure. [Reference: Hydraulic Reservoir Removal, page 655]

Required Tools and Materials

Tools and Materials	Liebherr Part Number	Notes
Oil (Hydraulic)	N/A	[]

NOTICE
The minimum weight of the each hydraulic reservoir (empty) is 520 kg (1146 lb).

► Use an approved lift device that can safely lift and support this weight.

NOTICE
The haul truck will not start if the hydraulic shutoff valves are not in the fully OPEN position.

► The hydraulic shutoff vales have an electric proximity switch that prevents the start up of the haul truck.

► Make sure the valves are in the fully OPEN position.

1. Connect applicable lift device to the lift points on the top of the hydraulic reservoir (4).
2. Attach an applicable lift device to the chains, and make sure the chains are over the center of the reservoir (4), and keep the reservoir level.
3. Put the hydraulic reservoir (4) in position on the reservoir mounts on the chassis.
4. Install the cap screws (17), locknuts (21), cinch washers (20), flat washer (18), and Fibromounts (19), if removed.
5. Connect the electrical connectors (3) and remove the identification tags.
6. Install the shutoff valve (14), and cap screws (13).
7. Install the flange (10), cap screws (9), and lock washers.
8. Install the shutoff valve (16), and cap screws (15).
9. Install the tube assembly (12), cap screws (11), lock washers, and flat washers.
10. Remove the protective covers from the hose (1) and ports.

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12.1.2 Hoist System Schematics

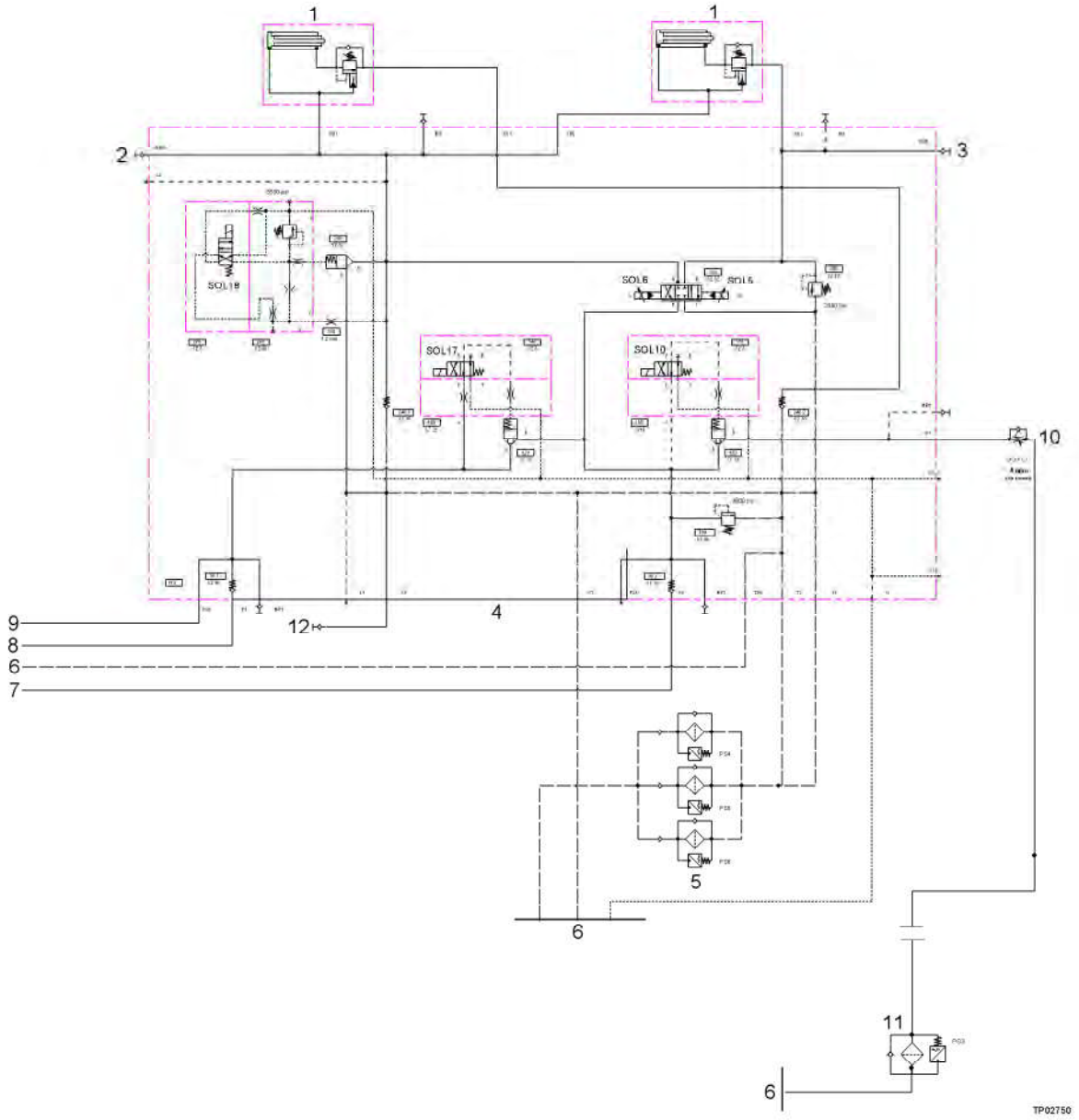


Fig. .1-370: Hoist System Schematic

Legend:

1. Hoist Cylinders
2. Buddy Hoist Extend
3. Buddy Hoist Retract
4. Hoist System Manifold
5. Return Line Filtration (Optional)
6. To Hydraulic Reservoir
7. From Rear Pump
8. From Front Pump
9. To Brake and Steering Manifold
10. To GOC Hydraulic Cooling Systems
11. Hydraulic Circulation Loop Filter
12. Central Service Hydraulic Fill

7. Do the hoist system lockout procedure before you start any work or service. [Reference: Hoist System Lockout Procedure, page 674]
8. Follow the applicable mine-specific tag-out and lockout procedure to prevent the haul truck from starting.

WARNING
The dump body can move when the pins are removed.

- ► Make sure that the overhead hoist is in the correct position.

9. Make sure the hoist cylinder shipping brackets (7) are installed on the chassis.
10. Attach an overhead hoist to the lift points on the dump body. [Reference: Dump Body , page 1048]
11. Tighten the tension on the cables of the overhead hoist.
12. Close the supply and return line valves on the hydraulic tank. [Reference: Hydraulic Reservoir, page 653]
13. Put a container below the hoist cylinder (12) to catch hydraulic fluid.
14. Remove the lubrication hoses (10) and install protective caps on the hoses and open ports.

NOTICE
The weight of a hoist cylinder without hydraulic fluid is 1270 kg (2800 lb).

Use an approved lift device that can safely lift and support the component weight.

15. Attach an applicable lift device to the hoist cylinder (12).

WARNING
Hydraulic fluid can cause skin irritation and injury if ingested.

- ► Always put on protective equipment when you service tasks on hydraulic systems and components.

DANGER
The cylinder rod can move in and out of the hoist cylinder if you do not contain it.

- ► The cylinder rod can be damaged, or cause serious injury or death.
- ► Make sure that you add cover plates and O-rings to the cylinder ports to contain the cylinder rod. Make sure that there is no trapped air in the cylinder.

16. Slowly and carefully remove the bolts (13), washers (14), and extend and retract hydraulic hoses (22).

ATTENTION
Hydraulic fluid drains from the hydraulic lines and the cylinders.

- ► Use a container to catch the fluid and install cover plates to prevent leakage and contamination.

17. Install protective covers on the hoses (22).

13.3.2 Front Brake Supply and Pilot Accumulator Removal

Front Brake Supply Accumulator Removal

- Follow the haul truck safety precautions. [Reference: Safety, page 52]
- Use a safety harness when you do service above the ground. [Reference: Safety Harness, page 83]
- Bleed the brake accumulators. [Reference: Brake and Steering Accumulator Bleed, page 732]

WARNING
Hydraulic fluid can cause skin irritation and injury if ingested.

► Always put on protective equipment when you service tasks on hydraulic systems and components.

1. Put a container below the supply accumulator (6) to collect the hydraulic fluid.
2. Disconnect the connection (2), hydraulic hoses (1), elbow (3), gauge block (4), and put protective covers on the hoses and open ports.

NOTICE

► The minimum weight of the front brake supply accumulator (dry) is 167 kg (368 lb).

Use an approved lift device that can safely lift and support the component weight.

3. Attach an applicable lift device to the supply accumulator (6).
4. Loosen the cap screws (5) and remove the brackets.
5. Remove the supply accumulator (6).

13.4 Brake and Steering Manifold

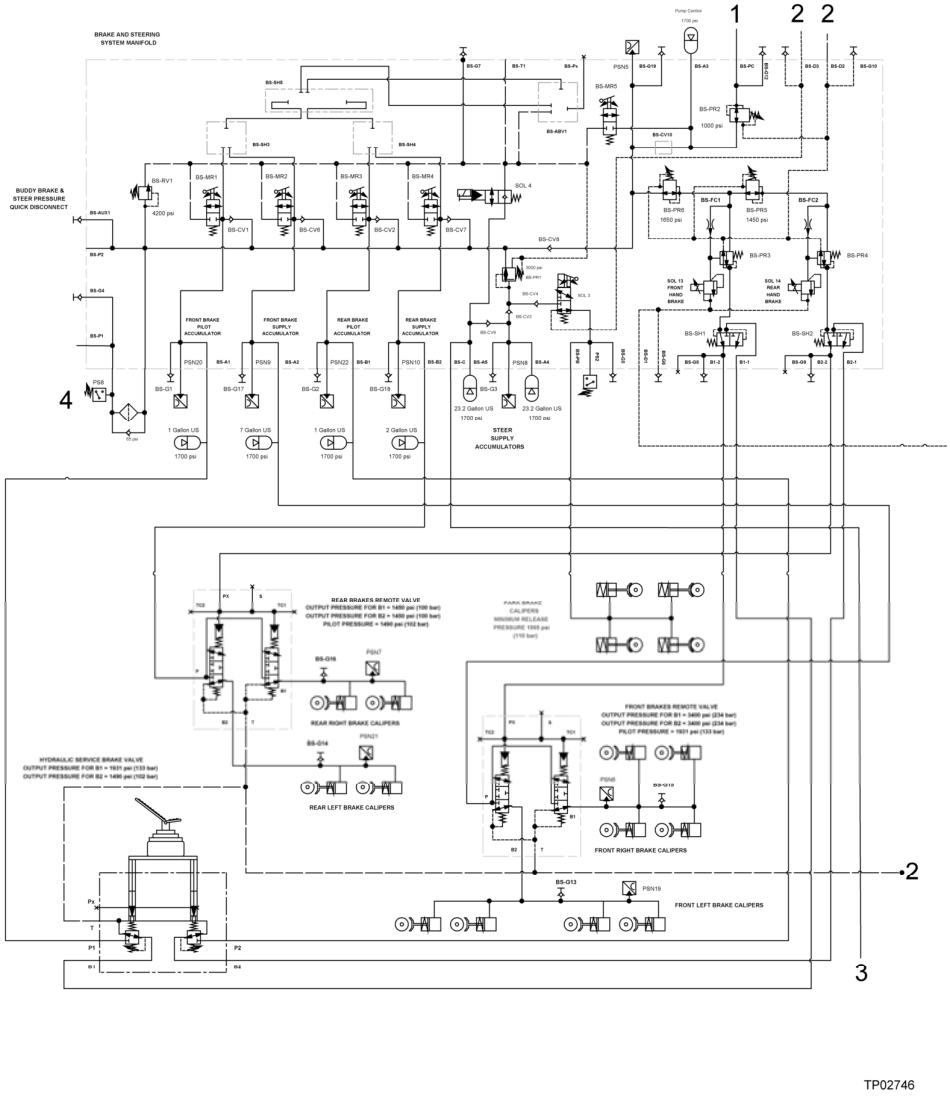


Fig. .4-392: Brake and Steering Manifold Schematics

Legend:

1. Pump Control
2. To Reservoir
3. To Steering
4. From Front Pump

13.4.1 System Description and Function

Hydraulic fluid comes from the main hydraulic pump (4), through the pressure filter, into the manifold. Pump control (1) ensures sufficient pressure is available for pressure compensation and electronic displacement control valves for the main hydraulic pumps. Pressure sensors for the steering, service, and park brake systems send signals to the main

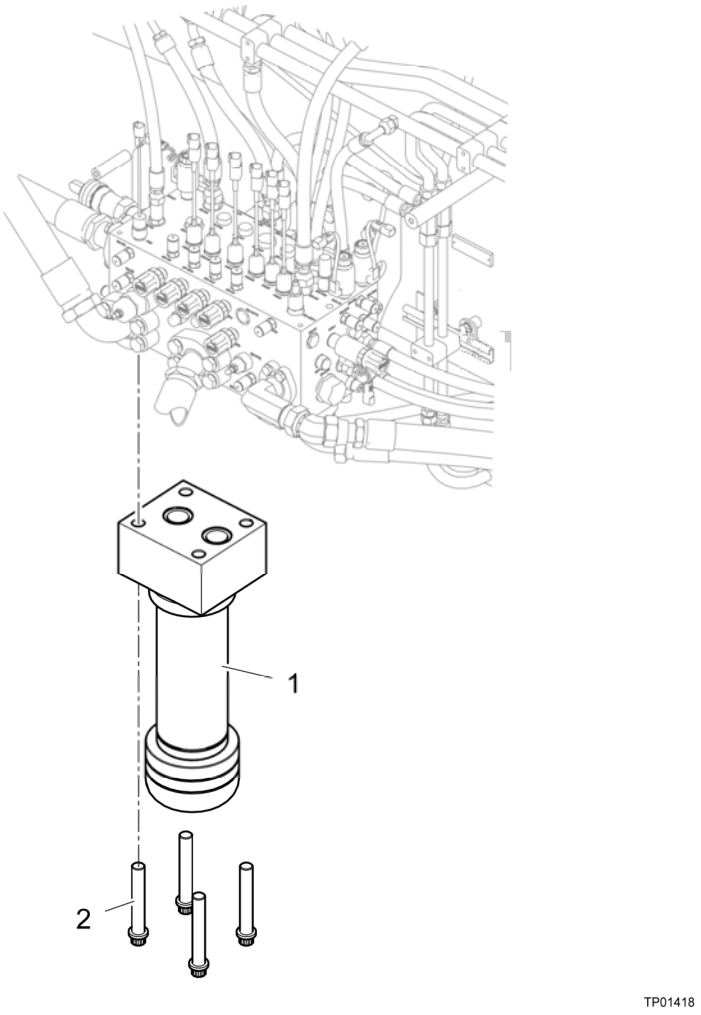


Fig. .6-400: Brake and Steering Pressure Filter Removal

13.10.2 Flow Amplifier Valve Removal

- Follow the haul truck safety precautions. [Reference: Safety, page 52]
- Follow the mine-specific lockout and tagout procedures.
- Bleed the steering accumulators. [Reference: Brake and Steering Accumulator Bleed, page 730]

WARNING
Hydraulic fluid can cause skin irritation and injury if ingested.

► Always put on protective equipment when you service tasks on hydraulic systems and components.

1. Put a container below the flow valve (1) to collect and discard the hydraulic fluid.
2. Remove the cap screws (2), flat washers (3), clamp (4), and hose (5).
3. Remove the hoses (6) and tees (7).
4. Remove the cap screws (8), flat washers (9), tube assemblies (10), and O-rings (11).
5. Remove the hoses (12) and connectors (13).
6. Put protective covers on the hoses (5), (6), (12), tube assemblies (10), and all open ports.

NOTICE

► The minimum weight of the flow amplifier valve is 29 kg (64 lb).

Use an approved lift device that can safely lift and support the component weight.

7. Remove the cap screws (14), flat washers (15), and remove flow amplifier valve (1).

1. Put an applicable support at the two ends of the cylinder (3).
2. Put the steering cylinder (3) in position on the haul truck.
3. Install the seal rings (11).
4. Carefully align the steering cylinder (3), and seal rings (11).
5. Apply a thin coat of oil to the pins (7) and (10).
6. Install pins (7) and (10).
7. Apply lubricant to the cap screws (4) and (9).
8. Install the cap screws (4), (8) washers (5), (9), and retainer pins (6).
9. Tighten the cap screws (4) and (8) to 548 N·m (404 lbf ft).
10. Remove the protective caps and connect the hydraulic lines (1) and lubrication hoses (2).
11. Lubricate the bushings (12) with grease.

[See Illustration Steering Cylinders Removal/Installation, page 755]

CAUTION
Test port adaptor can only pass contaminates that are smaller than the port diameter size.

- ► If a catastrophic failure occurs, system disassembly is required to manually remove large size contaminates.

CAUTION
External filter cart should never be connected and operated with an operating truck diesel engine.

- ► The truck operating system pressure exceeds the safe operating range of an external filter cart and personnel injury and equipment damage will occur if operated at the same time.

5. At the completion of step 4, remove test port adaptor hose from brake and steering manifold. Remove external filter cart hydraulic connections from truck.
6. Start diesel engine and bleed down accumulator pressure using the manual valves at BS-MR1, BSMR2, BS-MR3, BS-MR4, and SOL4 (as well as BS-MR5 for T264 models) to purge hydraulic fluid from accumulators. Allow pressure to build up in all accumulators and repeat bleed off for a minimum of five cycles.
7. Turn off diesel engine and repeat the previous steps as needed and continue to monitor filter conditions to make sure the filters are not in by-pass. Replace the filters as needed.

13.15.7 Removing Contamination from Steering Circuit

- Requires operation of diesel engine, removes contamination downstream of brake and steering manifold.
- Follow the haul truck safety precautions. [Reference: Safety, page 52]

Recommend completion of one of the provided options within [Reference: Removing Contamination from Tank, page 766] section first, then proceed for best results.

CAUTION
Systems under Pressure.

- ► Connection of test port adaptor hose is performed at system pressure.
- ► Review service manual to perform task safely.

CAUTION
Test port adaptor can only pass contaminates that are smaller than the port diameter size.

- ► If a catastrophic failure occurs, system disassembly is required to manually remove large size contaminates.

After completion of one of the options provided in [Reference: Removing Contamination from Tank, page 766], proceed to filtering the steering circuit:

1. Lock out truck propulsion.
2. Start truck diesel engine, allow to idle.

14.1.2 Auto Lube Components

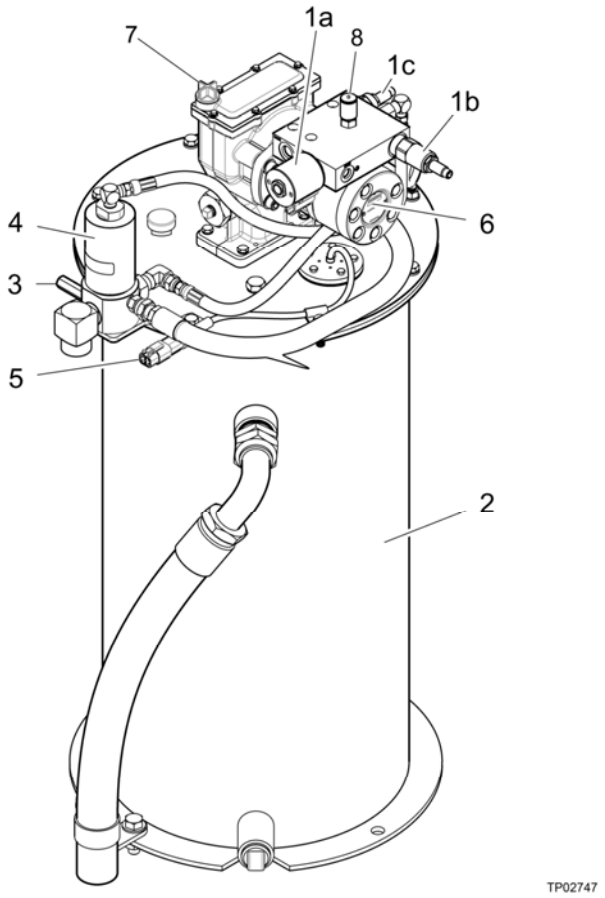


Fig. .1-426: Auto Lube System Components

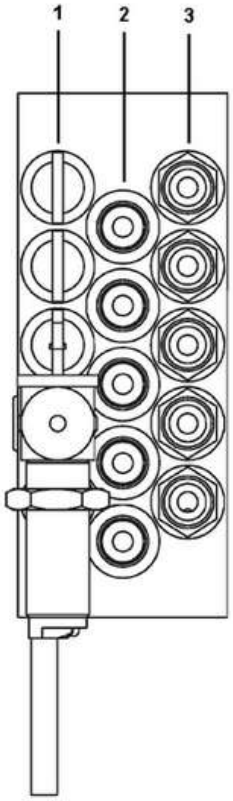
The auto lube system has the components that follow:

1. [Reference: Lubrication Pump, page 788]
   - (1a) Solenoid Operated Cartridge Valve
   - (1b) Pressure Reducing Valve
   - (1c) Flow Control Valve
2. [Reference: Grease Reservoir, page 788]
3. [Reference: Safety Unloader Valve, page 796]
4. [Reference: Vent Valve Assembly, page 797]
5. Grease Reservoir Level Sensor Electrical Connection
6. Hydraulic Motor
7. Oil Level Dipstick
8. Test Port

If there is a blockage or the pump reservoir is empty, the proximity switch can no longer detect piston movement. A signal is then given and a fault is shown on the HMI (touchscreen). There is also an LED light on the proximity switch that can be used to check for a change of state when troubleshooting.

Technical Information

Operating Pressure	Min. 20 bar (290 psi)	Max. 350 bar (5076 psi)
Output/Outlet Pair/Stroke	Min. 0.08 cm^3 (.0049 in^3)	Max. 1.8 L (110 in^3)
Operating Temperature	Min. -25 °C (-13 °F)	Max. 70 °C (158 °F)



The valve has three functional levels,

1. control piston level
2. metering piston level
3. outlet level

Follower

If the follower foam shows signs of damage or does not wipe the sides of the container sufficiently, service may be necessary.

- Disconnect the hydraulic supply from the pump.

14.5 Gear Oil Cooling System Filters

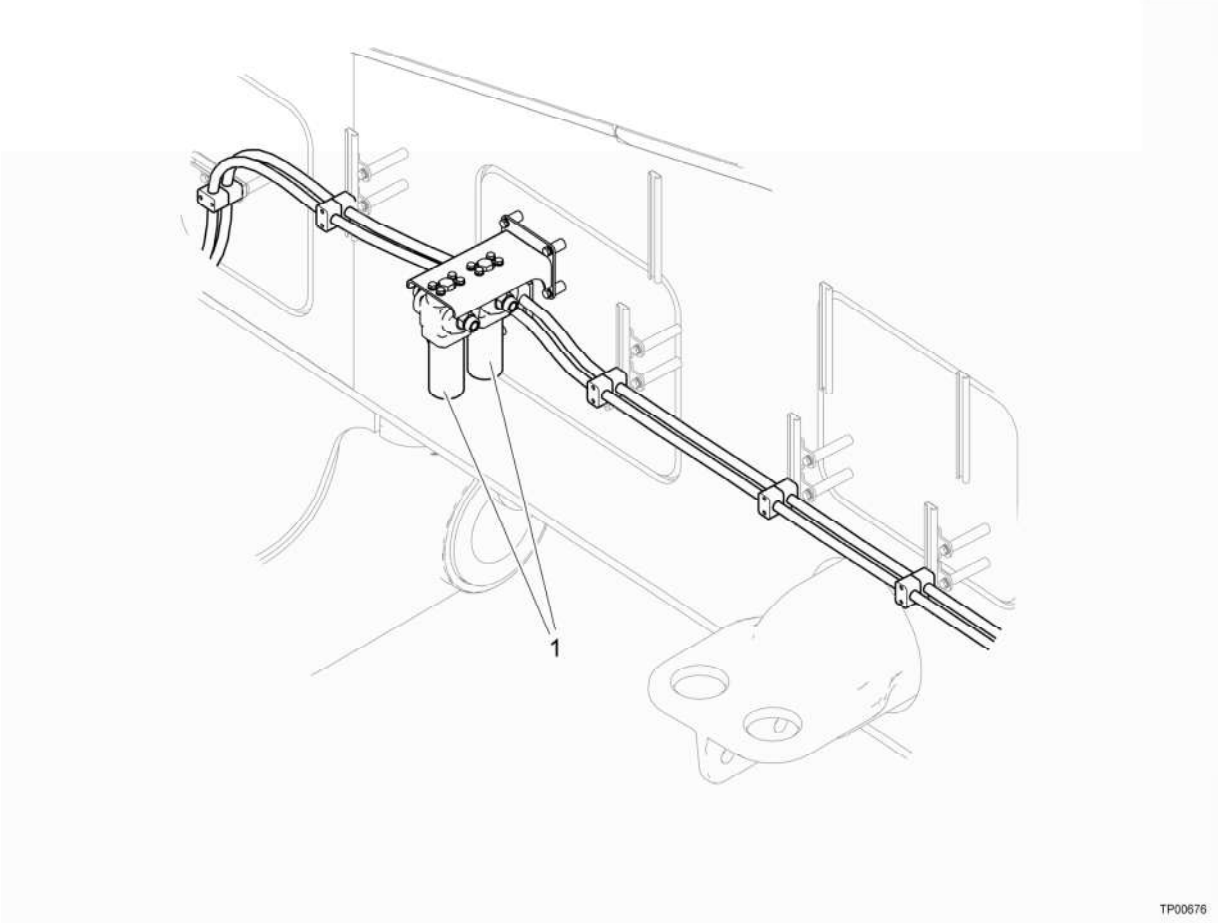


Fig. .5-447: Gear Oil Cooling Filters

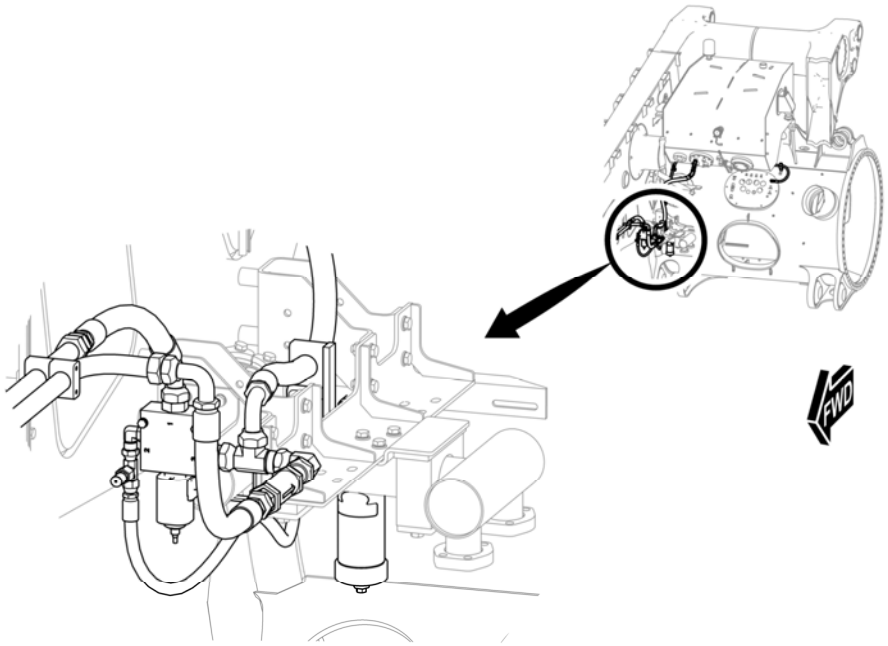
14.5.1 System Function and Description

The left and right circuits each have separate filters located on the right side (ODS) of the chassis.

As the oil flows through the filters, contaminants gradually block the element which results in increasing back pressure. Once this pressure exceeds 2 bar (35 psi), an internal bypass redirects the gear oil around the filters. The gear oil indicator on the indicator panel illuminates and informs the operator that service is necessary.

The gear oil cooling system filters are a one-time use. [Reference: 264-20-02-00 - Gear Oil Cooling System Filters Replacement Procedure, page 256]

14.8 Hydraulic Oil Cooling System



14.8.1 System Description and Function

The Hydraulic Oil Cooling Circuit function is designed to cool hydraulic oil during operation in warm ambient temperatures, and to protect the hoist oil cooler and filter assemblies when cold temperatures would affect oil viscosity and result in higher operating pressures.

The hydraulic cooling system contains these components:

- Gear oil cooling pump motor, mounted in the axle box.
- Hoist oil cooler manifold solenoid valve, located on the right inside chassis rail, forward of the hydraulic reservoir and the circulation filter.
- Circulation loop filter, forward of the hydraulic tank.
- Hydraulic oil heat exchanger assembly, mounted on the front driver-side bottom position of the grill.
- The rear pump from the double piston pump.

The single circuit function is to pull oil from the hydraulic reservoir with the gear oil pump hydraulic motor, mounted in the axle box. The oil circulates through the heat exchanger, based on the temperature of the oil.

The hoist oil solenoid valve (SOL 11), is a normally de-energized, solenoid operated, three-way, direct-acting spool type, screw in cartridge valve.

When the hydraulic system oil temperature rises above 45 °C (113 °F), the solenoid is de-energized open, to let the oil circulate through the heat exchanger.

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Replacing Pressure Transducer

- Follow the haul truck safety precautions. [Reference: Safety, page 52]
- Use a safety harness when you do service above the ground. [Reference: Safety Harness, page 83]

DANGER
Systems are pressurized!

► If pressure transducer (1) or coupling (3) are turned, the pressurized gas contained in the suspension can cause serious injury or loss of life.

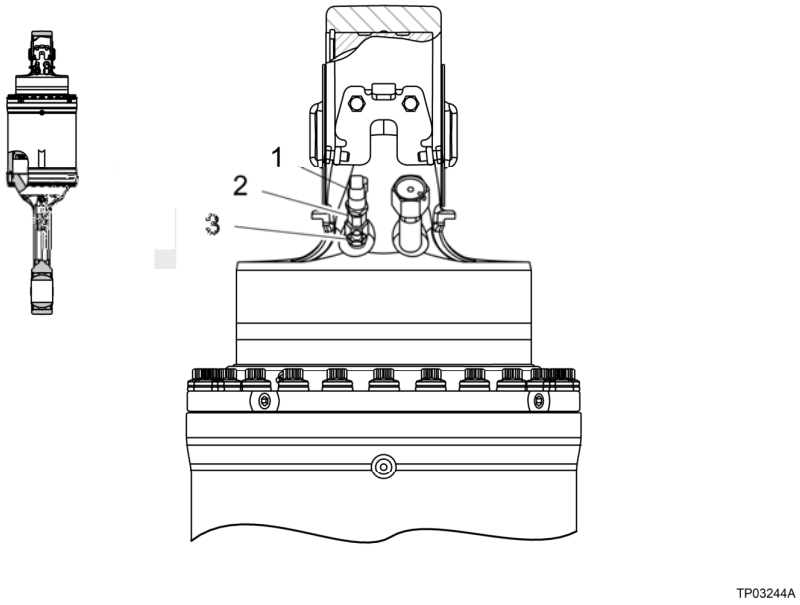

Fig. .1-464: Pressure Transducer Installed, Front Suspension

Legend:

1. Pressure Transducer
2. Minimess Adapter
3. Coupling

1. Remove Minimess adapter (2) together with pressure transducer (1) from the coupling (3). See [See Illustration Pressure Transducer Removed, Rear Suspension, page 858].
2. Remove pressure transducer (1) from the Minimess adapter (2).
3. Install the new pressure transducer (1) to the Minimess adapter (2) and torque to 20 N·m (15 lbf ft).

15.2.7 Rear Suspension Discharge Procedure

- Follow the haul truck safety precautions. [Reference: Safety, page 52]

DANGER
The suspension is pressurized with nitrogen.

► Put on approved protective equipment when you do procedures that include nitrogen under pressure.

Required Tools and Materials

Tools and Materials	Liebherr Part Number	Notes
Lifting device and support for the haul truck chassis (front)	N/A	Commercially available

Required Documents for Suspension (suspension) Monitoring and Maintenance

Component	Liebherr Part Number	Notes
Rear Suspension	N/A	[See Illustration Rear Suspension Assessment Chart, page 217]
Suspension Assessment Flowchart	N/A	[Reference: Suspension Assessment Flowchart, page 218]

1. Lift and support the rear end of the chassis until the rear suspensions are fully extended. Use the Suspension Assessment Charts to find the X_0 dimension. [Reference: Suspension Assessment Charts, page 216]

NOTICE
The weight of the rear axle must remain on the ground.

2. Remove the suspension transducer cover from the rear suspension.
3. Connect one of the hoses of the nitrogen charge kit to the suspension gas valve and place the opposite end into a waste oil container (allows oil froth to drain into the container during gas discharge).
4. Repeat prior step for the other rear suspension.
5. Slowly open the gas valves until you hear the gas release.
6. Once the gas pressure has completely vented from each suspension, close the gas valves.
7. Disconnect the hose from the gas valves.
8. Install the transducer covers.

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14. Lower the lower control arm against the support.

CAUTION
The retainer holds the outside bearing and shims.

- ► The outside bearing and shims can fall when the retainer is removed.
- ► Do not let the outside bearing and shims fall.

15. Remove the cap screws (11), washers (12), bearing retainer (13), outside bearing (15), and shims (14).
16. Lower the wheel assembly (18) until the upper kingpin ball (6) is clear of the upper control arm.
17. Put the wheel assembly (18) in a safe location.
18. Do an inspection of the kingpin balls (6) for signs of wear or damage.
[Reference: Kingpin Wear Limit, page 878]

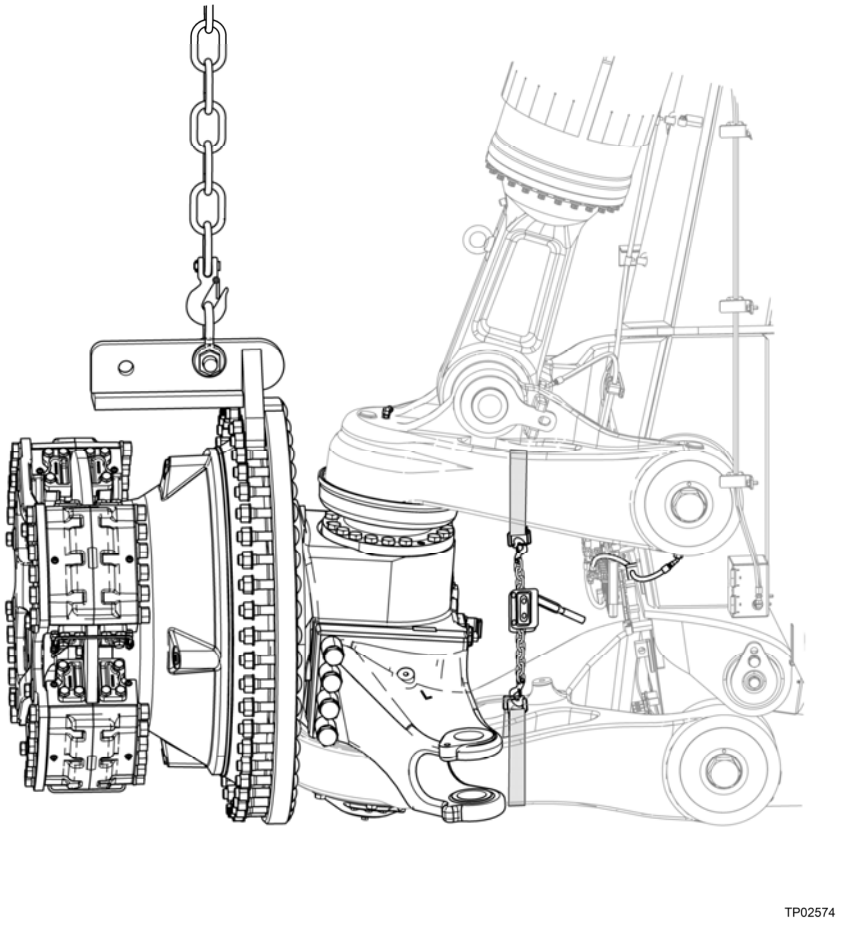

Fig. .1-477: Front Wheel Removal/Installation (5 of 5)

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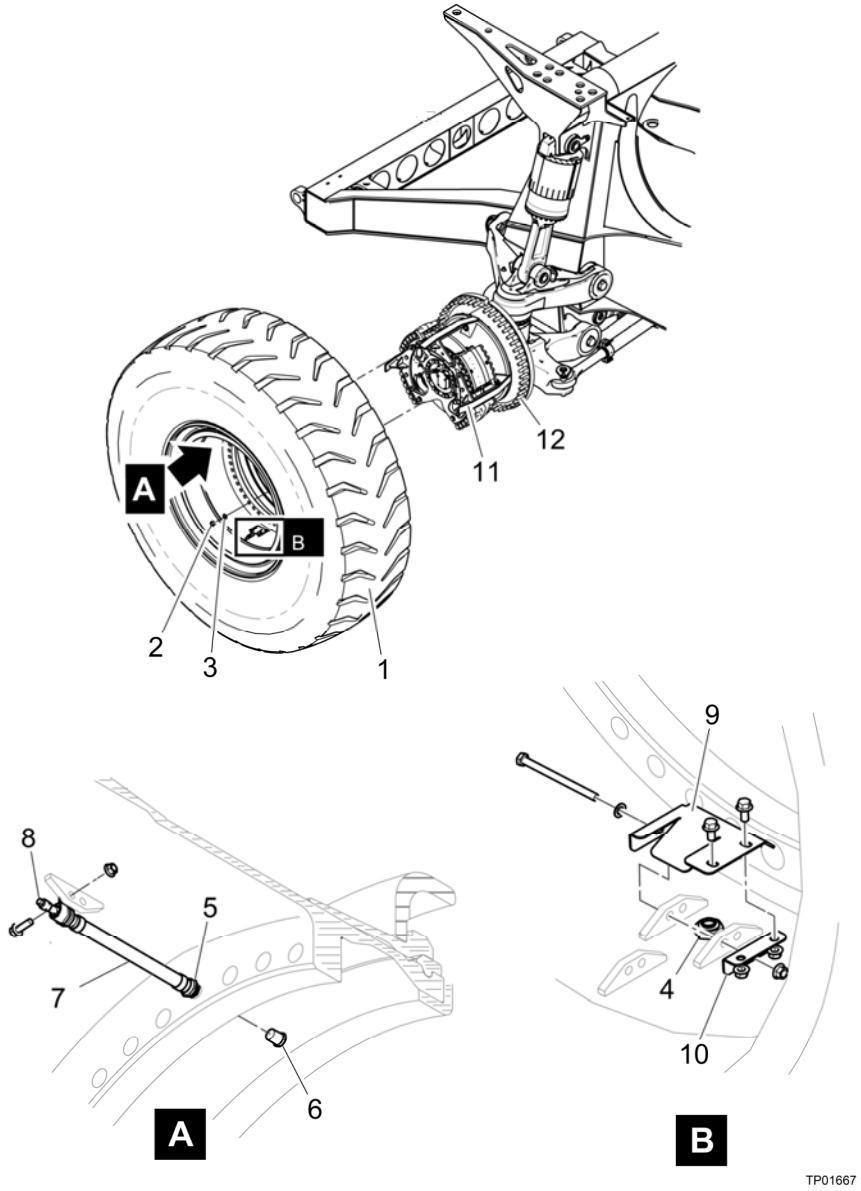

Fig. .2-485: Tire and Rim Assembly Removal/Installation

9. Immediately check rear disc temperatures, preferably with a contact thermometer, to confirm that the given burnish temperatures were achieved.
10. If the given burnish temperature was not achieved, complete the cool-down phase, and restart the procedure at step 4, using the same given requirements for the pass that did not meet the conditions.

NOTE
As the braking components are burnished, the friction coefficient will increase, which results in increased component temperature for the same input requirements.

11. Cool-down: continue driving at the cool-down travel speed and approximate time given to decrease the brake temperature to below the given cool-down temperature.
12. Repeat this procedure two additional times, referencing the pass criteria given for the second and third passes.
13. Reconnect the applicable brakes and verify that the calipers receive full pressure and no hydraulic leaks are present.

Rear Brake Burnish Criteria

Pass(es)	Burnish Travel Speed	Burnish Measured Temperature(s)	Cool-down Travel Speed	Cool-down Travel Time (~)	Cool-down Temperature(s) (<)
First	13 km/h (8 mph) to 16 km/h (10 mph)	371 °C (700 °F)	8 km/h (5 mph) to 16 km/h (10 mph)	30 minutes	149 °C (300 °F)
Second	13 km/h (8 mph) to 16 km/h (10 mph)	427 °C (800 °F)	8 km/h (5 mph) to 16 km/h (10 mph)	30 minutes	149 °C (300 °F)
Third	13 km/h (8 mph) to 16 km/h (10 mph)	482 °C (900 °F)	8 km/h (5 mph) to 16 km/h (10 mph)	30 minutes	149 °C (300 °F)

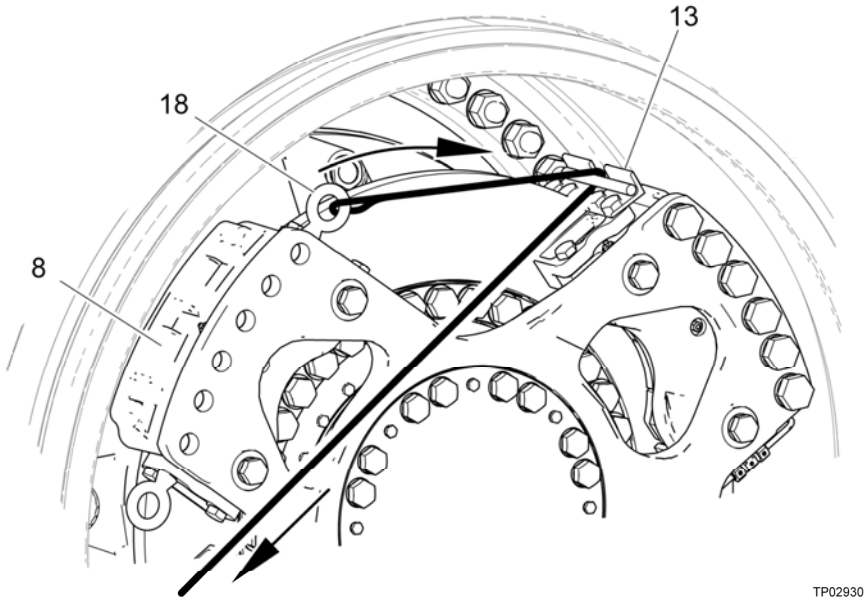

Fig. .8-500: Upper Front Brake Caliper Removal/Installation (3 of 4)

17. Install a rope (15) and tie one end to the eye bolt (18) and put rope over the upper caliper bracket (13) and secure.
18. Remove the cap screws (9) and hardened washers (10).
19. Pull the rope (15) and push the outboard caliper piece (8) to rotate the caliper to the top position.

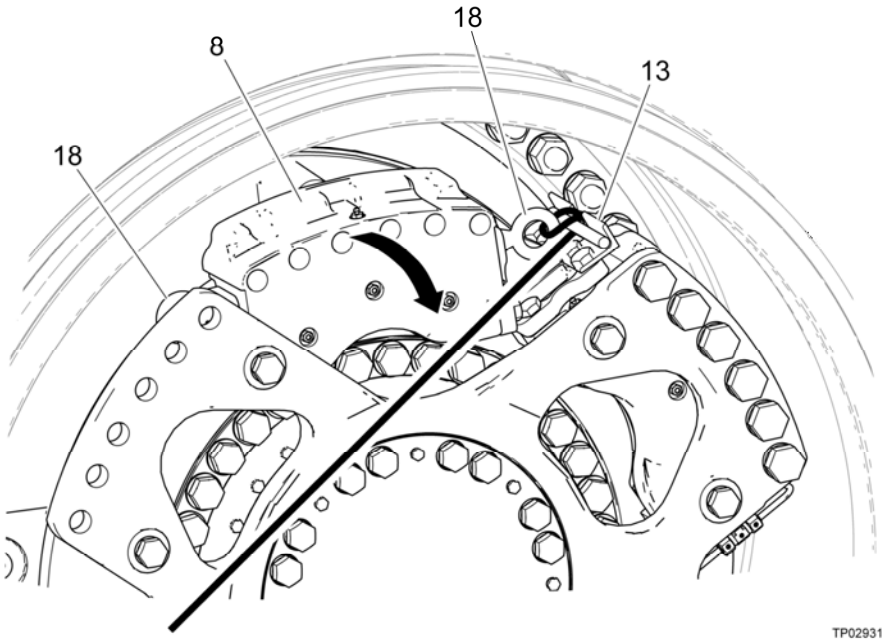

Fig. .8-501: Upper Front Brake Caliper Removal/Installation (4 of 4)

20. Correctly hold and attach an applicable lift device to the outboard caliper piece (8).

Kingpin Wear Limit

	Max.	One–half the life wear limit	Wear limit on ball
Kingpin ball	286.0 mm (11.26 in) diameter	283.0 mm (11.14 in) diameter	280.0 mm (11.02 in) diameter

NOTE
Wear normally occurs on one side of the kingpin ball,

- ► when the kingpin ball reaches one–half the life wear limit, rotate the kingpin 120 degrees.

NOTICE
The combined minimum weight of the kingpins and the spindle is 1120 kg (2469 lb).

Use an approved lift device that can safely lift and support the component weight.

NOTICE
The minimum weight of the kingpin is 170 kg (375 lb).

- ► Make sure the front wheel assembly is properly supported while replacing the fasteners.

1. Install the eye bolt into lower kingpin (3) and attach an applicable lifting device that can support the weight of the lower kingpin (3).
2. Make sure the bolt flange contact surface between the lower kingpin (3) and spindle (4) is clean, dry and smooth.
3. Carefully turn the spindle 180 degrees and hold in an upright position.

ATTENTION
Connection between the spindle and kingpin is a press fit.

- ► Cool the kingpin with dry ice to a temperature difference of at least 60 °C (140 °F) degrees.

NOTICE
Dry ice temperature is very cold!

- ► Danger of injury when working with very cold liquids.
- ► Always put on approved protective clothing and gloves.

4. Apply grease and coat the locating borehole in the spindle, for the lower kingpin (3).
5. Carefully set the cooled lower kingpin (3) on the spindle (4).
6. Install 18, new cap screws (2) with Liebherr anti-seize under the head of the screws and on the bottom threads (12.7 mm (0.5 in) to 25.4 mm (1 in)) only, and install hand-tight.
7. Use a cross pattern to torque the cap screws to 810 N·m (597 lbf ft).
8. Apply Loctite® 243 to the three set screws (5) and install.
9. Remove the eyebolt.

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16.14.2 Idler Arm Assembly Removal

- Follow the haul truck safety precautions. [Reference: Safety, page 52]
- Put an applicable support below the idler arm assembly (10).
- Remove the tie rods. [Reference: Tie Rod Removal, page 948]
- Remove the steering cylinders. [Reference: Steering Cylinder Removal, page 754]

1. Disconnect all lubrication hoses.
2. Remove the cap screws (1), flat washers (2) and the upper retainer (3).

WARNING
The minimum weight of the assembled idler arm is 372 kg (820 lb).

Use an approved lift device that can safely lift and support the component weight.

3. Put an applicable support below the idler arm assembly (10).
4. Remove the cap screws, flat washers (5), (6).

WARNING
The minimum weight of the retainer pin is 46 kg (101 lb).

Use an approved lift device that can safely lift and support the component weight.

5. Remove the pin (4).
6. Move the idler arm assembly (10) to the rear of the haul truck and out of the cross member.
7. Remove the inserts (7), cap screws (8), and bushings (9).
8. Do an inspection of the pin and bushings.

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16.17 Upper and Lower Front Control Arms

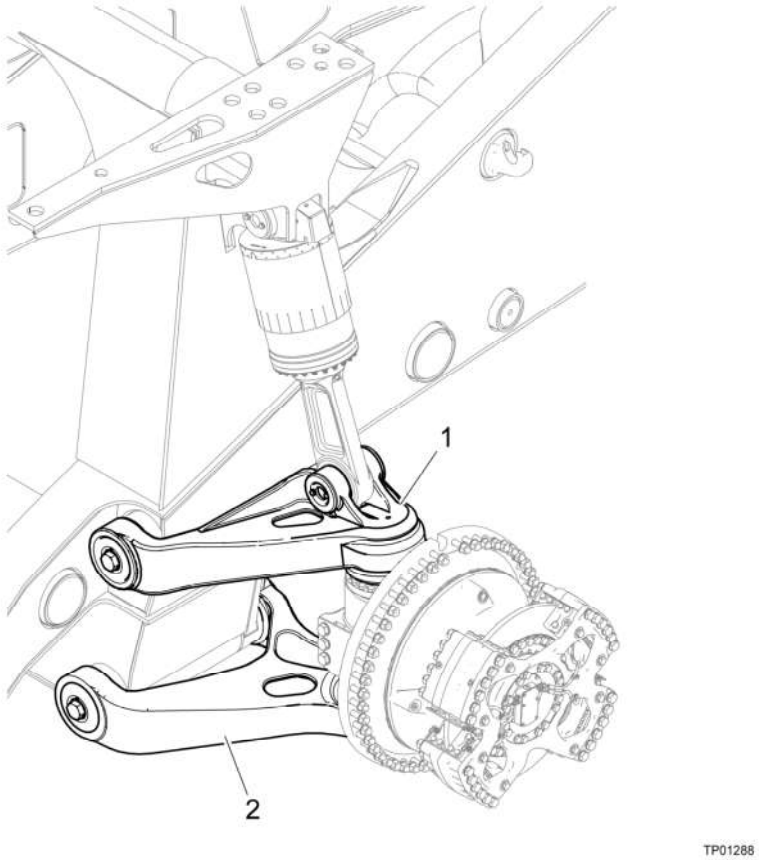

Fig. .17-520: Upper and Lower Control Arm

Legend:

1. Upper Control Arm 2. Lower Control Arm

16.17.1 System Description and Function

The control arms are attached to the chassis and to the kingpins. The front suspensions are attached to the upper control arm. When the haul truck moves along the ground, the control arms permit the front wheel assemblies to move vertically.

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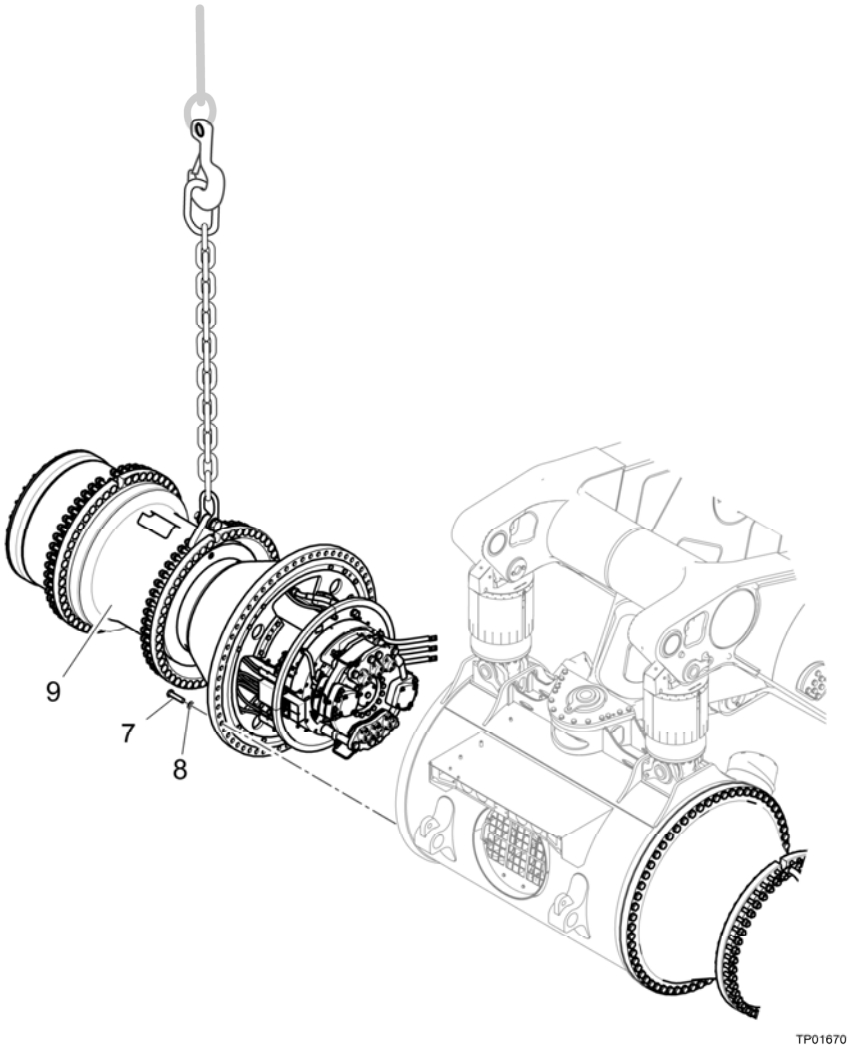

Fig. .18-526: Rear Wheel Drive Assembly Removal/Installation

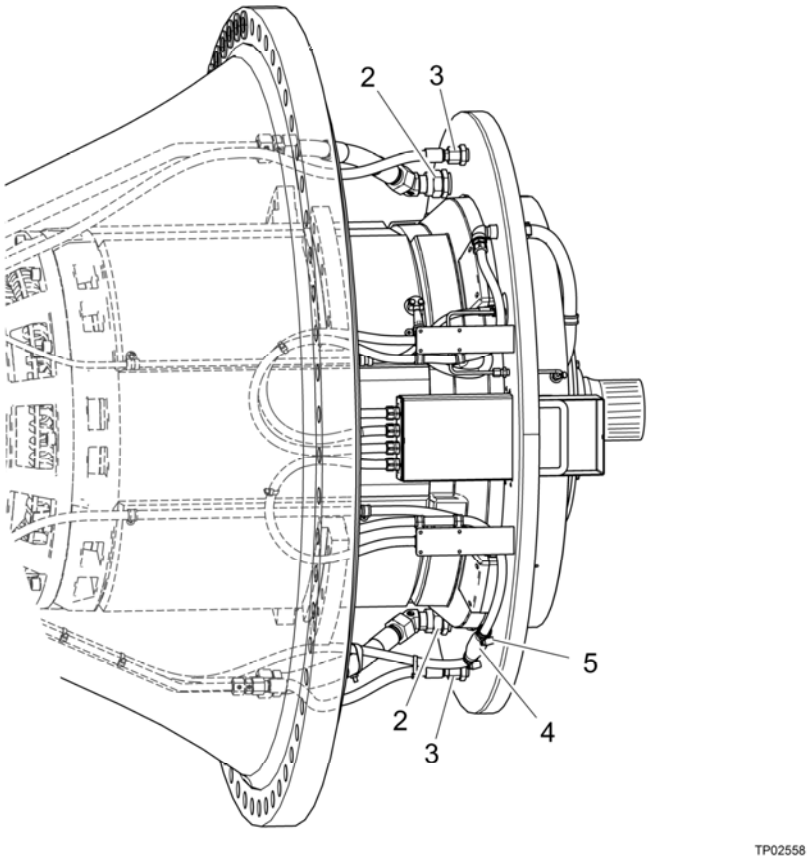

Fig. .18-535: Traction Motor Removal/Installation (Page 2 of 3)

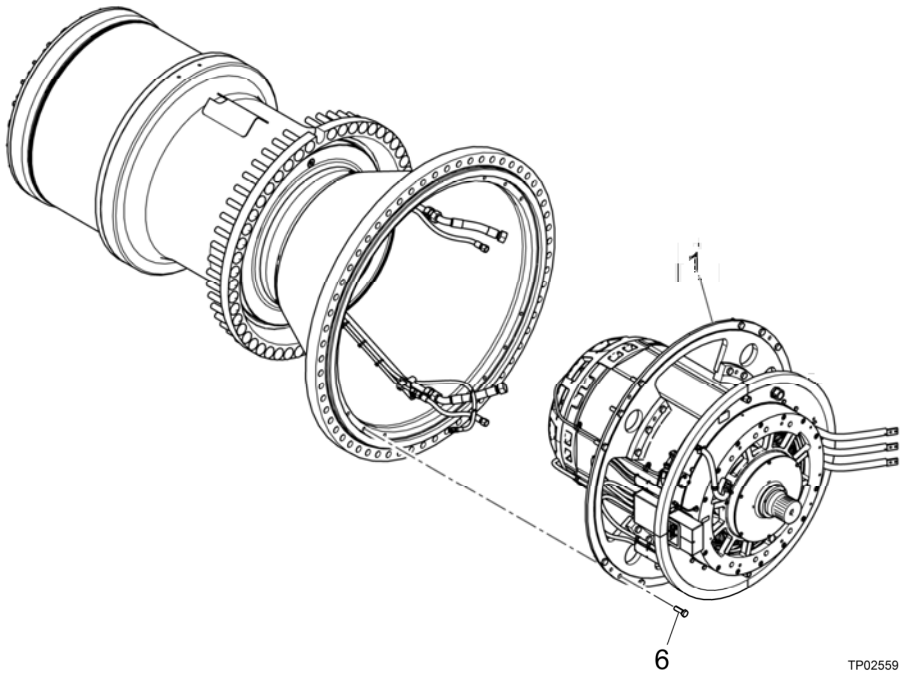

Fig. .18-536: Traction Motor Removal/Installation (Page 3 of 3)

20. Position the outer rim so that the valve hardware aligns with the slot in the rear wheel drive assembly.
21. Put the valve stem (3) of the inner wheel through the hole on the outer rim before the rim is put on the studs.

ATTENTION
The valve stem extension and diffuser valve can be damaged during installation of the tire and rim assembly.

► Be careful when you install the tire and rim assembly.

22. Move the tire machine into position and hold the outboard tire (21).
23. Move the outboard tire and rim (21) carefully into position.
24. Make sure that the rim is fully against the circumference of the wheel.
25. Apply a small quantity of Liebherr anti-seize to the threads and on the bearing face of the nuts (22).
26. Install nuts (22) and flat washers (23), and use a cross pattern to torque nuts (22) to 1575 N·m (1162 lbf ft).
27. Repeat the previous step three to four times, or until all the nuts keep a torque value of 1575 N·m (1162 lbf ft).
28. Install the valve stem (3) of the inner wheel to the outer rim.
29. Refer to the recommendations of the tire manufacturer for proper tire maintenance and inflation.

WARNING
A tire that blows apart can cause damage to equipment and injury to personnel.

► Do not stand near a tire when it is inflated. Always use a clip-on air chuck with remote controls. Use a safety cage if the unit is removed from the hauler.

30. Inflate the tires.

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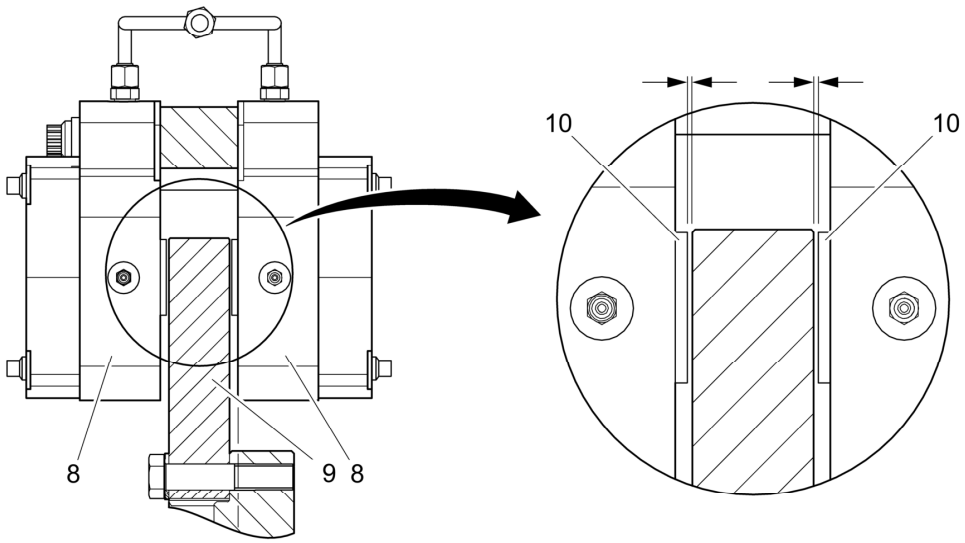

Fig. .23-551: Park brake caliper measurement

8. Measure the distance between the brake linings (10) and the brake disc (9).
9. Add shims equally on both sides of the park brake caliper halves to achieve the nominal dimension between the brake lining (10) and the brake disc (9).
10. Torque the cap screws (7) to 380 N·m (280 lbf ft).
11. After you torque the cap screws, check the distance again between the brake lining (10) and the brake disc (9).
12. Remove the pressure from the hydraulic lines attached to the inner and outer piston housing.
13. Remove the hydraulic lines from the inner and outer piston housings.
14. Install the connection tube (3).
15. Connect the main hydraulic supply line (1) to the connection tube (3).
16. Bleed the brakes. [Reference: Rear Brake Bleed, page 1017]
17. Close the access panel on the axle box.

[See Illustration Park Brake Removal/Installation, page 1021]

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[Reference: Dump Body Pivot Pins and Bearing Installation, page 1060]

4. Use the dump body control lever and slowly lower the dump body while you align the hoist cylinders.
5. Use an applicable hydraulic cylinder to extend the hoist cylinder enough to align the holes.
6. Install the hoist cylinder upper pins.
   [Reference: Hoist Cylinder Installation, page 690]
7. Install the safety cables and use the dump body control lever to raise the dump body.
8. Install the dump body pads. [Reference: Dump Body Pads Installation, page 1069]
9. Remove protective caps on the lubrication lines.
10. Connect all electrical wires and lubrication lines to the dump body.
11. Install the mudguards on both sides of the dump body.
12. Install the rock knockers on both sides of the dump body.
    [Reference: Rock Knocker Installation , page 1090]

[See Illustration Dump Body Removal/Installation, page 1049]

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17.7.2 Dump Body Pads Removal

- Follow the haul truck safety precautions. [Reference: Safety, page 52]

NOTICE
Pads must be equal.

- ► Pads that are not equal can cause stress to the dump body and the chassis.
- ► Make sure to replace the dump body pads on both sides of the chassis.

1. Remove the cap screws (2), flat washers (3) and (4), and nuts (5).
2. Remove the dump body pads (1) and the shims.
3. Replace the dump body pads (1).
   [Reference: Dump Body Pads Installation, page 1069], and [Reference: Dump Body Pad Shimming Procedure, page 1070]

1. Use the proximity switch hardware and install the proximity switch (1) to the proximity switch bracket (2).
2. Install cap screws (3), flat washers (5), lock washers (4), nuts (6), and the proximity switch bracket assembly (2) to the chassis bracket (7).
3. Install the proximity switch bracket assembly (2) to the dump body pad bracket (8) with the included hardware.

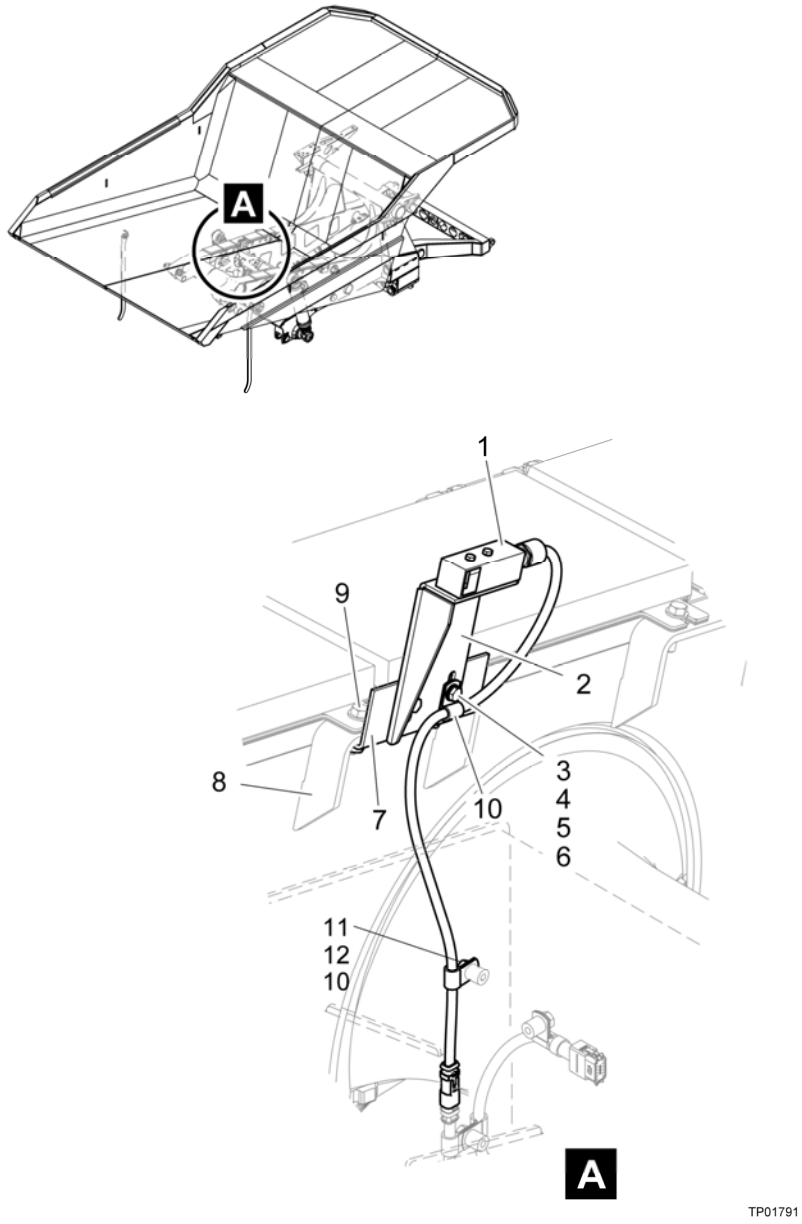

Fig. .8-586: Dump Body Proximity Switch Installation/Alignment (1 of 2)

4. Install cap screws (18), flat washers (19), lock washers (20), nuts (21), target magnets (17), and target magnet bracket (21) to the dump body pads.

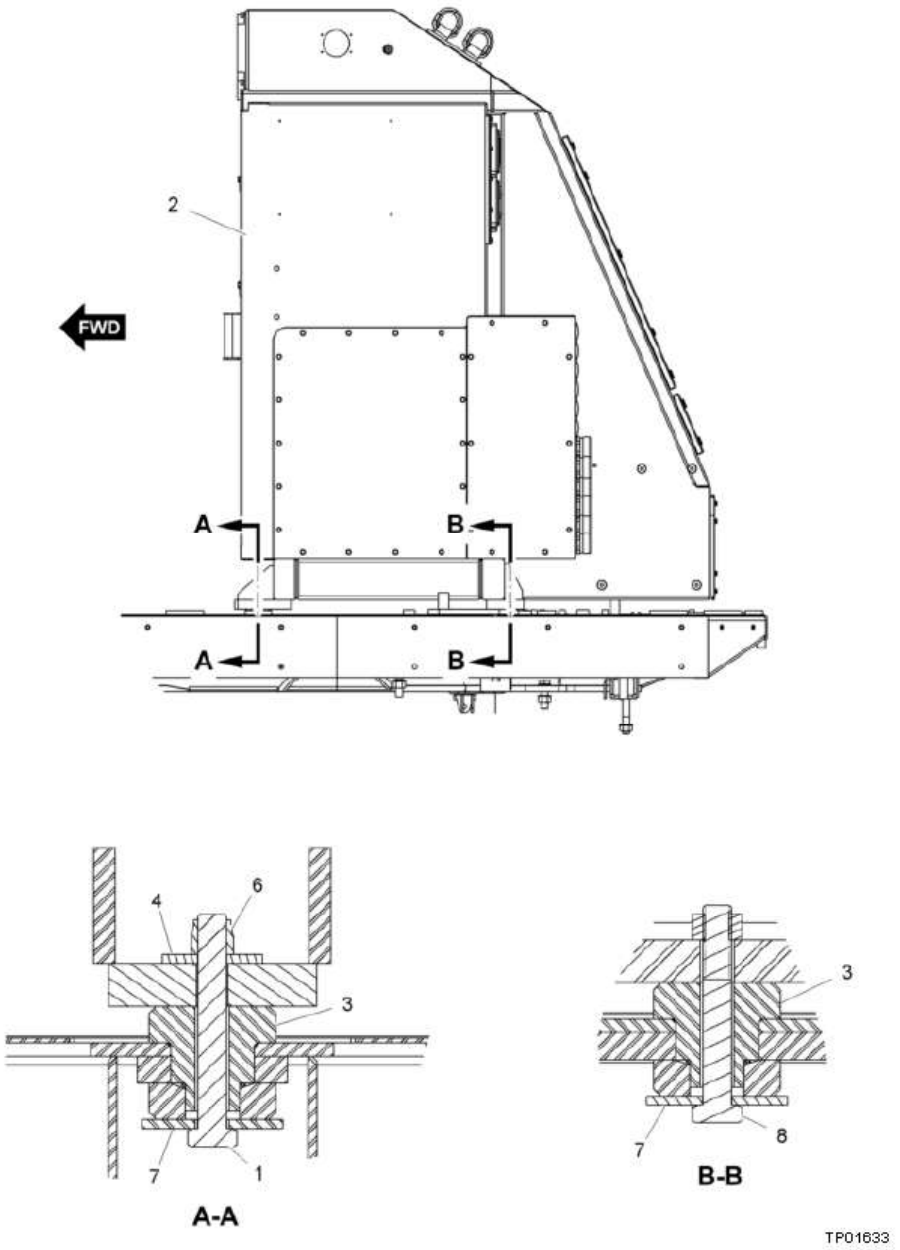

Fig. .12-597: Control Box Removal/Installation

17.15 Axle Box

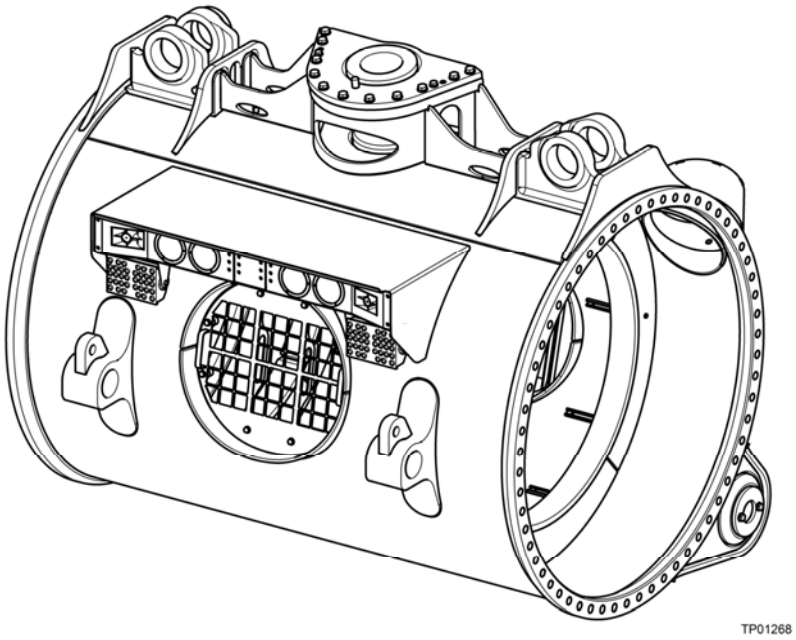

Fig. .15-607: Axle Box

17.15.1 System Description and Function

The axle box is aft of the haul truck. The axle box provides several functions for the haul truck. The axle box attaches to the rear control A-arm, drag links, and the rear wheel assemblies. The planetary gear box and traction motor assemblies are also attached to the axle box. The main blower air duct holes are attached to the axle box for air flow to decrease the temperature of the motors. There is an entry door with a seal on the axle box. The rear service and parking brake components are found in the axle box. The axle box housing remains under slight positive pressure while the haul truck is in operation. The air from the AC drive cooling system exhausts from the rear of the axle box through the vent gate.

8. Securely put the machine pin (13) on a hydraulic jack, or similar, and align the machine pin with the outboard side of the bore and spherical bushing.
9. If necessary, apply oil to the machine pin (13).
10. Install the spacer (7) and slowly push the machine pin (13) until the head of the machine pin is flat against the face of the outboard boss.
11. If necessary, lubricate the cap screws (10) with machine oil.
12. Install the spacer (7), cap screws (10), washers (11), and pin retainer (12).
13. After installation of the two ends of the drag link, torque cap screws (10) and (2) to 235 N·m (173 lbf ft).
14. Remove the protective covers and connect the lubrication hoses.

[See Illustration Drag Links Removal/Installation , page 1119]

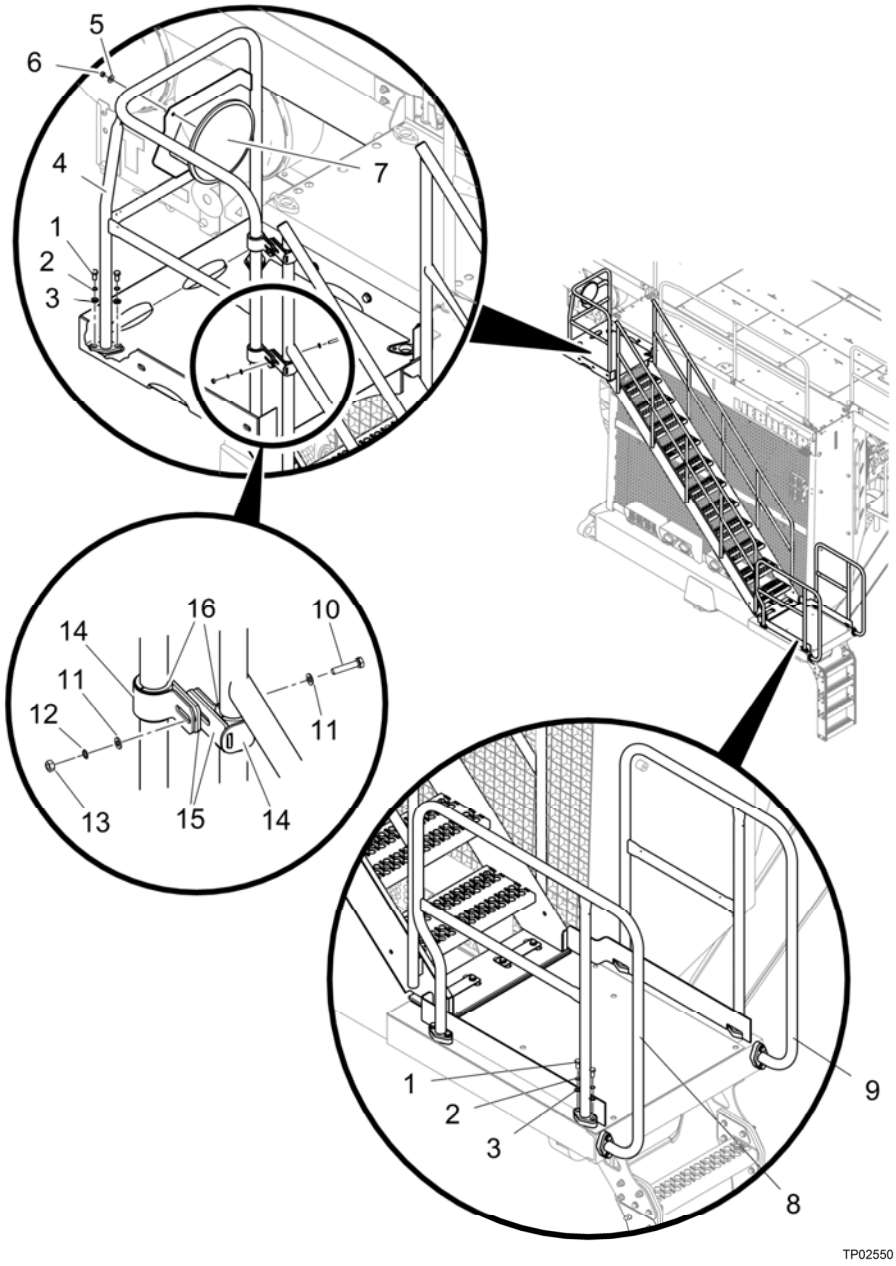

Fig. .19-621: Diagonal Ladder Installation/Removal (1 of 3)

1. Attach an applicable support or lift device to the diagonal ladder (33).
   [See Illustration Diagonal Ladder Installation/Removal (3 of 3), page 1139]
2. Remove cap screws (10), flat washers (11), lock washers (10), nut (13), and stiffeners (14) and (15).
3. Remove cap screws (1), lock washers (2), flat washers (3), and handrails (4), (8), and (9).

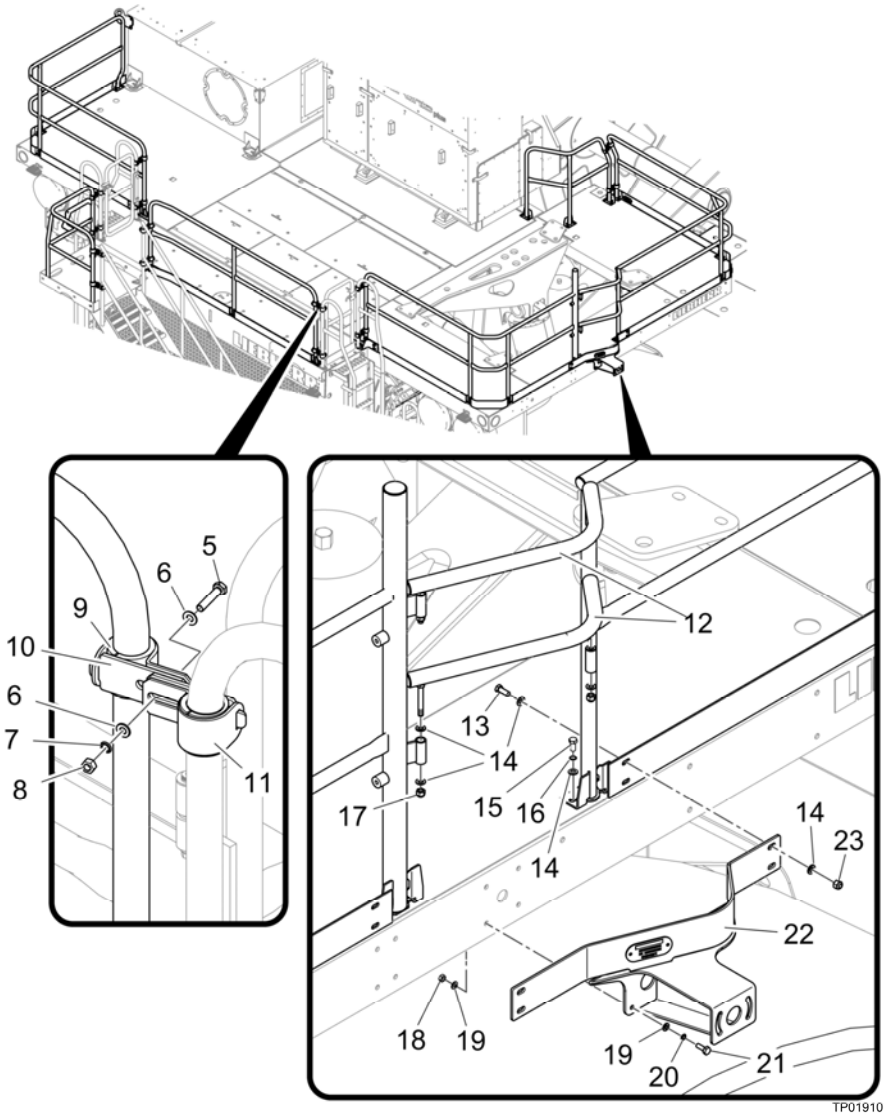

Fig. .19-631: Handrail Removal/Installation

8. Remove the cap screws (31), (33), flat washers (28),(32), nuts (30), locknuts (34), wedge washer (30), and the step cover (38).

NOTICE
The minimum weight of the hydraulic stair is 74 kg (163 lb).

Use an approved lift device that can safely lift and support the component weight.

9. Secure the stair with straps and to the lifting device.

NOTICE
The minimum weight of the hydraulic stair control box is 224 kg (494 lb).

Use an approved lift device that can safely lift and support the component weight.

10. Remove the cap screws (39), flat washers (40), and stair (51).
11. Remove the cap screws (19), lock washers (20), and the flat washers (21).
12. Safely secure the control box (1) to an approved lifting device and remove the hydraulic stair control box (1).
13. Remove cap screws (13) and (18), flat washers (14), locknuts (15), step platform support (12), and step platform (11).

[See Illustration Hydraulic Stair Installation/Removal (1 of 7), page 1154]

[See Illustration Hydraulic Stair Installation/Removal (2 of 7), page 1155]

[See Illustration Hydraulic Stair Installation/Removal (3 of 7), page 1156]

[See Illustration Hydraulic Stair Installation/Removal (4 of 7), page 1157]

[See Illustration Hydraulic Stair Installation/Removal (5 of 7), page 1158]

[See Illustration Liebherr Hydraulic Stair Installation/Removal (6 of 7), page 1159]

[See Illustration Hydraulic Stair Installation/Removal (7 of 7), page 1160]

5. Loosen the clamps (1) and remove the accumulator (2).

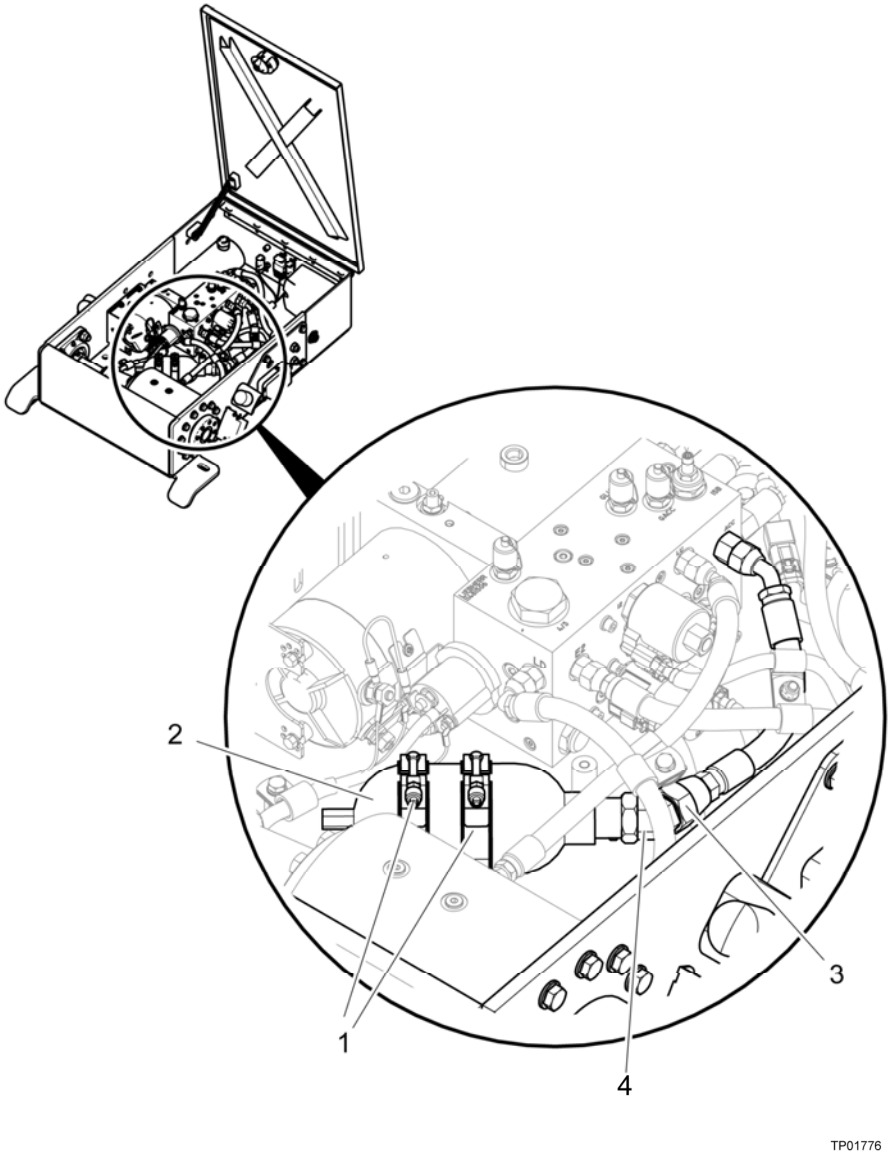

Fig. .20-647: Accumulator Removal/Installation

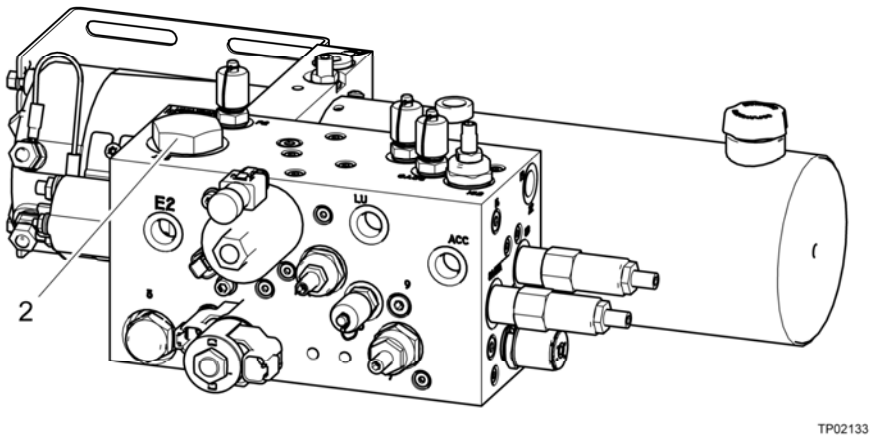

Fig. .20-653: Micron Element Filter

Legend:

2. Filter Element

Greasing the Bearing

Required Tools and Materials

Tools and Materials	Liebherr Part Number	Notes
Liebherr Hydraulic Plus Arctic	10330278	[Oil and Lubricant Specifications]

1. Open the LCB and locate the bearing grease drain port.
2. Using a clean rag, wipe off any dirt collected on the external surfaces of the bearing grease fitting.
3. Visually inspect the grease drain port for evidence of grease.
   - **If grease is observed in the grease drain port,**
     - Begin pumping fresh recommended grease into the bearing grease fitting until grease can be seen coming out of the grease drain port..
   - **If no grease is observed in the grease drain port,**
     - Begin pumping fresh recommended grease into the bearing grease fitting until grease can be seen coming out of the grease drain port.

Pre-Operation Check

1. Power and test the operation of the hydraulic stair before each shift.

LME/12222495/2020-06-19/en

9. Install the foot pedals. [Reference: Accelerator Pedal Installation, page 1239], [Reference: Dynamic Brake Pedal Installation, page 1250] and [Reference: Service Brake Pedal Installation, page 1245]

WARNING
The minimum weight of the operator cab seat is 93 kg (205 lb).

Use an approved lift device that can safely lift and support the component weight.

10. Install the operator cab seats. [Reference: Operator Cab Seat Installation, page 1271]

WARNING
The steering wheel must turn freely without abnormal noises, or obstruction.

- Continuous operation of the steering wheel, if it is operated under obstruction, or when it makes abnormal noises, can cause damage to the column and its internal components.
- If there are any abnormalities with the telescope, tilt, and turn features of the steering wheel, replace the steering column.
- The haul truck must not be operated if the steering column does not operate correctly.

WARNING
The steering column is a safety critical system.

- Do the safety critical test for the steering system before the haul truck is returned to operation. [Reference: Steering Column and Controls, page 1251]

11. Install the steering column; [Reference: Steering Column Installation, page 1255]
    1. install the clamp (2) and put the steering cables (1) through the clamp, and connect the cable harness under the dash.
    2. make sure there is no interference with the steering column, adjust cap screws (12), if necessary.
       [See Illustration Operator Cab Removal/Installation (3 of 4), page 1211]

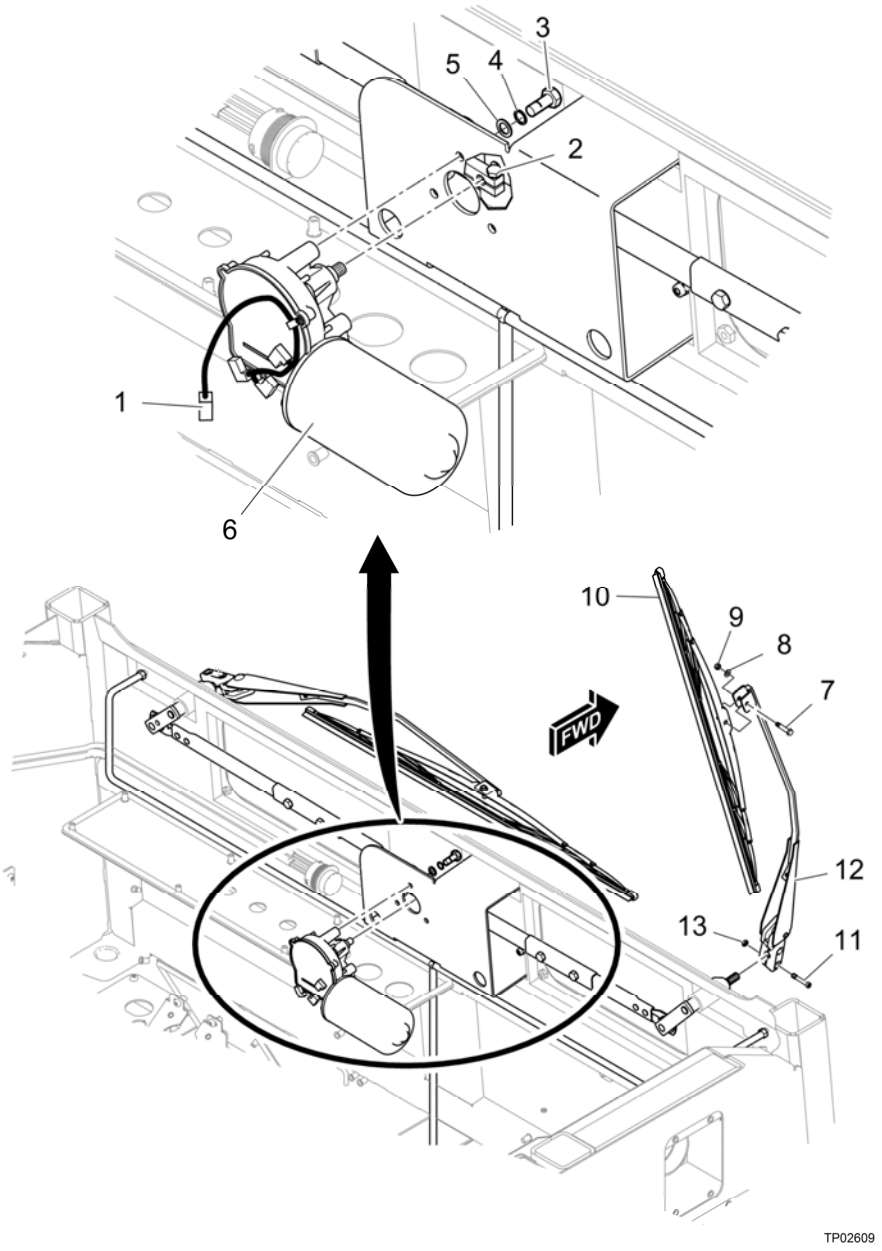

Fig. .3-676: Windshield Wiper Motor (2 of 2)

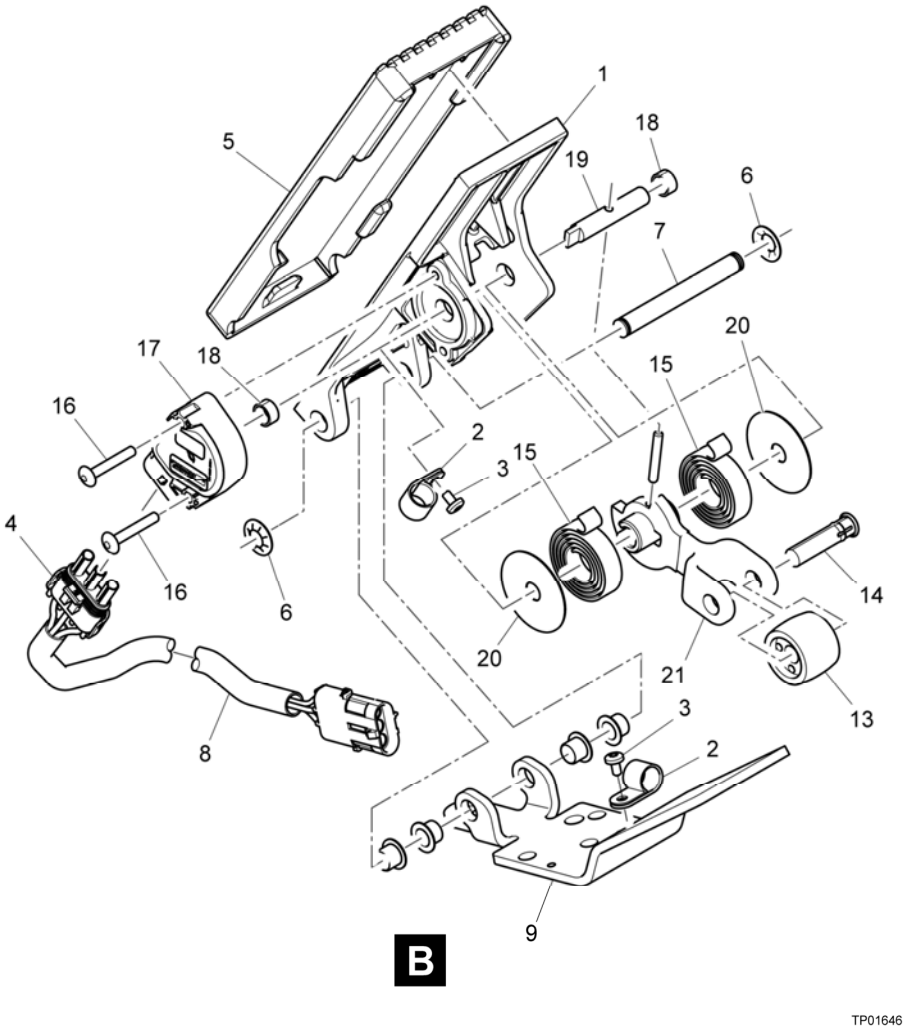

Fig. .7-683: Dynamic Braking Pedal Removal (Page 2 of 2)

Critical Steering Wheel Wire Harness Installation Check Procedure

1. Tilt and telescope the steering column to ensure it continues to operate correctly.
2. Check to make sure that all the turn signal functions are correct.
3. Apply the hazard lights and check that the service brakes lights over the flashing hazard function.
4. Install the turn signal switch lever. Make sure the lever is fully seated and snapped into location.
5. Turn the steering wheel from full left to full right, lock to lock, to make sure the steering column rotates freely. While rotating the steering wheel, feel for any catches, binding or abnormalities.

WARNING
The steering wheel must turn freely without abnormal noises, or obstruction.

- ► Continuous operation of the steering wheel, if it is operated under obstruction, or when it makes abnormal noises, can cause damage to the column and its internal components.
- ► If there are any abnormalities with the telescope, tilt, and turn features of the steering wheel, replace the steering column. The haul truck must not be operated if the steering column does not operate correctly.

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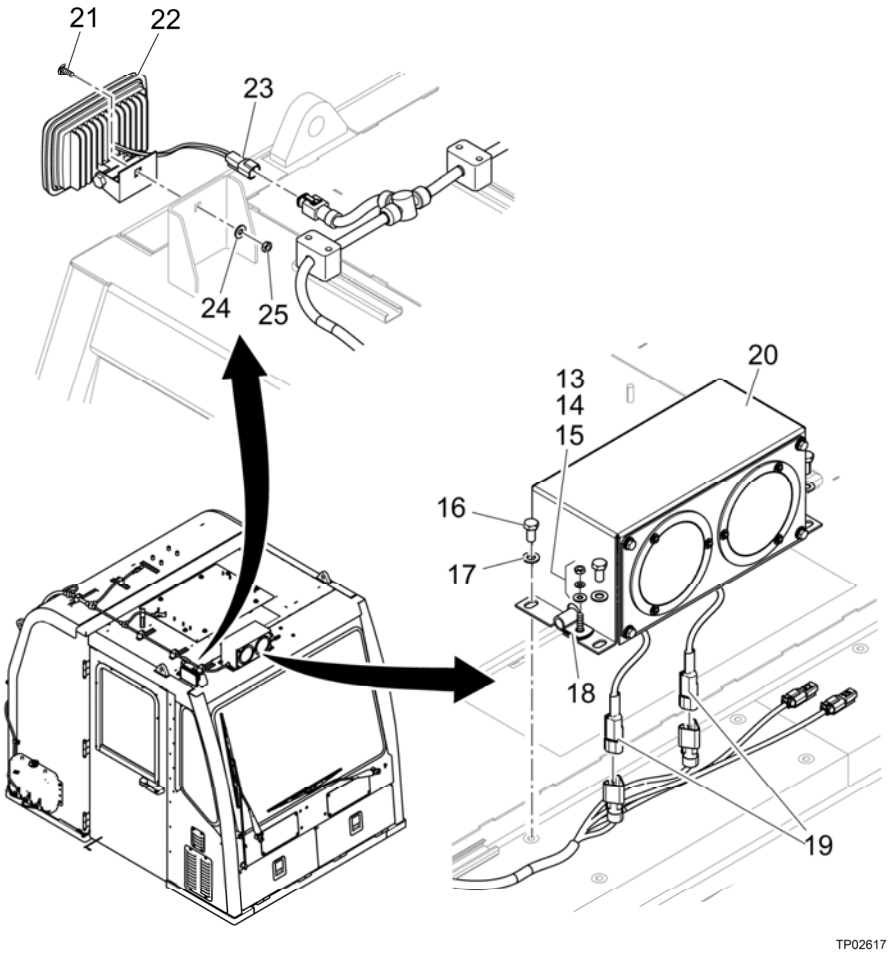


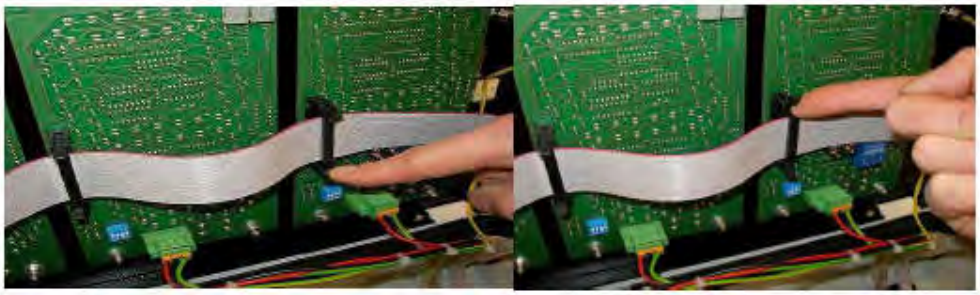
Fig. .10-706: Park Brake and Work Light

12. Remove the cap screw (21), flat washer (24), nut (25), disconnect the electrical connection (23), and remove the work light (22).
13. Disconnect the wiper fluid hose (28).

19.1.5 Display Panel Unit — Backing Plate with Heating Element

Removal of the Backing Plate with Heating Element

1. Open the front display panel. [Reference: Opening the Front Display Panel, page 1291]
2. To remove the flat ribbon cable, release the two retaining clips on the black plugs, and unclamp the flat ribbon cable from the three LED-array modules.



3. To remove the green power supply plugs, use the flat narrow screwdriver (2.5 x 7.5 mm) to unscrew each of the two screws.

Safety Alerts

Personal Equipment	Standard Warning Symbols
	

20.1.9 Index of Safe Work Procedures

The following provides a list of SWPs:

Safe Work Procedures

SWP Control Number	Task Description
[Reference: LME-SWP-00001 - Erection Site Setup, page 1321]	Erection Site Setup
[Reference: LME-SWP-00002 - Jacking Plates and Erection Stands, page 1325]	Stand and Jacking Plates
[Reference: LME-SWP-00003 - Off-loading Chassis from Transport Vehicle to Stands, page 1329]	Off-loading Chassis from Transport Vehicle to Stands
[Reference: LME-SWP-00004 - Off-loading Superstructure from Transport Vehicle, page 1333]	Off-loading Superstructure from Transport Vehicle
[Reference: LME-SWP-00005 - Removing the Containers from Transport Vehicles, page 1337]	Removing the Containers from Transport Vehicles
[Reference: LME-SWP-00006 - Fitting the Main Blower Motor, page 1341]	Fitting the Main Blower Motor to the Control Box
[Reference: LME-SWP-00007 - Fitting Superstructure to Chassis, page 1345]	Fitting Superstructure to Chassis
[Reference: LME-SWP-00008 - Fitting the Left or Right Traction Motor, page 1349]	Fitting Left or Right Traction Motor
[Reference: LME-SWP-00009 - Fitting Hydraulic Tank, page 1353]	Fitting Hydraulic Tank
[Reference: LME-SWP-00010 - Fitting Fuel Tank, page 1357]	Fitting Fuel Tank
[Reference: LME-SWP-00011 - Fitting Front Control Arms, page 1361]	Fitting Front Control Arm
[Reference: LME-SWP-00012 - Fitting Front Wheel, Kingpin, Spindle, Tie Rod and Idler Arm, page 1365]	Fitting Front Wheel, Kingpin, Spindle and Idler Arm
[Reference: LME-SWP-00013 - Fitting Suspensions (Shock Absorber), page 1369]	Fitting Suspensions
[Reference: LME-SWP-00014 - Fitting the Hood and Grill, page 1373]	Fitting the Hood and the Grill
[Reference: LME-SWP-00016 - Fitting Front Access Systems, page 1377]	Fitting Front Access Systems
[Reference: LME-SWP-00017 - Fitting Rollover Protective Structure (ROPS), page 1381]	Fitting Rollover Protective Structure (ROPS)
[Reference: LME-SWP-00018 - Fit Dump Body, page 1385]	Fitting the Dump Body

20.5 Off-loading Superstructure from Transport Vehicle [LME-SWP-00004]

Purpose and Location

Purpose	Location
LME Haul Truck	All locations

20.5.1 Specific Competencies

- Affiliates have the responsibility to approve and certify all personnel on equipment use, and specific requirements to safely and effectively complete all tasks.

20.5.2 Specialized Equipment

- Affiliates have the responsibility to test, tag, and daily inspect all specialized equipment used for related tasks.

Step	Work Procedure	Hazard Identified	Precaution	Check Off
6		Handling lifting equipment (hand and back injuries.)	• Use correct PPE at all times • Use mechanical lifting device or team lifting where applicable. • Use correct lifting techniques. • Eyes on hands at all times and use positive communication with work parties involved. • Use a crane to sling the load. All persons involved in attaching the superstructure to the haul truck must have fall restraints devices attached. • All man lift and safety devices are to be inspected before use and documented. • Fill out site permits as required.	☐
		Stored energy in slings and chains. (Personal injury)	• Always make sure that chains and slings are hung straight and no twists or knotted links are present that may cause the chains and load to suddenly move.	☐
7	Lifting the load	Load not lifting evenly (personal injury and equipment damage	• Crane supervisor to be in control of the lift at all times with positive communication via 2way radio to both cranes. • Tag lines to be attached to load to control movement. • Crane supervisor to direct the load and to check for load distribution, rigging and security. • Any persons can stop the lift and notify supervisor of problem that needs rectifying.	☐
		Single crane overload (personal injury & equipment damage)	• Crane supervisor to be in control of all crane operations. • Crane operator to monitor load gauges and radii at all times and relay information back to crane supervisor if risks arise. • Crane to be operating within manufactures load chart.	☐
		Suspended load (personal injury)	• All persons involved in the lift task are to have positive communication with rigger at all times, are to understand the task and have reviewed critical lift forms and risk assessments. • No persons are to enter the suspended load area or the swing radius, tag lines are to control the load at all times and tag line operators are to be directed rigger in charge of the lift.	☐
8	Swinging the load over into position	Load strike crane causing damage or causing the load to be unstable.	• Rigger to be in control of crane and be aware of load distances from crane boom. • Tag lines to direct load and keep load moving smoothly. • All persons are to keep clear of swing radius.	☐
9	Lowering the load onto the Frame	Suspended load (personal injury)	• No persons are to enter the suspended load area, tag lines are to control the load at all times and tag line operators are to be directed rigger in charge of the lift.	☐
		Working at heights	• The use of a man lift will required to locate the superstructure , all persons operating the man lift are to be certified operators and have all fall restraint devices attached. • All man lift and safety devices are to be inspected before use and documented. • All persons operating the man lift are to be out of the suspended load area until the load is located and sitting on the frame assembly. • Fill out site permits as required.	☐
10	Fitting superstructure	Pinch point Hazard and crush hazard	• Before any lifts are to take place. All site risk assessments and permits are to be completed and all component weights assessed. Make sure all equipment and safety devices are inspected before use and documented. Barricade area where lift is being performed.	☐
		Pinch point Hazard and crush hazard	• Keeping a well clear of the suspended load.	☐

20.12 Fitting Front Control Arms [LME-SWP-00011]

Purpose and Location

Purpose	Location
LME Haul Truck	All locations

20.12.1 Specific Competencies

- Affiliates have the responsibility to approve and certify all personnel on equipment use, and specific requirements to safely and effectively complete all tasks.

20.12.2 Specialized Equipment

- Affiliates have the responsibility to test, tag, and daily inspect all specialized equipment used for related tasks.

Step	Work Procedure	Hazard Identified	Precaution	Check Off
		Handling lifting equipment (hand and back injuries.)	• Use correct PPE at all times • Use mechanical lifting device or team lifting where applicable. • Use correct lifting techniques. • Eyes on hands at all times and use positive communication with work parties involved. • Use a man lift to sling the load, all persons operating the man lift are to be certified operators and have all fall restraint devices attached. • All man lifts and safety devices are to be inspected before use and documented. • Fill out site permits as required.	☐
		Stored energy in slings and chains. (Personal injury)	• Always make sure that chains and slings are hung straight and no twists or knotted links are present that may cause the chains and load to suddenly move.	☐
		Lifting strut assemblies (personal injury & equipment damage)	• Use of fork lift by certified operator. • Fork lift and attachments to be inspected before use and documented. • All lifting equipment to be inspected for defects before use. • Use correct rated lifting equipment for the weight being lifted. • All loads are to be slung using correct lifting techniques. • Keep clear of suspended loads at all times. • Only one person is to direct the fork lift to stop confusion and use positive communication at all times.	☐
6	Lifting the load	Load not lifting evenly (personal injury and equipment damage)	• Crane supervisor to be in control of the lift at all time with positive communication via 2way radio to both cranes • Tag lines to be attached to load to control movement • Crane supervisor to direct the load and to check for load distribution, rigging and security. • Any persons can stop the lift and notify supervisor of problem that needs rectifying.	☐
		Single crane overload (personal injury & equipment damage)	• Supervisor to be in control of all crane operations. • Crane operator to monitor load gauges and radii at all times and relay information back to supervisor if risks arise. • Crane to be operating within manufactures load chart.	☐
		Suspended load (personal injury)	• All persons involved in the lift task are to have positive communication with supervisor at all times, are to understand the task and have reviewed critical lift forms and risk assessments. • No persons are to enter the suspended load area or the swing radius, tag lines are to control the load at all times and tag line operators are to be directed by supervisor or rigger in charge of the lift.	☐
7	Swinging the load over into position	Load strike crane causing damage or causing the load to be unstable.	• Supervisor or rigger to be in control of crane and be aware of load distances from crane boom. • Tag lines to direct load and keep load moving smoothly. • All persons are to keep clear of swing radius.	☐
8	Fitting the hood	Suspended load (personal injury)	• No persons are to enter the suspended load area, tag lines are to control the load at all times and tag line operators are to be directed supervisor in charge of the lift. • • Make sure hood is located into position and is sitting down onto the bumper assembly before any persons enter the area.	☐

Step	Work Procedure	Hazard Identified	Precaution	Check Off
		Cuts, abrasions and pinch points. (personal injury)	• Eyes on hands at all times. • Use correct PPE for the task. • Wear gloves when handling shims etc. • Watch for pinch points when locating pins. • Check for and remove any sharps edges etc.	☐
		Working at heights. (fall, personal injury)	• The use of a man lift will be required fit upper pins. All persons operating the man lift are to be certified operators and have all fall restraint devices attached. • All man lifts and safety devices are to be inspected before use and documented. • Fill out site permits as required. • When working at heights to fit rear pins and grease lines etc., fall restraint devices are to be worn and hooked on at all times to correct anchor points.	☐
15	Removing lifting equipment from the load	Handling lifting equipment. (Hand and back injuries. Working at heights)	• • Use correct PPE at all times. • • Use mechanical lifting device where applicable. • • Use team lift where applicable. • Use correct lifting techniques. • Eyes on hands at all times and use positive communication with work parties involved. • The use of a man lift will be required to remove the rigging from the load, all persons operating the man lift are to be certified operators and have all fall restraint devices attached. • All man lifts and safety devices are to be inspected before use and documented.	☐
	Refitting rock ejector chains, body bar, mud flaps and body wiring.	Height and weight. Slipping of tooling.	• • Elevated work platform and / or harness. Team lift. Correct tooling.	☐
	De-Isolate & Live Testing	Unplanned movement & stored energy	• Live test as per LME procedure. Good communication.	☐
	Clean up of area after task is complete	Dust, spills	• Use PPE and spill smart.	☐

Related Task(s)

Dump Body Installation	[Reference: Dump Body Installation, page 1050]
Dump Body Pivot Pins and Bearings Installation	[Reference: Dump Body Pivot Pins and Bearing Installation, page 1058]
Dump Body Pads Installation	[Reference: Dump Body Pads Removal, page 1065]