LUBRICATION GUIDE

Model MLC80-A/MLC90A-1/MLC100A-1/MLC100-1

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THE ORIGINAL LANGUAGE OF THIS PUBLICATION IS ENGLISH

LUBRICATION SYMBOLS

The following symbols are used in the decals on the crane to identify lubrication points.

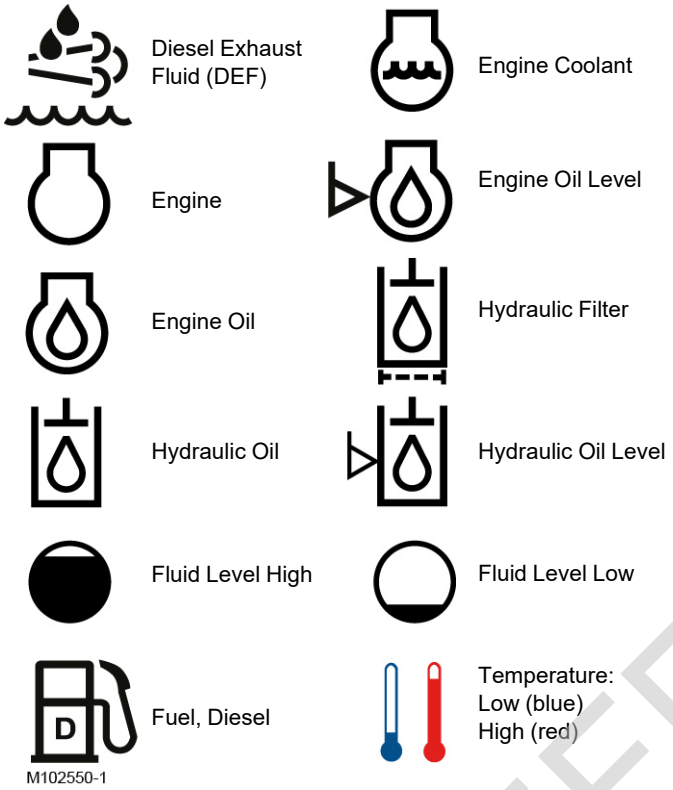


FIGURE 1

WARNING

Personal Injury Hazard

Personal injury can occur if the following safety precautions are not taken before and after servicing machinery.

- Stop the engine and wait until all moving parts have completely stopped (if necessary, position any grease fittings on moving parts at the access point and then stop the engine).
- Attach a WARNING “out-of-order” sign to the engine start control in the operator’s cab to warn all personnel that the crane is being serviced.
- Do not operate the crane until all safety guards and covers have been securely reinstalled and all maintenance equipment has been removed.

GENERAL LUBRICATION

This Lubrication Guide identifies the lubrication points and intervals for this crane.

The lubrication intervals for OEM (Original Equipment Manufacturer) parts (engine, light plant, etc.) have been omitted from this Lubrication Guide. ***Service OEM parts according to the original equipment manufacturers’ manuals.***

Depending on the options your crane is equipped with, some lubrication points given in this Lubrication Guide may not apply to your crane.

LUBRICATION INTERVALS

The intervals listed in this Lubrication Guide are for ***average operating conditions*** based on experience gained by testing lubricants at the factory and on the recommendations of lubricant suppliers. Severe operating conditions—excessively dusty or corrosive atmosphere, unusually high or low outside temperature, extreme loadings, uncommonly frequent or long operating cycles—may require shortening the lubrication intervals. Follow the intervals given in this Lubrication Guide until adequate experience is obtained to establish intervals which meet your operating conditions.

Bearings and bushings that are too warm, excessive play in moving parts, binding in moving parts, excessive or abnormal wear in gears and chains, and rust accumulation indicate a lack of lubrication. If these conditions are found during regular inspection, the lubrication interval for the faulty parts should be shortened.

CAUTION

Avoid Machinery Damage

Before lengthening lubrication intervals, check that all parts are receiving an adequate supply of clean lubricant; otherwise, parts will be damaged from a lack of lubrication. Contact your Manitowoc dealer or the Manitowoc Crane Care Lattice Team for recommendations on lengthening lubrication intervals.

Perform an oil analysis at regular intervals of each fluid used in the crane to determine oil-change intervals. Oil sample kits are provided in the Parts Box of current production cranes.

It is assumed that the lubrication intervals are cumulative — daily tasks are performed together with weekly tasks, daily and weekly tasks are performed together with monthly tasks, etc.

The lubrication intervals are based calendar time, on engine hours of operation, or on function hours of operation, ***whichever occurs first***.

- Engine hours are shown in the Crane Status Bar of the main display (see the Main Display Manual for instructions).
- Function hours are shown in the Function Hours Screen of the main display (see the Main Display Manual for instructions).

OVER-LUBRICATION

Over-lubrication is not only wasteful but also harmful:

- Excess lubrication can work its way onto friction surfaces and result in faulty operation.
- Oil or grease which drips onto walkways can cause personnel to slip and be hurt.
- Too high an oil level can cause churning and foaming of the oil and result in excessive heat and over-flow from the reservoir.
- An extra shot of grease, if too stiff or under too much pressure, can pop out a bearing seal.

LUBRICATION TIPS

- Check all oil levels before start-up so the oil has had a chance to run down from the reservoir walls and moving parts.
- Avoid introducing dirt into reservoirs. Carefully clean the area around dipsticks, level plugs, fill plugs, and breathers before removing them.
- Replace level plugs, fill plugs, drain plugs, and breathers snugly and wipe up any spillage.
- Keep oil and grease dispensers and containers tightly closed and stored in a dirt and moisture-free locations.
- Clean grease fittings before and after applying grease.
- Apply grease until the bushing or bearing is purged so dirt and water cannot enter. Wipe up excess grease.
- Protect the environment. Dispose of waste fluids, filters, and batteries properly. See Environmental Protection on page 4.

WATER IN HYDRAULIC OIL

Prevent damage that can occur when water mixes with hydraulic oil. Drain any accumulated water from the bottom of the hydraulic tank at the **start of each work day**. Crack open the drain plug on the bottom of the hydraulic tank. Securely tighten the drain plug as soon as the water stops draining and a steady stream of oil appears.

OIL CAN POINTS

Lubricate with engine oil ***all pins*** for moving parts not equipped with grease fittings every 40 hours of operation or once a week, whichever comes first.

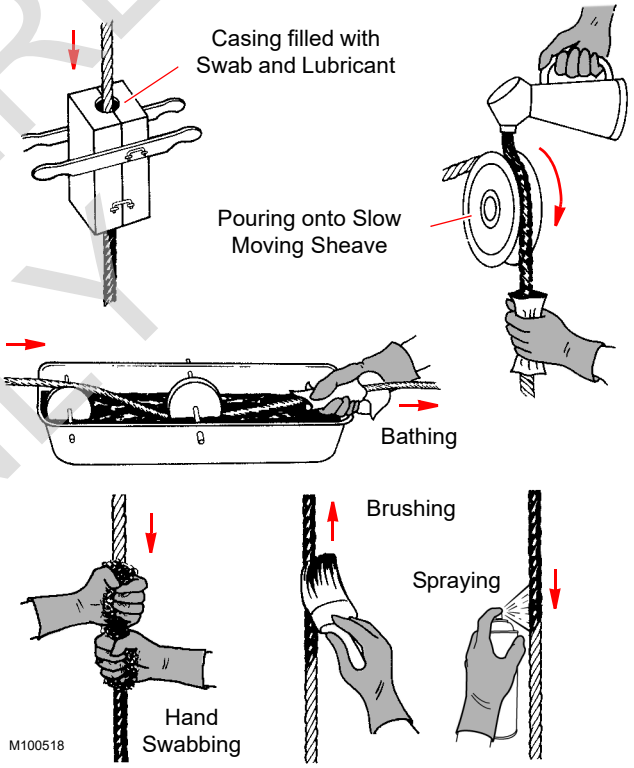
WIRE ROPE LUBRICATION

New wire rope is lubricated during manufacturing, but this lubricant is only adequate for initial storage and the early stages of operation. To prevent the damaging effects of corrosion and to reduce wear, the wire rope must be lubricated at regular intervals.

Contact your wire rope manufacturer/dealer for lubrication recommendations. The lubrication interval and the type of lubricant used depends on the type of wire rope, the severity of duty, and the type of corrosive elements the wire ropes is subjected to.

- The wire rope must be properly protected at all times.
- The lubricant must be fluid enough to fully penetrate the strands and rope core. Use one of the methods shown in Figure 2 to lubricate the wire rope.
- For maximum penetration, apply the lubricant where the wire rope “opens up” as it travels around a sheave or winds onto a drum.
- The wire rope must be clean and dry before applying lubricant. Cleaning methods include an air jet or wire brush.

Do not use grease to lubricate wire rope. Grease will not penetrate the rope properly and will build up in the valleys between the wires and strands. This buildup will inhibit rope inspection and could trap moisture in the rope’s interior. A high-quality wire rope lubricant is available from the Manitowoc Crane Care Lattice Team.



WARNING

Moving Rope Hazard

Take every precaution to protect hands from injury when rope is moving. Wear heavy gloves and move rope as slowly as possible.

FIGURE 2

CYLINDER ROD LUBRICATION

The cylinder rods on Manitowoc cranes have a layer of chrome plating on their surfaces to help protect them from corrosion. Inherently, however, the chrome plating has cracks in its structure which can allow moisture to corrode underlying steel.

Depending on ambient temperature and the frequency of cylinder operation, the crane's hydraulic oil may not penetrate these cracks and protect the rods. Even if the cylinders are operated on a regular basis, many cylinders have portions of exposed rod even when the cylinders are fully retracted.

Exposed cylinder rods on cranes that are stored, transported, or used in inclement environments (high humidity, rain, snow and salt air) are at high risk of corrosion.

All exposed cylinder rods must be protected by applying a thorough coat of cylinder rod protectant, available from Manitowoc in 12 oz. aerosol cans (Part No. 9999101803).

One can of the protectant is provided in the Parts Box supplied with the crane.

The cylinder rod protectant contains solvents and lubricants that penetrate metal pores, displace moisture, dissolve existing corrosion and then dry to a resilient, waxy coating. Cylinder operation and weather will remove the protectant over time. Therefore, inspect all cylinder rods weekly and reapply protectant to exposed rods.

ENVIRONMENTAL PROTECTION

Dispose of waste properly Improperly disposing of waste can harm the environment.

Harmful waste used in Manitowoc cranes includes—but is not limited to—oil, fuel, grease, coolant, air conditioning refrigerant, filters, batteries, and cloths which have come into contact with these substances.

Handle and dispose of waste according to local, state, and federal environmental regulations.

When filling and draining crane components, do not pour waste fluids onto the ground, down any drain, or into any source of water.

- Always drain waste fluids into leak-proof containers that are clearly marked with what they contain.
- Always fill or add fluids with a funnel or a filling pump.
- Immediately wipe up any spills.

REFERENCE INSTRUCTIONS

See the Service Manual for detailed information on specific maintenance checks and procedures.

HYDRAULIC FILTER REPLACEMENT

For instructions, refer to Section 2 of the Service Manual.

Hydraulic filter elements on this crane are specially designed to withstand high pressure as the elements fill with dirt. This feature prevents the elements from collapsing.

CAUTION

Hydraulic System Damage

Original Equipment Manufacturers' filter elements—available from Manitowoc—must be used on this crane. Substituting with any other brand or type filter element is prohibited.

Filter elements made by other manufacturers may collapse under pressure. This action will allow unfiltered oil to be drawn into hydraulic system—pumps, motors, and valves can be destroyed.

Manitowoc will reject warranty claims for damaged hydraulic components if proper hydraulic filter elements are not used.

LUBRICATION POINTS

- See Figure 3, page 7 for the location of the engine components.
- See Figure 4, page 8 through Figure 8, page 14 for the location of the lubrication points in the upperworks and lowerworks.
- See Figure 10, page 16 for the location of the lubrication points in the boom.

The letters before the item numbers in the illustrations correspond to the following intervals:

- A = At Assembly
- D = Daily
- W = Weekly
- M = Monthly
- Q = Quarterly
- S = Semiannually
- O = At Overhaul
- Y = Yearly
- B = Biennial (every two tears)

CRANELUBE

Manitowoc highly recommends using CraneLUBE lubricants to increase your crane's reliability and performance. Contact your Manitowoc dealer for information about the Manitowoc's CraneLUBE lubrication program.

Refer to the Lube and Coolant Product Guide after this publication for lubricant container sizes and part numbers.

APPROVED LUBRICANTS: NORMAL FACTORY FILL

For use down to 32°C (-10°F)

Table 1

ID	Lubricant Description	Specification	Manitowoc Part / Spec No.
A	EP Multi-Purpose Grease	Mobilux N.L.G.I. EP #2 Grease	471197
B	Synthetic Gear Oil	Mobil Delvac 80W-140 Synthetic	A13890
C	Anti-Freeze Coolant	50-50 ethylene-glycol and water	6829101130
D	Liquid Coolant Conditioner	See Engine Manufacturer's Manual	
E	Engine Oil SAE	15W-40 (use with low sulfur fuel)	6829104182
F	Open Gear Lube	Mobiltac 375 NC	471198
G	Synthetic Gear Oil	Mobil Delvac 75W-90 Synthetic	549515 / 6829014058
H	Hydraulic Oil	Phillips 66 Trans XP	6829006444
J	Diesel Exhaust Fluid (DEF)	See Engine Manufacturer's Manual	80019225
L	Spray Lube	Dry Film Moly Multipurpose Lubricant	
M	Turntable Bearing	Mobilgrease XHP 322 Mine	A19138

APPROVED LUBRICANTS: ARCTIC PACKAGE OPTION

For use down to -40°C (-40°F)

Table 2

ID	Lubricant Description	Specification	Manitowoc Part / Spec No.
A	EP Multi-Purpose Grease	Chevron RPM Arctic Grease	471166
B	Synthetic Gear Oil	Mobil SHC 626 Synthetic	549455
C	Anti-Freeze Coolant	50-50 ethylene-glycol and water	6829101130
D	Liquid Coolant Conditioner	See Engine Manufacturer's Manual	
E	Engine Oil SAE	15W-40 (use with low sulfur fuel)	6829104182
F	Open Gear Lube	Mobiltac 375 NC	471198
G	Synthetic Gear Oil	Mobil SHC 626 Synthetic	549455
H	Hydraulic Oil	Petro-Canada Hydrex MV Arctic 15	A03745
J	Diesel Exhaust Fluid (DEF)	See Engine Manufacturer's Manual	80019225
L	Spray Lube	Dry Film Moly Multipurpose Lubricant	
M	Turntable Bearing	Mobilgrease XHP 322 Mine	A19138

CAUTION

Machinery Damage!

Do not operate the main crane functions (swing, travel, drums, boom hoist) with arctic lubricants when the ambient temperature is above 16°C (60°F). Crane machinery will be damaged.

When the ambient temperature is above 16°C (60°F), limit operation to the crane setup functions.

When the ambient temperature is expected to remain above 16°C (60°F), drain the arctic lubricants and refill with the normal factory fill lubricants.

Structural Damage!

Cold weather can affect the structural integrity of the crane and attachment. Before operating in cold weather, read the Cold Weather Operation —Crane Limitations topic in Section 3 of the Crane Operator Manual.

FLUID CAPACITIES

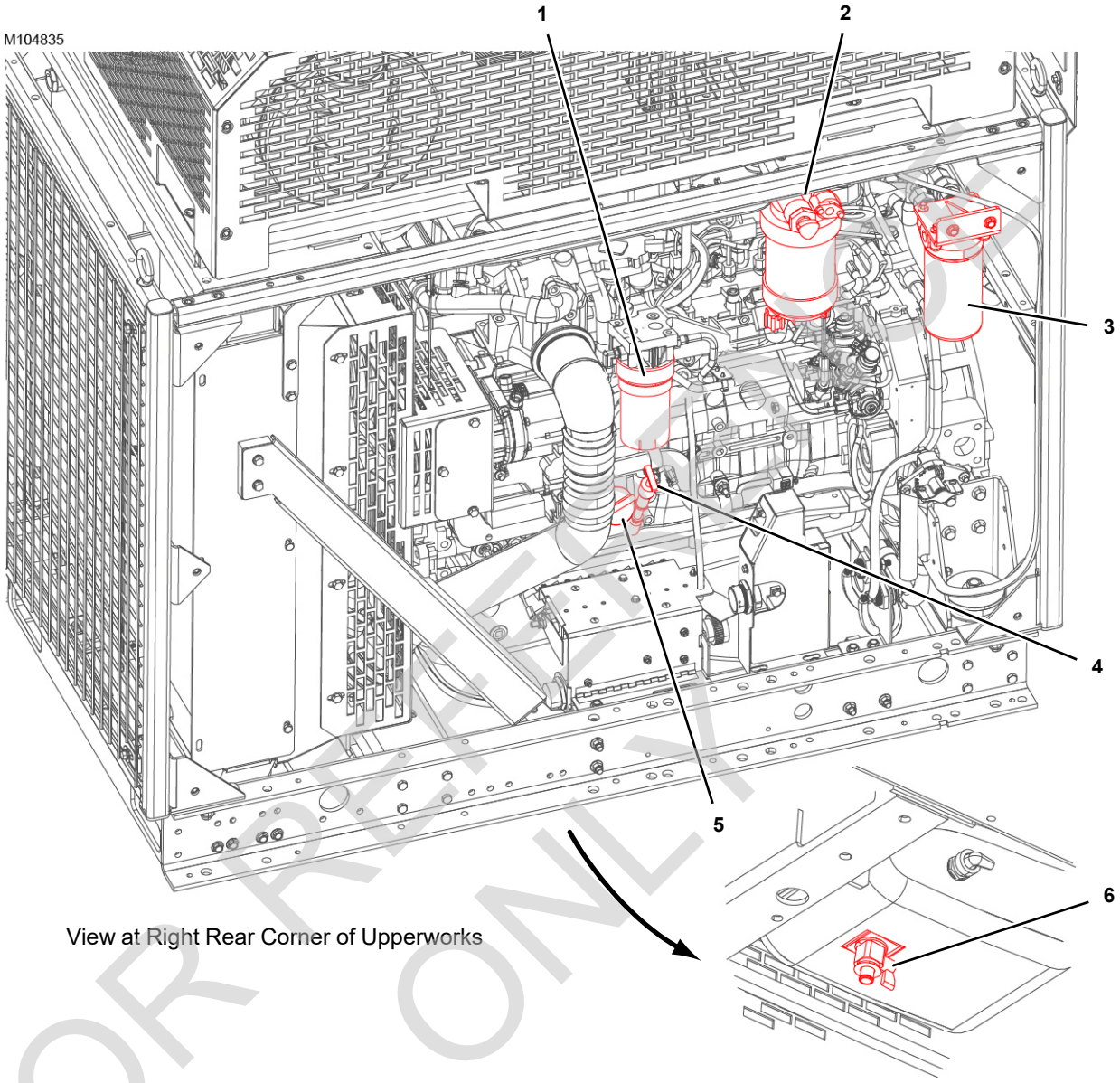
The fluid capacities given in Table 3 are approximate and should be used only as a guide for ordering sufficient fluid at oil change intervals.

Always fill each system to level plug opening or to specified point on the sight gauge or the dipstick. Do not overfill. Do not mix mineral oil with synthetic oil.

Table 3

System	Capacity		Lubricant Spec ID See Table 1 or Table 2
	US	Metric	
Cooling System	7.5 gal	28,4 L	C
Crawler Gearbox (2 places)	4 gal	15 L	B
Crawler Intermediate Roller (11 each crawler)	6 oz	175 cc	
Crawler Top Roller (2 each crawler)	0.3 oz	10 cc	
DEF Tank	10 gal	38 L	J
Drum 1 and 2 (without free fall)	2.6 gal	9,7 L	G
Drum 1 and 2 (with free fall)	4.6 gal	17,5 L	G
Drum 3 (Auxiliary Hoist)	5.3 gal	20 L	G
Drum 4 (Boom Hoist)	1.3 gal	5,1 L	G
Engine (QSB6.7 Tier 3 and Tier 4F)	5 gal	17 L	E
Fuel (ultra low sulfur)	100 gal	379 L	See Engine Manufacturer's Manual
Hydraulic Tank (to full cold mark)	67 gal	254 L	H
Hydraulic System	188 gal	710 L	H
Swing	1.3 gal	5 L	G
Tagline	See decal on each tagline barrel for data.		
Windshield Washer Fluid Tank	1 gal	4 L	Non-Freezing Washer Fluid

ENGINE COMPONENTS



View at Right Rear Corner of Upperworks

Item	Description	Required Service
1	Fuel Filer	See the Engine Manufacturer's Manual (stored in crane cab) for service intervals.
2	Fuel Pre-Filter/Water Separator with Drain Valve	
3	Engine Oil Filter	
4	Engine Oil Dipstick	
5	Engine Oil Fill Cap	
6	Engine Oil Drain Valve [1]	

[1] An owner furnished drain hose can be connected to the drain valve.

FIGURE 3

UPPERWORKS AND LOWERWORKS LUBRICATION

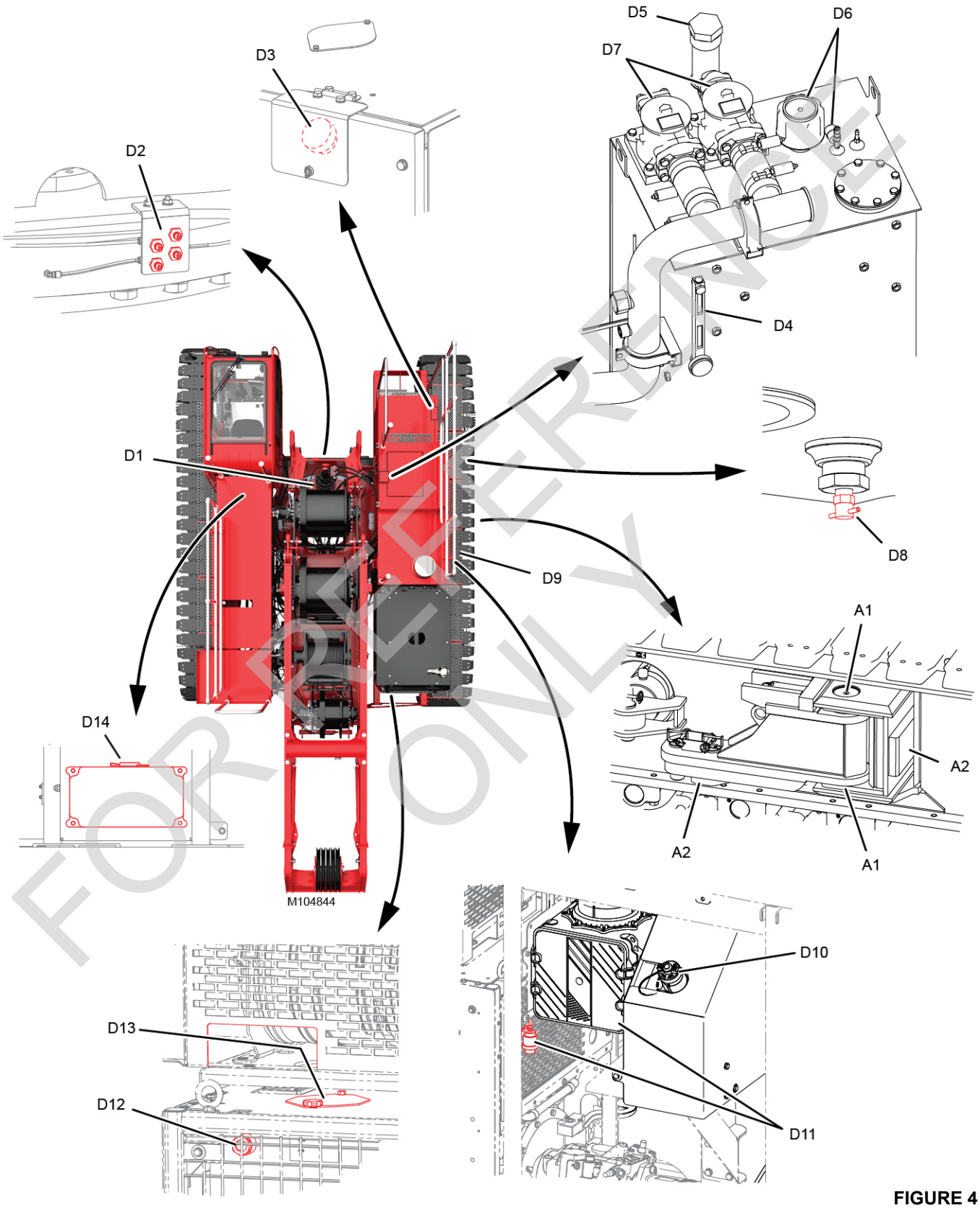


FIGURE 4

Item	Description	Required Service
	Prior to Use When Crane is Assembled	
A1	Carbody Extension Beams and Crawler	Thoroughly clean and spay all sliding surfaces with dry film moly multipurpose lubricant.
A2	Carbody Extension Beams	Grease 2 fittings each beam.
	Daily or Every 8 Hours of Engine Operation or (whichever comes first) See NOTE 1	
D1	Ring Gear and Swing Pinion	Check for proper lubrication. If required, coat with specified open gear oil. See NOTE 2.
D2	Turntable Bearing	Grease 4 fittings. Grease should seep out at seal between outer and inner ring. Swing slowly to distribute grease. Wipe off excess grease. Inspect lube hoses and fittings daily.
D3	Fuel Tank Fill Cap (under cover)	Check level on main display in cab. See NOTE 3. If required, fill with specified low-sulfur diesel fuel.
D4	Hydraulic Tank Oil Sight Gauge (inside enclosure)	Check level. Fill to proper level with hydraulic oil. See NOTE 4.
D5	Hydraulic Tank Fill Port Plug (under cover)	
D6	Hydraulic Tank Breather Indicator (under cover)	Check. Replace breather when indicated.
D7	Hydraulic Tank Filter Elements (under cover)	Check. Replace elements when indicated. See NOTE 6.
D8	Hydraulic Tank Drain Valve (under tank)	Drain water. See NOTE 7.
D9	Engine (oil level, fuel filters, etc.)	Service per engine manufacturer's manual.
D10	DEF Tank	Check level on main display in cab. See NOTE 8.
D11	Air Cleaner Service Indicator	Check. Replace air cleaner elements when indicated.
D12	Radiator Sight Gauge	Check that level is at middle of sight gauge. Fill to proper level with anti-freeze.
D13	Radiator Fill Cap (through access holes and under cover)	
D14	Windshield Washer Fluid Tank	Fill with a quality non-freezing washer fluid.

NOTE 1 Inspect the crane daily for leaks. If found, determine the cause, take corrective action, and refill the component with the specified lubricant. Repair or replace damaged parts as required.

NOTE 2 It will be necessary to climb into the carbody to inspect/lubricate the ring gear and swing pinion. ***Park swing and STOP engine so crane cannot be operated while servicing.***

NOTE 3 The fuel level is shown in the Crane Systems Bar of the Main Display.

FILL TANK IMMEDIATELY if the fuel level low fault appears in the Alerts Bar of the Main Display.

NOTE 4 Check the hydraulic oil level when the oil is cold. Fill the tank to the proper FULL COLD mark on decal.

FILL TANK IMMEDIATELY if the hydraulic oil level fault appears in the Alerts Bar of the Main Display.

NOTE 5 Before removing the fill plug, ***relieve the pressure in the tank with the vent valves provided***.

NOTE 6 Replace the filter elements when the filter fault appears in the Alerts Bar of the Main Display.

Inspect the suction line and/or clean or replace the suction strainer if the suction pressure fault appears in the Alerts Bar of the Main Display.

NOTE 7 Push up to drain water (turn counterclockwise to lock open). Unlock (turn clockwise) and pull down to close the drain valve as soon as water stops draining and a steady stream of hydraulic oil appears.

NOTE 8 The DEF level is shown in the Crane Systems Bar of the Main Display.

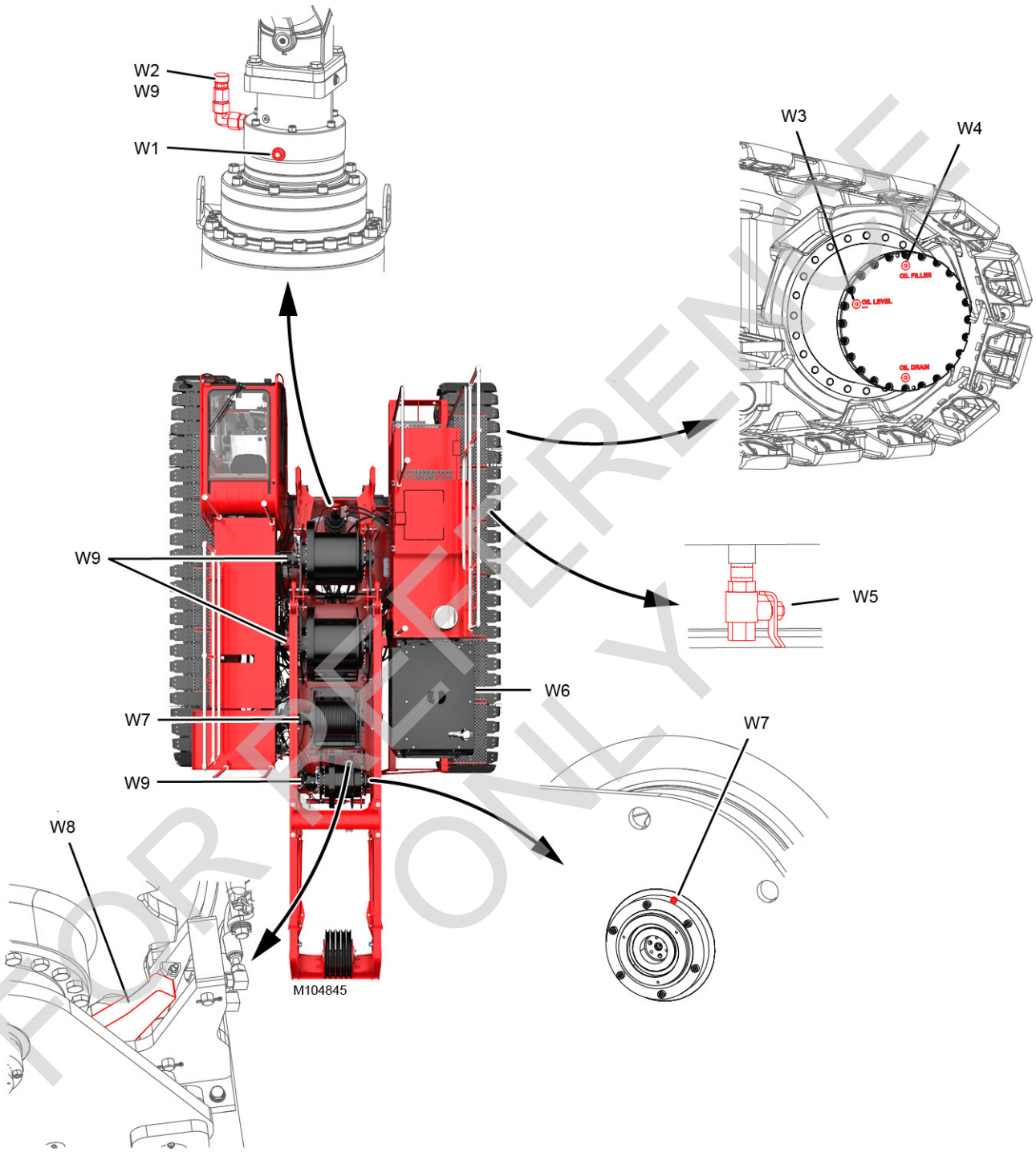


FIGURE 5

Item	Description	Required Service
Weekly or Every 10 Hours of Function Operation or Every 20 Hours of Engine Operation (whichever comes first)		
W1	Swing Gearbox Sight Gauge	Check level. Oil should be at center of gauge. Fill to proper level with specified gear oil.
W2	Swing Gearbox Breather/Fill Plug	
W3	Crawler Gearbox Level Plug (both crawlers)	Check level. See NOTE 1. Oil should be at bottom of plug hole. Fill to proper level with specified gear oil.
W4	Crawler Gearbox Fill Plug	
Weekly or Every 40 Hours of Engine Operation (whichever comes first)		
W5	Fuel Drain Valve (under tank)	Drain water. See NOTE 2.
W6	Engine	Service per engine manufacturer's manual.
W7	Drum Bearing (non-free fall, Drum 1, 2, 3, 4)	Grease: right end of Drum 1, 2, 4 and left end of Drum 3.
W8	Drum 4 Pawl Cam	Coat with specified open gear oil
W9	Gearbox Breathers (swing, Drum 1, 2, 4)	Clean by soaking breathers in a non-flammable solvent and blowing them thoroughly dry with compressed air.

NOTE 1 Travel in either direction so the gearbox fill and drain plugs form a visual line vertical to the ground.

NOTE 2 Attach an owner furnished 1/2 in NPT nipple and a hose to the drain valve. Crack open the drain valve. Fully close the drain valve soon as water stops draining and a steady stream of fuel oil appears. Remove the hose and nipple.

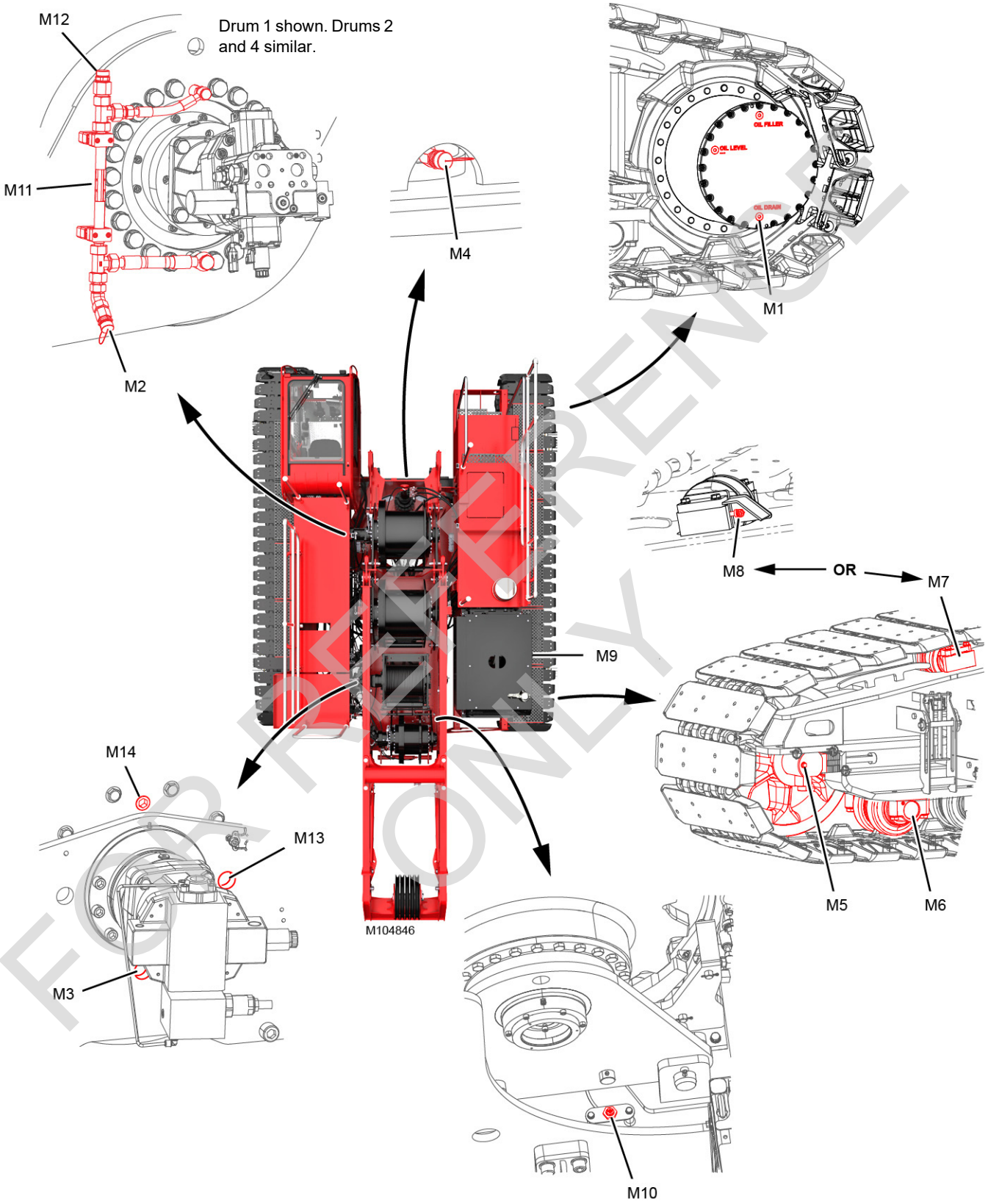
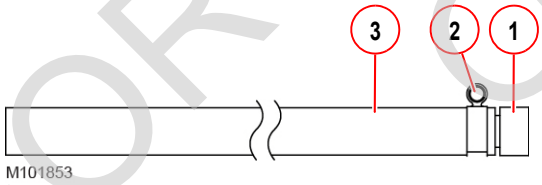


FIGURE 6

Item	Description	Required Service
After First 200 Hours of Engine Operation		
M1	Crawler Gearbox Drain Plug (both crawlers)	Drain and refill with specified gear oil. See NOTE 1.
M2	Drums 1, 2, 4 Gearbox Quick-Drain Valve	Drain and refill with gear oil (see NOTE 2).
M3	Drum 3 Gearbox Drain Plug	Drain and refill with gear oil (see NOTE 3).
M4	Swing Gearbox Quick-Drain Valve	Drain and refill with gear oil (see NOTE 2).
Monthly or Every 40 Hours of Function Operation or Every 200 Hours of Engine Operation (whichever comes first)		
M5	Front Crawler Roller (both crawlers)	Grease fitting under plug on both ends of shaft.
M6	Intermediate Crawler Rollers (13 each crawler)	Inspect for oil leaks or other damage. Rollers are sealed for life. Fill with specified gear oil at overhaul.
M7	Sealed Top Crawler Rollers (2 each crawler)	Inspect for oil leaks or other damage. Rollers are sealed for life. Fill with specified gear oil at overhaul.
M8	Greased Top Crawler Rollers (2 each crawler)	Grease both.
Monthly or Every 200 Hours of Engine Operation (whichever comes first)		
M9	Engine	Service per engine manufacturer's manual.
M10	Pawl Cam Shaft	Grease.
M11	Drum Gearbox Sight Gauge (typical Drum 1, 2, 4)	Check level. Oil should be at center of gauge. Fill to proper level with specified gear oil.
M12	Gearbox Breather/Fill Plug (typical Drum 1, 2, 4)	
M13	Drum Gearbox Sight Gauge (Drum 3)	Check level. See NOTE 3. Oil should be at center of gauge. Fill to proper level with specified gear oil.
M14	Drum Gearbox Fill Plug (Drum 3)	

NOTE 1 Travel in either direction so the gearbox fill and drain plugs form a visual line vertical to the ground.

NOTE 2 The gearbox is equipped with a quick-drain valve which requires use of the quick-drain drainer assembly shown in Figure 7. The quick-drain drainer assembly is stored in the parts box supplied with the crane.



Item	Description
1	Quick-Drain Drainer
2	Hose Clamp
3	Hose: 3/4 in (19 mm) Inside Diameter by 10 ft (3,0 m) Long

FIGURE 7

NOTE 3 Rotate the drum so the sight gauge and the plugs are accessible through the holes in the drum flange. ***Park drum and STOP engine so drum cannot be operated while servicing.***

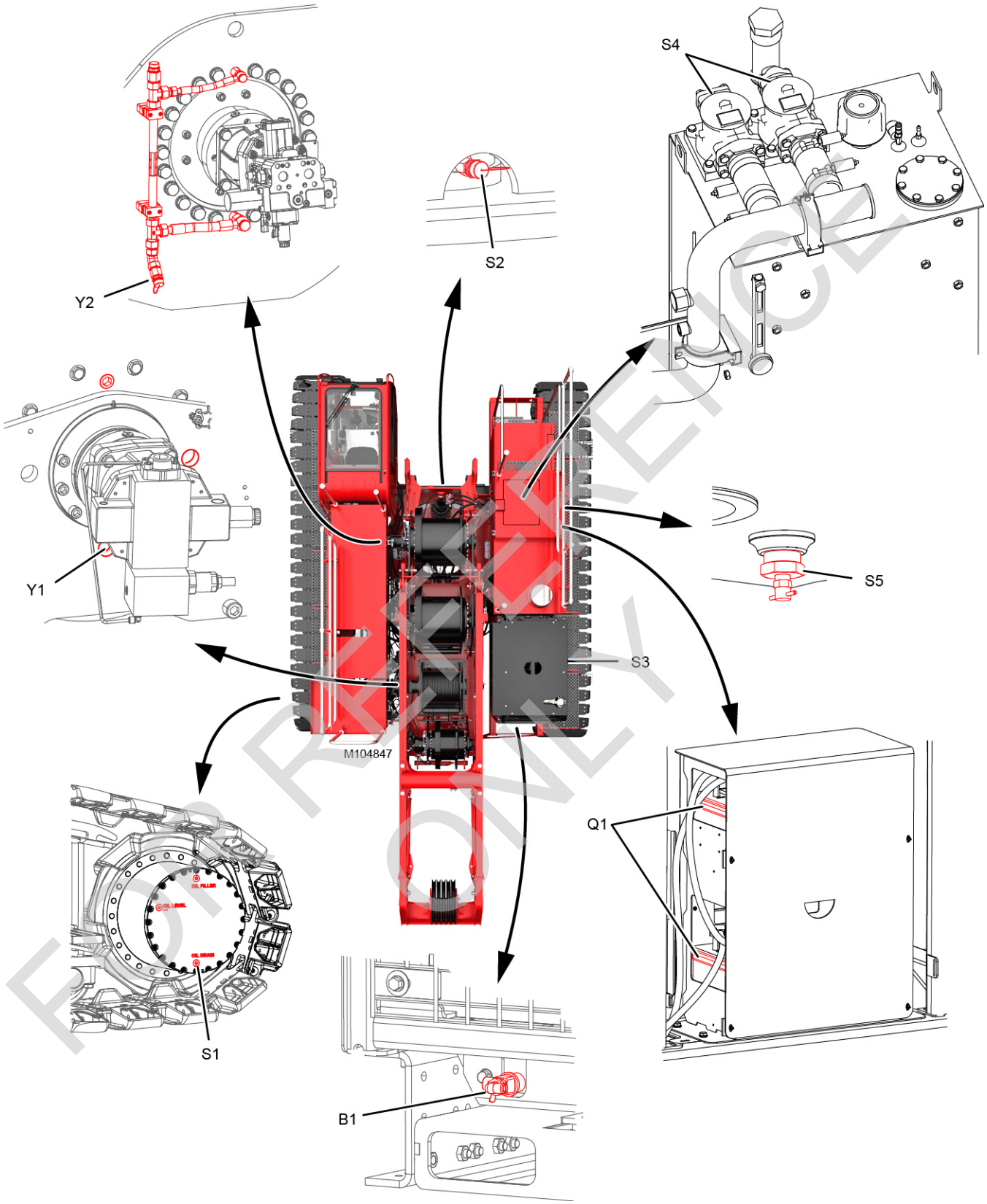


FIGURE 8

Item	Description	Required Service
	Quarterly or Every 500 Hours of Engine Operation or (whichever comes first)	
Q1	Batteries (qty 2) (see NOTE 1)	Clean and inspect. Check Electrolyte level.
	Semi-Annually or Every 200 Hours of Function Operation or Every 1000 Hours of Engine Operation (whichever comes first)	
S1	Crawler Gearbox (qty 2) (see NOTE 2	Drain and refill both with specified gear oil.
S2	Swing Gearbox (see NOTE 3)	Drain and refill with specified gear oil.
	Semi-Annually or Every 500 Engine Hours of Operation or (whichever comes first)	
S3	Engine	Service per engine manufacturer's manual.
	Semi-Annually or Every 1000 Engine Hours of Operation or (whichever comes first)	
S4	Hydraulic Filter (qty 2)	Replace
S5	Hydraulic Tank Drain Plug	Drain and refill with specified hydraulic oil.
	Yearly or Every 400 Hours of Function Operation or Every 2000 Hours of Engine Operation (whichever comes first)	
Y1	Drum 3 Drain Plug (see NOTE 4)	Drain and refill with specified gear oil.
Y2	Drum 1, 2, 4 Drain Plug (see NOTE 3)	Drain and refill each with specified gear oil.
	Biennially or Every 2000 Hours of Engine Operation (whichever comes first)	
B1	Radiator Drain Valve (see NOTE 5)	Drain and refill with specified antifreeze.

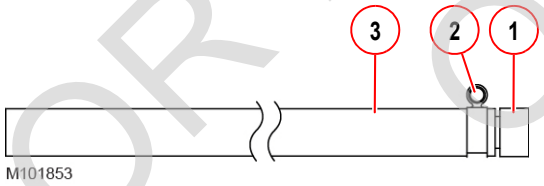
NOTE 1 Two batteries are located behind the removable cover.

NOTE 2 Travel in either direction so the gearbox fill and drain plugs form a visual line vertical to the ground.

NOTE 3 The gearbox is equipped with a quick-drain valve which requires use of the quick-drain drainer assembly shown in Figure 9. The quick-drain drainer assembly is stored in the parts box supplied with the crane.

NOTE 4 Rotate the drum so the sight gauge and the plugs are accessible through the holes in the drum flange. ***Park drum and STOP engine so drum cannot be operated while servicing.***

NOTE 5 Attach an owner furnished hose to the nipple on the drain valve.



Item	Description
1	Quick-Drain Drainer
2	Hose Clamp
3	Hose: 3/4 in (19 mm) Inside Diameter by 10 ft (3,0 m) Long

FIGURE 9

As an alternative to filling the swing gearbox through the fill plug, you can fill the gearbox using the Power Fill Procedure outlined in Section 6 of the Service Manual supplied with the crane.

BOOM RIGGING LUBRICATION

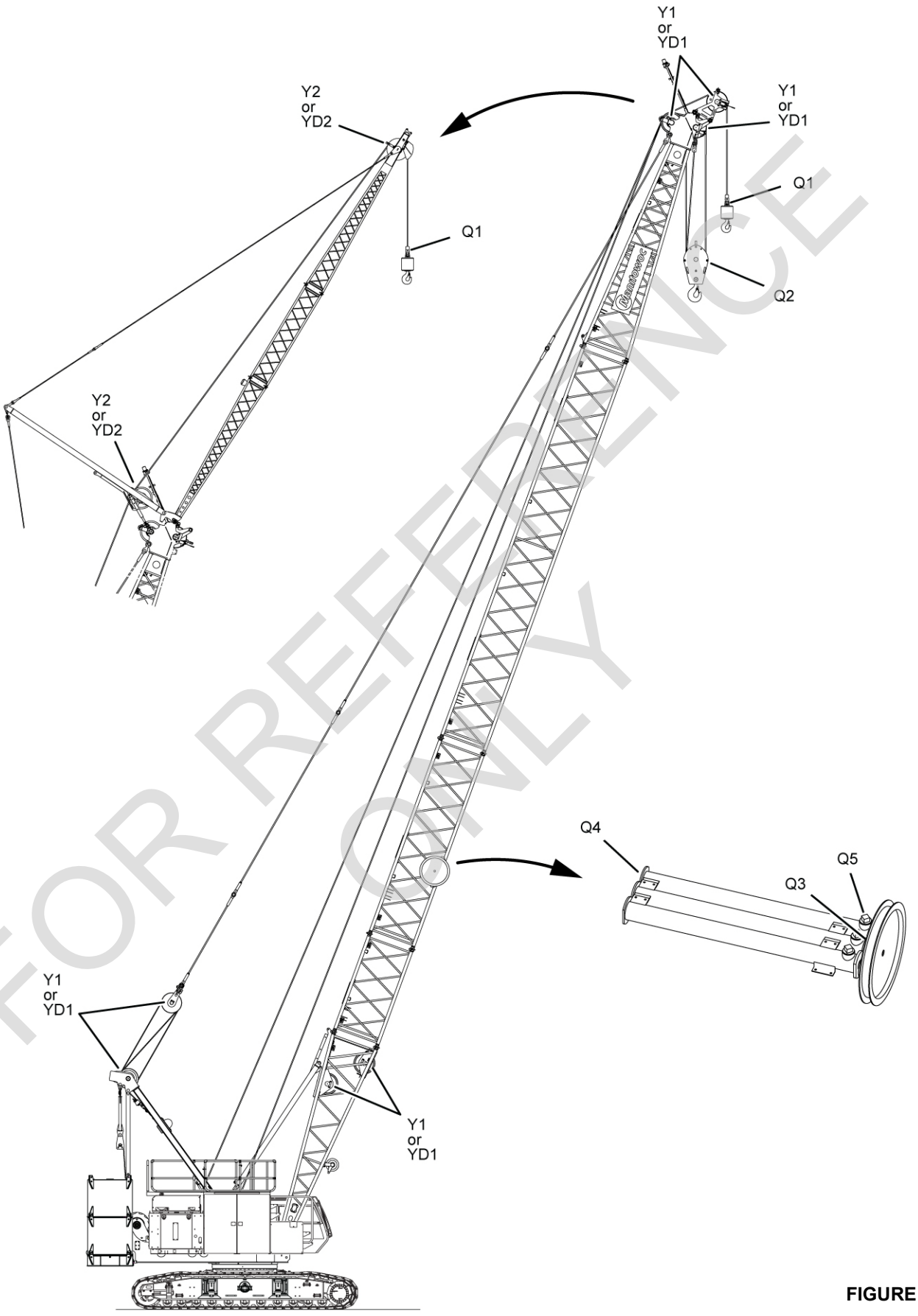


FIGURE 10

Item	Description	Required Service
Quarterly or Every 250 Hours of Engine Operation (whichever comes first)		
Q1	Hook-and-Weight Ball Swivel (1 fitting)	Grease.
Q2	Load Block (3 fittings)	Grease.
Q3	Tagline Gears (1 fitting)	Grease (grease will drop onto gears).
Q4	Tagline Level Plug (1 each barrel)	Check level of each barrel with tagline horizontal. Oil should be up to plug opening.
Q5	Tagline Fill Plug (1 each barrel)	Fill each barrel to proper level with SAE 90 heavy-duty gear oil. See decal on tagline.
Yearly or Every 2000 Hours of Crane Operation (whichever comes first)		
Y1	Boom Sheaves	The boom and jib sheaves are packed with grease at assembly and do not require greasing at regular intervals. Inspect the boom and jib sheaves for proper operation yearly or every 2000 hours of crane operation. Overhaul the sheaves and repack them with grease if needed.
Y2	Jib Sheaves	
Yearly or Every 2000 Hours of Crane Operation (whichever comes first) or at a Desired Interval if the Sheaves are Equipped with Sealed Bearings and Grease Fittings		
YD1	Boom Sheaves	The boom and jib sheaves are packed with grease at assembly and do not require greasing at regular intervals. If the sheaves are equipped with sealed bearings and grease fittings, they can be greased at a desired interval established by the crane owner/user. Inspect the boom and jib sheaves for proper operation yearly or every 2000 hours of crane operation. Overhaul the sheaves and repack them with grease if needed.
YD2	Jib Sheaves	

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SHEET	ZONE	REV	DESCRIPTION OF MODIFICATION	DATE
1	1B	D1	LUBE SPEC FOR ITEMS 2 WAS A	08-23-19

LUBRICATION & LOCATION CHART

ITEM NUMBER	LOCATION NAME/ FUNCTION	APPROXIMATE CAPACITY	LUBE SPEC	INSTR (SEE NOTE #'S)	SERVICE POINTS	SERVICE	SERVICE HOURS (WHICHEVER COMES FIRST)		
							FUNCTION	ENGINE	FLUID LIFE
	CRAWLER/TRAVEL								
1	CRAWLER DRIVE-GEAR BOX	15.0 L	B	4,12	2	DRAIN & FILL	200	1000	6 MONTHS
						CHECK & FILL	10	20	WEEKLY
D1 2a	FRONT ROLLER		M	3,12,13	2	LUBE	40	200	MONTHLY
D1 2b	TOP ROLLER (ONLY WHEN EQUIPPED WITH 80113527)		M	3,12,13	4	LUBE	40	200	MONTHLY
3	CARBODY / CRAWLER EXTENSION BEAM		L	2	4	SPRAY ON			
4	PINS - CARBODY / CRAWLER EXTENSION BEAM		A	3,12,13	8	LUBE	AT SET-UP		
	SWING								
5	SWING DRIVE	5.0 L	G	4,12	1	DRAIN & FILL	200	1000	6 MONTHS
				4,12	1	CHECK & FILL	10	20	WEEKLY
6	SLEWING BEARING		M	3,12,13,30	1	LUBE	8	8	8
7	RING GEAR / PINION		F	3,12,13	1	LUBE	8	8	8
	DRUMS								
8	DRUM 1-FRONT, NON-FF	9.7 L	G	4,5,12	1	DRAIN & FILL	400	2000	1 YEAR
					1	CHECK & FILL		200	MONTHLY
			A	3,7,12,13	1	LUBE		40	WEEKLY
9	DRUM 2-REAR, NON-FF	9.7L	G	4,5,12	1	DRAIN & FILL	400	2000	1 YEAR
					1	CHECK & FILL		200	MONTHLY
			A	3,7,12,13	1	LUBE		40	WEEKLY
10	DRUM 1-FRONT, FF	17.5 L	G	4,5,12	1	DRAIN & FILL	400	2000	1 YEAR
					1	CHECK & FILL		200	MONTHLY
11	DRUM 2-REAR, FF	17.5 L	G	4,5,12	1	DRAIN & FILL	400	2000	1 YEAR
					1	CHECK & FILL		200	MONTHLY
12	DRUM 3	21.0 L	G	4,5,12	1	DRAIN & FILL	400	2000	1 YEAR
					1	CHECK & FILL		200	MONTHLY
13	DRUM 4-BOOM HOIST	5.1 L	G	4,5,12	1	DRAIN & FILL	400	2000	1 YEAR
					1	CHECK & FILL		200	MONTHLY
14	PAWL-GREASE		A	3,12,13	1	LUBE		200	MONTHLY
15	PAWL, LEVER		F	3,10,12	1	LUBE		40	WEEKLY
	DRIVE TRAIN								
16	TIER 4F ENGINE CRANkCASE (CUMMINS QSB6.7)	17.0 L	E	4,12	1	DRAIN & FILL		500	6 MONTHS
					1	CHECK & FILL		10	DAILY
					1	CHANGE FILTER		500	6 MONTHS
16	TIER 3 ENGINE CRANKCASE (CUMMINS QSB6.7)	17.0 L	E	4,12	1	DRAIN & FILL		SEE NOTE #25	
					1	CHECK & FILL		10	DAILY
					1	CHANGE FILTER		SEE NOTE #25	
17	ENGINE COOLING SYSTEM (CUMMINS)	28.4 L	C	1,4,6	1	DRAIN & FILL		2000	2 YEARS

	LUBRICATION DESCRIPTION SEE NOTE # 27	NORMAL FACTORY FILL LUBE SPECIFICATION DOWN TO -10°F(-23°C)	ARTIC PACKAGE OPTION LUBE SPECIFICATION DOWN TO -40°F (-40°C)
A	EXTREME PRESSURE MULTIPURPOSE GREASE	N.L.G.I EP #2 GREASE	471166 (CHEVRON RPM ARCTIC GREASE)
B	SYNTHETIC GEAR LUBE	A13890 (MOBIL DELVAC SYNTH 80W-140)	549455 (MOBIL SHC 626)
C	FULLY FORMULATED ANTI-FREEZE COOLANT	6829101130	
D			
E	ENGINE OIL SAE	6829104182	
F	OPEN GEAR LUBE	471198 (MOBILTAC 375 NC)	
G	SYNTHETIC GEAR LUBE	549515 / 6829014058 (MOBIL DELVAC SYNTH 75W-90	549455 (MOBIL SHC 626)
H	HYDRAULIC OIL	6829006444 PHILIPS 66 TRANS XP	549318 / A03745 PETRO-CANADA HYDREX MV ARTIC 15
J	DIESEL EXHAUST FLUID	80019225	
K	EXTREME PRESSURE 3% MOLY GREASE		
L	DRY MOLY LUBE SPRAY	FASTENAL #63277	
M	GREASE - SLEWING BEARING	A19138 (MOBILGREASE XHP 322 MINE)	

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TOLERANCE TABLE

PAINT CODE 00MAPI001-TBD

SEE TOLERANCE TABLE

SEE COMPONENTS

3RD ANGLE

LUBE CHART
MLC100-1

DO NOT SCALE

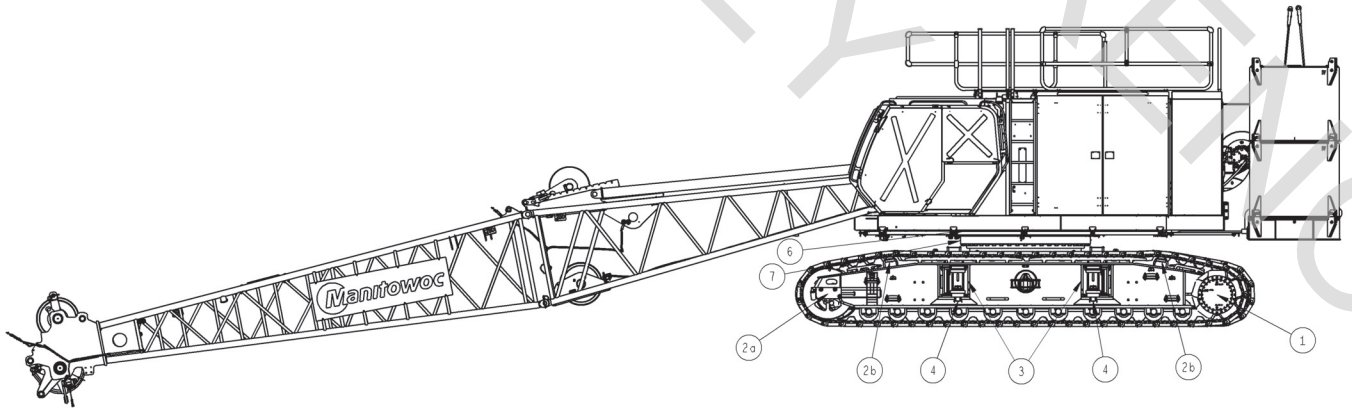
DESIGNER JZICK

DRAWING NO. 80108501 REVISION D

CAGE CODE 12361 UNITS MM SCALE 1.00 SIZE FORMAT A1 SHEET 1/3 GROUP CREATOR HDD

LUBRICATION & LOCATION CHART

ITEM NUMBER	LOCATION NAME	APPROXIMATE CAPACITY	LUBE SPEC	INSTR (SEE NOTE #'S)	SERV PTS	SERVICE	SERVICE HOURS		
							FUNCTION	ENGINE	FLUID LIFE
17	ENGINE COOLANT			1,6,12	1	CHECK & FILL		10	DAILY
17	ENGINE COOLANT CONDITIONER	AS REQUIRED			1	TEST ADD		SEE SERVICE MANUAL	
18	AIR CLEANER FILTER			20	1	CHANGE FILTER		SEE NOTE	
19a	FUEL FILTER			12	1	CHANGE FILTER		500	6 MONTHS
19b	FUEL/WATER SEPARATOR				1	DRAIN WATER TRAP		10	DAILY
20	FUEL TANK	378.5 L			1	CHECK & FILL		10	DAILY
21	BATTERIES, STARTING (ELECTROLYTE)				2	CHECK & FILL		500	3 MONTHS
22	DEF SUPPLY MODULE FILTER				1	CHECK FILTER		4500	
23	DIESEL EXHAUST FLUID (DEF) TANK	37.8 L	J	12	1	CHECK & FILL		10	DAILY
24	DEF TANK FILTER				1	CHECK FILTER		1 YEAR	
	BOOM								
25	HOOK BLOCK SWIVEL BEARING		A	3,12,13	1	LUBE		250	3 MONTHS
26	WEIGHT BALL		A	3,12,13	1	LUBE		250	3 MONTHS
	HYDRAULICS SYSTEM								
27	HYDRAULIC SYSTEM	710.0 L	H	8,15,16	1	FILL			
28	HYDRAULIC TANK	252.0 L	H	8,15	1	CHECK & FILL		10	DAILY
		710.0 L	H	8,15,16	1	DRAIN & FILL		1000	6 MONTHS
29	HYDRAULIC FILTER			19	2	CHANGE FILTER		1000	6 MONTHS
30	TANK BREATHER					CHECK & CHANGE		10	DAILY



MLC100-1 LEFT SIDE VIEW

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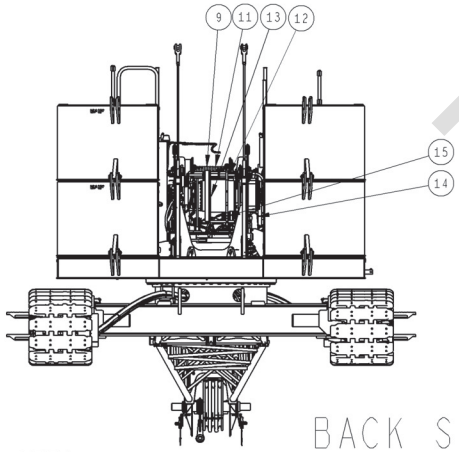
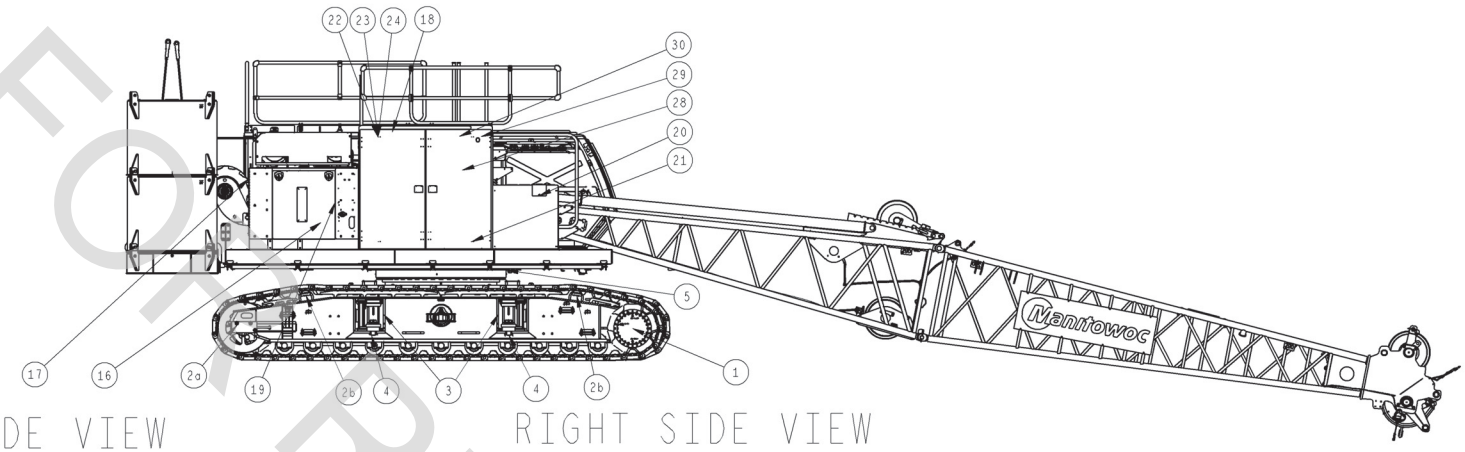
TITLE IN PRIMARY LANGUAGE
LUBE CHART
MLC100-1
TITLE IN SECONDARY LANGUAGE

UNITS	SCALE	SIZE FORMAT	SHEET	GROUP CREATOR	DRAWING NO.	REVISION
MM	1.00	A1	2/3	HDD	80108501	D



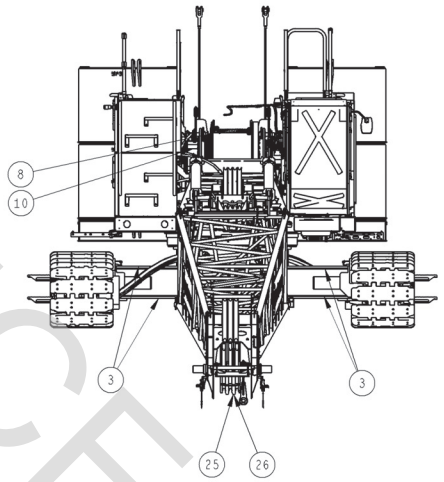
BACK SIDE VIEW



RIGHT SIDE VIEW

NOTES:

1. CAPACITIES INDICATED ARE FOR A FULLY FORMULATED MIXTURE OF 50% AFC AND 50% WATER.
2. SPRAY DRY MOLY LUBE ON BOTTOM PLATES, TOP PLATES AND SIDE PLATES OF CRAWLER EXTENSION BEAM AND CARBODY PLATES THE BEAM MOVES ON.
3. ALL POINTS REQUIRING PERIODIC LUBRICATION SHALL BE LUBRICATED AS REQUIRED AT ASSEMBLY.
4. FINAL FLUID LEVELS SHALL BE ADJUSTED BY INDICATING ARROWS, DIPSTICK MARKINGS OR TO FILLER PLUGS.
5. OIL LEVEL MUST BE VISIBLE IN THE SIGHT GLASS. IF OIL LEVEL IS NOT VISIBLE IN SIGHT GLASS, THE HOIST MAY BE UNDERFILLED. OIL ESCAPING FROM THE VENT PLUG IS AN INDICATION THE HOIST MAY BE OVERFILLED.
6. FILL SURGE TANK TO BOTTOM OF FILLER NECK. RUN ENGINE THROUGH (2) THERMAL CYCLES. CHECK LEVEL AND REFILL AS REQUIRED.
7. GREASE DRUM BEARING
8. THE HYDRAULIC OIL SHALL MEET OR EXCEED 6829014631.
10. APPLY OPEN GEAR LUBE BETWEEN PAWL AND LEVER.
11. ACCESS THRU HOLE IN BASE SECTION.
12. SERVICE BY WHICHEVER INTERVAL OCCURS FIRST.
13. USE GREASE FITTINGS PROVIDED.
14.
15. CHECK FLUID LEVEL USING SIGHT GAUGE ON THE SIDE OF THE TANK, NOTE FULL LEVEL FOR CYLINDERS EXTENDED OR RETRACTED IS SHOWN ON THE DECAL.
16. FINAL SYSTEM VOLUME IS AFTER CYLINDERS EXTENDED / RETRACTED. INITIAL FILL MAY BE LESS THAN FULLY SYSTEM CAPACITY NOTED.
17.
18
19. REPLACE THE HYDRAULIC FILTER ELEMENT WHEN THE FILTER PRESSURE SWITCH ACTIVATES AND THE CONTROL SYSTEM SHOWS A WARNING.
20. REPLACE AIR CLEANER ELEMENT WHEN INDICATOR SHOWS RED (25" H2O).
21.
22.
23.
24. ABOVE REQIREMENTS APPLY FOR TEMPERATURES OF 5°F (-15°C) AND ABOVE. FOR LOWER TEMPERATURES CONTACT FACTORY.
25. SERVICE HOURS: 500 (0-500 PPM SULFUR FUEL)
    400 (500-5000 PPM SULFUR FUEL)
    250 (>5000 PPM SULFUR FUEL, NOT RECOMMENDED)
26. DO NOT MIX SYNTHETIC BASE LUBES WITH MINERAL BASED LUBES.
27. VARIOUS CONTAINER SIZES OF LUBRICANTS ARE AVAILABLE FOR ORDER THROUGH CRANE CARE. CONTACT CRANE CARE FOR DETAILS.
28.
29.
30. (4) GREASE ZERKS AT THIS SERVICE POINT.



FRONT SIDE VIEW

Manitowoc

TITLE IN PRIMARY LANGUAGE
LUBE CHART
MLC100-1
TITLE IN SECONDARY LANGUAGE

UNITS	SCALE	SIZE FORMAT	SHEET	GROUP CREATOR	DRAWING NO.	REVISION
MM	1.00	A1	3/3	HDD	80108501	D