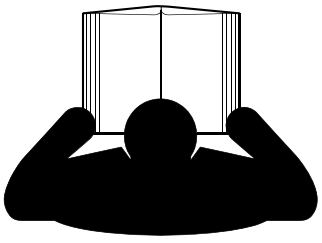
OPERATOR MANUAL

Supplement

Crane Warm-up Procedures



⚠DANGER

An untrained operator subjects himself and others to death or serious injury. Do not operate this crane unless:

- You are trained in the safe operation of this crane. Manitowoc is not responsible for qualifying personnel.
- You read, understand, and follow the safety and operating recommendations contained in the crane manufacturer's manuals and load charts, your employer's work rules, and applicable government regulations.
- You are sure that all safety signs, guards, and other safety features are in place and in proper condition.
- The Operator Manual and Load Chart are in the holder provided on crane.

Published 3-30-2017, Control # 516-04

TOC

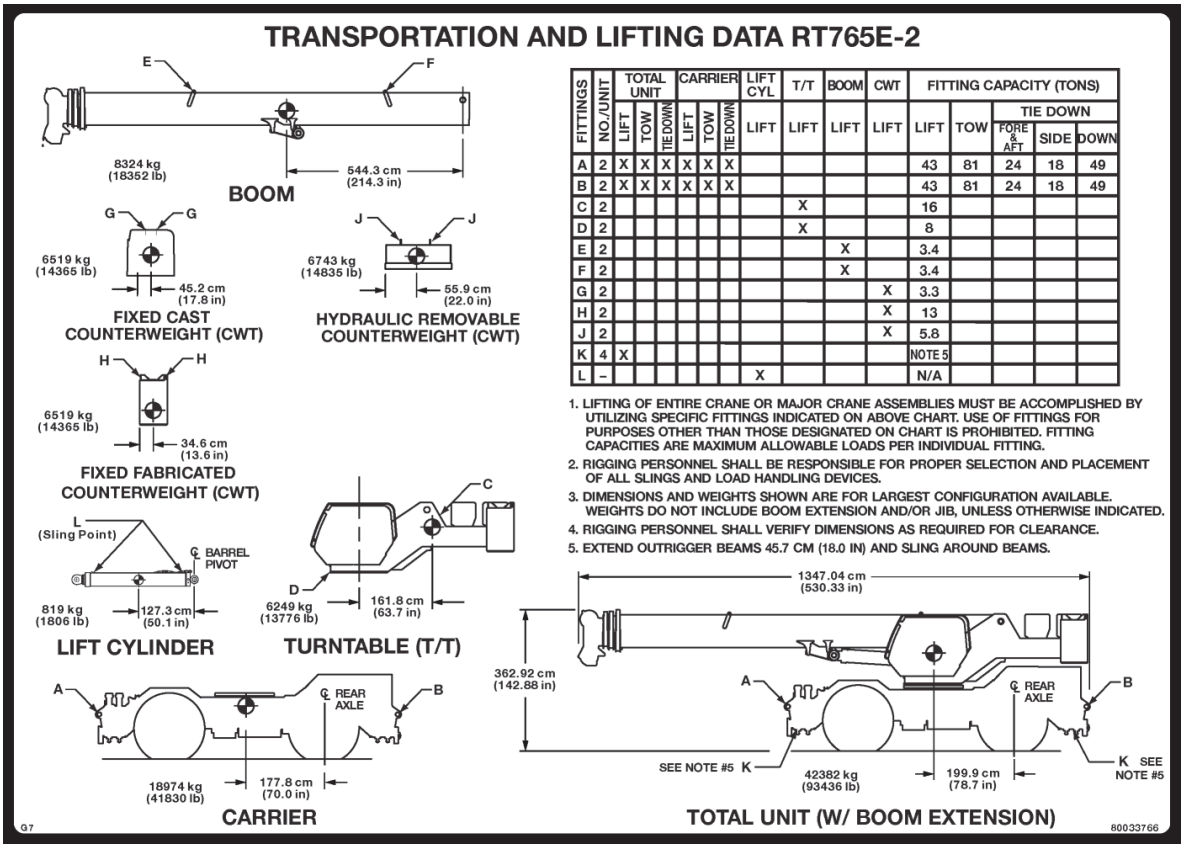
Pump #3

Type . . . . . .Gear
Sections 1
Output - @ loaded engine speed
Section 1 . . . . . 19.8 gpm (75 l/min)

Max. Single Line Speed . . . . . 500 fpm (153 m/min)

Hoists

Drum Dimensions
Diameter . . . . . 15 in (381 mm)
Length (Standard) . . . . . 18.38 in (467 mm)
Cable
Diameter . . . . . 0.75 in (19 mm)
Length-Main . . . . . 650 ft (198 m)
Length-Aux. . . . . 653 ft (199 m)
Max. Permissible Line Pull (6x36)
. . . . . 16,800 lb (74.7 kN)



FITTINGS	NO./UNIT	TOTAL UNIT LIFT	TOTAL UNIT TOW	TOTAL UNIT TIE DOWN	CARRIER LIFT	CARRIER TOW	CARRIER TIE DOWN	LIFT CYL LIFT	T/T LIFT	BOOM LIFT	CWT LIFT	FITTING CAPACITY (TONS) LIFT	TOW	TIE DOWN FORE & AFT	TIE DOWN SIDE	TIE DOWN DOWN
A	2	X	X	X	X	X	X					43	81	24	18	49
B	2	X	X	X	X	X	X					43	81	24	18	49
C	2								X			16				
D	2								X			8				
E	2									X		3.4				
F	2									X		3.4				
G	2										X	3.3				
H	2										X	13				
J	2										X	5.8				
K	4	X										NOTE 5				
L	–							X				N/A				

1. LIFTING OF ENTIRE CRANE OR MAJOR CRANE ASSEMBLIES MUST BE ACCOMPLISHED BY UTILIZING SPECIFIC FITTINGS INDICATED ON ABOVE CHART. USE OF FITTINGS FOR PURPOSES OTHER THAN THOSE DESIGNATED ON CHART IS PROHIBITED. FITTING CAPACITIES ARE MAXIMUM ALLOWABLE LOADS PER INDIVIDUAL FITTING.
2. RIGGING PERSONNEL SHALL BE RESPONSIBLE FOR PROPER SELECTION AND PLACEMENT OF ALL SLINGS AND LOAD HANDLING DEVICES.
3. DIMENSIONS AND WEIGHTS SHOWN ARE FOR LARGEST CONFIGURATION AVAILABLE. WEIGHTS DO NOT INCLUDE BOOM EXTENSION AND/OR JIB, UNLESS OTHERWISE INDICATED.
4. RIGGING PERSONNEL SHALL VERIFY DIMENSIONS AS REQUIRED FOR CLEARANCE.
5. EXTEND OUTRIGGER BEAMS 45.7 CM (18.0 IN) AND SLING AROUND BEAMS.

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FIGURE 1-4

operate. Be sure that the surfaces will support a load greater than the crane's weight and maximum capacity.

Be aware of all conditions that could adversely effect the stability of the crane.

Be aware of the danger for people entering the working area. Do not allow unnecessary personnel in the vicinity of the crane while operating.

WIND FORCES

There are basic principles that must be followed while operating in windy conditions. This information has been provided to assist in determining safe operation in windy conditions.

Always use extreme caution when windy conditions exist. NEVER exceed the rated capacity shown on the *Load Chart*.

Always check the *Load Chart* to ensure the load to be lifted is within the rated capacity of the crane.

Wind can have a significant effect on loads that may be lifted by a crane. Wind forces act differently on a crane depending upon the direction from which the wind is blowing (e.g., wind on the rear of the boom can result in decreased forward stability, wind on the underside of the boom can result in decreased backward stability, wind on the side of the boom can result in structural damages, etc.)

Wind forces can exert extreme dynamic loads. Manitowoc recommends that a lift not be made if the wind can cause a loss of control in handling the load.

Wind forces can be determined by typical visible effects on the landscape.To assist you in determining prevailing wind conditions, refer to (Table 2-1).

NOTE: The wind speed corresponding to the Beaufort scale in the table is mean wind speed at 10 m (33 ft) elevation over a period of 10 minutes.

Table 2-1 Beaufort Wind Scale

		Maximum Wind Speed			
Beaufort Number	**Description**	**m/s**	**km/h**	**mph**	**Visible Indicator Effects of wind as observed on land**
Zero (0)	Calm	0.3	1.1	0.7	Calm; smoke rises vertically
1	Light Air	1.5	5.4	3.4	Smoke drift indicates wind direction. Leaves and wind vanes are stationary.
2	Light Breeze	3.3	11.9	7.4	Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.
3	Gentle Breeze	5.4	19.4	12.1	Leaves and small twigs constantly moving. Light flags extended.
4	Moderate Breeze	7.9	28.4	17.7	Dust and loose paper raised. Small branches begin to move.
5	Fresh Breeze	10.7	38.5	23.9	Branches of a moderate size move. Small trees in leaf begin to sway.
6	Strong Breeze	13.8	49.7	30.9	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic bins tip over.
7	High Wind	17.1	61.6	38.3	Whole trees in motion. Effort needed to walk against the wind.
8	Gale	20.7	74.5	46.3	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	Strong Gale	24.4	87.8	54.6	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.
10	Storm	28.4	102.2	63.5	Trees are broken off or uprooted, structural damage likely.

Wind Speeds

The maximum permissible wind speed referred to in the load charts is the 3-second wind gust speed measured at the boom tip height and is designated as ***V(z)***. This value is either recorded at boom tip or calculated based on mean wind speed recorded at crane operation site. For lift planning purposes only, the 3-second wind gust speed, ***V(z)***, may be calculated based on mean wind speed reported at http://www.windfinder.com "Super Forecast".

Rated Load Chart Example - Non-metric

RATED LIFTING CAPACITIES IN POUNDS
36 FT. - 110 FT. BOOM

ON OUTRIGGERS FULLY EXTENDED - 360°

Radius in Feet	#0001								
	Main Boom Length in Feet								
	36	40	50	**60	70	80	90	100	110
10	130,000 (69.5)	90,300 (71.5)	90,300 (75.5)	*62,500 (78)					
12	112,500 (65.5)	90,300 (68.5)	90,300 (73)	62,500 (76.5)	*40,200 (78)				
15	93,250 (60)	90,300 (63.5)	90,250 (69.5)	62,500 (73.5)	40,200 (76)	*40,200 (78)			
20	71,550 (49.5)	71,500 (55)	71,300 (63)	62,500 (68)	40,200 (71.5)	40,200 (74.5)	40,200 (78)	*36,900 (78)	
25	56,650 (36.5)	56,600 (45)	56,350 (56)	53,650 (63)	40,200 (67)	40,200 (70.5)	37,950 (73)	34,900 (75)	*25,150 (78)
30	43,500 (11.5)	44,300 (32)	43,950 (48.5)	43,650 (57.5)	40,200 (62.5)	[illegible]	32,750 (69.5)	30,200 (72)	25,150 (74)
35			33,550 (40)	33,700 (51.5)	34,700 (58)	[illegible]	[illegible] (66)	26,400 (69)	24,700 (71.5)
40			25,800 (28)	26,150 (44.5)	[illegible]	[illegible]	25,200 (62.5)	23,300 (66)	21,800 (68.5)
45				[illegible]	[illegible] (47)	22,300 (54)	22,400 (59)	20,700 (62.5)	19,400 (65.5)
50				[illegible]	[illegible] (41)	18,25[illegible] (49.5)	19,100 (55)	18,550 (59.5)	17,350 (62.5)
55					14,300 (33.5)	[illegible] (44)	16,000 [illegible]1)	16,400 (56)	15,600 (60)
60					[illegible]	12,700 (38.[illegible]	13,550 (46.5)	13,950 (52.5)	14,100 (56.5)
65						[illegible]00 (31.5)	11,550 (41.5)	11,950 (48.5)	12,300 (53.5)
70						9,010 (22.5)	9,920 (36)	10,250 (44)	10,650 (50)
75							8,510 (29.5)	8,890 (39.5)	9,250 (46)
80							7,260 (21)	7,690 (34.5)	8,050 (42.5)
85								6,620 (28.5)	7,010 (38)
90								5,630 (20)	6,100 (33)
95									5,240 (27)
100									4,480 (19.5)
Minimum boom angle (°) for indicated length (no load)									0
Maximum boom length (ft.) at 0° boom angle (no load)									110

NOTE: ( ) Boom angles are in degrees.
#RCL operating code. Refer to RCL manual for operating instructions.
*This capacity is based on maximum boom angle.
NOTE: For allowable capacities while operating in 3-second wind gust speeds greater than 30 mph and up to 45 mph, refer to *Capacity Reduction Factors for wind speed (3-second gust speed) V(z) greater than 30 mph.*

Lifting Capacities at Zero Degree Boom Angle									
Boom Angle	Main Boom Length in Feet								
	36	40	50	**60	70	80	90	100	110
0°	30,350 (30.1)	25,700 (34.2)	17,950 (44.2)	13,050 (54.6)	10,050 (64.2)	7,790 (74.2)	6,300 (84.2)	4,900 (94.2)	3,900 (104.2)

NOTE: ( ) Reference radii in feet.
** Boom length is with inner-mid fully extended and outer-mid & fly fully retracted.

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FIGURE 2-4

- The platform is properly attached and secured to the load hook.

- For boom mounted platforms:
  - The platform is properly attached and secure.

To avoid death or serious injury:

- NEVER use this crane for bungee jumping or any form of amusement or sport.
- NEVER handle personnel on the loadline unless the requirements of applicable national, state and local regulations and safety codes are met.
- NEVER permit anyone to ride loads, hooks, slings or other rigging for any reason.
- NEVER get on or off a moving crane.
- NEVER allow anyone other than the operator to be on this crane while the machine is operating or traveling.
- NEVER allow anyone on the hoist access platform while traveling.

The following standards and regulations regarding personnel handling are available by mail at the following addresses:

- *ASME (formerly ANSI) B30 Series American National Safety Standards For Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings*; *ASME B30.5, Mobile And Locomotive Cranes, and ASME B30.23, Personnel Lifting Systems*, are available by mail from the ASME, 22 Law Drive, Fairfield, New Jersey, 0700-2900
- *US DOL/OSHA Rules and Regulations* are available by mail from the Superintendent of Documents, PO Box 371954, Pittsburgh, PA, 15250-7954.

ENVIRONMENTAL PROTECTION

Dispose of waste properly! Improperly disposing of waste can threaten the environment.

Potentially 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 environmentally harmful substances.

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

When filling and draining crane components, observe the following:

- 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 clean up any spills.

MAINTENANCE

The crane must be inspected prior to use on each work shift. The owner, user, and operator must ensure that routine maintenance and lubrication are being dutifully performed. **Never** operate a damaged or poorly maintained crane.

Manitowoc continues to recommend that cranes be properly maintained, regularly inspected and repaired as necessary. Manitowoc reminds crane owners to ensure that all safety decals are in place and legible. Manitowoc continues to urge crane owners to upgrade their cranes with rated capacity limiter and control lever lockout systems for all lifting operations.

Shut down the crane while making repairs or adjustments.

Always perform a function check after repairs have been made to ensure proper operation. Load tests should be performed when structural or lifting members are involved.

Follow all applicable safety precautions in this manual when performing crane maintenance as well as crane operations.

Keep the crane free of mud, dirt, and grease at all times. Dirty equipment introduces hazards, wears-out faster, and makes proper maintenance difficult. Cleaning solutions used should be non-flammable, non-toxic and appropriate for the job.

Routine maintenance and inspection of this crane must be performed by a qualified person(s) according to the recommendations in the *Manitowoc Crane Care Maintenance and Inspection Manual*. Any questions regarding procedures and specifications should be directed to your Manitowoc distributor.

Service and Repairs

WARNING

Fall Hazard!

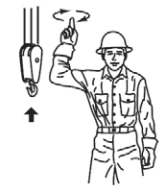
Working at elevated heights without using proper fall protection can result in severe injury or death.

Always use proper fall protection as required by local, state or federal regulations.

Service and repairs to the crane must only be performed by a qualified person. All service and repairs must be performed in accordance with manufacturer's recommendations, this manual, and the service manual for this machine. If there is any question regarding maintenance procedures or specifications, contact your Manitowoc distributor for assistance.

STANDARD HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS

Complies with ASME B30.5-2011

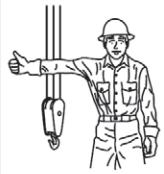


HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.

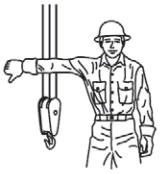
LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.

USE MAIN HOIST. Tap fist on head; then use regular signals.

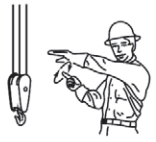
USE WHIPLINE (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.



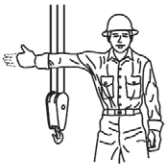
RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.



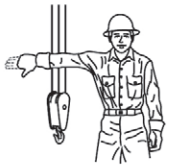
LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.



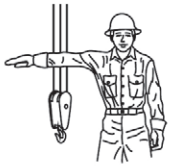
MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal (hoist slowly shown as an example).



RAISE BOOM AND LOWER LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.

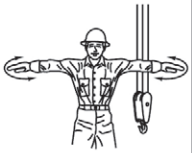


LOWER BOOM AND RAISE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.

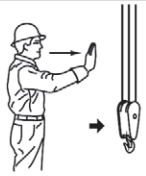


SWING. Arm extended, point with finger in direction of swing of boom.

STOP. Arm extended, palm down, move arm back and forth horizontally.



EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.



TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

DOG EVERYTHING. Clasp hands in front of body.

TRAVEL (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For land cranes only.)

TRAVEL (One Track). Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For land cranes only.)

EXTEND BOOM (Telescoping Booms). Both fists in front of body with thumbs pointing outward.

RETRACT BOOM (Telescoping Boom). Both fists in front of body with thumbs pointing toward each other.

EXTEND BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest with thumb tapping chest.

RETRACT BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

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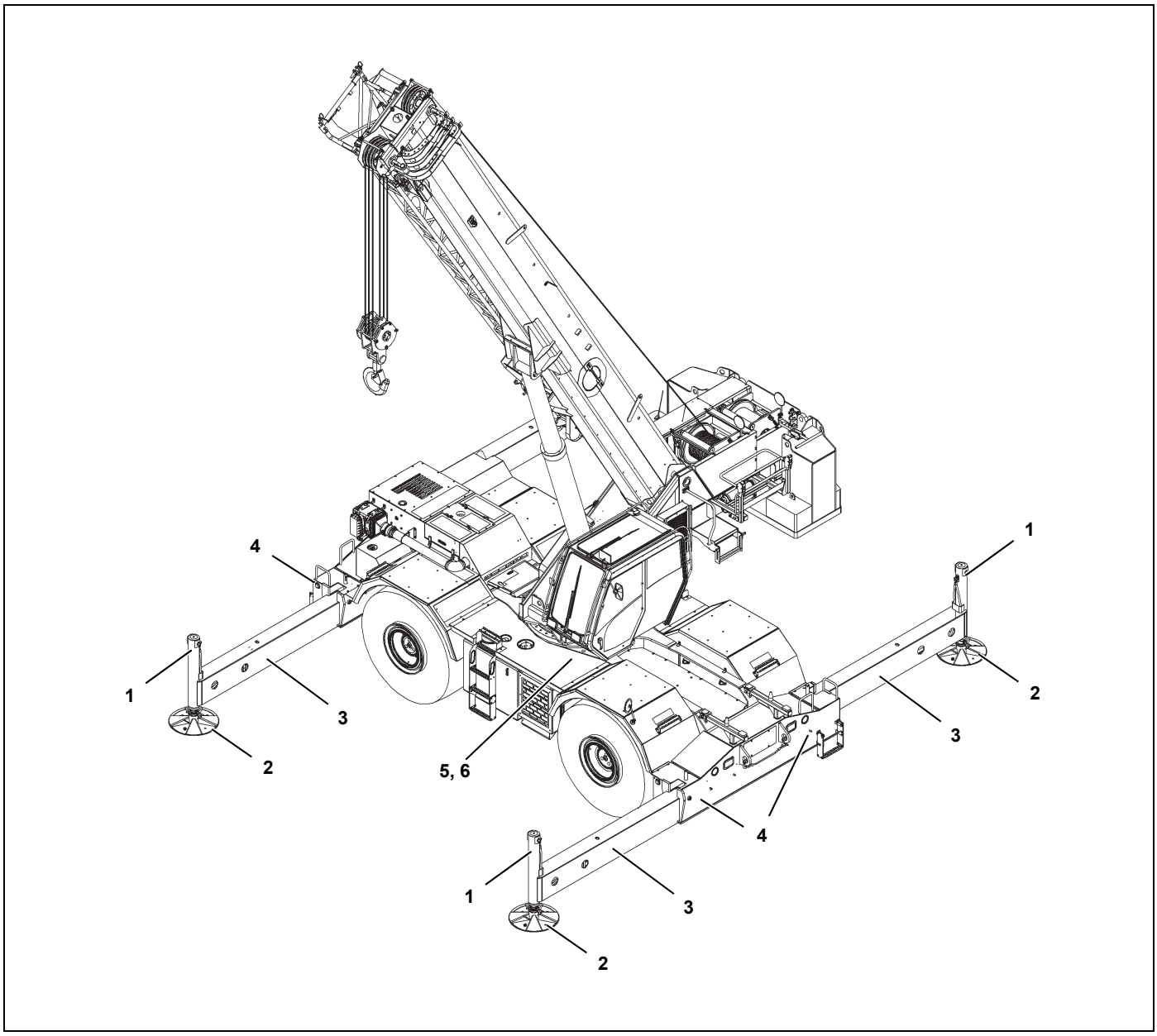
FIGURE 2-10

Carrier Inspection



Overload less than 25%			
1	Jack Cylinders	Inspect for leaking.	
2	Outrigger Pads	Inspect for deformation and cracked welds.	
Overload from 25% to 49%			
1	Jack Cylinders	Inspect for leaking.	
2	Outrigger Pads	Inspect for deformation and cracked welds.	

LCD Display

The LCD Display(12) (Figure 3-6) is located in the steering column gauge display. The display shows the transmission gear being used, fault codes, DEF level and master software version.

If an active engine fault code is present, the display will show the code when the Ignition Switch is in the RUN position and the engine is off. The display will show the master software version when the Ignition Switch is in the ACC position.

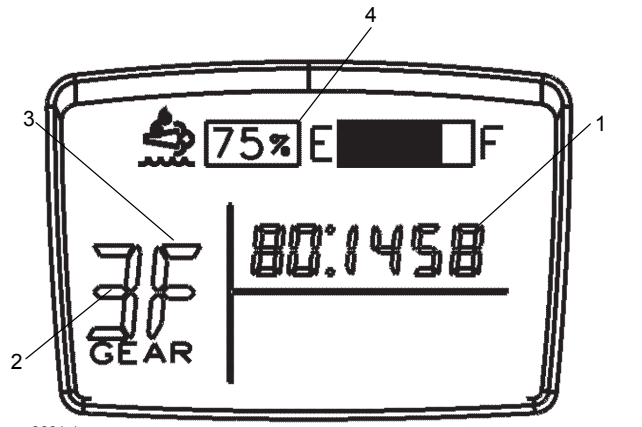


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FIGURE 3-7

Figure 3-7 Item Numbers

Item	Description
1	Engine Fault Code, Master Software Version
2	Transmission Gear Selected
3	Forward or Reverse
4	DEF Quantity/Level Gauge

Engine Stop

The Engine Stop Indicator (13) (Figure 3-6) is located in the steering column gauge display. It illuminates red when a signal is sent from the engine ECM. In addition, a warning buzzer will also sound.

If this indicator light illuminates, note the fault code, shut the engine off and refer to the Engine Operator Manual.

Engine Warning

The Engine Warning Indicator (14) (Figure 3-6) is located in the steering column gauge display. It illuminates amber when a signal is sent from the engine ECM.

If this indicator light illuminates, note the fault code and see Engine Operator Manual.

The Engine Warning Indicator may also illuminate with the Diesel Particulate Filter Indicator or Diesel Exhaust Fluid Indicator.

Diesel Particulate Filter

The Diesel Particulate Filter (DPF) Indicator (15) (Figure 3-6) is located in the steering column gauge display. This indicator illuminates amber when the diesel particulate filter is getting filled with soot and needs to be cleaned out.

When the DPF indicator illuminates or flashes, start exhaust system cleaning process.

The indicator will be lit continuously during the early stages of clogging. If the system continues to clog, the lamp will begin to flash and slight engine derate will occur.

If even more clogging occurs, the engine warning light (14) will illuminate in addition to the DPF indicator (15) and severe engine derate will occur.

WARNING

Extreme Heat Hazard!

During the exhaust system cleaning process the exhaust becomes very hot. Do not park the vehicle near objects that are flammable.

Use caution near the exhaust tailpipe as it will also become very hot.

The exhaust system cleaning process can take place in three different modes:

Passive: the exhaust is hot enough during normal working operation to burn off any hydrocarbon (soot) accumulation

Active: Active self-exhaust system cleaning occurs when there is not sufficient heat in the exhaust to convert all the hydrocarbon being collected in the DPF. Exhaust temperatures are raised by injecting a small amount of fuel. The resulting chemical reaction raises exhaust gas temperatures high enough to oxidize the hydrocarbon from the filter. This is all done without any operator intervention.

Manual: Manual or stationary, exhaust system cleaning is the same as active exhaust system cleaning but takes place while the equipment is not being operated. It offers the equipment operator the option, if needed, of performing exhaust system cleaning outside the normal duty cycle.

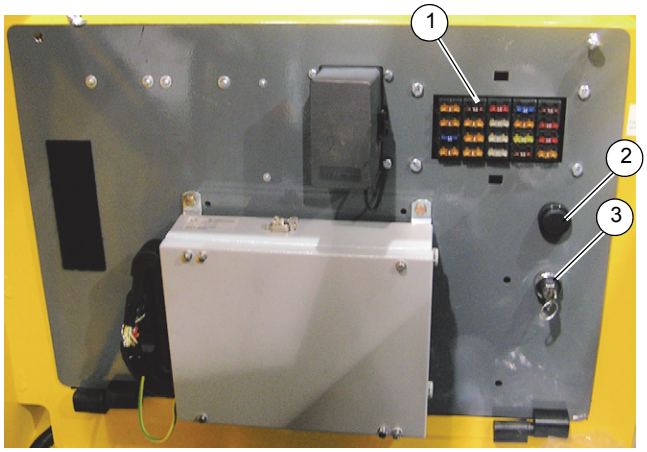

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FIGURE 3-12

Figure 3-12 Item Numbers

Item	Description
1	Fuse Panel
2	Buzzer
3	Rated Capacity Limiter (RCL) Emergency Override Switch

Rated Capacity Limiter (RCL) Emergency Override Switch and Indicator (CE Certified Cranes)

WARNING

Loss of RCL Monitoring Hazard!

The RCL Emergency Override Switch is to be used in emergency situations only.

Do not operate the crane with the RCL overridden during normal operations.

When the RCL is overridden, always have a helper on the ground to signal you.

The RCL system, when programmed accurately, will lockout the three craning functions—boom down, telescope extend, and hoist up—when a lift is attempted at or above the crane's capacity or when a two-block condition exists. Locking out these three functions prevents the overload or two-block condition from worsening.

The RCL emergency override switch is located inside a key-locked single-door enclosure (1, Figure 3-13) that is attached to the outside rear of the operator's cab. The switch is a two-position momentary rocker switch with integral indicator that, when actuated, will override and prevent the RCL, for a period of 30 minutes, from locking out the three craning functions (boom down, telescope extend, and hoist up) should an overload or two-block condition occur.

Overriding the RCL with this switch should only be done in the case of an emergency or when servicing the boom.

The indicator in the override switch will illuminate red and the RCL and A2B override indicators on the RCL display will flash to indicate the switch has been activated. Upon activation, all craning function movements are reduced to 15% of their normal maximum speeds.

The RCL override function is automatically cancelled after 30 minutes. The RCL override function can also be cancelled by the operator by either pressing the RCL emergency override switch a second time, by turning off the engine, or by turning the crane function power switch off.

Refer to the *RCL Operator Manual* for more information.

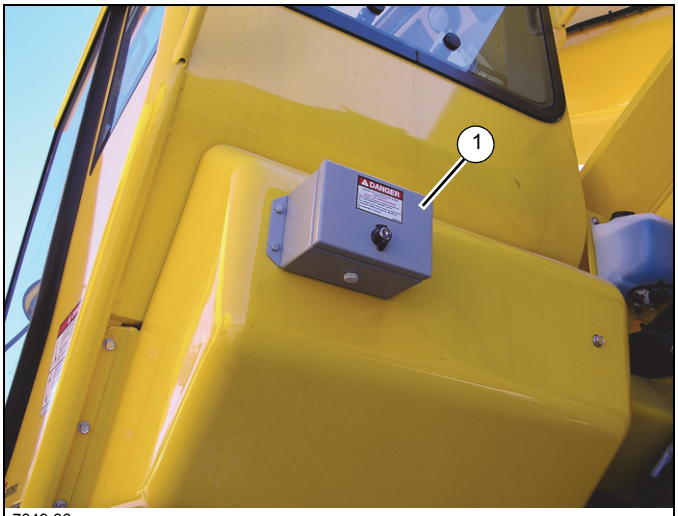

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FIGURE 3-13

Rated Capacity Limiter (RCL) Internal Light Bar (Optional) (Not Shown)

The Rated Capacity Limiter (RCL) Internal Light Bar is located on the upper left hand corner of the crane cab. The RCL is an operational aid that warns a crane operator of approaching overload conditions and over hoist conditions that could cause damage to equipment and personnel.

Strobe Light or Beacon (Optional) (Not Shown)

The strobe light or beacon is on the roof of the cab. It is on when the ignition switch is on.

Backup Alarm (Not Shown)

The backup alarm is an audio system used to warn personnel outside the crane when the crane is backing up. The alarm system is electrical and consists of the backup alarm and its associated wiring. The alarm is connected to

WARNING

Run-away Crane Hazard!

Releasing the parking brake while the low service brake pressure indicator is illuminated and the buzzer is sounding, indicating the service brakes are inoperable, may result in the crane rolling away freely without the ability of the operator to stop the crane.

Never release the parking brake while the low service brake pressure indicator is illuminated and the buzzer is sounding.

3. Disengage the parking brake.
4. Position the Drive Axle Switch to either two-wheel high or four-wheel low.

CAUTION

Use four-wheel drive only when more traction is required.

5. Lift the Transmission Shift Lever up out of its detent and push the lever to the forward (F) position, then rotate the Transmission Shift Lever Knob to the first (1) gear position. The gear selection “F1” will appear in the LCD Display to indicate that forward propulsion and first (1) gear have been selected; if the Service Brake Foot Pedal is not depressed prior to shifting to a gear, the gear selection will flash in the LCD Display until the Transmission Shift Lever is returned to the neutral (N) position and the transmission will not shift.
6. Release the Service Brake Foot Pedal and depress the Foot Throttle Pedal until maximum first gear speed is attained, then rotate the Transmission Shift Lever Knob to the second (2) gear position to continue to increase speed. For additional speed, continue shifting to a higher gear.

CAUTION

Possible Machine Damage!

Do not downshift to a lower gear if the road speed is greater than the maximum speed of the lower gear.

Traveling — Reverse

Traveling in reverse is accomplished the same way as traveling forward, except for shifting the Transmission Shift Lever to reverse (R). Refer to *Traveling — Forward*, page 3-28.

CAUTION

Possible Machine Damage!

Apply service brakes and bring crane to a complete stop before shifting transmission into reverse.

Traveling — Towing/Pulling

CAUTION

Machine Damage Hazard!

Manitowoc recommends towing or pulling another vehicle with the optional pintle hook (if equipped) or by attaching at a point no higher than the pintle hook height, or severe damage may occur to the drivetrain.

Do not tow or pull by attaching to the tie-down lugs unless the attaching point is no higher than the pintle hook height.

Use four-wheel drive when greater traction is necessary to avoid severe damage to the drivetrain.

Should the crane become mired down, use a tow truck or tractor to free the vehicle. Severe damage to the drivetrain may occur if the operator attempts to free the crane unassisted.

To avoid severe damage to the drive train while using the crane to tow or pull another vehicle, follow these recommendations:

- Ensure the boom is in a horizontal position and not elevated above 0°.
- Ensure the outrigger beams and jack cylinders are fully retracted with the floats properly stowed.
- Tow or pull on open ground when possible.
- Connect to the optional pintle hook (if equipped) or attach cables/straps to the crane at a point no higher than the pintle hook height.
- Use four-wheel drive when greater traction is necessary. (Refer to *Four-Wheel Drive Operation*, page 3-31 for operating instructions.)
- Should the crane become mired down, use a tow truck or tractor to free the vehicle. Severe damage to the drivetrain may occur if the operator attempts to free the crane unassisted.
- Conduct all travel with the assistance of a ground person to warn the operator of any changing conditions in the terrain being traversed.

7. Apply the parking brake.
8. Put all operating controls in the neutral position.
9. Position the Crane Function switch to OFF.
10. Shut down the engine following the proper procedures specified in this manual and the applicable engine manual.
11. Remove the keys.
12. Close and lock all windows, covers, and doors.

CAUTION

Risk of Undesirable Operation!

To avoid possible engine fault codes and undesirable operation, ensure the keyswitch has been off two minutes before disconnecting the batteries.

Disconnect batteries, if machine will be inactive for over 24 hours.

13. Turn Battery Disconnect to OFF position (shown) if machine will be inactive for over 24 hours (Figure 3-19).

7693-2 **FIGURE 3-19**

Unattended Crane

WARNING

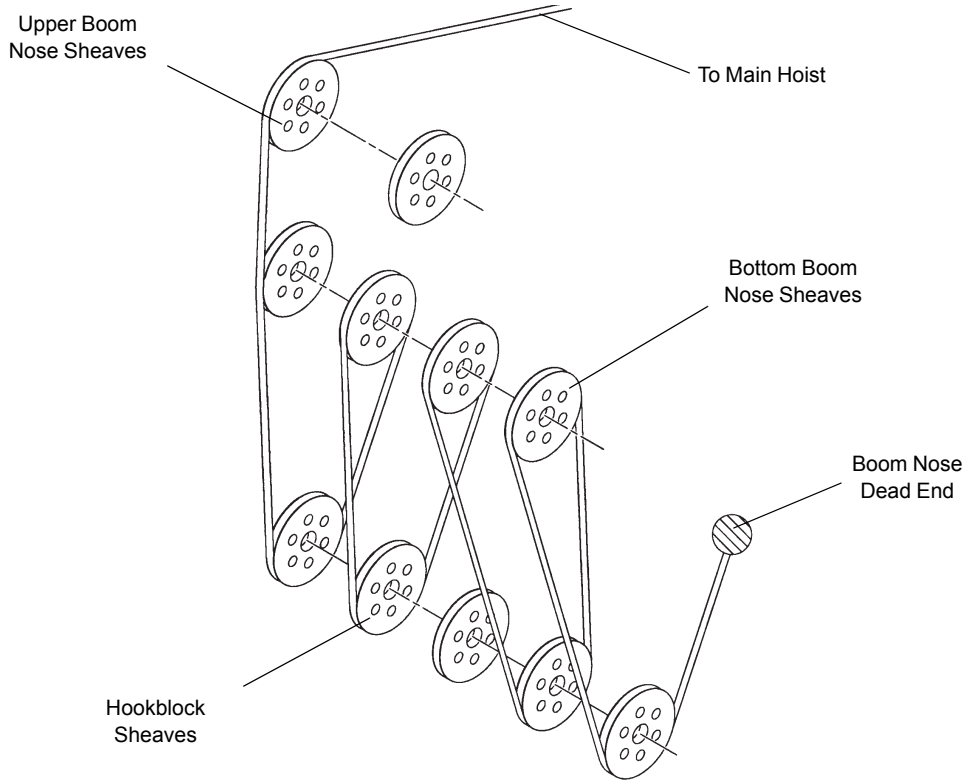
Tipping Hazard!

Changing weather conditions including but not limited to: wind, ice accumulation, precipitation, flooding, lightning, etc. should be considered when determining the location and configuration of a crane when it is to be left unattended.

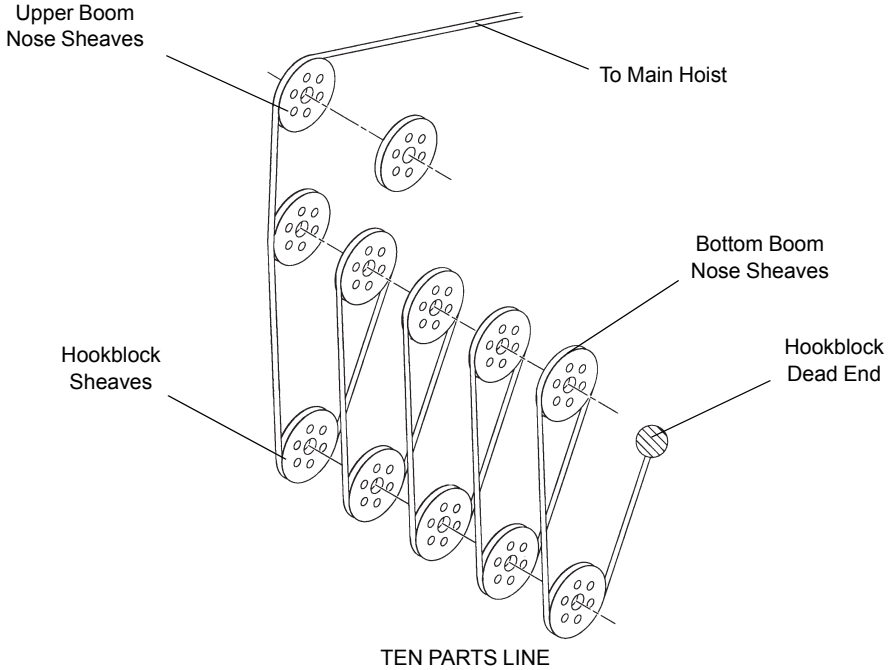
Failure to comply with these instructions may cause death or serious injury.

The configuration in which the crane should be left while unattended shall be determined by a qualified, designated individual familiar with the job site, configuration, conditions, and limitations.

3



EIGHT PARTS LINE



TEN PARTS LINE

5 SHEAVE HOOKBLOCK

FIGURE 4-8 continued

4

24. Remove the retainer clips and attachment pins from the anchor and attach fittings on the right side of the boom nose and stow them in the base of the swingaway.
25. Remove the clip pin and pin securing the boom extension alignment device. Place the boom extension push bar assembly in the stowed position and secure it in place with the pin and clip pin.

DANGER

Failure to maintain the proper clearance between the base extension anchor fittings and the boom nose attach fittings could cause these fittings to contact each other during operation of the boom.

26. Extend the boom enough to engage the boom stop block.
27. Rig the boom nose and hoist cable as desired and operate the crane using normal operating procedures.

Setting the Folding Swingaway Offset

DANGER

Crushing Hazard!

Ensure any blocking material used is adequate to support the weight of the extension assembly without tipping or falling.

1. Extend and set the outriggers and swing the boom to over the front. Position the boom to above horizontal.
2. Block under the tip of the extension assembly section.
3. To set the offset from a lesser degree to higher degree perform the following procedures:

CAUTION

Possible Equipment Damage!

Do not overload the extension anchor fittings or the extension base section when lowering the boom.

a. Slowly lower the boom until the pressure is relieved on the offset link pins.

NOTE: For 25 or 45 degree offset, make sure the mast is in the raised position.

b. Remove the offset link clip pins and attach pins securing the offset links in the lesser degree offset position. If going to maximum offset stow them in the stowage lugs. If going to the intermediate (25 degree) offset install them in the offset links for that degree of offset.
c. Slowly elevate and telescope the boom at the same time so that the extension does not move off of the blocking until the offset links take the full weight of the extension.
d. Reeve the hoist cable as described under normal erecting procedures.

4. To set the offset from higher degree to lesser degree, perform the following procedures:

CAUTION

Do not overload the extension anchor fittings or the extension base section when lowering the boom.

a. Slowly lower the boom until the pressure is relieved from the offset links.
b. Remove the offset link clip pins and attachment pins and lower the boom until the holes for the lesser degree offset position align in the offset links. Install the offset pins and clip pins.
c. Slowly elevate and telescope the boom at the same time so that the extension does not move off of the blocking until the offset links take the full weight of the extension.
d. Reeve the hoist cable as described under normal erecting procedures.

ERECTING AND STOWING THE BI-FOLD BOOM EXTENSION WITH THE 20 FT (6.1 m) INSERT

DANGER

Crushing Hazard!

Before attempting to erect or stow the bi-fold extension with insert, read and strictly adhere to all danger decals installed on the boom/boom nose, boom extension, insert, and stowage brackets.

Erecting

1. Fully extend and set the outriggers.
2. Position the boom over the front.

Arctic Lubricants and Conditions

Temperatures Below -9°C (15°F)

Regions with ambient temperatures below -9°C (15°F) are considered arctic. In general, petroleum based fluids developed especially for low temperature service may be used with satisfactory results in these temperatures. However, certain fluids, such as halogenated hydrocarbons, nitro hydrocarbons, and phosphate ester hydraulic fluids, may not be compatible with hydraulic system seals and wear bands. Therefore, always check with an authorized Manitowoc distributor or Manitowoc Crane Care if in doubt of the suitability of a specific fluid or lubricant.

When operating in cold weather and regardless of the oil viscosity of the crane's lubricants, always follow the cold weather start-up and operating procedures described in the *Operator Manual* to ensure adequate lubrication during system warm-up and proper operation of all crane functions.

Cold Weather Package and Lubricants

Manitowoc recommends the following cold weather lubricants for use with ambient temperatures down to -29°C (-20°F) (TABLE 5-2) and -40°C (-40°F) (TABLE 5-3). But, these cold weather lubricants alone are not sufficient to operate the crane in extreme low temperatures. Therefore, it is also recommended that the crane be equipped with the following accessories:

--29°C (-20°F) Package

- Transmission heater
- Swivel heater
- Battery heater
- Fuel heater
- Engine hood insulation
- Fan clutch
- Radiator air shutters
- Air diverter
- Diesel fired cab heater
- Cold weather alternator
- Fluids suitable to -29°C (-20°F)
  - Arctic windshield washer fluid
  - Arctic fuel

-40°C (-40°F) Package

- Coolant heater (to circulate warm coolant through heaters and engine)
- Transmission heater
- Swivel heater
- Battery heater
- Fuel heater
- Hydraulic reservoir heater
- Engine hood insulation
- Fan clutch
- Radiator shutters
- Air diverter
- Diesel fired cab heater
- Cold weather alternator
- Super-capacitor starting system
- Fluids suitable to -40°C (-40°F):
  - Arctic windshield washer fluid
  - Arctic fuel

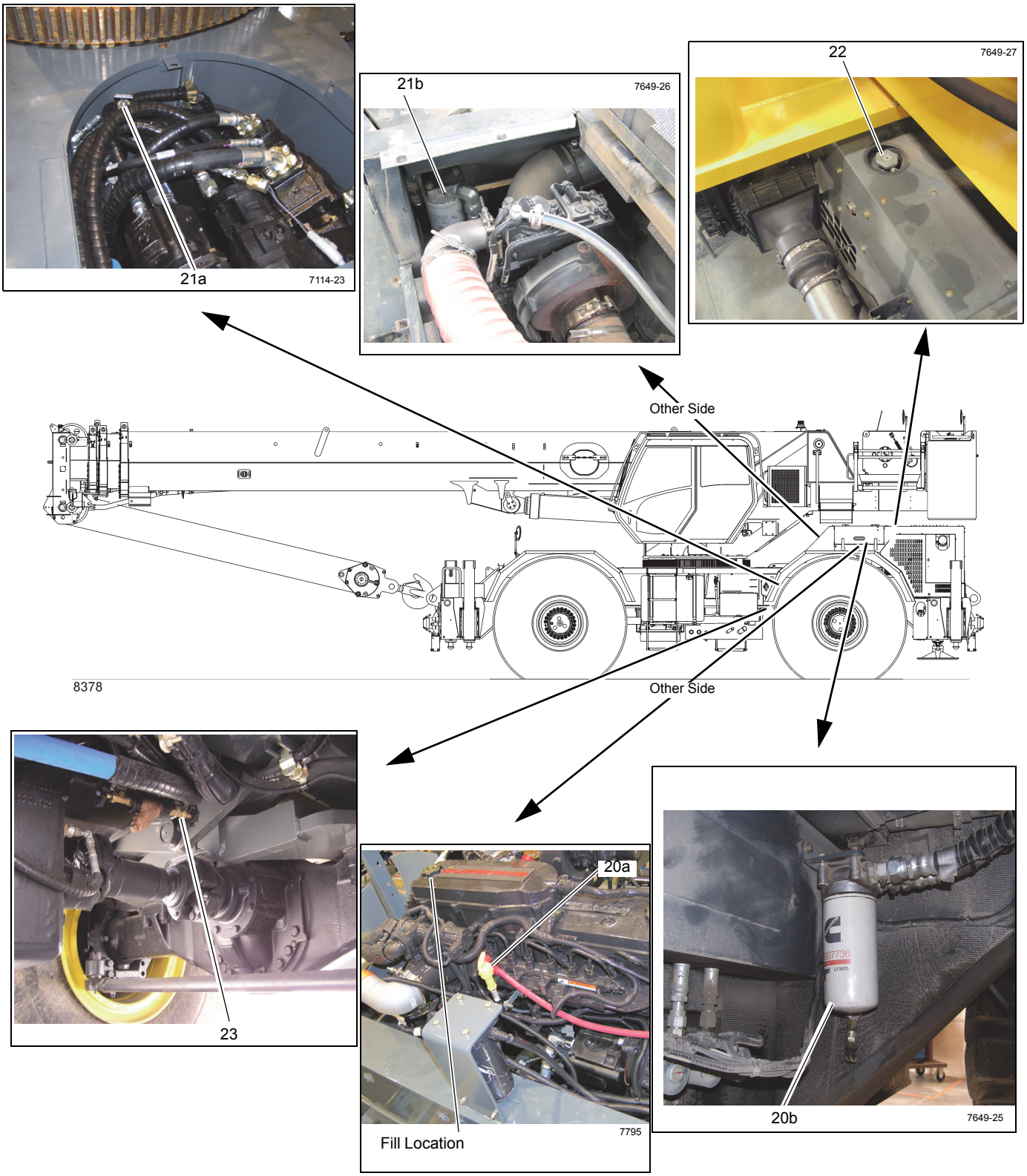
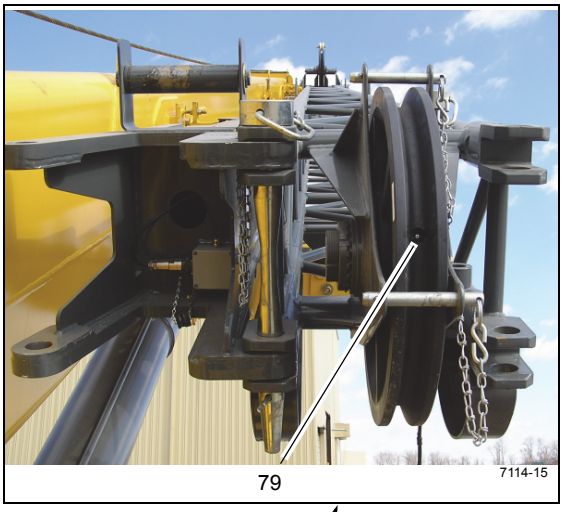

21a
7114-23
21b
7649-26
22
7649-27
Other Side
8378
Other Side
23
20a
Fill Location
7795
20b
7649-25

FIGURE 5-3

5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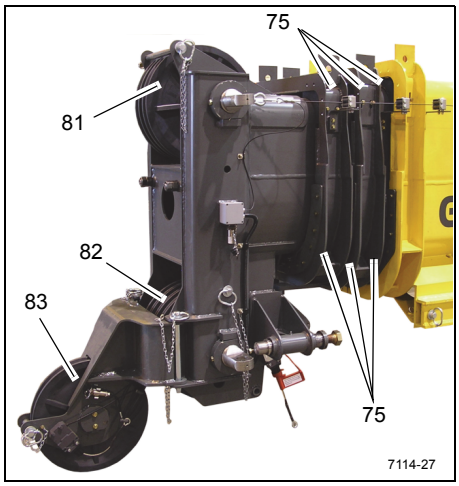
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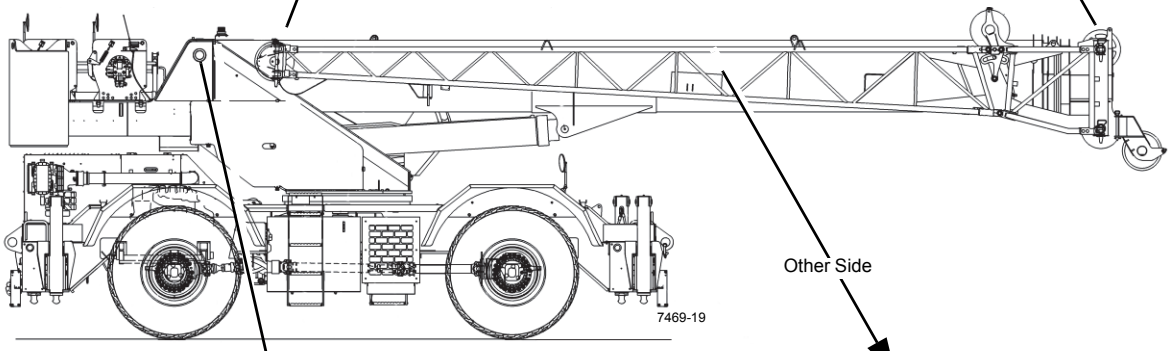
Other Side
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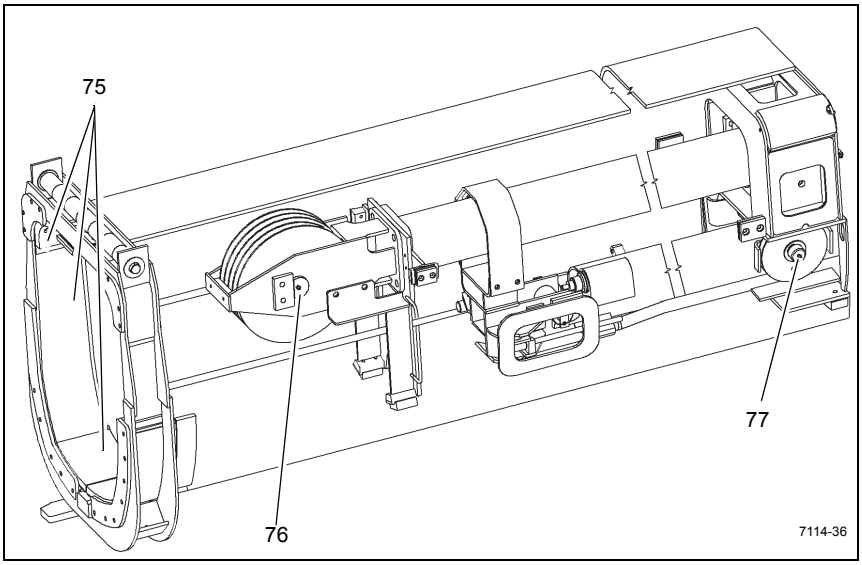
7649-17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7114-36

FIGURE 5-8

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