

Job Safety Analysis

Use These Forms Before You Begin Any Job to Alert You of Any Hazards That May Exist

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Crawler Crane Disassembly

Customer Name:	Job Location:	Unit #:	Job#:
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REQUIRED PERSONAL PROTECTION EQUIPMENT:	MSDS(s) ASSOCIATED WITH THE JOB:
Hard hat, ear plugs, safety glasses with side shields, gloves, steel toed boots, fall protection & all other required site specific personal protective equipment.	Chemicals normally used on the crane or stored on Service trucks

To improve readability and comprehension of this field document, we have detailed all common hazards and the recommendations for safe work at the beginning of this JSA. It is understood and assumed that any time during the disassembly of this crane, any or all of these hazards may become relevant. **This JSA is to be used in conjunction with the operator's manual. If there is ever a discrepancy between the two the operator's manual takes precedence.**

Common Hazards	Safe Job Practices
<ul style="list-style-type: none"> • Slips, Trips and Falls 	<ul style="list-style-type: none"> • Use of personal fall protection system is mandated when working where employees are exposed to falls greater than 4 feet. • To reduce the risk of slipping, non-skid material (sand in paint) has been applied to painted walkways and platforms. However, walkways and platforms can be slippery when wet and when oil or grease is spilled on them. Keep walkways and platforms clean and dry to prevent slipping on them. When non-skid material wears out, reapply it • Wear shoes with a highly slip-resistant sole material. Clean any mud or debris from shoes before entering the crane cab or climbing onto crane. • Do not use top of mast, boom, or jib as walkways (unless they have optional catwalks). • Use both hands and handrails, steps and ladders provided to climb onto and off crane. • Lift tools and other equipment which cannot be carried in pockets or tool belts onto and off crane with hand lines or hoists. • Boom and gantry are not intended as ladders. DO NOT attempt to climb lattice work of boom or gantry to get to maintenance points.
<ul style="list-style-type: none"> • Crushing Injury Hazard 	<ul style="list-style-type: none"> • Barricade all accessible areas to crane so personnel cannot be struck or crushed when upperworks is swung. • Do not climb on or off crane while upperworks is being swung or crane is being traveled. • Signal operator that you need to climb on or off crane. • Operator: do not swing or travel while personnel are climbing on or off crane. Stop swing and travel motions. Apply swing brake and turn on Travel Brake. • Use of dedicated spotters and signal persons when flying objects with cranes. • Use of tag lines when a rotating load may become a hazard.
<ul style="list-style-type: none"> • Struck By/ Caught Between/Pinch Point Hazards 	<ul style="list-style-type: none"> • Hard Hats and Safety Glasses shall be worn at all times during the assembly/disassembly of this crane. • Never handle wire rope with bare hands. Always wear heavy-duty gloves to prevent being cut by broken wires. • Use extreme care when handling coiled pendants. Stored energy can cause coiled pendants to uncoil quickly with considerable force. • Do not attempt to maintain or repair any part of crane while engine is running, unless absolutely necessary. • If engine must be run, keep your clothing and all parts of your body away from moving parts. Maintain constant verbal communication between person at controls and person performing maintenance or repair procedure. • Do not use your hands to check for air and hydraulic oil leaks • Relieve pressure before disconnecting air, coolant, and hydraulic lines and fittings. • Do not attempt to lift heavy components by hand. Use a hoist, jacks, or blocking to lift components.

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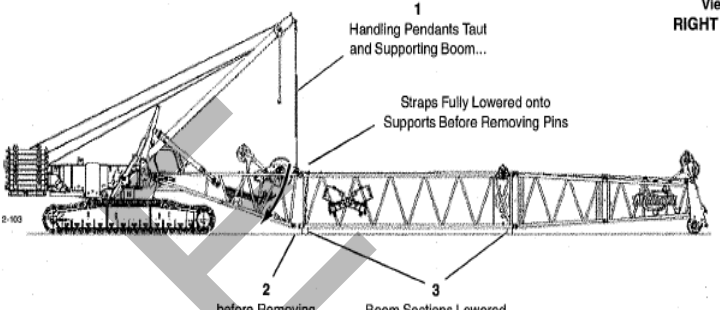
	<ul style="list-style-type: none"> • Store tools, oil cans, spare parts, and other necessary equipment in tool boxes. Do not allow these items to lie around loose in operator's cab or on walkways and stairs. • Use of dedicated spotters to direct and signal all vehicle traffic. • Before a crew member goes to a location that is out of view of the operator and is either in, on, or under the equipment, or near the equipment (or load) where the crew member could be injured by movement of the equipment (or load), the crew member must inform the operator that he/she is going to that location. Where the operator knows that a crew member went to a location covered by the above sentence, the operator must not move any part of the equipment (or load) until the operator is informed in accordance with a prearranged system of communication that the crew member is in a safe position.
<ul style="list-style-type: none"> • Collapsing Boom Hazard 	<ul style="list-style-type: none"> • Select a suitable location for boom disassembly. It must be firm, level, and be free of obstructions. It should have enough open space to accommodate the crane, the length of boom, and - if required - movement of an assist crane or other equipment. If possible, secure the area to keep unauthorized personnel and vehicles away. • Do not remove bottom connecting pins from any boom section when boom is supported by straps as shown in Figure <div data-bbox="1171 440 1980 837"> <p>View A WRONG - DANGEROUS!</p> </div> <ul style="list-style-type: none"> • Do not remove bottom connecting pins from any boom section when boom point is resting on ground and handling pendants are slack as shown in Figure <div data-bbox="1184 886 1980 1268"> <p>View B WRONG - DANGEROUS!</p> </div>

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	<ul style="list-style-type: none"> Do not remove strap connecting pins until straps are fully lowered into supports as shown in Figure Below. Never work or stand inside boom unless it is lowered and securely blocked as shown in Figure. 	
<ul style="list-style-type: none"> Designate Assembly Area 	<ul style="list-style-type: none"> Select a good location to assemble the crane Ensure ground conditions are firm, level and uniformly supportive in compliance with engineer's soil data. Select an area large enough and free of any underground or overhead obstructions or hazards to accommodate the crane, assist crane, selected boom and jib length, and the movement of trailers. Erection area should not interfere or pose a hazard to other onsite personnel. Erection area to be clearly marked and barricaded. There should be at least 2 feet of clearance between the counterweights and nearest obstacle. Ensure there is enough timber blocking to support the boom when it is being assembled. Ground support as specified in the erection drawings is complete and in compliance with the stated requirements. 	
<ul style="list-style-type: none"> Assist Crane Requirements 	<ul style="list-style-type: none"> The assist crane shall be sized in accordance with site restrictions and manufacturers specifications. Site conditions and matting must be suitable for maximum loading of the assist crane. Assist crane will assembled in accordance with manufacturer's instructions. 	
<ul style="list-style-type: none"> Rigging Failure 	<ul style="list-style-type: none"> Rigging shall be inspected per applicable OSHA/ASME standards, at a minimum, daily and prior to use. Examples of unserviceable rigging would be bird caging, kinks, and broken wires. 	
<ul style="list-style-type: none"> Electrical Shock Hazard 	<ul style="list-style-type: none"> Ensure adequate clearance from power lines is continuously maintained per ASME B30.5. 	
<ul style="list-style-type: none"> Operational Test Loads (if required) 	<ul style="list-style-type: none"> Test loads shall not exceed 100% of the manufacturers load rating. Any request to load test a crane above the manufacturers load rating must be approved by a Regional Vice President. Test loads shall never exceed 110% of manufacturers load rating. Test loads must be freely suspended. Testing using static loads is prohibited. All rigging must be inspected and approved prior to load testing. The weight and radius of the load test shall be determined by: <ul style="list-style-type: none"> Manufacturers load chart. Site Conditions. Winch line pull, (ie the test load must be lifted while staying within the line pull capacity of the drum being utilized). 	

Note: At no time will a trainee, apprentice, or an oiler operate any crane during the assembly, reconfiguration, and/or disassembly process or while the crane is in bypass.

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BASIC JOB STEPS	POTENTIAL HAZARDS	SAFE JOB PRACTICES
<ul style="list-style-type: none"> ● Boom Rigging 	<p>See Common Hazards Above</p> <p>Tipping Hazard</p> <p>Falling Load Hazard!</p> <p>Collapsing Boom Hazard!</p>	<p>See Safe Job Practices Above</p> <p><i>Refer to operator's manual for detailed procedures.</i></p> <p><i>Block ends of crawlers, if required, before you attempt to raise or lower boom from or to ground.</i></p> <p><i>Lift against chords only never against lacings. Use nylon lifting slings.</i></p> <p><i>If wire rope or chain slings are used, install protective covering (such as sections of rubber tire) between slings and chords.</i></p> <p><i>Boom will collapse if medium inserts are installed in an incorrect assembly sequence. Follow the assembly Sequence indicated in the Boom Rigging Assembly Drawings</i></p>
<ul style="list-style-type: none"> ● Boom Removal <ul style="list-style-type: none"> ○ <i>Remove Wind Speed Indicator Assembly</i> ○ <i>Disconnect Electric Cables</i> ○ <i>Remove Load Line</i> ○ <i>Remove Block-Up Limit Control</i> ○ <i>Remove Rated Capacity Indicator/Limiter</i> ○ <i>Remove Extended Upper Boom Point</i> ○ <i>Remove Standard Upper Boom Point</i> ○ <i>Remove Intermediate Suspension</i> ○ <i>Disconnect Boom Straps</i> ○ <i>Lower Boom Top Wire Rope Guide</i> ○ <i>Disassemble Remaining Boom Sections</i> ○ <i>Remove Boom Butt and Assembled Inserts</i> ○ <i>Lower Drum 6 Sheaves</i> ○ <i>Remove Second Insert</i> ○ <i>Lower Drum 1 from Operating Position</i> ○ <i>Disassemble Boom Butt and First Insert</i> ○ <i>Inspect Boom Stops</i> 	<p>See Common Hazards Above</p> <p>Crushing Injury Hazard!</p> <p>Crushing Injury Hazard!</p> <p>Equipment Damage! Equalizer rails are provided only to support equalizer during assembly and disassembly.</p> <p>Boom inserts, including medium insert if applicable, must be disassembled in proper sequence.</p> <p>Crushing Injury Hazard!</p> <p>Falling Load Hazard!</p>	<p>See Safe Job Practices Above</p> <p><i>Refer to operator's manual for detailed procedures.</i></p> <p><i>Never work under or inside boom sections that are not securely blocked.</i></p> <p><i>Prior to lowering boom, warn personnel to stand clear of extended upper boom point rollers.</i></p> <p><i>To prevent structural damage, install stop pins on equalizer before lowering boom with boom hoist.</i></p> <p><i>See Boom Rigging Drawings at the end of this section to determine the proper insert to remove.</i></p> <p><i>Perform this procedure only if will be equipped with luffing jib.</i></p> <p><i>Adjust position of slings so butt and inserts are horizontal when lifted.</i></p> <p><i>Jib backstay straps can be stored on boom sections for shipping.</i></p> <p><i>If jib will not be used, remove all jib backstay straps, links, and pins stored on boom sections.</i></p>

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<ul style="list-style-type: none">• Boom Ladder Disassembly	<p>See Common Hazards Above Fall Hazards!</p> <p>Falling Load Hazard!</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i> <i>Limit load on ladder to 300 lb (136 kg).</i> <i>Avoid improper use. Ladder is intended for use only on Manitowoc #79A and #55 boom inserts. Any other use is prohibited.</i> <i>Use ladder for boom assembly/disassembly and maintenance only when boom is horizontal.</i> <i>Make sure ladder is properly secured to insert.</i> <i>Keep hands free of any objects while climbing ladder.</i> <i>Objects which cannot be carried in pockets or tool belts shall be lifted into place onto ladder platform prior to climbing ladder.</i> <i>Stand only on platform. Do not stand on cross braces.</i> <i>Ladders must be properly stored to prevent them from falling out of butt when boom is raised.</i></p>
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SAMPLE

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Crawler Crane Disassembly

<ul style="list-style-type: none"> • Lower Fixed Mast <ul style="list-style-type: none"> ○ Check Mast Stop Pressure If your crane is prepared for a MAX-ER attachment, each mast stop has a hydraulic pressure gauge ○ Lower Mast 	<p>See Common Hazards Above</p> <p>Explosion Hazard!</p> <p>Mast Holdback Requirements when Using 18000 Boom</p> <p>Holdback Requirements when an Using Assist Crane</p> <p>Wire Rope Damage!</p> <p>Mast Damage!</p>	<p><i>See Safe Job Practices Above</i> Refer to operator's manual for detailed procedures. <i>A qualified operator is required to lower the mast. The operator must be experienced with the 18000 and thoroughly familiar with its operation.</i> <i>A qualified signal person is required to give signals to the operator(s). A holdback is required to lower the fixed mast.</i> <i>Mast stop cylinders are equipped with nitrogen pre-charged accumulators. Do not tamper with accumulators unless authorized and trained to do so.</i></p> <p><i>Either the assembled 18000 boom or an assist crane can be used.</i></p> <table border="1" data-bbox="1373 651 1969 769"> <thead> <tr> <th>Mast Length</th> <th>Minimum Boom Length</th> </tr> </thead> <tbody> <tr> <td>100 ft (30,5 m)</td> <td>120 ft (36,6 m)</td> </tr> <tr> <td>140 ft (42,7 m)</td> <td>140 ft (42,7 m)</td> </tr> </tbody> </table> <table border="1" data-bbox="1365 846 1982 1040"> <thead> <tr> <th>Mast Length</th> <th>A From End of Crawler</th> <th>B Horizontal</th> <th>C Vertical</th> </tr> </thead> <tbody> <tr> <td>100 ft (30,5 m)</td> <td>110 ft (33,5 m)</td> <td>35,000 lbf (156 kN)</td> <td>27,000 lbf (120 kN)</td> </tr> <tr> <td>140 ft (42,7 m)</td> <td>(see Note)</td> <td></td> <td></td> </tr> </tbody> </table> <p><i>Boom hoist equalizer will tip if it is not properly supported, possibly resulting in damage to wire rope. Support boom hoist equalizer properly during mast raising.</i></p> <p><i>Lower live mast arms before raising fixed mast. Mast can collapse if arms are up when live mast is lowered. Avoid mast or equalizer damage. Do not proceed to raise mast until fixed mast straps are unpinned from strap brackets.</i> <i>Mast raising cylinders must be lowered using set-up remote before lifting loads with fixed mast.</i></p>	Mast Length	Minimum Boom Length	100 ft (30,5 m)	120 ft (36,6 m)	140 ft (42,7 m)	140 ft (42,7 m)	Mast Length	A From End of Crawler	B Horizontal	C Vertical	100 ft (30,5 m)	110 ft (33,5 m)	35,000 lbf (156 kN)	27,000 lbf (120 kN)	140 ft (42,7 m)	(see Note)		
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<ul style="list-style-type: none"> ● Disassemble Fixed Mast <ul style="list-style-type: none"> ○ <i>Disconnect Live Mast Straps from Fixed Mast Straps</i> ○ <i>Disconnect Mast Straps</i> ○ <i>Remove Mast Top from Inserts</i> ○ <i>Raise Wire Rope Guide</i> ○ <i>Lower Mast Stops</i> ○ <i>Disconnect Mast Inserts from Mast Butt</i> ○ <i>Disassemble Mast Inserts</i> ○ <i>Remove Mast Butt and Top</i> 	<p>See Common Hazards Above</p> <p>An assist crane is required to disassemble and remove the fixed mast.</p> <p>Falling Mast Hazard</p> <p>Perform this procedure only if Drum 3 will be used for an additional load line.</p> <p>Lift against chords only - never lift against lacings.</p> <p>Grab hooks must be toward mast butt. Shorten both rear legs of sling by 13 links to provide proper lifting balance.</p> <p>Do not support entire weight of mast butt and top on alignment pins. Damage may result.</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i></p> <p><i>Mast assist arms must remain raised after live mast is disconnected from fixed mast rigging. Live mast will fall over backwards if raised to vertical when arms are down.</i></p> <p><i>Adjust slings so inserts lift level.</i></p>
<ul style="list-style-type: none"> ● Remove Counterweight 	<p>See Common Hazards Above</p> <p>Tipping Hazard!</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i> <i>Remove crane counterweight before removing car body counterweight.</i></p>
<ul style="list-style-type: none"> ● Remove Crawlers 	<p>See Common Hazards Above</p> <p>Tipping Hazard!</p> <p>Rotating Drive Shaft Hazard! Crawler drive shaft rotates at high speed.</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i> <i>Do not exceed 120,000 lb (54 430 kg) capacity at 26 ft (7,9 m) radius when handling crawlers with mast. Crane will tip forward.</i> <i>Make sure crane is level. Adjust pedestals as required.</i></p> <p><i>Drive shaft may spin when the last bolt is removed. KEEP HANDS CLEAR of drive shaft flange.</i> <i>Make sure guards are in place and securely attached at both ends during operation.</i></p>

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<ul style="list-style-type: none"> • Store Live Mast 	<p>See Common Hazards Above</p> <p>Falling Mast Hazard!</p> <p>Mast Damage!</p> <p>Mast Damage!</p> <p>Swinging Straps Hazard!</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i> <i>Read and thoroughly understand mast lowering instructions.</i></p> <p><i>Mast assist arms must be raised when lowering live mast.</i></p> <p><i>Make sure mast angle indicator is properly installed and calibrated prior to lowering gantry and mast. Mast can be damaged if angle indicator is not properly installed.</i></p> <p><i>Mast straps will swing to rear when unpinned from rotating bed. Stand to side when unpinning links.</i></p>
<ul style="list-style-type: none"> • Raise Crane off of Car body Pedestals <ul style="list-style-type: none"> ○ Remove Drum 3 (Whip Line Drum) ○ Disconnect Hydraulic Hoses and Electric Cables ○ Remove Rotating Bed Catwalks and Steps 	<p>See Common Hazards Above</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i></p> <p><i>Note: Do not disconnect hydraulic hoses to rotating bed.</i></p>
<ul style="list-style-type: none"> • Place Car body and Adapter Frame onto Trailer <ul style="list-style-type: none"> ○ Fully extend jacks to lift upperworks, adapter frame, and car body ○ Disconnect Rotating Bed from Car body ○ Position trailer under adapter frame, car body and rotating bed 	<p>Do not hit jacks with trailer. Do not hit swing motors with rotating bed.</p> <p><i>NOTE Rotating bed must not be more than 4-1/2" out of level when extending or retracting rotating bed jacks.</i></p> <p>Do not hit jacks with trailer.</p>	<p><i>Refer to operator's manual for detailed procedures.</i></p> <p><i>Use of designated spotter to direct truck drivers</i></p> <p><i>Monitor levels. Ensure cribbing and base are level.</i></p>
<ul style="list-style-type: none"> • Place Rotating Bed on Trailer <ul style="list-style-type: none"> ○ Disconnect Rotating Bed from Car body ○ Lower Upperworks onto Trailer ○ Stow Operator's Cab ○ Stow Rotating Bed Jacks ○ Install Wind Deflectors 	<p>See Common Hazards Above</p> <p><i>NOTE Rotating bed must not be more than 4-1/2" out of level when extending or retracting rotating bed jacks.</i></p> <p>Take extreme care not to hit jacks with trailer.</p>	<p><i>See Safe Job Practices Above</i> <i>Refer to operator's manual for detailed procedures.</i></p> <p><i>Monitor levels. Ensure cribbing and base are is level.</i></p> <p><i>Use of designated spotter to direct truck drivers.</i></p>

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Additional Comments (include any additional observations or comments on this job task below)

All personnel shall review the job safety analysis prior to work activity and sign below. Perimeter of work area shall have yellow caution or red warning tape installed to prevent any unnecessary jobsite personnel being exposed to these hazards.

PRINT

SIGNATURE

Assembly/Disassembly Director: _____ Date: _____