

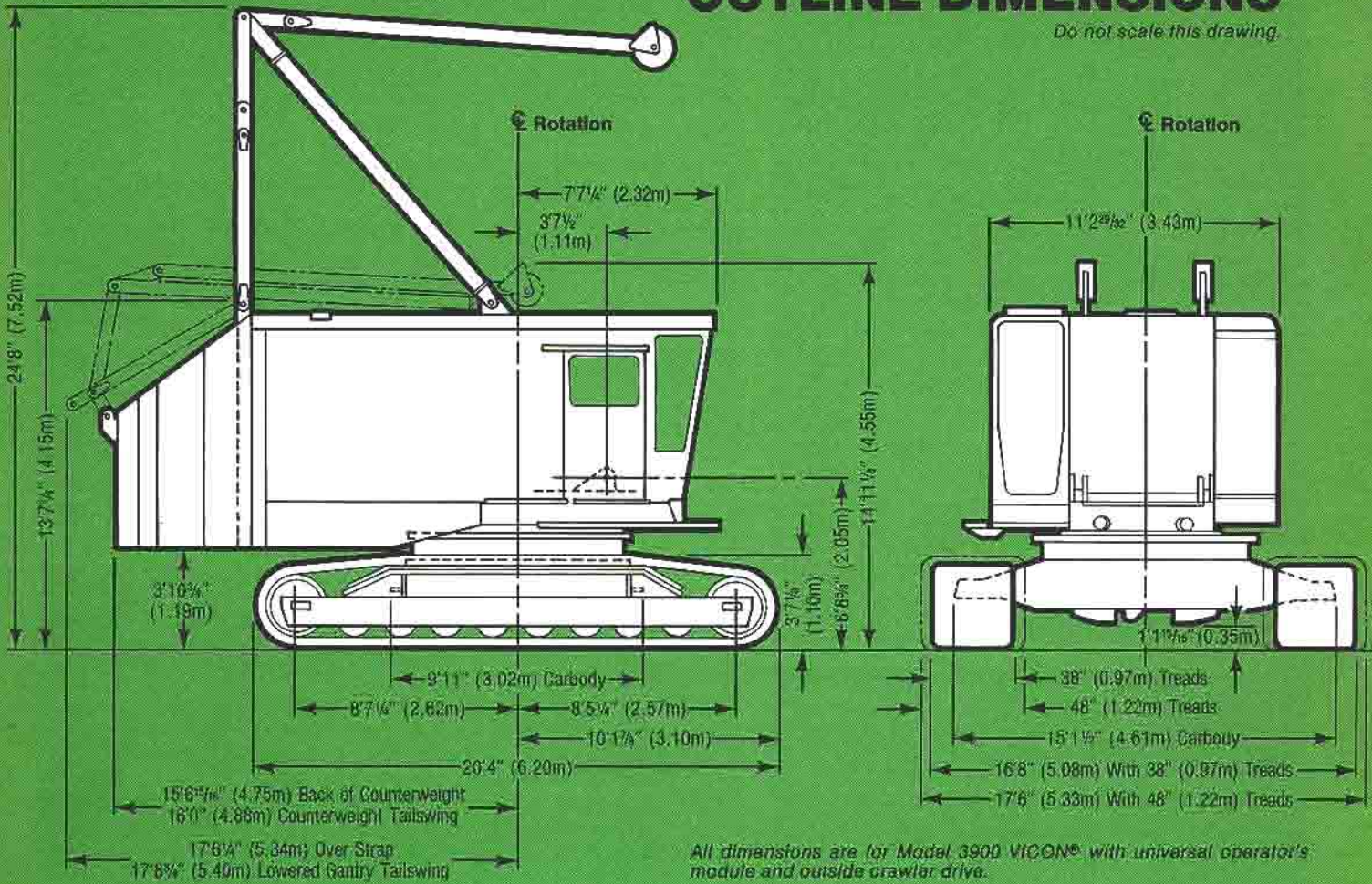
**Manitowoc**

**3900** **VICON**<sup>®</sup>  
**LIFT • CLAM • DRAG • GRAPPLE • MAGNET**



# OUTLINE DIMENSIONS

Do not scale this drawing.



## POWER PLANTS

	Model	Cylinder	Bore	Stroke	Cubic Inch Displacement	Net HP @ RPM (at flywheel)
<b>BASIC</b>	Cummins NT-855-C310	6	5.500" (140mm)	6.000" (152mm)	855 (14,011cc)	287 @ 2,000
<b>OPTIONAL</b>	Cummins NTA-855-C360*	6	5.500" (140mm)	6.000" (152mm)	855 (14,011cc)	334 @ 2,000
	Caterpillar 3406B DIT	6	5.400" (137mm)	6.500" (165mm)	893 (14,634cc)	300 @ 2,000
	Caterpillar 3406B DITA*	6	5.400" (137mm)	6.500" (165mm)	893 (14,634cc)	345 @ 2,000
	Detroit Diesel 12V-71N*	12	4.250" (108mm)	5.000" (127mm)	852 (13,962cc)	363 @ 2,000

Air Compressor: 37.5 CFM (1,062 Liters).

\*Recommended for Duty Cycle.

Fuel Tank Capacity: 225 Gallons (852 Liters).

For other power plants, consult factory.

## DRUMS AND LAGGINGS

Application	Drum	Diameter	Drum Width	Type of Laggings	Wire Rope Size	Spooling Capacity			
						First Layer	Layers	Maximum Capacity	
<b>LIFTCRANE</b>	Hoist	Right	17½" (445mm)	17¾" (441mm)	None	1" (25mm)	77' (23.49m)	7	710' (216.55m)
	Whip	Left	27" (686mm)	17¾" (441mm)	Grooved	1" (25mm)	116' (35.38m)	2	240' (73.20m)
	Third Drum	Rear Aux.	17" (432mm)	32 <sup>9</sup> / <sub>16</sub> " (827mm)	None	1" (25mm)	140' (42.70m)	3	467' (142.44m)
							150' (45.75m)*	3	501' (152.81m)*
<b>CLAMSHELL</b>	Closing	Right	27" (686mm)	17¾" (441mm)	Grooved	1½" (29mm)	105' (32.03m)	3	340' (103.70m)
	Holding	Left	27" (686mm)	17¾" (441mm)	Grooved	1½" (29mm)	105' (32.03m)	3	340' (103.70m)
<b>DRAGLINE</b>	Drag	Right	24" (610mm)	17¾" (441mm)	Grooved	1¼" (32mm)	83' (25.32m)	1	83' (25.32m)
	Hoist	Left	27" (686mm)	17¾" (441mm)	Grooved	1" (25mm)	116' (35.38m)	1	116' (35.38m)

\*Without ratchet ring.

For other options, consult factory.



# WEIGHTS

	Pounds*	Kilograms*
<b>LIFTCRANE (complete):</b> lowerworks, upperworks, and 60' (18.30m) basic boom	229,485	104,186
<b>CARBODY AND UPPERWORKS (combined):</b> complete with basic machinery, drums, gantry, backhitch, equalizer, and boom hoist wire rope	94,550	42,926
<b>LOWERWORKS:</b>		
<b>Carbody</b> , with travel mechanism, king pin, and roller path	29,000	13,166
<b>Crawler Assemblies (2)</b> , with 38" (0.97m) wide treads and outside drive chains, each assembly 20,830 lbs. (9,457 kgs.)	41,660	18,914
For 48" (1.22m) treads, add 4,170 lbs. (1,893 kgs.) to each crawler assembly	50,000	22,700
<b>UPPERWORKS:</b>		
<b>Rotating Bed</b> , complete with basic machinery, including drums, but not gantry and backhitch, front end attachments, or counterweight	59,640	27,077
<b>Gantry and Backhitch</b>	4,200	1,907
<b>Equalizer</b>	1,050	477
<b>Telescopic Boom Stop</b>	650	295
<b>Removable Counterweight (3-piece):</b>		
Inner	32,000	14,528
Middle	26,500	12,031
Outer	15,500	7,037
Total	74,000	33,596
<b>Dragline Fairlead:</b>		
Revolving Type	1,910	867
Hinged Type	3,340	1,516
<b>BOOM NO. 8:</b>		
<b>Butt</b> , 30' (9.15m) less wire rope and pendants	3,250	1,476
<b>Open Throat Top</b> , 30' (9.15m) equipped with 4-sheave lower point, 2-sheave upper point, and basic pendants	4,925	2,236

	Pounds*	Kilograms*
<b>Regular Top</b> , 30' (9.15m) equipped with 2-sheave point and basic bridle set	4,202	1,908
<b>Inserts:</b>		
10' (3.05m) with pendants and wire rope roller guide	1,160	527
20' (6.10m) with pendants and wire rope roller guide	1,930	876
30' (9.15m) with pendants and wire rope roller guides	2,610	1,185
30' (9.15m) with pendants, wire rope roller guides, and jib backstay lugs	2,660	1,208
<b>Pendant Spreader Bar</b>	280	127
<b>Wire Rope Guide</b>	270	123
<b>JIB NO. 123:</b>		
<b>Butt</b> , 15' (4.58m)	690	313
<b>Insert</b> , 10' (3.05m)	340	154
<b>Top</b> , 15' (4.58m) with point assembly	695	316
<b>Basic Pendant</b> , 2 required, each 115 lbs. (52.21 kgs.)	230	104
<b>Pendant</b> , 2 per insert, each 65 lbs. (29.51 kgs.)	130	59
<b>Backstay Pendant</b> , 2 required, each 155 lbs. (70.37 kgs.)	310	141
<b>Strut</b> , 12'6" (3.81m)	365	166
<b>JIB NO. 124:</b>		
<b>Butt</b> , 15' (4.58m)	410	186
<b>Insert</b> , 10' (3.05m)	175	80
<b>Top</b> , 15' (4.58m) with point assembly	480	218
<b>Basic Pendant</b>	100	45
<b>Pendant</b> , 2 per insert, each 20 lbs. (9.08 kgs.)	40	18
<b>Backstay Pendant</b> , 2 required, each 140 lbs. (63.56 kgs.)	280	127
<b>Strut</b> , 18' (5.49m)	380	173

\*Weights are approximate and may vary between machines as a result of design changes and component variations.

# GENERAL

**SWING SPEED:** Independent Swing, variable, 4.50 RPM maximum. Standard Swing, variable, 4.95 RPM maximum.

**MACHINERY HOUSE:** Steel house fully encloses upperworks machinery. Service doors left side rear, left front, and in roof, plus roof ladder provide easy access. Catwalks and railings optional.

**UNIVERSAL OPERATOR'S MODULE:** Fully-enclosed and insulated module isolates operator from machinery noise. Large, rubber-mounted safety glass windows provide wide-angle view. Sliding door right side; sliding window left side; overhead window for high-boom vision. Signal horn standard; windshield wiper, fan, heater, and air conditioner optional. Optional elevated modules provide operator eye level 14' (4.27m) or 18' (5.49m) above ground.

**TRAVEL SPEED:** Variable, 1.45 MPH (2.33 KPH) maximum.

**GRADEABILITY:** 30%.

**CONTROLS:** Modulating air controls engage clutches for main drive shaft, boom hoist, and drums. With VICON, control levers for drums, travel, and swing operate both clutch and converter. First movement engages clutch; further movement increases converter output, permitting variable speed. Drum brakes are pedal-operated, mechanically applied on liftcrane and air-applied on duty cycle machines. Travel locks, steering, and swing lock are air controlled. Slide pinion is manually controlled.







**CARBODY:** Single-piece steel weldment provides high strength-to-weight ratio. Fabricated construction provides maximum strength where it's needed most. Webbed design transmits loads efficiently from area beneath roller path to four integral wings at sides.

The wings, clearly visible on finished carbody (below), fit into pockets in crawler assemblies, providing fast setup and a low center of gravity. Machined surfaces on wing bottoms distribute loadings over large area of crawlers to minimize bearing pressure and increase stability. Steering mechanism, visible at center of carbody bottom, is normally enclosed by steel covers.



## LOWERWORKS

**KING PIN:** Machined steel fabrication bolted to carbody. Supports vertical travel shaft and provides pivot for rotating bed. King pin remains in place during shipment, reducing setup time. Mates with pressure-lubricated bronze bushing in rotating bed. Takes horizontal loadings only, no uplift.



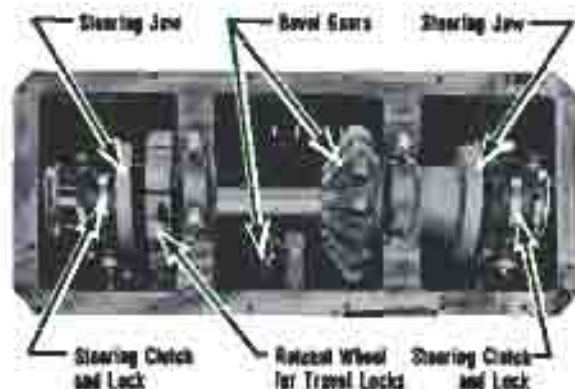
**ROLLER PATH AND RING GEAR:** Large-diameter roller path forms stable support for rotating upperworks. Machined, heat-treated, alloy steel casting has 105 1/2" (2.69m) outside diameter, 4 1/2" (124mm) wide top face, and 3" (76mm) thick hook roller flange. Roller path secured to carbody with single row of high strength bolts, remains in place for shipment, reducing setup time. Internal ring gear teeth are precision-cut by machine.

**FRONT IDLER ROLLER:** Double-flanged, 29 1/2" (749mm) diameter, fabricated steel roller mounted at front of crawler assembly keeps tread properly aligned. Roller mounted on stationary shaft supported at both ends for maximum strength. Roller revolves on two bronze bushings lubricated by center grease pocket.

**CRAWLER TREADS:** Provide large surface area to distribute loads for maximum stability with low ground-bearing pressures. Consist of 44 pads per crawler assembly. Adjacent pads connected by two wear-resistant steel pins. Closed pad design prevents dirt from being carried onto crawler frames. 38" (0.97m) and 48" (1.22m) pad widths available.

**CRAWLER ASSEMBLIES:** Two self-contained assemblies mount quickly on carbody wings, enabling fast setup. Each assembly consists of a fabricated frame supporting a drive sprocket, a crawler sprocket and chain, eight intermediate rollers, a front idler roller, and crawler tread. Abrasion-resistant slide rails along crawler frame top provide smooth, continuous support for tread, eliminating tread flexing and need for upper idler rollers.

**CRAWLER DRIVE:** Optional outside drive chains (shown) permit crawler assemblies to be removed or installed as units for fast setup and takedown. Self-contained drive sprocket is mounted within crawler assembly and joined to horizontal travel shaft by jaw clutch coupling. Inside drive chains are standard.



**CRAWLER SPROCKET AND TUMBLER:** Steel casting with flame-hardened teeth and rim constructed for durability. Mounted on stationary shaft supported at both ends by crawler frame for maximum strength and proper alignment. Sprocket and tumbler revolve on two bronze bushings lubricated by center grease pocket for efficient operation. Self-cleaning tumbler has alternate sides open.



**CRAWLER PADS:** Constructed of alloy steel cast in a closed box-section design for high strength-to-weight ratio. Heavy internal ribbing provides maximum strength, especially where rollers bear. Tapered outer edges maximize maneuverability.



**INTERMEDIATE ROLLERS:** Eight 18" (457mm) diameter rollers recessed in crawler frame bottom distribute loadings properly to tread. Double-flanged roller design keeps tread properly aligned. Rollers mounted individually on stationary shafts supported at both ends by welded frames and held in place by keeper bars. Each roller revolves on two bronze bushings lubricated by a center grease pocket.



**TRAVEL AND STEERING MECHANISM:** Simple mechanical system provides reliable steering control. Travel power transmitted from upperworks to mechanism through vertical shaft in king pin. Mechanism is mounted on center section of three-piece horizontal travel shaft in carbody. Bevel gears that transmit power from vertical shaft to horizontal shaft run in oil for long life. Air-controlled jaw clutches at each side of bevel gears provide steering. Each clutch can be placed into engaged, neutral, or locked position. Operator steers by choosing combinations of clutch positions. Both clutches engaged for straight travel; one clutch placed in neutral for gradual turns or locked position for sharp turns. Clutch interlock keeps at least one clutch engaged at all times.

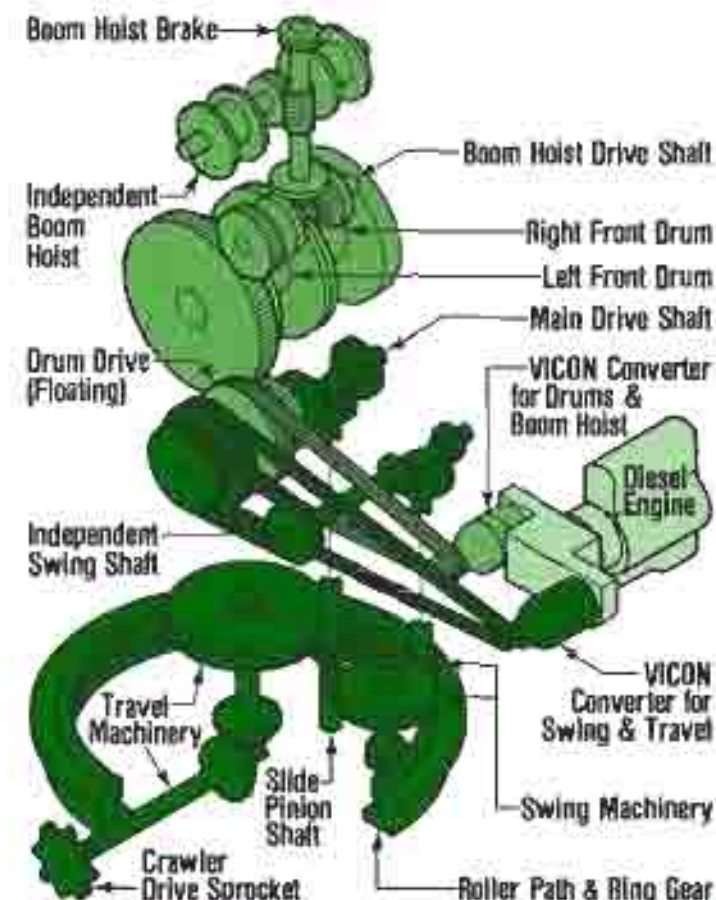
Ratchet wheel at left of bevel gears is engaged by two gravity-applied, air-released travel locks. Engaging a single lock prevents travel in one direction while permitting movement in opposite direction. Engaging both locks prevents all travel.

## POWER TRAIN

**POWER TRANSMISSION, VICON®:** Manitowoc's patented VICON (Variable Independent CONTROL) system provides precision control and independent operation of major functions. Engine power is divided by transmission case to two controlled torque converters. Front converter powers hoisting drums and boom hoist. Rear converter powers swing and travel machinery. With VICON, clutches engage when no torque is transmitted from power source, eliminating clutch slippage and wear. After clutch is fully engaged, converter output is increased to provide infinitely-variable speed and torque for smooth, precise control.

**VICON POWER LOWERING:** VICON provides controlled power load lowering for line pulls exceeding 6,000 pounds (2,724 kgs). Load can be held or lowered using hoist converter's stepless variable output.

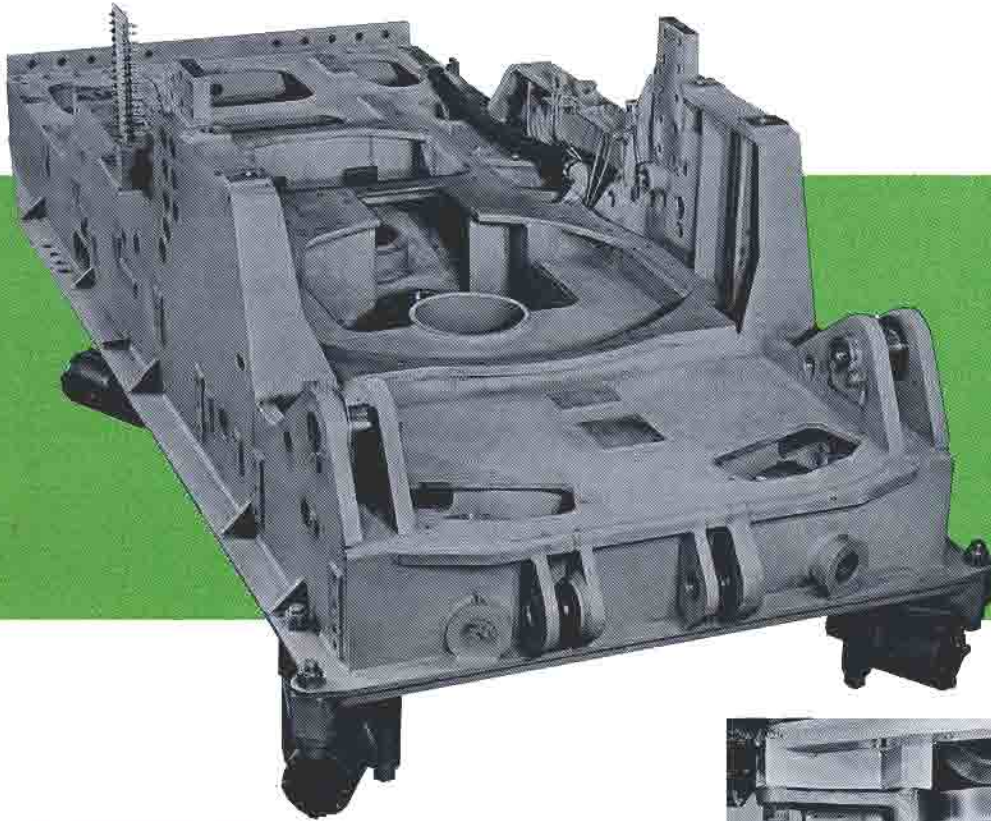
**FULL-RANGE VICON POWER LOWERING:** Optional hydraulic motor drives output shaft of VICON hoist converter in reverse to provide power lowering for line pulls less than 6,000 pounds (2,724 kgs). Permits full range of lowering speeds with any load from empty hook through maximum capacity.





# UPPERWORKS

**REAR HOOK ROLLERS:** Four rollers supported in pairs by steel frames secure rotating bed to roller path. Widely-spaced hangers distribute loadings over large area of roller path. Rollers are mounted individually on eccentric shafts for easy adjustment. Each roller revolves on a durable bronze bushing for easy maintenance.

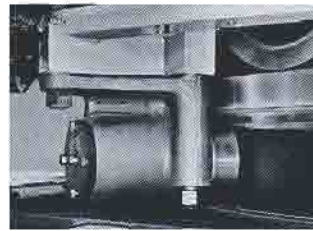


**ROTATING BED:** Single-piece steel fabrication with integral machinery side frames forms rigid deck for mounting all upperworks components. Fabricated construction provides high strength-to-weight ratio. Precision boring assures proper alignment of machinery components. Bed rotates on four bushing-mounted house rollers: two front and two rear.

**MAIN DRIVE SHAFT:** Precision-machined alloy-steel shaft, antifriction-bearing mounted for efficient operation. Shaft chain-driven by rear VICON® converter transmits power to travel and standard swing functions through two single-disc reversing clutches. (See "Power Train", page 5.)

Operator selects travel or standard swing by positioning manually-controlled slide pinion to engage either travel or swing machinery. Left clutch is then applied to travel forward or swing left. Right clutch is applied to travel backward or swing right. Clutch hubs are splined to shaft. Clutch spiders with bevel pinions revolve on antifriction bearings. Clutches are air applied and spring released for smooth operation. Bevel pinions on clutches engage bevel gear on top of slide pinion shaft. Pinions and gear are fully enclosed and operate in oil for long life.

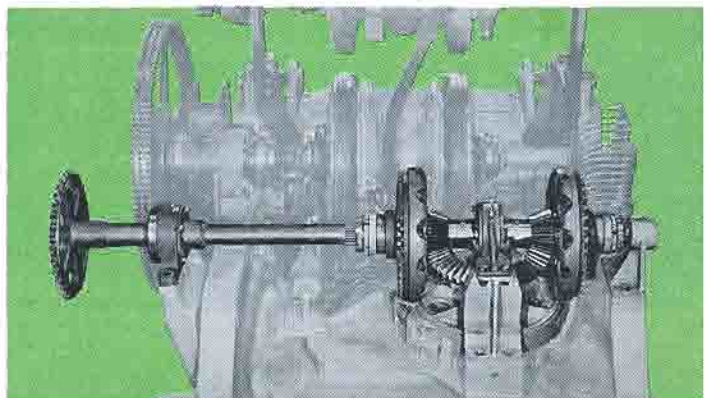
Main drive shaft also supports sprocket and pinion that drive drum shaft. Mounted on antifriction bearings, sprocket and pinion revolve independently of main drive shaft and are driven by front VICON converter.



**FRONT HOOK ROLLERS:** Two rollers supported individually by steel frames bolted to rotating bed. Wide spacing of frames holds rotating bed securely on roller path. Rollers mounted on eccentric shafts for easy adjustment. Each roller revolves on a durable bronze bushing for easy maintenance.

**INDEPENDENT SWING SHAFT:** Optional. Heat-treated alloy steel shaft, antifriction-bearing mounted on rotating bed behind main drive shaft permits independent operation of swing and travel functions. Chain-driven from main drive shaft. Independent swing is controlled smoothly by two single-disc clutches mounted on shaft; one clutch engaged for swing left; the other for swing right. Clutch hubs splined to shaft. Clutch spiders antifriction-bearing mounted.

Clutches applied by manually-actuated cam levers and released by springs. Linings remove easily for quick replacement. Bevel pinions on clutches drive through gear train to ring gear on roller path. Pinions enclosed and lubricated by circulating oil for long life. Spring-applied, air-released swing brake provided.

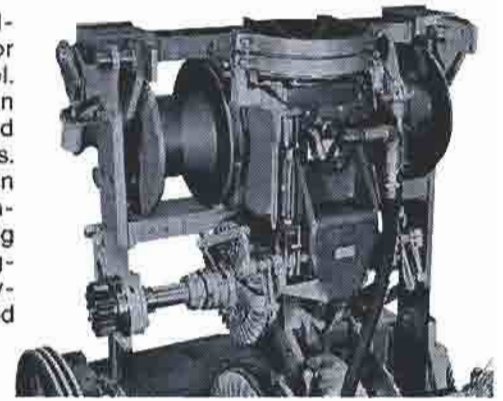




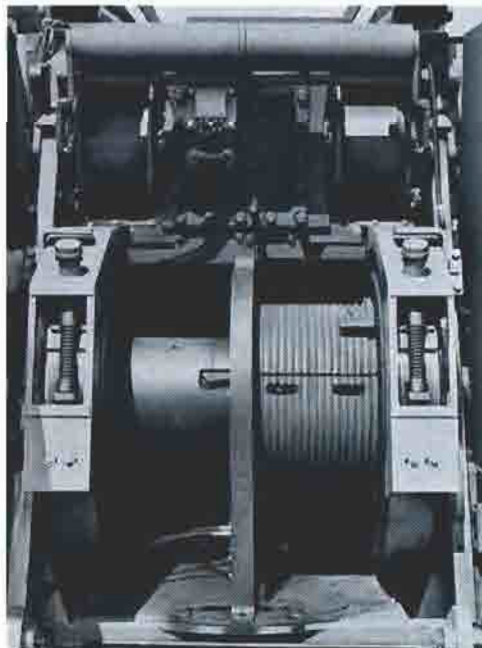
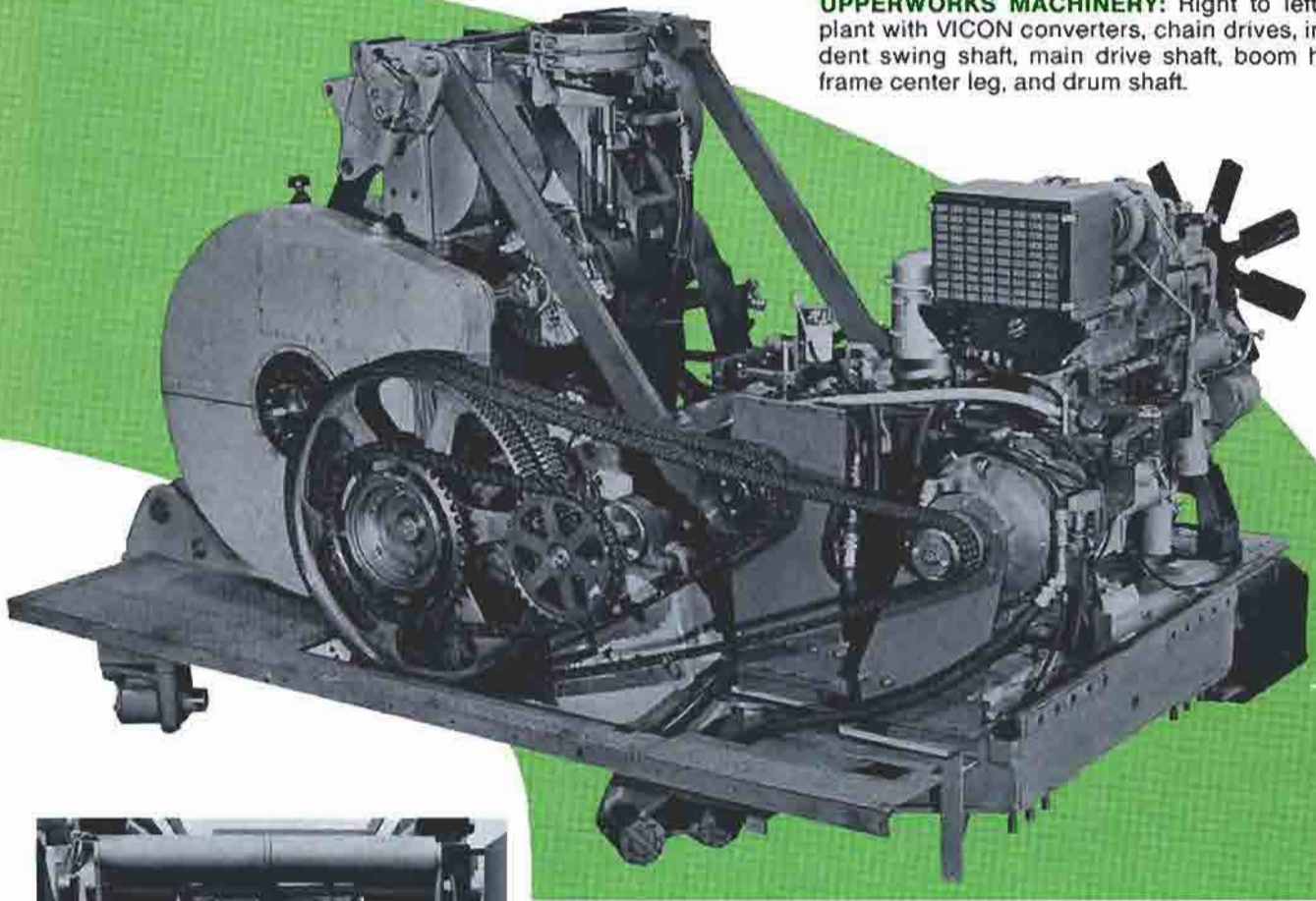


**SWING LOCK:** Air-operated, spring-loaded, gear-type lock engages swing gear for positive locking.

**INDEPENDENT BOOM HOIST:** Permits simultaneous booming, hoisting, and swinging for faster operation with superior load control. Reliable, mechanical boom hoist mounted on top of A-frame powers boom both up and down for accurate control of load radius. Dual-drum design provides equal tension on both sides of boom rigging for superior handling. Air-controlled, single-disc reversing clutches provide smooth operation. Spring-applied, air-released main brake, manually-controlled auxiliary brake, and gravity-applied ratchet-and-pawl provided.



**UPPERWORKS MACHINERY:** Right to left: power plant with VICON converters, chain drives, independent swing shaft, main drive shaft, boom hoist, A-frame center leg, and drum shaft.



**DRUM SHAFT ASSEMBLY:** Heat-treated alloy-steel shaft, antifriction-bearing mounted for efficient operation. Enclosed drum gears run in oil for extended life with minimized maintenance. Antifriction-bearing-mounted drums are cast steel with a cast-iron brake-and-clutch flange bolted to outboard side. Clutch spiders splined to drum shaft. Clutches are air-controlled, internal-expanding, band type. Brakes are external-contracting band type with toggle design that maximizes braking efficiency. Mechanically-applied brakes are standard on liftcranes. Air-applied brakes are optional on liftcranes and standard on clamshells and draglines to increase operator efficiency in duty cycle applications. Spring set parking brakes are provided on liftcranes and duty cycle machines that employ air-controlled brakes.

**CENTRALIZED LUBRICATION:** Conveniently grouped and labeled grease fittings placed in an easily-accessible location simplify lubrication and reduce maintenance time.





# FRONT END EQUIPMENT

**NO. 8 BOOM:** Rugged boom serves both liftcrane and duty cycle applications. 30' (9.15m) butt; 10' (3.05m), 20' (6.10m), and 30' (9.15m) inserts; 30' (9.15m) top. All sections constructed of inverted-angle chords and tubular lacings welded in rectangular box-section design 74" (1.88m) wide x 72" (1.83m) deep. Chords 100,000 PSI (7,000 kg/cm<sup>2</sup>) yield steel; lacings 90,000 PSI (6,300 kg/cm<sup>2</sup>) yield steel. Adjacent boom sections connect with four single-bolt pad joints for fast boom assembly. Basic boom length; 60' (18.30m). Maximum boom lengths: 100' (30.50m) for dragline; 120' (36.60m) for clamshell; 210' (64.05m) for liftcrane.

"Open Throat Top", standard on liftcranes and combination lift-clam-drag machines. Features four 24" (610mm) diameter sheaves in lower point and two 27" (686mm) diameter sheaves in upper point, all mounted on straight roller bearings. Rope guard provided on liftcranes; cheek plate provided on combination machines.

"Regular Top", standard on duty cycle machines. Equipped with cheek plate and one 36" (914mm) diameter sheave for dragline or magnet, or two 36" (914mm) diameter sheaves for clamshell or grapple. All sheaves mounted on tapered roller bearings.

**GANTRY AND BACKHITCH:** Fabricated gantry has parallel tube legs. Supported on large pins by A-frame center leg. Folding, link-type backhitch is pin-connected to gantry and rear of machinery house. All sheaves antifriction-bearing mounted.

**EQUALIZER:** Fabricated steel frame supports six antifriction-bearing-mounted sheaves.

**BOOM RIGGING:** Ten-part standard rigging formed by a single line reeved from boom hoist drums through sheaves on gantry and equalizer. Rigging between gantry and equalizer remains intact during shipment, minimizing setup time. On liftcranes and combination machines, equalizer is connected to boom point by two 1½" (38mm) diameter pendants. As inserts are added to lengthen boom, additional pendant sets are added to lengthen rigging. On machines equipped specifically for duty cycle service, equalizer is connected to boom point by two 2-part bridles of wire rope.

**AUTOMATIC BOOM STOP:** Standard on liftcrane, clamshell, and combination machines. When boom reaches 82° angle from horizontal, it contacts a push rod mechanism that automatically stops boom hoist operation.

**PANTOGRAPHIC BOOM STOP:** Standard on clamshell. Folding arms pin to A-frame and boom butt provide physical stop when boom reaches maximum allowable angle.

**TELESCOPIC BOOM STOP:** Standard on liftcrane. Air-cushioned telescoping tubes pinned to boom and A-frame start cushioning at 74° boom angle; provide positive physical stop at 85° from horizontal.

**WIRE ROPE GUIDE:** Mounted on upper side of boom top. Two fleeting sheaves, bronze-bearing mounted in steel frame.

**WIRE ROPE ROLLER GUIDES:** Mounted on top of boom inserts. Rollers are induction-hardened tubing, antifriction-bearing mounted.

**NO. 123 JIB:** Optional. 20-ton (18.14-metric ton) maximum capacity. 30' (9.15m) basic length extendible to 40' (12.20m), 50' (15.25m), or 60' (18.30m) with 10' (3.05m) inserts and matching pendants. Jib offset angle adjustable to 0, 10, or 20 degrees. All-welded construction with tubular chords and lacings. Chords 100,000 PSI (7,000 kg/cm<sup>2</sup>) yield steel. Rectangular box section 30" (762mm) wide x 30" (762mm) deep at pin-connected joints. Jib point has 24" (610mm) OD, antifriction-bearing-mounted sheave, cheek plate, and anchor for two-part line. Maximum boom-and-jib combination, 230' (70.15m).

**NO. 124 JIB:** Optional. 10-ton (9.07-metric ton) maximum capacity. 30' (9.15m) basic length extendible to 40' (12.20m), 50' (15.25m), or 60' (18.30m), with 10' (3.05m) inserts and matching pendants. Jib offset angle adjustable to 0, 10, 20, or 30 degrees. All-welded construction with tubular chords and lacings. Chords 100,000 PSI (7,000 kg/cm<sup>2</sup>) yield steel. Rectangular box section 29½" (749mm) wide x 22" (559mm) deep at pin-connected joints. Jib point has 19½" (495mm) OD, antifriction-bearing-mounted sheave with wire rope guide. Anchor joint for two-part line optional. Maximum boom-and-jib combination, 250' (76.25m).

CONSULT JIB LIFTING CAPACITY CHARTS FOR SPECIFIC CAPACITY WHEN USED ON VARIOUS BOOM LENGTHS.

**REVOLVING FAIRLEAD:** Furnished on dragline-equipped machines. Full revolving, antifriction-bearing mounted in support at front of rotating bed. All joints tapered-pin connected for maximum stability. Trunnion shaft bronze-bearing mounted. Two large side guide rollers are case hardened and bronze-bearing mounted for long life. Two end guide rollers provided. For boom lengths through 80' (24.40m).

**HINGED FAIRLEAD:** Optional. Recommended for booms longer than 80' (24.40m). Extends guide sheaves for greater drag rope fleet angle. Stationary frame securely mounted to boom hinge lugs and front of rotating bed with tapered pins for maximum rigidity. Swivel frame antifriction-bearing mounted. Drag rope fully guided through swivel frame by sheaves and rollers. Sheaves mounted on tapered shaft for maximum stability; shafts antifriction-bearing mounted.

**TAGLINE:** Boom-mounted, two-barrel tagline with 20" (508mm) wheel standard on clamshell-equipped machines. Boom-mounted, three-barrel tagline with 30" (762mm) wheel optional.

## MANITOWOC ENGINEERING CO.

Division of The Manitowoc Company, Inc.  
Manitowoc, Wisconsin 54220

*Because of a program of continuing improvements, Manitowoc Engineering Co. reserves the right to change specifications at any time, without notice.*