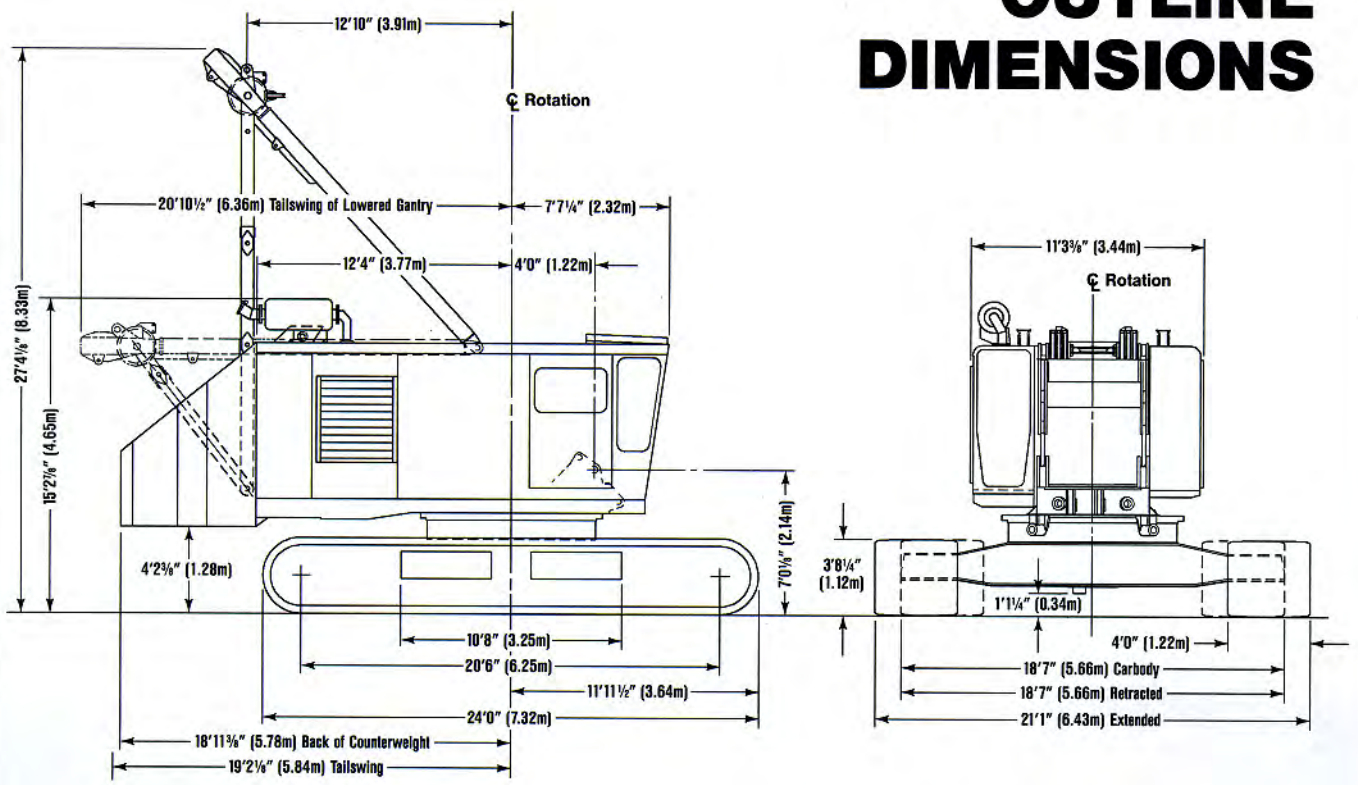
Manitowoc

3950W

LIFTCRANE • CLAMSHELL • DRAGLINE

OUTLINE DIMENSIONS



WEIGHTS*

	Pounds	Kilograms
LIFTCRANE (complete): lowerworks, upperworks, & 70' (21.34m) basic boom	301,670	136,835
CARBODY AND UPPERWORKS (combined): complete with basic machinery, drums, gantry, backhitch, equalizer, & boom hoist wire rope	112,375	50,973
LOWERWORKS:		
Carbody, with travel mechanism, king pin, & roller path	40,605	18,418
Crawler Assemblies (2), with 48" (1.22m) wide treads & outside drive chains. Each assembly 34,440 lbs. (15,622 kgs.)	68,880	31,243
UPPERWORKS:		
Rotating Bed, complete with basic machinery, including drums, but not gantry, backhitch, front end attachments, or counterweight	62,865	28,515
Gantry and Backhitch	5,900	2,676
Equalizer	2,010	912
Telescopic Boom Stop	660	299
Removable Counterweight (3-piece):		
Inner	43,000	19,505
Middle	30,000	13,608
Outer	29,400	13,336
Total	102,400	46,448
Dragline Fairlead:		
Revolving Type	1,910	866
Hinged Type	5,250	2,381

	Pounds	Kilograms
BOOM NO. 39:		
Butt, 30' (9.15m) less wire rope and pendants	4,400	1,996
Open Throat Top, 40' (12.19m) equipped with 6-sheave lower point, 1-sheave upper point, and basic pendants	6,475	2,937
Inserts:		
10' (3.05m) with pendants & wire rope roller guide	1,395	633
20' (6.10m) with pendants & wire rope roller guide	2,305	1,046
40' (12.19m) with pendants & wire rope roller guides	3,920	1,778
40' (12.19m) with pendants, wire rope roller guides, & jib backstay lugs	3,960	1,796
Pendant Spreader Bar	610	277
Wire Rope Guide	395	179
JIB NO. 123:		
Butt, 15' (4.58m)	600	272
Insert, 10' (3.05m)	340	154
Top, 15' (4.58m) with point assembly	695	315
Basic Pendant (2), each 115 lbs. (52 kgs.)	230	104
Pendant, 2 per insert, each 65 lbs. (30 kgs.)	130	59
Backstay Pendant (2), each 90 lbs. (41 kgs.)	180	82
Strut, 12'6" (3.81m)	390	177
JIB NO. 124:		
Butt, 15' (4.58m)	325	147
Insert, 10' (3.05m)	170	77
Top, 15' (4.58m) with point assembly	520	236
Basic Pendant	100	45
Pendant, 2 per insert, each 25 lbs. (11 kgs.)	50	23
Backstay Pendant (2), each 95 lbs. (43 kgs.)	190	86
Strut, 18' (5.49m)	350	159

**Weights are approximate and may vary between cranes because of design changes and component variations.*

POWER PLANTS

	Model	Cylinder	Bore	Stroke	Cubic Inch Displacement	Net HP @ RPM (at flywheel)
BASIC	Cummins NTA-855-C360	6	5.500" (140mm)	6.000" (152mm)	855 (14,011cc)	335 (250 kW) @ 2,000
OPTIONAL	Caterpillar 3406B DITA	6	5.400" (137mm)	6.500" (165mm)	893 (14,634cc)	364 (272 kW) @ 2,000
	Detroit Diesel 12V-71N	12	4.250" (108mm)	5.000" (127mm)	852 (13,962cc)	363 (271 kW) @ 2,000

Air Compressor: 37.5 CFM (1,062 Liters). Fuel Tank Capacity: 211 Gallons (799 Liters). Consult factory for other power plants.

DRUMS AND LAGGINGS

Unequal-Width Drums (standard)

Application	Drums			Lagging	Wire Rope Diameter	Spooling Capacity		
	Location	Diameter	Width			First Layer	Layers	Maximum Capacity
LIFTCRANE								
Hoist	Right Front	19" (483mm)	20⅜" (518mm)	None	1" (25mm)	97' (29.57m)	8	1,050' (320.04m)
Whip	Left Front	21" (533mm)	14⅜" (365mm)	Plain	1" (25mm)	75' (22.86m)	7	673' (205.13m)
Auxiliary	Rear	19" (483mm)	37¼" (946mm)	None	1" (25mm)	178' (54.25m)	8	1,922' (585.83m)
CLAMSHELL								
Closing	Right	27" (686mm)	20⅜" (518mm)	Grooved	1⅛" (29mm)	123' (37.49m)	—	—
Holding	Left	27" (686mm)	14⅜" (365mm)	Grooved	1⅛" (29mm)	87' (26.52m)	—	—
DRAGLINE								
Drag	Right	24" (610mm)	20⅜" (518mm)	Grooved	1¼" (32mm)	97' (29.57m)	—	—
Hoist	Left	27" (686mm)	14⅜" (365mm)	Grooved	1" (25mm)	96' (29.26m)	—	—
Full-Width Tandem Drums (optional)								
LIFTCRANE								
Hoist	Front	19" (483mm)	37¼" (946mm)	None	1" (25mm)	178' (54.25m)	8	1,922' (585.83m)
Whip	Rear	27⅝" (702mm)	37¼" (946mm)	Plain	1" (25mm)	254' (77.42m)	4	1,126' (343.20m)
CLAMSHELL								
Closing	Front	27" (686mm)	37¼" (946mm)	Grooved	1⅛" (29mm)	221' (67.36m)	—	—
Holding	Rear	27" (686mm)	37¼" (946mm)	Grooved	1⅛" (29mm)	221' (67.36m)	—	—
DRAGLINE								
Drag	Front	24" (610mm)	37¼" (946mm)	Grooved	1¼" (32mm)	172' (52.43m)	—	—
Hoist	Rear	27" (686mm)	37¼" (946mm)	Grooved	1⅛" (29mm)	221' (67.36m)	—	—

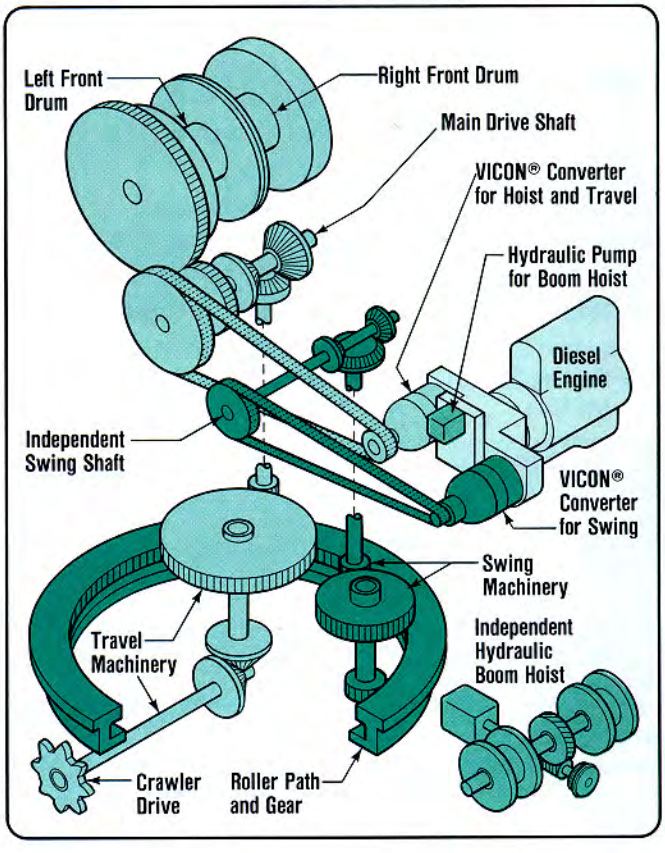
Consult factory for other drum options.

POWER TRAIN

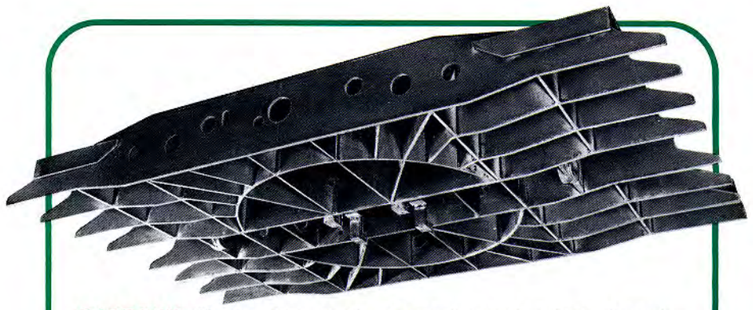
POWER TRANSMISSION, VICON®: Manitowoc's patented **VICON** (**V**ariable **I**ndependent **CON**trol) system provides precision control and independent operation of major functions. Transmission case divides engine power to two controlled torque converters and a hydraulic pump. Front converter powers hoisting drums and travel machinery. Rear converter powers swing. Hydraulic pump powers independent boom hoist. VICON system engages clutches 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 system provides controlled power load lowering for line pulls over 6,000 pounds (2,722 kgs.). It enables the load to be held or lowered by the VICON torque converter's stepless variable output. Drum clutch remains engaged, eliminating transfer of load from clutch to brake during normal operation.

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 (2,722 kgs.). Permits a full range of lowering speeds with any load from empty hook through maximum capacity.

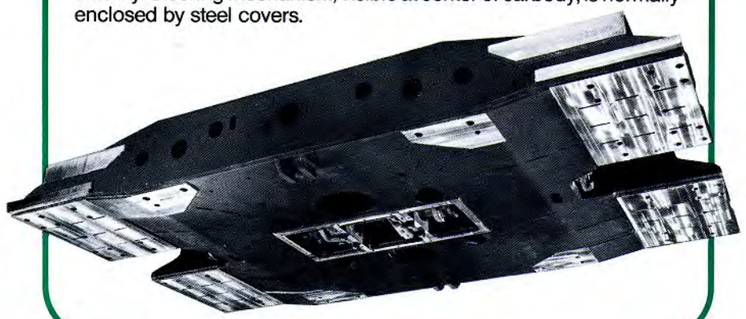


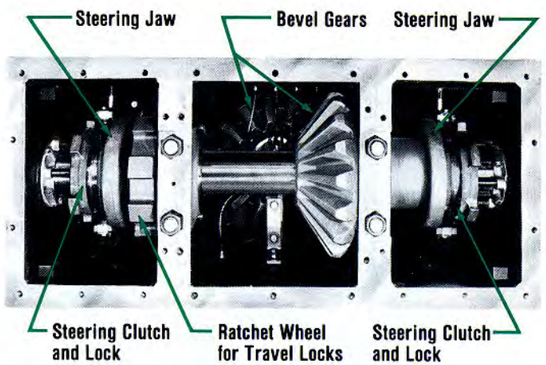
LOWERWORKS



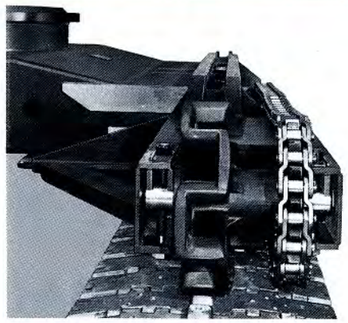
CARBODY: Single-piece steel weldment provides high strength-to-weight ratio. Webbed design transmits loadings efficiently from area beneath roller path to four integral wings at sides.

The wings, visible on finished carbody (below), fit into pockets in the crawler assemblies, providing fast set-up 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, is normally enclosed by steel covers.



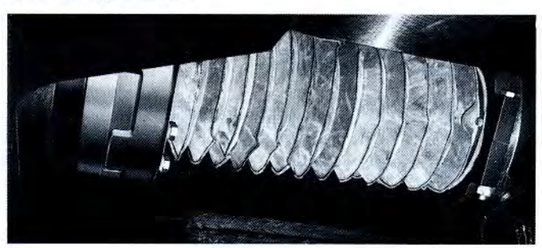


TRAVEL AND STEERING MECHANISM: Mechanical system provides reliable control. Power is transmitted from upperworks through a vertical shaft in the king pin to the steering mechanism mounted on a three-piece horizontal shaft in carbody. Bevel gears that connect the vertical and horizontal shafts run in oil for long life. Two air-controlled jaw clutches provide steering. Both clutches are engaged for straight travel, and one clutch is placed in neutral for gradual turns or locked position for sharp turns. 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. Engaging both locks prevents all travel.



CRAWLER SPROCKET AND TUMBLER: Durable steel casting with flame-hardened teeth and rim. 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.

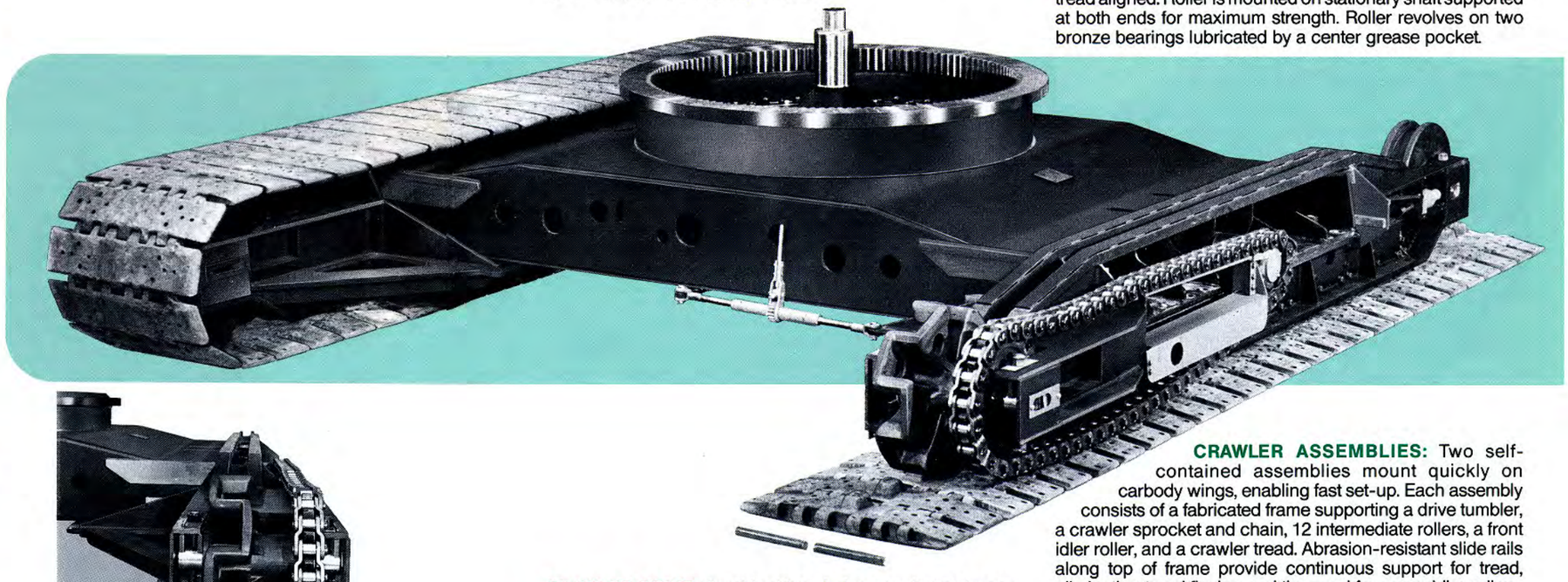
JAW CLUTCH COUPLING: Jaw clutches on ends of carbody's travel shaft mate quickly with drive shafts in crawler frames and are locked in position by coupling covers. Crawler drive shafts are splined and telescope so crawlers can be extended and retracted without uncoupling the jaw clutches. The splined shafts are protected from dirt and moisture by bellows.



ROLLER PATH AND RING GEAR: Machined, heat-treated, alloy-steel casting with 105⅝" (2.69m) outside diameter, 6" (152mm) wide top face, and 3" (76mm) thick hook roller flange forms stable support for rotating upperworks. Secured to carbody with high-strength bolts, roller path remains in place for shipment, reducing setup time. Internal ring gear teeth are precision-cut by machine.

KING PIN: Machined steel fabrication bolted to carbody provides pivot for rotating bed and supports vertical travel shaft. Remains in place for shipment, reducing set-up time. Mates with pressure-lubricated bronze bearing in rotating bed.

FRONT IDLER ROLLER: Double-flanged steel roller keeps tread aligned. Roller is mounted on stationary shaft supported at both ends for maximum strength. Roller revolves on two bronze bearings lubricated by a center grease pocket.

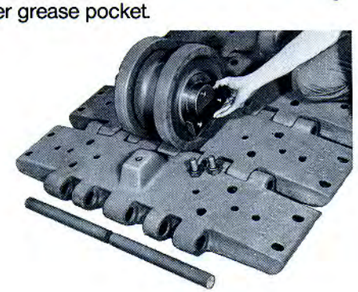


CRAWLER ASSEMBLIES: Two self-contained assemblies mount quickly on carbody wings, enabling fast set-up. Each assembly consists of a fabricated frame supporting a drive tumbler, a crawler sprocket and chain, 12 intermediate rollers, a front idler roller, and a crawler tread. Abrasion-resistant slide rails along top of frame provide continuous support for tread, eliminating tread flexing and the need for upper idler rollers.

CRAWLER DRIVE: Outside drive chains permit crawlers to be removed and installed as complete assemblies for fast set-up. Drive sprocket in crawler frame is joined to horizontal travel shaft by jaw clutch. Telescoping shaft allows crawler to be extended, retracted, and removed without separating drive chain or tread.

CRAWLER TREADS: Consist of 52 pads per crawler. 48" (1.22m) wide pads distribute loadings over large area for maximum stability and low ground-bearing pressure. Adjacent pads connected by two wear-resistant steel pins. Closed design prevents pads from carrying dirt onto crawler frames.

INTERMEDIATE ROLLERS: Twelve double-flanged 14" (356mm) diameter rollers recessed in bottom of crawler frame distribute loadings properly to tread and keep tread properly aligned. Rollers are 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.

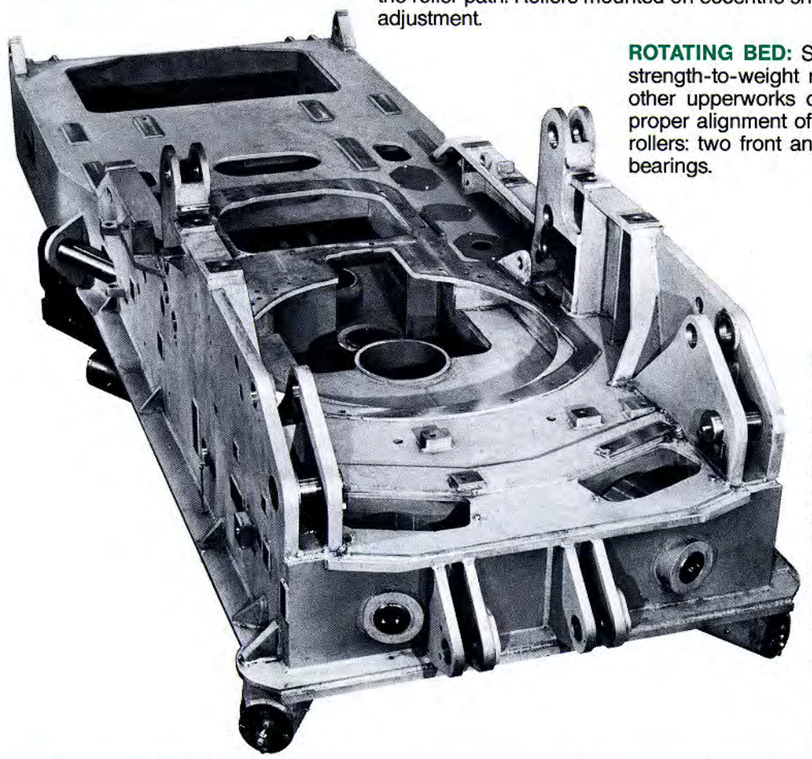


CRAWLER PADS: Constructed of alloy steel cast in closed box-section design with center driving lug. Heavy internal ribbing provides great strength, especially next to driving lug, where intermediate rollers bear. Tapered outer edges minimize digging-in during turns.

TREAD ADJUSTMENT: Crawler tread is adjusted easily by positioning the front idler roller's support shaft, then inserting shims.

UPPERWORKS

REAR HOOK ROLLERS: Four antifriction-bearing-mounted rollers supported in pairs by heavy steel hangers that pivot to equalize roller loadings. Hangers' wide spacing provides stability and distributes loadings over a large area of the roller path. Rollers mounted on eccentric shafts for easy adjustment.

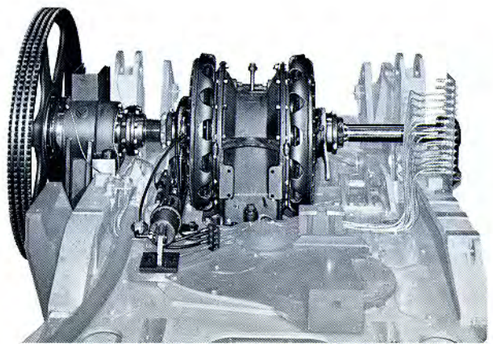


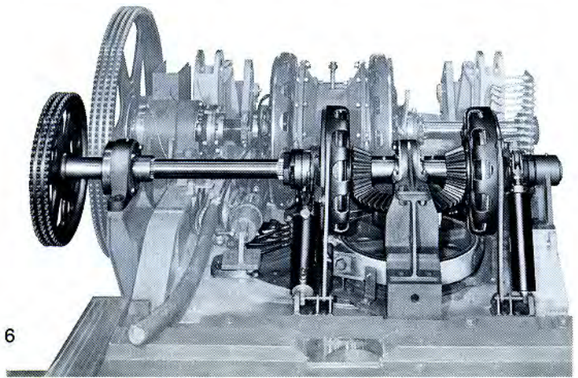
ROTATING BED: Single-piece steel fabrication with high strength-to-weight ratio forms rigid deck for mounting all other upperworks components. Precision boring assures proper alignment of machinery. Bed rotates on four house rollers: two front and two rear, all mounted on antifriction bearings.

FRONT HOOK ROLLERS: Two antifriction-bearing-mounted rollers supported individually by fabricated frames integral with rotating bed. Frames spaced wide to provide stability. Rollers mounted on eccentric shafts for easy adjustment.

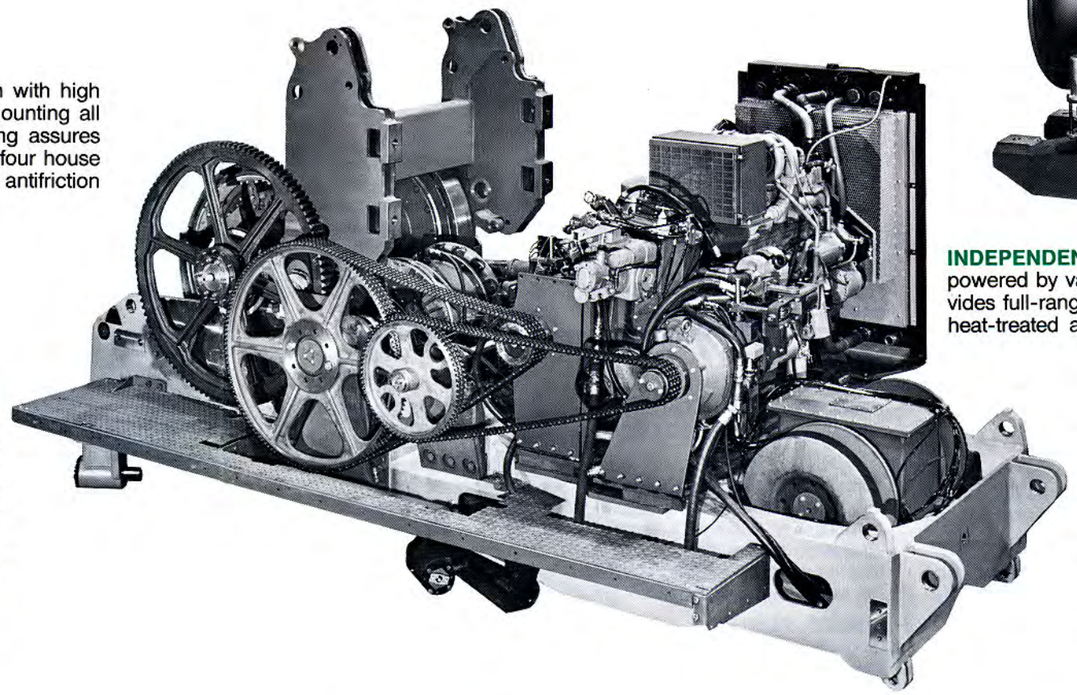
MAIN DRIVE SHAFT: Precision-machined alloy-steel shaft, antifriction-bearing-mounted for efficient operation. Shaft, chain-driven by front VICON® converter, transmits power for travel and hoisting functions. (See "Power Train", page 3.) Pinion splined to shaft's left end drives drum shaft. Large single-disc clutches at middle are air applied, spring released. One clutch is engaged for forward travel, the other engaged for backward travel. 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.

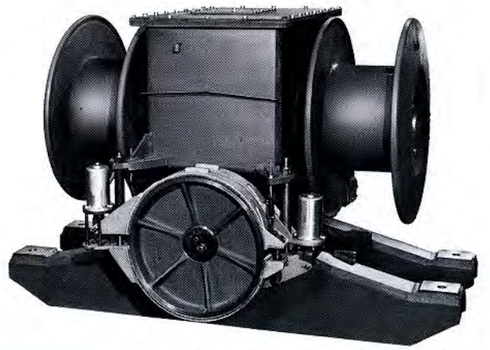
INDEPENDENT SWING SHAFT: Permits swing function to be operated independently for maximum productivity. Heat-treated, alloy-steel shaft antifriction-bearing-mounted on rotating bed. Chain-driven by rear VICON converter. Powers two double-disc clutches that smoothly control swing direction. Clutch hubs splined to shaft. Clutch spiders with integral bevel pinions, antifriction-bearing mounted. Clutches applied by air-actuated cam levers, and released by springs. Cam lever faces separated by roller bearings that minimize friction. Linings remove easily for replacement. Bevel pinions drive through gear train to ring gear on roller path. Spring-applied, air-released swing brake provided.





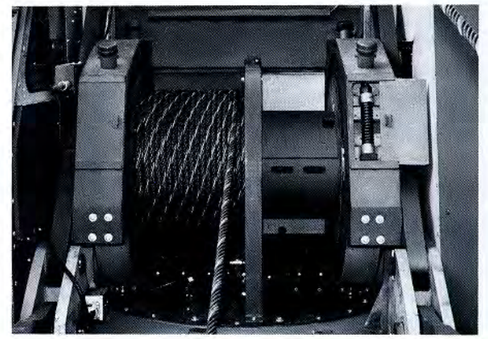
UPPERWORKS MACHINERY: Components fit compactly onto rotating bed. Right to left: boom hoist, power plant with VICON controlled torque converters and boom-hoist hydraulic pump, chain drives, independent swing shaft, main drive shaft, drum shaft, and A-frame center legs.

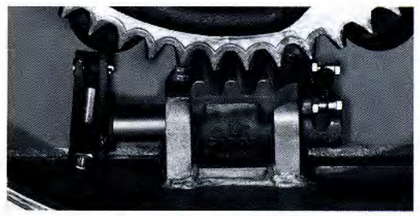




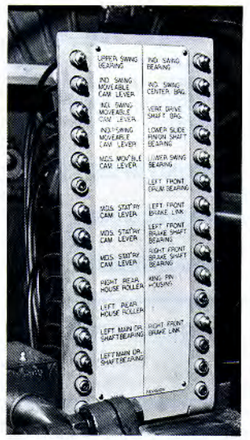
INDEPENDENT BOOM HOIST: Hydrostatic boom hoist powered by variable-displacement hydraulic motor provides full-range speed control. Dual drums mounted on heat-treated alloy-steel shaft. Driven through planetary gear reduction by bronze worm and gear. All rotating shafts antifriction bearing mounted. Gears fully enclosed and run in oil. Boom hoist main brake is external-contracting band-type, spring applied, air released. Auxiliary brake is external-contracting band-type, manually-applied from operator's station. Ratchet and pawl enclosed inside gear housing. Ratchet mounted to worm gear; pawl gravity-engaged, air-released. Drum rotation indicator standard. Boom hoist mounted in rear of rotating bed.

DRUM SHAFT ASSEMBLY: Heat-treated alloy-steel shaft, antifriction-bearing mounted for efficient operation. 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. Air-controlled, internal-expanding, band type clutches. External-contracting, band-type brakes have toggle design that maximizes efficiency. Mechanically-applied brakes are standard on liftcranes. Air-applied brakes are standard on excavators. Spring-set parking brakes are provided on machines that have air-controlled brakes.





SWING LOCK: Air-controlled, spring-loaded gear segment engages swing gear for positive locking.



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

GANTRY AND BACKHITCH: Gantry is fabricated plate with parallel box-section legs. Supported on large pins by A-frame center leg. Three-piece telescoping backhitch is pin-connected to rear of rotating bed and top of gantry. All gantry sheaves are antifriction-bearing mounted.

GANTRY LIFTING DEVICE: Electrically-powered hydraulic unit begins raising of gantry and controls lowering of gantry into cab roof.

FRONT END EQUIPMENT

NO. 39 BOOM: 30′ (9.14m) butt; 10′ (3.05m), 20′ (6.10m), and 40′ (12.19m) inserts; 40′ (12.19m) open-throat top. Rectangular box-section design. All-welded construction with inverted-angle chords and tubular lacings. Chords are 100,000 PSI (689,500 kPa) yield steel; lacings are 90,000 PSI (620,550 kPa) yield steel. All boom sections 80″ (2.03m) wide x 80″ (2.03m) deep at pin-connected joints. Each insert matched with two pair of 1¼″ (32mm) diameter, single-length pendants. Lower boom point equipped with six 24″ (610mm) diameter sheaves. Upper boom point has single 27″ (686mm) diameter sheave with rope guard for liftcrane or cheek plate for dragline. For clamshell, upper point has two 27″ (686mm) diameter sheaves with cheek plates. All sheaves antifriction-bearing mounted. Basic boom length, 70′ (21.34m); maximum length, 260′ (79.25m).

BOOM RIGGING: Twelve-part rigging is formed by a single line reeved from boom hoist drums through sheaves on gantry and equalizer. Equalizer is connected to boom point by four 1¼″ (32mm) diameter pendants. As inserts are added to lengthen boom, additional sets of pendants are added to lengthen rigging.

EQUALIZER: Fabricated steel frame supports four vertical sheaves and two horizontal sheaves, all antifriction-bearing mounted.

AUTOMATIC BOOM STOP: Standard on liftcrane, clamshell, and combination machines. When boom reaches 82° angle, it contacts push rod, automatically stopping boom hoist operation.

TELESCOPIC BOOM STOP: Standard on liftcrane. Air-cushioned telescoping tubes pinned to boom and A-frame start cushioning at 77° 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.

4½° OFFSET BOOM TOP: Optional. Increases clearance between boom and load. Standard boom top converted by adapter links at upper joints. Consult factory for capacity charts and information.

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 (689,500 kPa) 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 (689,500 kPa) 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, three-barrel tagline with 30″ (762mm) wheel standard on clamshell-equipped machines.

GENERAL

MACHINERY HOUSE: Fully encloses upperworks machinery. Sliding service doors on left side and in roof; hinged service door at left front. Power plant radiator shutter and ladder to roof provided. Catwalks and railings on both sides of cab, optional.

UNIVERSAL OPERATOR'S MODULE: Fully enclosed, insulated module mounted on right front corner of rotating bed provides comfortable environment. Large, rubber-mounted safety-glass windows offer wide-angle view. Sliding door on right side; sliding window on left side; roof window for overhead vision. Controls conveniently located and arranged for efficient operation. Signal horn standard; heater, windshield wiper, and circulating fan, optional. Elevated operator's module with duplicate controls, optional. Module is mounted forward of standard cab and provides eye-level 26′6″ (8.08m) above ground.

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

SWING SPEED: Variable, 4.90 RPM maximum.

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

GRADEABILITY: 30%.

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

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Form Adv. 7170
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